Overview of carbon pricing policies in Latin America and the Caribbean

2025

An analysis of their effectiveness and guidelines for implementation

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[1] De Miguel, C., Lorenzo, S., Ferrer, J., Gómez, J. J. and Alatorre, J. E. (2025). Economic policy and climate change: carbon pricing in Latin America and the Caribbean. *Project Documents* (LC/TS.2024/58). Economic Commission for Latin America and the Caribbean.

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Abstract

This document provides an overview of carbon pricing policies in Latin America and the Caribbean and analyses their effectiveness in reducing greenhouse gas (GHG) emissions. It reviews the characteristics and specifics of the design of carbon pricing instruments as implemented in the region, focusing on the rates charged, the sectors in which they are applied, the revenue raised and how it is used, among other aspects. It also describes progress made in applying both explicit instruments, such as carbon taxes and tradable emissions permits, and implicit ones, such as fuel taxes, the social price of carbon and the reduction of fossil fuel subsidies. The document highlights the region's **progress in using offsets and carbon credit mechanisms, while also noting the limited use made of carbon taxes.** It emphasizes the need to increase carbon tax rates to reflect the social cost of GHG emissions more accurately.

The document presents an analysis of the effectiveness of carbon pricing instruments and their relationship with other public policies, which found that **a US$ 1 increase in the carbon tax rate could be associated with a 0.5% reduction in per capita CO_2 emissions**, although its effectiveness depends on various factors (e.g. rate level, elasticities and complementary policies)**.** By granting fossil fuel subsidies, some countries are implementing a negative carbon price by default. **A meta-analysis of assessments of the effectiveness of carbon pricing found that carbon taxes reduce GHG emissions by an average of 3.87%, while emissions trading systems reduce them by 5.49%.** Despite the effectiveness of carbon pricing instruments, they need to be coordinated and linked with other relevant national and sectoral policies, to avoid compromising climate objectives.

The document notes that**, in the five Latin American and Caribbean countries that apply a carbon tax, for every US$ 1 in carbon tax revenue collected between 2017 and 2024, US$ 22 was spent on explicit fossil fuel subsidies**. A comparison of data on climate finance and fossil fuel subsidies found that **in Latin America and the Caribbean, for every dollar invested in climate action between 2021 and 2022, another dollar went on explicit fossil fuel subsidies.** This calls for these subsidies to be reviewed and gradually phased out.

Lastly, the document includes an analysis of the technical, operational, political and prospective (TOPP) capabilities that need to be addressed to improve the efficacy of carbon pricing and its implementation, and concludes with 10 guidelines for improving the design and implementation of carbon pricing instruments.

Introduction

The planet continues to warm. In 2024, the global annual mean surface temperature was 1.55 °C ± 0.13 °C above the 1850–1900 average, making it the warmest year on record (World Meteorological Organization [WMO], 2025). Despite national commitments to reduce GHG emissions, efforts remain insufficient. Achieving the Paris Agreement target of limiting the temperature increase to 1.5 °C requires a reduction in GHG emissions of 43% by 2030 and 65% by 2035 (United Nations Framework Convention on Climate Change [UNFCCC], 2023). This explains the continuing need to accelerate climate action and take advantage of the new cycle of nationally determined contributions and thus make more ambitious commitments to reduce emissions.

The emissions reduction needed to meet the Paris Agreement targets cannot be achieved without major changes in the productive structure, a commitment to sectors that are more carbon-efficient and galvanize the economy, together with clean energy and urban mobility systems, improvements in land use and more environmentally friendly distribution patterns and consumption behaviour. All this requires changes in both public and private investment to align with national (and global) climate goals and to facilitate the transformation of low carbon sectors and activities. This will enable countries to fulfil their nationally determined contributions and will put them on track to achieve carbon neutrality by 2050 at the latest. A sine qua non for moving in this direction requires changing relative prices in favour of the goods and services that are essential for this transformation.

Carbon prices are intended to trigger the changes needed in investment, production and consumption structures and to induce the type of technological progress that can lower the costs of reducing emissions in the future (Carbon Pricing Leadership Coalition [CPLC], 2017). Economic theory identifies various ways to introduce a carbon price. It can be done explicitly through carbon taxes or emissions trading systems (World Bank, 2025), or implicitly, by incorporating shadow prices (the social price of carbon) into financial and regulatory instruments and in investment evaluation processes to encourage low carbon activities (De Miguel et al., 2025; Economic Commission for Latin America and the Caribbean [ECLAC], 2023). Similarly, taxing specific products with uses linked directly to GHG emissions, such as fuels, is another implicit way of taxing carbon (United Nations, 2021). Reducing fossil fuel subsidies has an equivalent effect and is another fundamental step towards carbon pricing by eliminating existing distortions that encourage emissions.

This document presents a regional overview of carbon pricing policies, complementing and updating the results of the study "Economic policy and climate change: carbon pricing in Latin America and the Caribbean," published by ECLAC in 2025.[2] Section I reviews the instruments applied in the region, encompassing carbon taxes, tradable emissions permits, the social price of carbon and fuel taxes. Section II analyses the effectiveness of carbon taxes, reviewing the impact of related policies, such as fossil fuel subsidies, on the effectiveness of the tax. This section also uses an econometric model to make an empirical analysis of the environmental effectiveness of carbon taxes as applied in the region. Section III discusses how governments can make carbon pricing more effective by strengthening the TOPP capabilities of the institutions tasked with defining and implementing it. Section IV proposes 10 guidelines for improving the design and implementation of carbon pricing policies, and section V sets forth conclusions.

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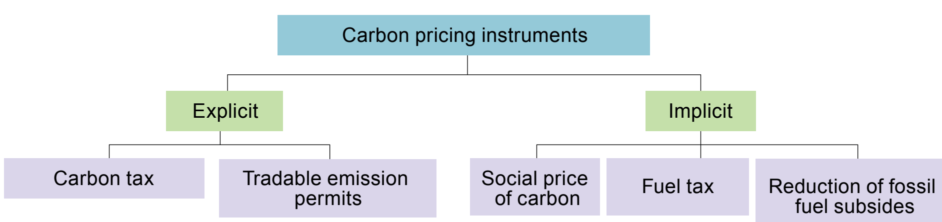
[2] De Miguel, C., Lorenzo, S., Ferrer, J., Gómez, J. J. and Alatorre, J. E. (2025). Economic policy and climate change: carbon pricing in Latin America and the Caribbean. *Project Documents* (LC/TS.2024/58). Economic Commission for Latin America and the Caribbean.

I. Carbon pricing policies in Latin America and the Caribbean

Carbon pricing can be introduced as part of public policy through various alternatives, the validity and appropriateness of which depends, in each case, on the interests of decision makers, the policy to be implemented, and national and international circumstances. Although there may be different ways to classify carbon pricing instruments, the literature often distinguishes between explicit and implicit carbon prices (see diagram 1). While this document reviews each of the explicit and implicit carbon pricing instruments, it focuses on carbon taxes, tradable emissions permits, the social price of carbon, fuel taxes and fossil fuel subsidies.

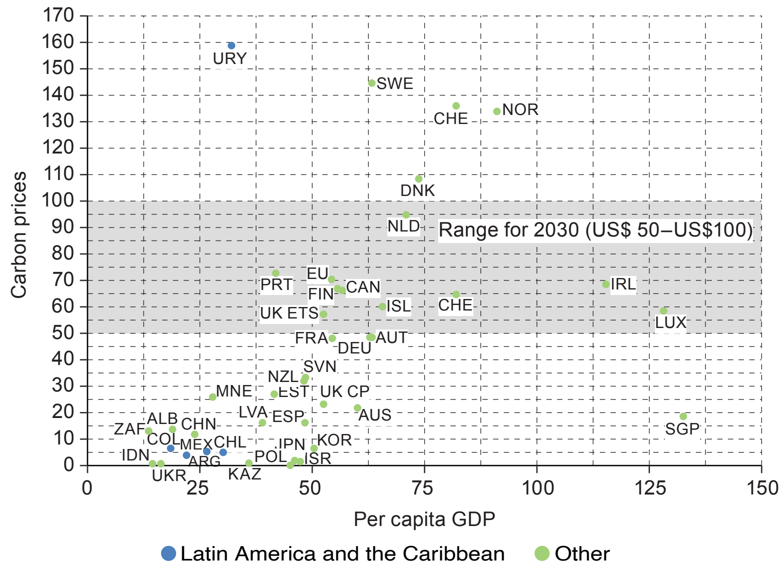
Diagram 1
Carbon pricing instruments for climate policy analysis



Source: Prepared by the authors.

A major challenge in implementing carbon pricing is how to define the price or rate to be charged. According to the Intergovernmental Panel on Climate Change (IPCC), to limit the temperature increase to 2 °C, carbon prices in 2030 should be between US\$ 60 per ton of carbon dioxide (tCO_2eq) and US\$ 120/tCO_2eq; and, to restrict the increase to 1.5 °C, they should be between US\$ 170/tCO_2eq and US\$ 290/tCO_2eq (Intergovernmental Panel on Climate Change [IPCC], 2022). Nonetheless, the High-Level Commission on Carbon Prices considers that the explicit carbon price compatible with the Paris Agreement targets should already be in the range of US\$ 40/tCO_2eq to US\$ 80/tCO_2eq and should be between US\$ 50/tCO_2eq and US\$ 100/tCO_2eq by 2030 (Carbon Pricing Leadership Coalition [CPLC], 2017). Although approximately 80 carbon pricing instruments are being implemented around the world (World Bank, 2025b), few are in the latter range and, with the exception of Uruguay, they are all applied in high-income countries (see figure 1).

Figure 1
World (selected economies): carbon prices and per capita GDP, 2025
(Dollars per ton of CO_2 and thousands of dollars at 2021 prices)



Source: Prepared by the authors, on the basis of World Bank. (2025). *State and Trends of Carbon Pricing Dashboard*. https://carbonpricingdashboard.worldbank.org; (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators.
Note: The price range of between US$ 50–US$ 100 /tCO_2, differentiated in the figure by the shaded area represents the carbon prices suggested by the High-Level Commission on Carbon Prices for 2030 in line with Paris Agreement targets.

Carbon pricing policies in Latin America and the Caribbean date back to 2014, when several countries introduced new taxes to discourage activities that generated GHG emissions as part of tax reforms. Measures of this type, initially implemented in Mexico, gained momentum after the adoption of the Paris Agreement and the GHG emissions reduction commitments that countries made as they submitted their nationally determined contributions. In addition to interest in decarbonizing economies, the application of carbon pricing also hastens technological change that helps to modernize production systems and make processes more emissions-efficient. A third motivation for the use of carbon pricing is to generate tax revenue in contexts of resource scarcity, whether or not it is allocated to climate objectives.

A. Carbon tax

The carbon tax seeks to discourage consumption and investment decisions that contribute to greenhouse gas emission. In practice, this policy instrument works by defining a carbon tax rate, along with the tax base and the taxable event.[3] Those liable for the tax must decide whether to reduce their emissions (by changing their energy inputs or process technology, or by incorporating emissions abatement and capture mechanisms), and thus avoiding the tax; or, alternatively, pay the tax at the legally specified rate. In other words, the instrument does not guarantee that an emissions reduction target set by the authority will be attained; instead it is a process of constant monitoring and price adjustment that depends on the response of the regulated parties.

Despite its many advantages in discouraging and modifying investment decisions that generate GHG emissions, the carbon tax in Latin America and the Caribbean is still only implemented by five countries (Argentina, Chile, Colombia, Mexico and Uruguay). Across the region, the design of these taxes display both similarities and differences. The main characteristics of those applied in the region are described below.

[3] Definition of the taxpayer, the destination of the revenue, the institutions responsible for collection and the frequency of payment are other relevant elements in the design of the carbon tax.

One of the main reasons for their limited adoption is the political and social complexity of introducing them. While higher-income population groups would pay more with this type of tax in absolute terms, the lower-income quintiles would have to allocate a larger share of their income to paying it, whether directly or indirectly. This means that the mere announcement of its introduction triggers social reactions and political consequences that few governments are willing to experience. However, the tax has a better chance of success if it is introduced gradually but with certainty, as part of a package of policies that promote substitution of the goods and services mainly affected, or the creation of alternatives to them, along with measures to mitigate the effects of the tax and compensate the most vulnerable. This needs to be backed up by a media campaign highlighting the virtues of this type of measure for general well-being.

1. Carbon tax in Mexico

Mexico is the only Latin American country that has three carbon pricing instruments operating simultaneously: an emissions trading system (ETS), a federal carbon tax and a set of subnational carbon taxes applied in specific states. Some of the characteristics of the carbon tax are presented below.

Description of the tax

The carbon tax in Mexico is regulated by the 2013 amendment of the Special Tax on Production and Services Act. In 2014, Mexico started to implement a variant of the Special Tax on Production and Services (IEPS), which is levied on the carbon content of fossil fuels. In fact, it does not tax the total carbon content of fuels, but the additional CO_2 emissions content relative to natural gas (World Bank, 2021). In March 2022, the Ministry of Finance and Public Credit of Mexico announced the exemption of gasoline and diesel from the carbon tax as a fiscal stimulus for both fuels lasting until 31 December 2024. In 2025 this exemption, as a fiscal stimulus policy, has been eliminated, in order to maintain financial stability and increase tax revenue. Accordingly, consumers now have to pay IEPS on gasoline and diesel in full.

Included and excluded sectors and activities

The carbon tax applies to the production, import and sale of fossil fuels (propane, butane, gasoline and aviation gasoline (*gasavión*), jet fuel *(turbosina)* and kerosene, diesel, fuel oil, petroleum coke, coal coke, mineral coal and other fossil fuels) intended for combustion processes, except for natural gas and fuels not used in combustion, such as paraffins (Office of the President of Mexico, 2021).

Point of regulation

The point of regulation refers to where, in the production chain, emissions, or inputs related to the emissions-generating production process, are controlled. In general, the point of regulation depends on the type of carbon pricing instrument being implemented and its ease of measurement and control. The earlier in the chain, the easier it is to regulate the input but the harder it is to identify the final emissions source (the facility). The further down the production chain, the more the focus should be on regulating emissions and the easier it is to regulate the source (Pizarro Gariazzo, 2021). As the Mexican carbon tax has an upstream point of regulation, it applies to activities or processes that occur in the early stages of a supply chain.

Rate and coverage

According to the Special Tax on Production and Services Act, the carbon tax rate in Mexico varies by type of fuel, on the basis of its carbon content, since some fuels have a higher carbon content than others. In December of each year, the Ministry of Finance and Public Credit updates the quota that determines the value of the carbon tax to be applied from the start of the following year, taking the national consumer price index into account. Pursuant to the agreement published in the Official Journal of the Federation on 27 December 2024, the update factor applicable to fossil fuels is 1.0454. Table 1 shows the fossil fuel tax rates that have been in force in Mexico since 1 January 2025.

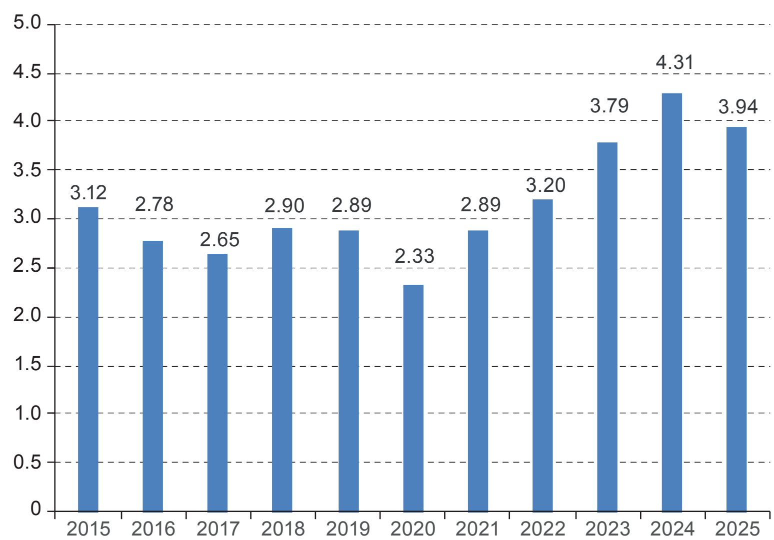
As a result, the carbon tax ranges between US$ 1.00 and US$ 3.94 per tCO_2eq in 2025, covering roughly 13% of all GHG emissions in Mexico (World Bank, 2025a)— a modest price compared to the international prices suggested to be consistent with the Paris Agreement targets. Figure 2 shows how the carbon tax rate has evolved in Mexico between 2015 and 2025.

Table 1
Mexico: tax rates applicable to fossil fuels under the Special Tax on Production and Services Act, 2025
(Mexican pesos)

Fossil fuels	Tax
Propane *(Per litre)*	0.10
Butane *(Per litre)*	0.13
Gasoline and jet fuel *(Per litre)*	0.17
Jet fuel and other kerosene *(Per litre)*	0.20
Diesel *(Per litre)*	0.21
Combustible oil *(Per litre)*	0.22
Petroleum coke *(Per ton)*	25.72
Coal coke *(Per ton)*	60.30
Coal *(Per ton)*	45.40
Other fossil fuels *(Per ton of carbon content)*	65.63

Source: Ministry of Finance and Public Credit of Mexico. (2024, 27 December). Acuerdo 180/2024. Acuerdo por el que se actualizan las cuotas que se especifican en materia del impuesto especial sobre producción y servicios para 2025. *Diario Oficial de la Federación*.

Figure 2
Mexico: carbon tax rate, 2015–2025
(Dollars per ton of carbon)



Source: Prepared by the authors, on the basis of World Bank. (2025). *State and Trends of Carbon Pricing Dashboard*. https://carbonpricingdashboard.worldbank.org/.

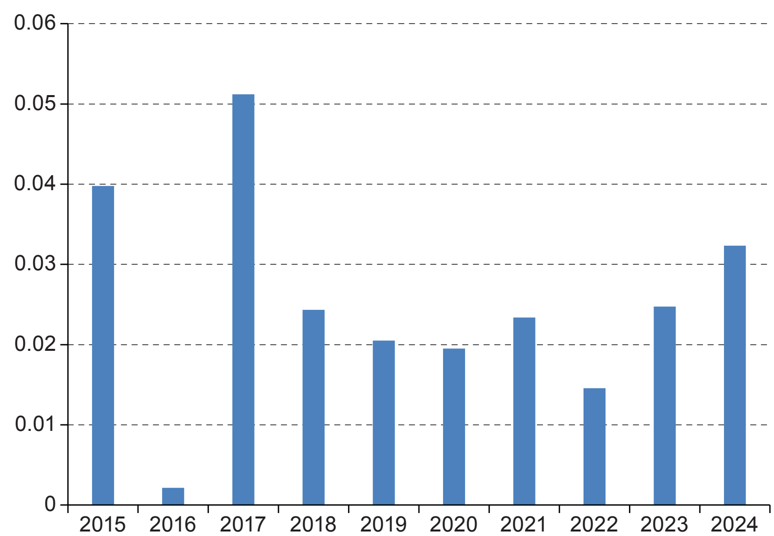
Offsets

In 2017, Mexico defined the procedure for offsetting carbon tax payments through the issuance of certified emissions reductions endorsed by the clean development mechanism under the United Nations Framework Convention on Climate Change. This regulation allowed up to 20% of the total tax liability to be offset for projects developed in Mexico (Ministry of Finance and Public Credit of Mexico and Secretariat of the Environment and Natural Resources of Mexico, 2017). In 2019, this limit was abolished, so that currently the entire tax payment can be offset through certified emissions reductions (Mexican Carbon Platform, 2023). However, owing to the rules governing the operation of this offsetting mechanism, this has not happened in practice. The reason is that, when purchasing offsetting units to reduce the carbon tax payment, the monetary value of the certified emissions reductions is deducted instead of the amount (in tons) of carbon reduced. This generates insufficient economic incentives for purchasing certified emissions reductions (Mexican Carbon Platform, 2023).

Revenue collection and use

The carbon tax raised just over US$ 2.936 billion in Mexico between 2017 and 2024. As this revenue is not earmarked, it enters the nation's general budget. In 2024, the carbon tax generated fiscal revenue of US$ 598.9 million, representing a 35% increase over the previous year's level; however, it accounted for just 0.22% of total tax revenues (Ministry of Finance and Public Credit of Mexico, 2024) and 0.03% of GDP (see figure 3). The revenue-generating capacity of the carbon tax has diminished significantly in Mexico, owing partly to the tax rate and to its sensitivity to the country's economic dynamics.

Figure 3
Mexico: carbon tax revenue, 2015–2024
(Percentages of GDP)



Source: Prepared by the authors, on the basis of Ministry of Finance and Public Credit of Mexico and National Institute of Statistics and Geography.

2. Carbon tax in Chile

In Chile, the carbon tax was introduced as part of the green tax included in the 2014 tax reform, under Act No. 20.780. This imposed a levy on local pollutant emissions (such as particulate matter, nitrogen oxides (NOx) and sulfur dioxide (SO_2)), and of global pollutant emissions (such as CO_2); implementation began in 2017. Some of the characteristics of the carbon tax are described below.

Description of the tax

Following adoption of the tax law modernization (Act No. 21.210) in 2020, the carbon tax in Chile became an annual tax on CO_2 emissions generated by fixed sources that, individually or collectively, emit at least 25,000 tons of CO_2 per year.

Included and excluded sectors and activities

The carbon tax in Chile currently applies to establishments (fixed sources) that attain or exceed the annual emissions threshold of 25,000 tons of CO_2, notably in the electricity generation, industry, and mining sectors. It does not apply to emissions sources that operate on the basis of nonconventional renewable generation sourced primarily from biomass.

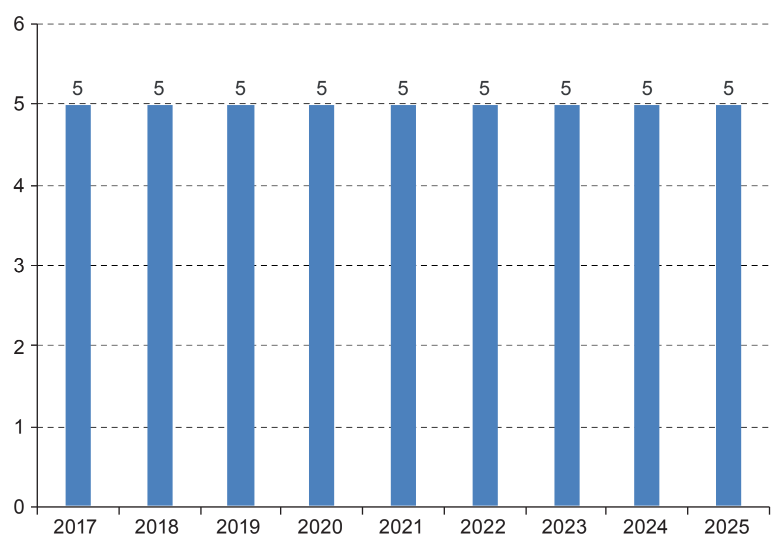
Point of regulation

Chile's carbon tax has a downstream point of regulation. The design of the tax is based on the direct emissions approach; in other words it taxes the actual emissions released into the atmosphere by the facilities subject to the tax, rather than the carbon content of the fossil fuels used.

Rate and coverage

Chile's carbon tax was set at a rate of US$ 5 per ton of CO_2 emitted, based on the social cost of carbon, which had been estimated by the Ministry of Social Development and Family to evaluate public investment projects since 2013. It covers about 55% of Chile's GHG emissions (World Bank, 2025a). The tax was specified in Act No. 20.780 as a fixed amount, without the possibility of annual adjustment. This puts it well below the social cost of carbon used to evaluate public investment projects financed from the national budget. Figure 4 shows how the carbon tax rate in Chile has evolved since its implementation in 2017.

Figure 4
Chile: carbon tax rate, 2017–2025
(Dollars per ton of carbon)



Source: Prepared by the authors, on the basis of World Bank. (2025). *State and Trends of Carbon Pricing Dashboard*. https://carbonpricingdashboard.worldbank.org/.

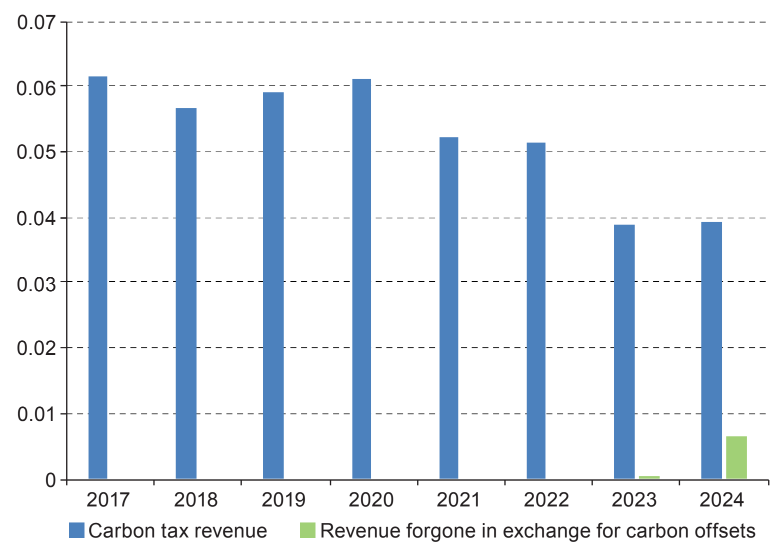
Offsets

Since 2023, Chile has allowed taxpayers to offset all or part of their taxable emissions by implementing CO_2 emissions reduction projects in the country, provided that these reductions are additional, measurable, verifiable, and permanent (Ministry of the Environment of Chile, 2021). This enables taxpayers to choose between paying taxes or offsetting them; it opens a window of opportunity to finance emissions reduction projects and encourages the involvement and use of private sector resources by expanding the range of mitigation alternatives. According to the Ministry of Economy, Development and Tourism and the Ministry of the Environment of Chile, the country's emissions trading system managed to reduce 4.4 million tons of CO_2 in 2024, thereby helping to mobilize more than US$ 22 million for climate action.

Revenue collection and use

The carbon tax raised just over US$ 1.109 billion in Chile between 2017 and 2024 (Ministry of Energy of Chile, 2025). In 2024, the tax yielded approximately US$ 200 million, representing 0.34% of the country's total tax revenue and 0.04% of GDP for that year (see figure 5). The 4.4 million tons of CO_2 that were offset in 2024 translated into more than US$ 22 million in carbon tax revenue that would otherwise have been collected (green bar in figure 5). The carbon tax yielded 8.2% less revenue in 2024 than in 2023. Revenue from the carbon tax in Chile enters the national budget and, under constitutional rules, its use is not earmarked for any specific purpose.

Figure 5
Chile: carbon tax revenue, 2017–2024
(Percentages of GDP)



Source: Prepared by the authors, on the basis of Ministry of Finance and Public Credit of Mexico.

3. Carbon tax in Colombia

Colombia introduced the carbon tax as one of its economic and environmental policy instruments to fulfil its GHG reduction commitments. It was regulated by Act No. 1819 of 2016 (Structural Tax Reform), and implementation began in 2017. It was subsequently amended by the December 2022 tax reform (Act No. 2277 of 2022). Some of the characteristics of the carbon tax are described below.

Description of the tax

In Colombia, the national carbon tax is a levy on the carbon content of all fossil fuels. The taxable event is the first activity in the supply chain for domestic sale, import or self-consumption.

Included and excluded sectors and activities

The carbon tax in Colombia is levied on the carbon content of all fossil fuels, including all petroleum derivatives and all types of fossil gas used for energy purposes, provided they are used for combustion. In the case of coal, the tax is not levied on coking coal, because this type of coal is used mainly in steel production and not for direct combustion, so it is not considered a fossil fuel under the carbon tax legislation. In the case of liquefied petroleum gas (LPG), the tax only applies to sales to industrial users, while for natural gas, it only applies to sales to the petrochemical and hydrocarbon refining industries (Ministry of Environment and Sustainable Development of Colombia, 2024).[4]

Point of regulation

Colombia's carbon tax has an upstream point of point of regulation, which means that it is based on the carbon content of the fuels used.

Rate and coverage

Colombia's carbon tax was set in 2017 at 15,000 Colombian pesos per tCO_2eq (equivalent to US$ 5.00/tCO_2eq at the time). The rate is indexed to inflation to maintain the price signal, through an annual adjustment for inflation plus one point until the tax rate is equivalent to three Tax Value Units (US$ 35.80 in 2025).[5] Resolution No. 000008 of 2025 of the Directorate of National Taxes and Customs updated the carbon tax rates nationwide. The unit values to be charged by fuel type in 2025 are shown in table 2.

Table 2
Colombia: carbon tax rates for selected fossil fuels, 2025
(Colombian pesos)

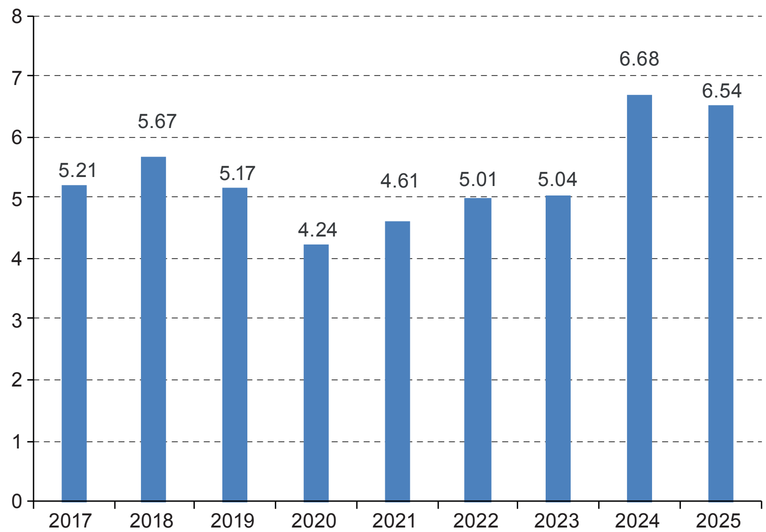
Fossil fuel	Tax
Coal[a] *(Per ton)*	69 787.61
Fuel oil *(Per gallon)*	318.10
Jet fuel *(Per gallon)*	269.98
Kerosene *(Per gallon)*	263.30
Liquefied petroleum gas *(Per gallon)*	179.10
Diesel (ACPM) *(Per gallon)*	223.69
Gasoline *(Per gallon)*	197.93
Natural gas *(Per cubic metre)*	42.16

Source: Directorate of National Taxes and Customs. (2025). *Resolución número 000008. Por la cual se ajustan las tarifas del impuesto nacional a la gasolina y al ACPM, y del impuesto nacional al carbono*.
[a] In the case of coal, the tax will first be levied in 2025, and only 25% of the rate will be charged. This percentage will be raised incrementally to reach 100% in 2028.

Consequently, for 2025, the tax rate per ton of carbon equivalent was set at 27,399 Colombian pesos (US$6.50/$tCO_2eq$),[6] which covers roughly 20% of Colombia's GHGs (World Bank, 2025a). Figure 6 shows the evolution of the carbon tax rate since its implementation in 2017.

[4] Under the law, fuel alcohol (ethanol), biodiesel produced from vegetable products, fuels sold in the departments of Guainía, Vaupés and Amazonas, and the sale of marine diesel and refuelling for international shipments are also exempt.
[5] The Tax Value Unit is the measure of value used to adjust the amounts referenced in provisions on taxes and tax obligations in Colombia.
[6] Resolution No. 000007 of 31 January 2024 (Directorate of National Taxes and Customs, 2024).

Figure 6
Colombia: carbon tax rate, 2017–2025
(Dollars per ton of carbon)



Source: Prepared by the authors, on the basis of World Bank. (2025). State and Trends of Carbon Pricing Dashboard. https://carbonpricingdashboard.worldbank.org/.

Offsets

Colombia has a non-causation mechanism that was created alongside the tax and regulated through Decree No. 926 of 2017. This gives exemption from the carbon tax in exchange for offsetting GHGs that would be generated by burning taxed fossil fuels that will be sold, imported or consumed. Thie decree only allows offsets with carbon credits issued by national mitigation projects, retroactive for up to five years. The 2022 tax reform in Colombia limited offsets to 50% of the tax liability.

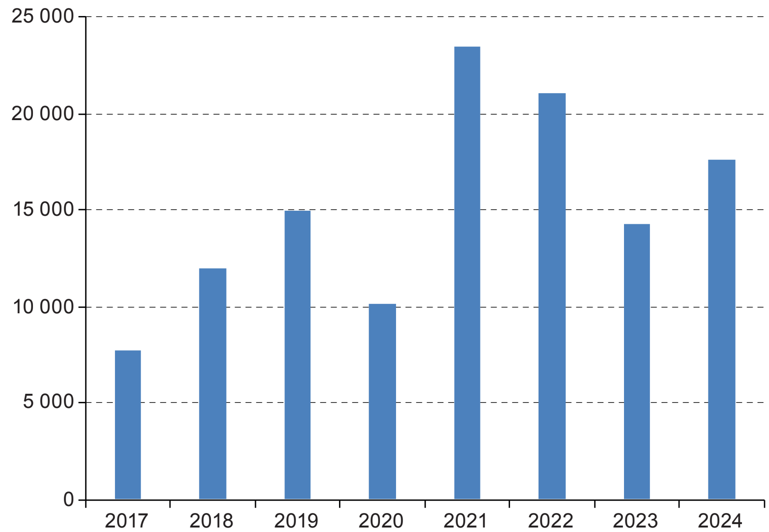
Data from the Ministry of Environment and Sustainable Development of Colombia show that the carbon tax non-causation mechanism in Colombia allowed 121,000 megatons of CO_2eq to be offset between 2017 and 2024 (see figure 7), of which 77.7% came from agriculture, forestry and other land use projects and from reducing emissions from deforestation and forest degradation, 17.3% from initiatives developed in the energy sector, and 5.1% from initiatives in the industrial, waste and transportation sectors (Ministry of Environment and Sustainable Development of Colombia, 2024). These generated resources of US$ 315.3 million.

Revenue collection and use

The revenue obtained from the carbon tax amounted to US$ 135.5 million in 2024, 4% less than in 2023, and representing 0.21% of total tax revenue and just over 0.03% of GDP (see figure 8).

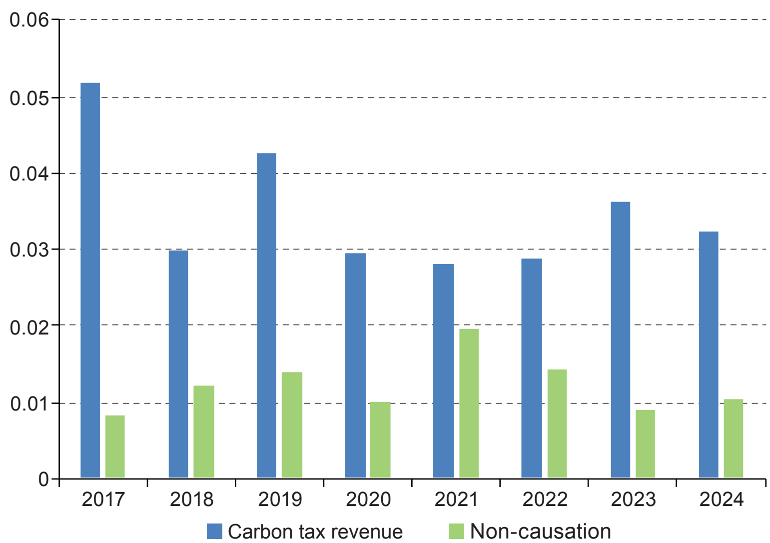
In Colombia, 80% of the revenue obtained from the carbon tax is used to finance or invest (or both) in environmental projects targeting sustainability, restoration and payments for environmental services, among other things. This proportion of the revenue is administered by *Fondo para la Vida* (Fund for Life). The other 20% of the revenue is administered by *Fondo Colombia en Paz* (Colombia in Peace Fund) and is used to finance projects under the National Comprehensive Programme for the Substitution of Illicit Crops.

Figure 7
Colombia: CO_2eq emissions offset under national carbon tax non-causation mechanism, 2017–2024
(Megatons of CO_2eq)



Source: Prepared by the authors, on the basis of data from the Ministry of Environment and Sustainable Development of Colombia.

Figure 8
Colombia: carbon tax revenue and projected non-causation, 2017–2024
(Percentages of GDP)



Source: Prepared by the authors, on the basis of data from the Directorate of National Taxes and Customs and the Ministry of Environment and Sustainable Development of Colombia.
Note: The non-causation of the tax was projected using a price of 10,000 Colombian pesos per tCO_2eq paid (Ministry of Environment and Sustainable Development of Colombia).

4. Carbon tax in Argentina

The carbon tax was introduced into Argentina's tax legislation through Act No. 27.430 of 2017 as part of that year's tax reform. The reform introduced the liquid fuel tax and CO_2 tax, replacing the existing tax on liquid fuels and natural gas. The CO_2 tax was implemented as from 2018. Some of the characteristics of the tax are described below.

Description of the tax

The CO_2 tax in Argentina is designed as an excise duty (a fixed amount per unit of measure) that seeks to reflect the environmental impact of liquid fuel use, by considering the amount of CO_2 emitted and decoupling the tax burden per litre from potential variations in the domestic price of each of the taxed products (Congressional Budget Office of Argentina, 2018).

Included and excluded sectors and activities

The Argentine carbon tax is levied on a variety of liquid fuels and also on solid fuels such as coal and petroleum coke. It is applied in the energy, industry, transportation, extractive mining, agriculture, forestry and fishing sectors. Biofuels in their pure state are exempt from the tax. Also exempt are transfers of taxed fuels destined for export; fuel supplies for vessels engaged in international traffic or transport, for aircraft on international flights or for fishing vessels; use as raw material in certain chemical and petrochemical processes; in the case of fuel oil, when used as fuel for coastal shipping; and the definitive import of taxable products exempted by destination, when used by their importers in certain chemical, petrochemical or industrial processes specified in the regulations (Salassa Boix, 2020).

Point of regulation

Argentina's carbon tax has an upstream point of regulation and is therefore associated with CO_2 emissions generated by the burning of the taxed fuels.

Rate and coverage

The CO_2 tax rate in Argentina is calculated on the basis of fixed peso amounts for each product as shown in table 3. The amounts vary between 0.41 and 0.56 Argentine pesos per litre or kg, depending on the type of fuel. The law creating the tax stipulated that the fixed amounts used to calculate the tax would be updated quarterly in line with variations in the consumer price index. The national government has the power to increase the tax amounts by up to 25% when advised to do so by environmental and/or energy policies (Ministry of Economic Affairs of Argentina, 2025).

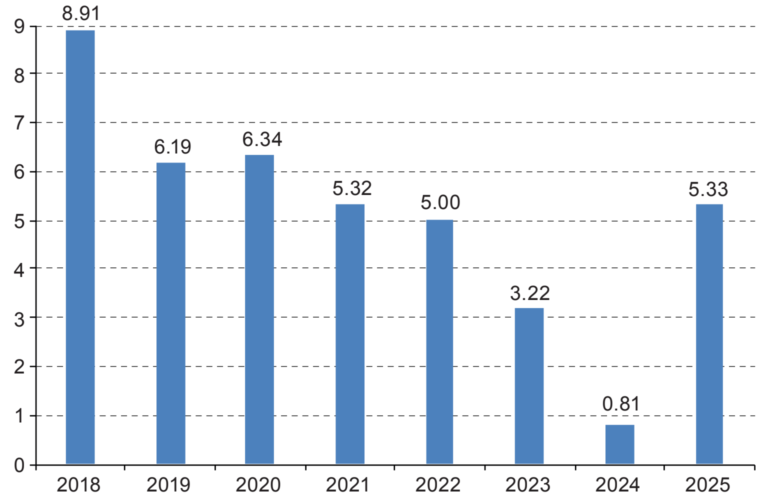
Table 3
Argentina: CO_2 tax rates for selected fossil fuels and derivatives
(Argentine pesos)

Fossil fuel or derivative	Tax
Unleaded gasoline of research octane number (RON) up to 92 RON *(Per litre)*	0.41
Unleaded gasoline, of over 92 RON *(Per litre)*	0.41
Virgin gasoline *(Per litre)*	0.41
Natural or pyrolysis gasoline *(Per litre)*	0.41
Solvent *(Per litre)*	0.41
Turpentine *(Per litre)*	0.41
Gas oil *(Per litre)*	0.47
Diesel oil *(Per litre)*	0.47
Kerosene *(Per litre)*	0.47
Fuel oil *(Per litre)*	0.52
Petroleum coke *(Per kg)*	0.56
Coal *(Per kg)*	0.43

Source: Prepared by the authors, on the basis of National Congress of Argentina. (2017, 29 December). Impuesto a las ganancias. Ley 27.430. *Boletín Oficial de la República Argentina*. (33.781).

Consequently, the carbon tax in Argentina is roughly US$ 5.30/tCO_2 and covers about 38% of the country's GHGs (World Bank, 2025a). Figure 9 shows the carbon tax rate in Argentina since this economic instrument was first applied in 2018.

Figure 9
Argentina: carbon tax rate, 2018–2025
(Dollars per ton of carbon)



Source: Prepared by the authors, on the basis of World Bank. (2025). State and Trends of Carbon Pricing Dashboard. https://carbonpricingdashboard.worldbank.org/.

Offsets

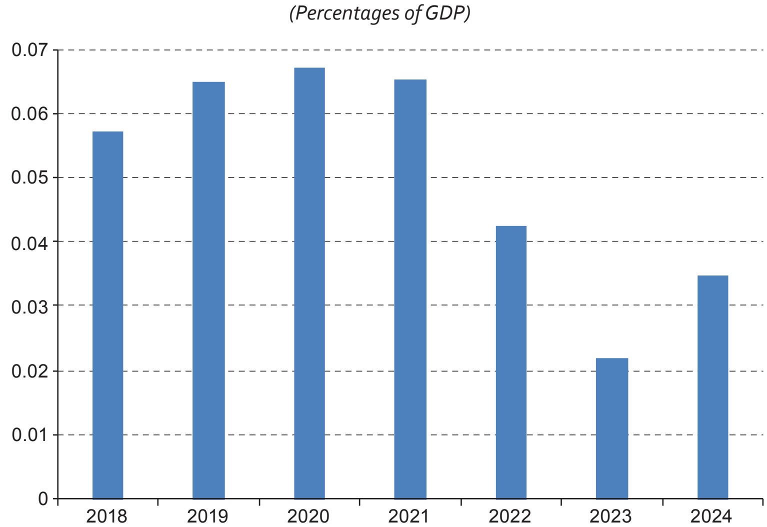
In Argentina, the carbon tax has not regulated the possibility of offsetting tax payments through certified emissions reductions in respect of projects developed under the clean development mechanism of the United Nations Framework Convention on Climate Change, or projects of other types.

Revenue collection and use

The revenue collected from the CO_2 tax in Argentina is distributed among the different levels of government and, in some cases, a specific appropriation of the funds raised is also decided upon, pursuant to the provisions of the general distribution and special distribution regimes.

In Argentina, the carbon tax generated revenue of US$ 222.3 million in 2024, which was 57% more than in 2023 and represented 0.15% of total tax revenue and just over 0.03% of GDP (see figure 10). The lowering of the tax rate, resulting from updates, has meant a significant reduction in revenue.

Figure 10
Argentina: carbon tax revenue, 2018–2024
(Percentages of GDP)



Source: Prepared by the authors, on the basis of data from the National Directorate for Tax Research and Analysis.

5. Carbon tax in Uruguay

Uruguay's carbon tax is the most recently implemented nationally in the region. This new tax was regulated through Act No. 19.996 of 2021 as part of that year's tax reform and aims to contribute to the reduction of GHG emissions from the burning of fossil fuels.

Description of the tax

Implementation of the carbon tax in Uruguay began in January 2022, after a new taxable event, based on CO_2 emissions, was introduced in the IMESI (specific domestic tax).

Included and excluded sectors and activities

The carbon tax in Uruguay is levied on the first sale or transaction made by fuel manufacturers and importers (super and premium 97 gasoline), per tCO_2 emitted. Direct sales of fuel alcohol by the manufacturer to industrial firms that produce gasoline for use as a raw material are exempt from the tax.

Point of regulation

The carbon tax in Uruguay has an upstream point of regulation, so it is levied on the carbon content of the fuels subject to the tax.

Rate and coverage

The law authorizes the government to update the specific domestic tax on fuels each year, by an amount up to the variation in the consumer price index. Through Decree No. 372/024 of 2024, the Ministry of Economy and Finance, together with the Ministry of Energy and Mining, updated the tax per tCO_2 applicable to gasolines levied by the specific domestic tax, as shown in table 4.

Table 4
Uruguay: carbon tax rates for selected fuels, 2025
(Uruguayan pesos)

Fuel	Tax/tCO_2	Tax per litre of fuel
Gasoline (Super 95) 30-S	6 704	13.61
Gasoline (Premium 97) 30-S	6 704	13.74

Source: Prepared by the authors, on the basis of Ministry of Economy and Finance and Ministry of Industry, Energy and Mining. (2024, 31 December). Decreto 372/024. *Diario Oficial*. (31.588).

Taking into account the January 2025 updated values of the specific domestic tax for gasoline, the carbon tax in Uruguay corresponds to US$ 158.80/tCO_2 and covers just 4% of the country's GHGs (World Bank, 2025a). Figure 11 shows the carbon tax rate in Uruguay since this economic instrument was first applied in 2022.

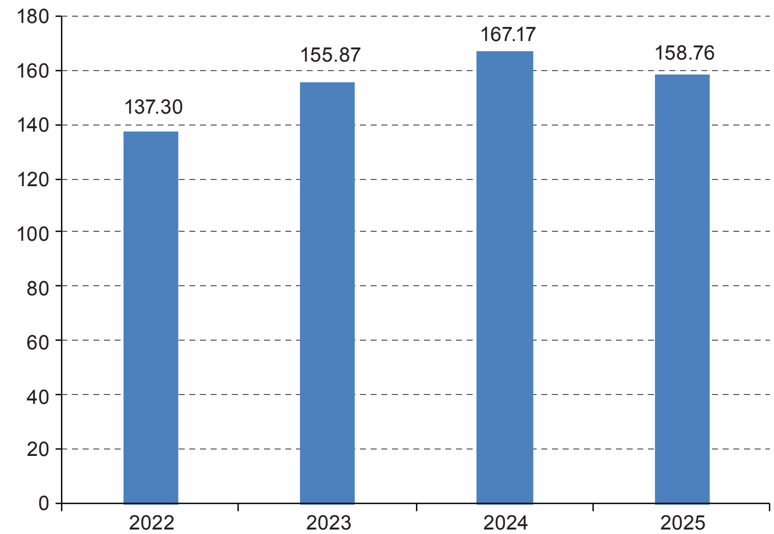
Offsets

Uruguay does not allow carbon tax payments to be offset through certified emissions reductions, which means that those subject to the tax have to pay it in full.

Revenue collection and use

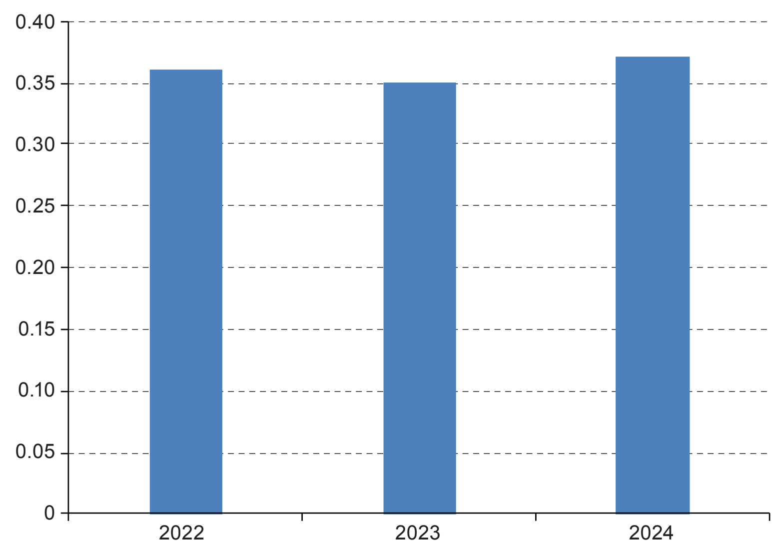
The laws authorize the government to distribute the revenue collected from the carbon tax to finance policies that promote GHG reduction, sustainable transport and the adaptation of ecosystems and production systems to climate change. The government may also create a special fund for this purpose. In 2024, the carbon tax generated revenue of US$ 294.5 million, representing a 9% increase over fiscal year 2023. The amount collected was equivalent to 0.37% of GDP (see figure 12) and 1.8% of the country's total tax revenue.

Figure 11
Uruguay: carbon tax rate, 2022–2025
(Dollars per ton of carbon)



Source: Prepared by the authors, on the basis of World Bank. (2025). *State and Trends of Carbon Pricing Dashboard*. https://carbonpricingdashboard.worldbank.org/.

Figure 12
Uruguay: carbon tax revenue, 2022–2024
(Percentages of GDP)



Source: Prepared by the authors, on the basis of data from the Central Bank of Uruguay.

6. Subnational carbon taxes

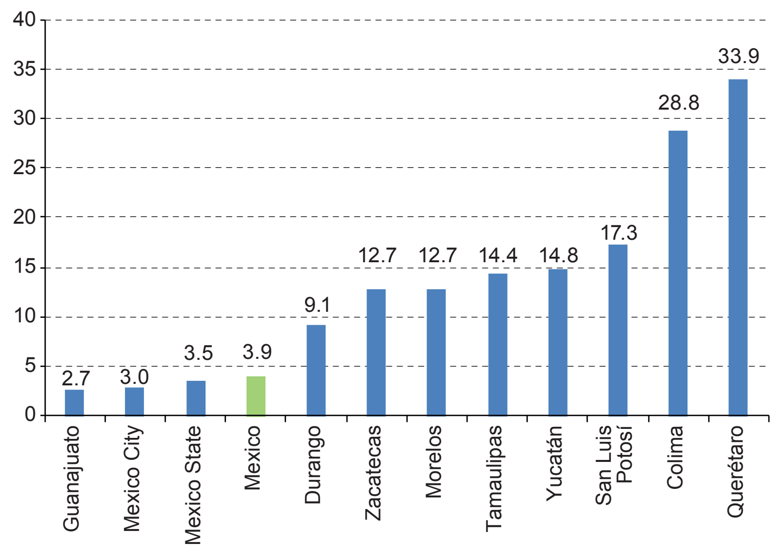
Subnational carbon taxes in Mexico arose from the conjunction of two needs: the chronic shortage of subregional tax revenues for local governments and the relatively greater impact of climate change faced by some states and cities. Subnational governments have adopted their own climate policies to mitigate impacts, adapt to new climate conditions and, in the case of the subnational carbon tax, obtain revenue to finance climate and environmental action.

Mexico

In Mexico, article 8 of the General Law on Climate Change authorizes subnational governments to formulate, apply and evaluate their own climate policies, in line with national policy. They are also allowed to implement fiscal, financial or market instruments that promote Mexico's climate policy.

In addition to the federal tax that has been in force since 2014, various federative states and federal entities, such as Colima, Durango, Guanajuato, Mexico City, Mexico State, Morelos, Querétaro, San Luis Potosí, Tamaulipas, Yucatán and Zacatecas, have established their own GHG tax arrangements. In several cases, the state tax rate is significantly higher than the national one (see figure 13). For example, the state tax in Querétaro is US\$ 33.90 per tCO_2eq, and its revenues are mainly used to finance infrastructure and environmental protection projects.

Figure 13
Mexico (selected states): subnational carbon tax rates
(Dollars per tCO_2eq)



Source: Prepared by the authors, on the basis of Secretariat of the Environment and Natural Resources of Mexico. (2021, 22 October). *Programa de prueba del sistema de comercio de emisiones*. https://www.gob.mx/semarnat/acciones-y-programas/programa-de-prueba-del-sistema-de-comercio-de-emisiones-179414; García, J., Piquero, E., Colín, D. and Aguilera, F. (2021). *Impuestos al carbono en estados mexicanos*. Mexican Carbon Platform; Mexican Carbon Platform. (2023). *Impuestos al carbono en México: desarrollo y tendencias*.

Table 5 summarizes the main characteristics of the subnational carbon taxes implemented in Mexico. While the national price was set in 2014, several states introduced subnational carbon taxes in 2017, and the number has increased significantly since 2022. In all cases, the taxes are levied on emissions from fixed sources; and in some states minimum emissions thresholds are established, examples being Yucatán (> 500 tCO_2eq) and Tamaulipas (> 25 tCO_2eq). Most taxes cover the main GHGs: CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6), and some states include other pollutants such as black carbon, particulate matter (PM_{10}, $PM_{2.5}$) and ammonia (NH_3).

The subnational tax rates vary widely, ranging from US\$ 2.70/tCO_2eq (Guanajuato) to US\$ 33.90/tCO_2eq (Querétaro). The average state tax rate of US\$ 13.90/tCO_2eq, is considerably higher than the national rate (US\$ 3.90). Some states grant tax incentives or exemptions to encourage emissions mitigation (e.g. Colima, Querétaro and San Luis Potosí), whereas jurisdictions like Mexico City and Zacatecas do not. In general, the revenue collected is used to finance climate change mitigation and adaptation projects and measures to support health, the environment or the energy transition. The organization of the carbon tax in Mexico is trending towards decentralization, with heterogeneous arrangements in terms of design, tax rate, gas coverage and use of revenues. This diversity reflects different levels of climate ambition and institutional capacities among the subnational governments; and it provides opportunities for comparative analysis and the evaluation of public policies in terms of climate governance.

Table 5
Mexico: characteristics of subnational carbon taxes

Jurisdiction	Start year	Tax base	Gases covered[a]	2025 rate *(Dollars/ tCO_2e)*	Tax incentive	Use of revenue
Mexico	2014	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, SF_6	3.94	Yes	General budget, no specific allocation
Zacatecas	2017	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, SF_6	12.73	No	Environmental and economic improvement
Tamaulipas	2020	Fixed sources > 25 tCO_2e	CO_2, CH_4, N_2O, HFC, PFC, SF_6 (except natural gas)	14.40	No	Mitigation and adaptation
Durango	2022	Fixed sources	CO_2, CH_4, N_2O	9.11	No	Environmental improvement
Mexico State	2022	Non-federal stationary sources	CO_2, CH_4, N_2O	3.50	No	Environmental improvement
Querétaro	2022	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, SF_6	33.90	Yes	Mitigation and adaptation
Yucatán	2022	Fixed sources > 500 tCO_2e	CO_2, CH_4, N_2O, HFC, PFC, SF_6	14.76	Yes	Health and healthy environment
Guanajuato	2023	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, black carbon	2.72	Yes	Environmental and economic improvement
Mexico City	2025	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, black carbon, PM_{10}, $PM_{2.5}$, NH_3	2.95	No	Mitigation, adaptation and energy transition
San Luis Potosí	2025	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, black carbon	17.26	Yes	Mitigation, adaptation and energy transition
Colima	2025	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, black carbon	28.80	Yes	Mitigation and adaptation
Morelos	2025	Fixed sources	CO_2, CH_4, N_2O, HFC, PFC, black carbon	12.73	No	Mitigation and adaptation

Source: Prepared by the authors, on the basis of Secretariat of the Environment and Natural Resources of Mexico. (2021, 22 October). *Programa de prueba del sistema de comercio de emisiones*. https://www.gob.mx/semarnat/acciones-y-programas/programa-de-prueba-del-sistema-de-comercio-de-emisiones-179414; García, J., Piquero, E., Colín, D.and Aguilera, F. (2021). *Impuestos al carbono en estados mexicanos*. Mexican Carbon Platform; Mexican Carbon Platform. (2023). *Impuestos al carbono en México: desarrollo y tendencias*.

[a] CH_4, methane; N_2O, nitrous oxide; HFCs, hydrofluorocarbons; PFCs, perfluorocarbons; PM_{10}, particulate matter of diameter less than 10 micrometres; $PM_{2.5}$, particulate matter of diameter less than 2.5 micrometres; NH_3, ammonia; SF_6, sulfur hexafluoride and natural gas.

Despite the differences that exist between the national carbon tax and the taxes applied in the states, there is a risk of double taxation. Accordingly, the national and subnational institutions are challenged to work in harness, according to their respective jurisdictions, to harmonize the various carbon pricing instruments and make sure implementation is environmentally, socially and economically effective. Close coordination is required between the various carbon pricing instruments applied in Mexico (federal carbon tax, state carbon tax and emissions trading system), to help to construct a balanced and effective policy portfolio for climate change mitigation.

The International Climate Initiative conducted an analysis of the interaction of economic instruments for climate change mitigation in Mexico. This found that a carbon tax can help to control excessive volatility in the ETS; the coverage of the carbon tax should be at least equal to that of the ETS; and an ETS can be implemented while ensuring a stable flow of revenue for the government if the carbon tax is used as a floor price (Deutsche Gesellschaft für Internationale Zusammenarbeit [GIZ] and Secretariat of the Environment and Natural Resources, 2017). In this context, a more comprehensive national strategy on fiscal measures to address GHGs remains pending and necessary, in which the National Climate Change System could provide a forum for designing and implementing an environmental and climate tax strategy (Heredia and Corral, 2023).

B. Tradable emissions permits

Tradable emissions permit systems are another carbon pricing instrument that seeks to create incentives for economic agents to reduce their emissions. It works by setting an upper limit on total emissions, and distributing limited, individual permits (either at no charge or through auctions) to emitting sources, in order to meet the emissions reduction target (the defined upper limit). Although tradable emissions permit systems are much more complex to implement than tax-based carbon pricing systems, they solve the central problem of taxes, by achieving lower reduction costs, thus increasing cost-efficiency (Pizarro Gariazzo, 2021).

Article 6 of the Paris Agreement establishes a framework for international cooperation that includes market mechanisms such as ETSs, enabling the transfer of emissions reductions between countries, through units referred to as internationally transferred mitigation outcomes. This flexibility can help to increase climate ambition by allowing reductions to be made where they are most economical.

1. Progress of emissions trading systems in Latin American and Caribbean countries

Although prices and revenues in key ETSs have declined globally, ETS revenues remain an important source of climate finance in cases where permits are distributed through auctions, providing governments with resources to finance additional decarbonization efforts or support vulnerable groups (International Carbon Action Partnership [ICAP], 2025). In Latin America and the Caribbean, tradable emissions permits continue to attract interest from countries, and regulatory and institutional frameworks for their implementation are being devised. Institutional challenges in terms of monitoring, reporting and verification, along with the technical capacities needed for implementation, remain significant. Table 6 shows the progress made in some Latin American and Caribbean countries towards the effective implementation of tradable emissions permit systems in the near future.

Table 6
Latin American and the Caribbean (selected countries): progress in creating emissions trading systems

Country	System	Details
Mexico	Tradable emissions permit system	• Created in 2020 and currently in the pilot phase • Operates under a regulated market model • Emission permits (100,000 tCO_2) were allocated free of charge • Applies to CO_2 emissions from direct fixed sources (combustion and industrial processes) in the energy and manufacturing sectors
Brazil	Brazilian Greenhouse Gas EmissionsTrading System (SBCE)	• Act No. 15.042 of 11 December 2024 created SBCE • Based on the cap-and-trade principle, whereby the government sets a ceiling on the emissions that can be produced by the regulated sectors • The Federal Government of Brazil will issue permits, referred to as Brazilian emissions quotas • SBCE will be implemented in five stages, with full implementation occurring by the end of the process • The measures that regulated entities must comply with vary according to the amount of their annual emissions: - More than 10,000 tCO_2eq/year: requires compliance with reporting obligations - From 10,000 tCO_2eq/year to 25,000 tCO_2eq/year: requires the submission of an emissions monitoring plan and annual reports on GHG emissions and removal - More than 25,000 tCO_2eq/year: requires the filing of annual reports on periodic compliance with obligations, in addition to the obligations mentioned above
Colombia	National Tradable Emissions Quota Programme (PNCTE)	• Act No. 1931 of 2018 created PNCTE • Currently in the design phase; roles and responsibilities of the institutions to be determined, PNCTE emissions ceiling to be defined and initial auction price to be set for the tradable permits • Planned to start operating in 2030 as a regulated market • It will be possible to use emissions reductions for various purposes: - Carbon tax offsetting - International trade under article 6 of the Paris Agreement - Carbon Offsetting and Reduction Scheme for International Aviation - Participation in voluntary carbon markets

Country	System	Details
Argentina	National strategy for the use of carbon markets	• Aims to create a framework for the use of markets nationwide • A bill to create a regulated emissions trading market is currently going through the legislative process • Empowers the government to set caps on emissions rights and allocate them among sectors and productive activities • Seeks to achieve emissions reductions that will help the country to fulfil its nationally determined contributions
Chile	Emissions trading system	• Creation made possible by the Climate Change Framework Law of Chileemissions trading • Work is under way to design and pilot an emissions trading system in the energy sector • Considered a key element for decarbonization and its financing
Dominican Republic	Emissions trading system	• The country has taken steps to develop a carbon market • Aims to enable productive sectors to trade and obtain benefits for their efforts to reduce GHGs • There is a road map for implementing the monitoring, reporting and verification system • Progress is being made in strengthening the technical capacities of the teams involved in the country's carbon market • A pilot emissions trading system is under consideration

Source: Prepared by the authors on the basis of official documents.

Among the emissions trading systems currently being implemented worldwide, the European Union's system is one of the benchmarks for its efficiency in reducing emissions. The portfolio of measures being implemented by the European Union to fulfil its emissions reduction commitments includes the Carbon Border Adjustment Mechanism, which aims to establish a level playing field between producers in the European Union and those outside it. An analysis by Eicke et al. (2021) shows that in Latin America and the Caribbean, the economies of Honduras and Trinidad and Tobago are those likely to be affected most by the Mechanism. In contrast, analyses by Lee (2023) predict a limited impact for the group of countries comprising Central America, Cuba, the Dominican Republic, Haiti and Mexico.

2. Article 6 of the Paris Agreement and carbon credit mechanisms

Article 6 of the Paris Agreement opened up the possibility of strengthening both domestic and international carbon markets that help countries to meet their emissions reduction commitments, as defined under nationally determined contributions, through the transfer of internationally transferred mitigation outcomes. Thus carbon credits representing GHGs reduced or eliminated through mitigation activities are traded on carbon credit markets, thereby meeting the demand of emitters for whom the cost of reducing their own emissions is higher than the cost of buying credits.

Carbon-credit mechanisms are therefore another form of carbon pricing, although a broad-based carbon price is not set (Metayer and Cárdenas Monar, 2025). These mechanisms can take three different forms —international, governmental and independent— and they differ mainly in terms of the entity that administers them. In the first case, it is United Nations entities (United Nations Framework Convention on Climate Change), in the second, governments themselves, and in the third, non-governmental entities (such as Verra or Gold Standard) (Center for Clean Air Policy [CCAP] and United Nations Framework Convention on Climate Change Regional Collaboration Centers [RCC] Latin America (2024).

In particular, article 6.2 of the Paris Agreement allows the use of internationally transferred mitigation outcomes, thereby opening up the possibility of linking ETSs between countries or regions, provided that double counting is avoided and environmental integrity is guaranteed. To this end, projects with emissions reductions that are not considered by the countries for fulfilling their nationally determined contributions can be used in international emissions reduction transactions. This in itself represents a flexibility mechanism for fulfilling climate commitments, mobilizing climate finance and engaging the private sector in climate action.

There are high expectations for the generation of carbon capture projects that could be offered to international markets, on the basis of the implementation of article 6 of the Paris Agreement. However, the volume that this type of transaction could attain is still unclear and its operation requires improvements to legal frameworks to ensure market integrity, as its proper execution is subject to various risks.

In Latin America and the Caribbean, more and more countries are entering into bilateral agreements to negotiate projects in which GHG emissions reductions are transferred. Table 7 summarizes these bilateral agreements and the number of associated projects, as well as the emissions reductions associated with each project.

In the case of the government carbon credit mechanism, countries specify a legislative framework to regulate it and determine the national institutions responsible for administering it. In Latin America, only Chile, Colombia and Mexico have defined regulatory frameworks that regulate the possibility of offsetting all or part of the carbon tax payment through the delivery of some type of certified emissions reduction, or carbon credits issued by mitigation projects, which has created local carbon markets.

Table 7
Latin America and the Caribbean (selected countries): bilateral agreements under article 6 of the Paris Agreement

Host country	Purchasing country	Status of agreement	Number of projects	Project type	Subtype	$ktCO_2eq$/year
Costa Rica	Japan	Memorandum of understanding	2	Solar	Solar photovoltaic	2.11
				Energy efficiency service		0.27
	Singapore	Memorandum of understanding				
Chile	Japan	Memorandum of understanding	5	Solar	Solar photovoltaic	0.50
				Solar	Solar photovoltaic	2.32
				Solar	Solar photovoltaic	2.13
				Solar	Solar photovoltaic	7.82
				Solar	Solar photovoltaic	7.79
	Switzerland	Bilateral agreement (signed)	1	Transport	Electric vehicles	n/a
	Singapore	Bilateral agreement (signed)				
Colombia	Singapore	Memorandum of understanding	-			
Dominican Republic	Singapore	Memorandum of understanding	-			
	Sweden	Memorandum of understanding	-			
Dominica	Switzerland	Bilateral agreement (signed)	1	Transport	Electric vehicles	n/a
Mexico	Japan	Memorandum of understanding	-			
Paraguay	Singapore	Bilateral agreement (negotiated)	-			
	United Arab Emirates	Memorandum of understanding	-			
Peru	Switzerland	Bilateral agreement (signed)	1	Energy efficiency in homes	Stoves	n/a
	Singapore	Bilateral agreement (signed)	-			
Uruguay	Switzerland	Bilateral agreement (signed)	1	Transport	Electric vehicles	n/a

Source: Prepared by the authors, on the basis of United Nations Environment Programme Copenhagen Climate Centre. (2025, 15 September). *Article 6 Pipeline*. https://unepccc.org/article-6-pipeline/.

Despite the advantages of market-based mechanisms, for emissions trading systems to contribute effectively to the goals of the Paris Agreement, they must be aligned with net zero emissions pathways, have strict emissions limits and robust monitoring, reporting and verification mechanisms; and they mustavoid double counting in international carbon flows. This highlights the challenge of strengthening institutional capabilities to ensure a robust monitoring, reporting and verification infrastructure, expanding sectoral coverage strategically to link key sectors within the emissions mix and defining clear rules to avoid double counting.

C. Social price of carbon

Achieving the targets of the Paris Agreement requires heavy investment in climate action and the implementation of policy tools that include regulatory (including financial) reforms, procurement and supply chain reforms, green banks and other items, that respond to the scale and urgency of the climate crisis (Stern et al., 2022). While contributing to GHG emissions reduction, these climate investments could also boost environmental sustainability, which would stimulate economic growth and the emergence of new industries, attract private investment and create jobs.

The policy instruments most commonly used to promote green investments include carbon pricing. The carbon taxes and ETSs discussed in the previous sections can be complemented by shadow pricing (the social price of carbon), in order to create economic incentives that shift investment decisions on publicly funded activities and projects towards low carbon investments. The rationale behind the social price of carbon is to introduce a price signal that corrects the inefficiencies generated by the negative externality associated with GHG emissions. The social price of carbon seeks to internalize social costs in the decisions of investors that are responsible for the emissions. One advantage of this type of carbon pricing is that it is applied ex ante, which means it has no direct inflationary consequences because it does not place an additional burden on the production of goods and services, unlike taxes or the costs of entering an emissions market. The shadow price is applied to investment decisions before they occur.

As in the case of explicit carbon prices, one of the challenges for policymakers is how to define the social price of carbon at the national level. From the standpoint of economic theory, the optimal social cost of carbon should be defined at the point where the marginal cost of reducing emissions (mitigation) equals the marginal cost of the damage caused by climate change (that is, the marginal benefit of decontamination) (Rabl et al., 2014). Based on this definition, three methodological alternatives can be considered: the social cost of carbon, the cost of mitigation to achieve a public policy objective and the evidence-based policy definition.[7]

The social cost of carbon is the estimated present value of the economic damage caused by the emission of one ton of CO_2 into the atmosphere today (Hambel et al., 2024; Price et al., 2007). This method of estimating the social price of carbon measures the magnitude of the externality that should be incorporated into government policy decisions and investment choices. The assessment is performed using integrated assessment models, which use projections of socioeconomic and climate variables such as population, per capita GDP, emissions, atmospheric GHG concentration, temperature variations, precipitation and sea level, and the present value of damage caused to sectors and activities, such as agriculture, energy, health and coastal zones.

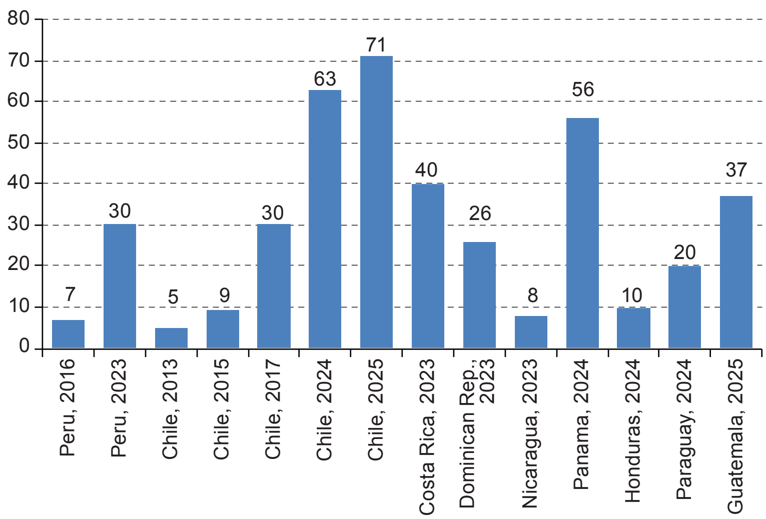
In the case of the cost of mitigation to achieve a public policy objective, it is necessary to define an emissions reduction policy objective and calculate the available carbon budget according to the predefined objective. Next, the country's mitigation studies can be used to obtain future GHG emissions scenarios and characterize mitigation costs, which can then be used to construct the marginal abatement cost curve. Lastly, the intersection of the carbon budget with the curve yields the social cost of carbon that is needed to meet the public policy objective.

7 A more detailed explanation of the three methods for calculating the social price of carbon can be found in De Miguel et al., (2025).

If the information needed to use either of the two previous methods is not available, or if the technical capabilities, budget or time to perform estimations using proprietary models and data are limited, international evidence or work already done by other countries or by institutions specializing in the subject can be used. In this way, the social cost of carbon can be defined on the basis of a review of different types of background information: (i) the experience of other countries; (ii) studies and literature; (iii) multilateral organizations; and (iv) carbon markets.

In Latin America and the Caribbean, several countries are implementing the social price of carbon as part of their public investment evaluation processes and methodologies. Others are currently implementing it. The Euroclima Programme of the European Union has been collaborating with ECLAC to support technical work and capacity-building to embed this shadow price in national public investment systems throughout the region. Figure 14 presents some of the national estimates of social prices of carbon in the region's countries.

Figure 14
Latin America and the Caribbean (selected countries): estimates of the social price of carbon
(Dollars per tCO_2eq)



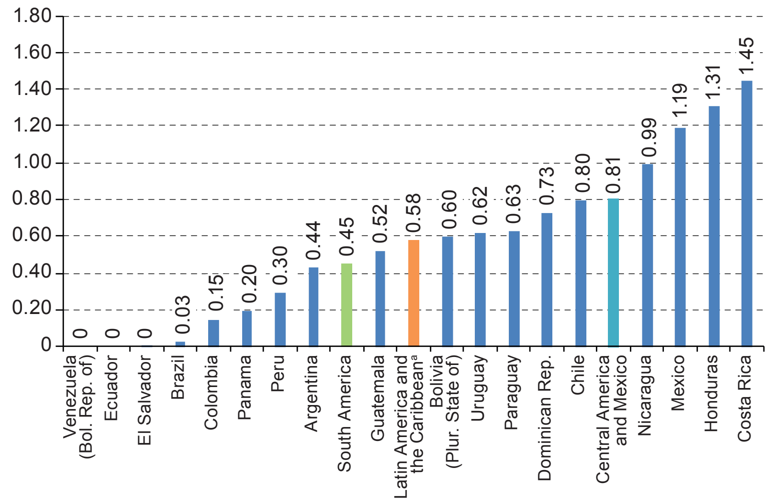
Source: Prepared by the authors, on the basis of data from the Economic Commission for Latin America and the Caribbean and the European Union.
Note: The year for which the social price of carbon was estimated in each country appears next to the country name. Where countries appear twice or more, the social price of carbon has been updated by the national public investment system.

A robust social price of carbon is crucial for the development and evaluation of climate policies, and ultimately for their approval. It is essentially the price that governments use internally to perform cost-benefit analysis and guide climate policy decisions (Burke et al., 2019). This is important to enable public investment to prioritize low carbon technological alternatives. Its use makes more environmentally friendly alternatives more competitive than other technological options when conducting social assessments, because the social net present value captures the positive effect of reducing CO_2 emissions relative to the carbon-intensive alternative. Conversely, less environmentally friendly alternatives may be penalized in the social assessment because they are more costly in the estimation of the social net present value (Ministry of Economy and Finance of Peru, 2023).

D. Fuel taxes

Fuel taxes are another way to apply an implicit price to carbon. Implicit carbon pricing influences the price of carbon more indirectly, through related policies such as fuel taxation, energy efficiency standards, the elimination of fossil fuel subsidies, and incentives to use low carbon technologies (United Nations, 2021). In particular, fuel excise taxes are older, more widespread and, in some regions, higher than explicit carbon prices (Platform for Collaboration on Tax [PCT], et al., 2023). In Latin America, while only five countries implement a carbon tax explicitly, fuel taxes are more widespread (see figure 15) and generate a large proportion of environment-related tax revenues (Organisation for Economic Co-operation and Development [OECD] et al., 2025).

Figure 15
Latin American and the Caribbean (selected countries and subregions): revenue from fuel taxes
(Percentages of GDP)



Source: Prepared by the authors, on the basis of official information from the countries.
[a] The regional figure is the simple average of the countries included in the figure.

Official data for 2024 show that fuel tax revenues in Latin America and the Caribbean average 0.58% of regional GDP, which in relative terms is just under half of the amount collected in Organisation for Economic Co-operation and Development (OECD) countries (1.26% of GDP). The level of revenue obtained from fuel excise taxes varies across the region, with some countries reporting very low revenues relative to GDP, while those in other countries are even above the OECD average. In some countries, such as Costa Rica and Honduras, fuel taxes account for a large proportion of their total tax revenue; so, given their decarbonization ambitions, they need to find alternative revenue sources to finance various national programmes. This challenges the countries to develop strategies to address the fiscal risks of decarbonization, in order to minimize its impact on public finances.

Another positive effect of fuel taxes is that they improve local air quality, which generates co-benefits for people's health. For example, there is ample evidence of a positive relationship between higher levels of exposure to particulate matter of diameter smaller than 2.5 microns and mortality, and also with morbidity associated with various diseases, such as cardiovascular and respiratory diseases and cancer. This is particularly relevant for a highly urbanized region like Latin America and the Caribbean, where exposure in many cities exceeds the air quality standards recommended by the World Health Organization, meaning that millions of people are exposed to levels of air pollution that are a human health hazard. Some cities in the region exceed the recommended values by more than two, three or even five times (World Health Organization [WHO], 2024).

II. The effectiveness of carbon pricing

Some of the region's countries now have 10 years' experience of implementing some of the carbon pricing instruments. In this time, there have been numerous opportunities for countries to exchange experiences, share lessons learned on the application and effectiveness of these policies, and demonstrate progress in terms of results. Measuring the effectiveness of a carbon pricing instrument is complex, because it is impossible to completely isolate the potential effects on GHG emissions of other policies implemented at the same time, or those of exogenous factors such as changes in fossil fuel prices and economic conditions in the country in which the policy is applied. Table 8 presents several criteria for evaluating and measuring the effectiveness of instruments and policies to address climate change.

Table 8
Criteria for evaluating and assessing policy instruments and packages

Criterion	Description
Environmental effectiveness	Reducing GHG emissions is the main objective of mitigation policies and, therefore, a fundamental criterion in the evaluation. Environmental effectiveness has temporal and spatial dimensions.
Economic effectiveness	Climate change mitigation policies usually have costs, and they generate economic benefits other than those obtained from the prevention of future climate change. Economic effectiveness requires minimizing costs and maximizing benefits.
Distributional effects	The costs and benefits of policies tend to be distributed unevenly across different groups in society (Zachmann et al., 2018; Alatorre et al., 2024), for example among industry, consumers, taxpayers, poor and rich households, industries, regions and countries. Policy design affects distributional impacts, and equity can be taken into account in policy design to achieve political support for climate policies (Baranzini et al., 2017).
Co-benefits and negative side effects	Climate change mitigation policies can impinge on other objectives, whether co-benefits (Mayrhofer and Gupta, 2016; Karlsson et al., 2020), such as those related to air quality, or negative side effects, such as a rise in the consumer price index. Conversely, emissions can be impacted by the side effects of other policies. There may be various interactions between climate change mitigation and the Sustainable Development Goals (Liu et al., 2019).
Institutional requirements	Effective policy implementation requires specific institutional prerequisites to be met. These include effective monitoring of activities or emissions, enforcement, and institutional structures for policy design, oversight, review and updating. Requirements differ from one policy instrument to the next. A separate factor is the overall feasibility of a policy within a jurisdiction, including political feasibility (Jewell and Cherp, 2020).

Criterion	Description
Transformative potential	Climate change mitigation policies can be considered potentially transformative if they alter emissions trajectories radically or facilitate the adoption of technologies, practices or products that have much lower emissions.

Source: Intergovernmental Panel on Climate Change. (2022). *Climate Change 2022: Mitigation of Climate Change. Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz and J. Malley, Eds.). Cambridge University Press. https://doi.org/10.1017/9781009157926; Zachmann, G., Fredriksson, G. and Claeys, G. (2018). The Distributional Effects of Climate Policies. *Bruegel Blueprint Series, 28*. Bruegel; Alatorre, J., Rezza, L., Lorenzo, S. and Gramkow, C. (2024). *Distributional implications of climate change and policy recommendations for an inclusive, just and sustainable transition* (LC/TS.2024/112). Economic Commission for Latin America and the Caribbean; Baranzini, A., van den Bergh, J. C. J. M., Carattini, S., Howarth, R. B., Padilla, E. and Roca, J. (2017). Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations. *Wiley Interdisciplinary Reviews: Climate Change, 8*(4), https://doi.org/10.1002/wcc.462; Mayrhofer, J. P. and Gupta, J. (2016). The science and politics of co-benefits in climate policy. *Environmental Science & Policy, 57*. https://doi.org/10.1016/j.envsci.2015.11.005; Karlsson, M., Alfredsson, E. and Westling, N. (2020). Climate policy co-benefits: a review. *Climate Policy, 20*(3). https://doi.org/10.1080/14693062.2020.1724070; Liu, J. Y., Fujimori, S., Takahashi, K., Hasegawa, T., Wu, W., Takakura, J. and Masui, T. (2019). Identifying trade-offs and co-benefits of climate policies in China to align policies with SDGs and achieve the 2 °C goal. *Environmental Research Letters, 14*(12). http://doi.org/10.1088/1748-9326/ab59c4; Jewell, J. and Cherp, A. (2020). On the political feasibility of climate change mitigation pathways: Is it too late to keep warming below 1.5 °C? *Wiley Interdisciplinary Reviews: Climate Change, 11*(1). https://doi.org/10.1002/wcc.621.

This document does not attempt to provide a comprehensive and rigorous analysis of the effectiveness of carbon pricing instruments in Latin America. However, it does raise points for discussion on their potential effectiveness, taking into account some of the criteria outlined in the foregoing table.

A. Related policies and the effective carbon rate

Carbon taxes seek to discourage consumption and investment decisions that generate GHGs. The capacity of this tax to reduce emissions (its effectiveness) depends not only on the high or low carbon price decided upon in each jurisdiction, but also on the impact that other public policies or regulations may have on economic agents' decisions. Two related policies that are often applied alongside carbon taxes and have an impact on emissions are taxes and subsidies on fossil fuels. Fuel taxes encourage emissions reduction, whereas subsidies induce higher emissions.

1. Fossil fuel subsidies

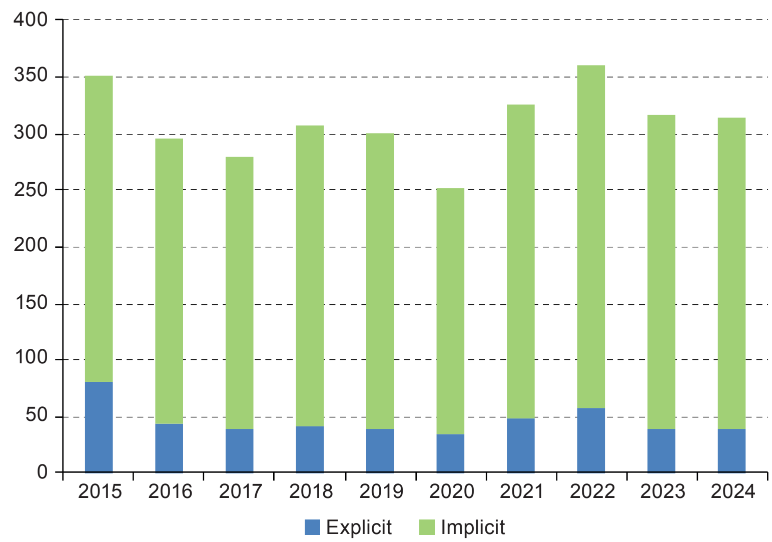
Achieving the goals of the Paris Agreement requires greater climate ambition and the implementation of a set of measures and public policies. These include sectoral policies to foster sustainable mobility, renewable energy and energy efficiency, as well as sustainable agriculture and livestock farming, among other activities. In addition, policies that are at odds with climate objectives, such as fossil fuel subsidies, need to be altered. The latter are similar to a negative price on emissions (Carbon Pricing Leadership Coalition, 2017), so reducing and eliminating them is essential in the carbon pricing process and in achieving greater consistency and coordination among public policies.

Fossil fuel subsidies are all the more harmful in a region such as Latin America and the Caribbean, where there is limited fiscal headroom and fuel expenditure is heavily concentrated among the higher income quintiles. In effect, this represents a monetary transfer to the population group that does not need the subsidy, while providing public funding for activities that generate more GHG emissions and local pollution. Accordingly, fossil fuel subsidies transfer scarce public resources to the highest income deciles, which is totally regressive from a fiscal standpoint but also from an environmental perspective, because the most deprived sectors are the most exposed to climate risks.

According to the International Monetary Fund (IMF), fossil fuel subsidies (both explicit and implicit) amounted to US$ 7 trillion globally in 2022, equivalent to 7.1% of global GDP; and the figure is estimated at roughly US$ 6.6 trillion in 2024, representing 6.4% of global GDP (Black et al., 2023). In the case of Latin America and the Caribbean, these subsidies (both explicit and implicit) amounted to US$ 314.4 billion in 2024 (see figure 16), equivalent to 5.2% of the region's GDP. Of the total subsidies in the region, only

12% are explicit, in other words direct support provided to producers and subsidies granted when the retail price is below the cost of fuel supply. The remaining 88% corresponds to implicit subsidies. The latter include external costs not taken into account in the retail price, such as costs associated with climate change, health impacts from local air pollution and the externalities of traffic congestion and accidents associated with the use of transport fuels.

Figure 16
Latin America and the Caribbean: fossil fuel subsidies, 2015–2024
(Billions of dollars at constant 2021 prices)



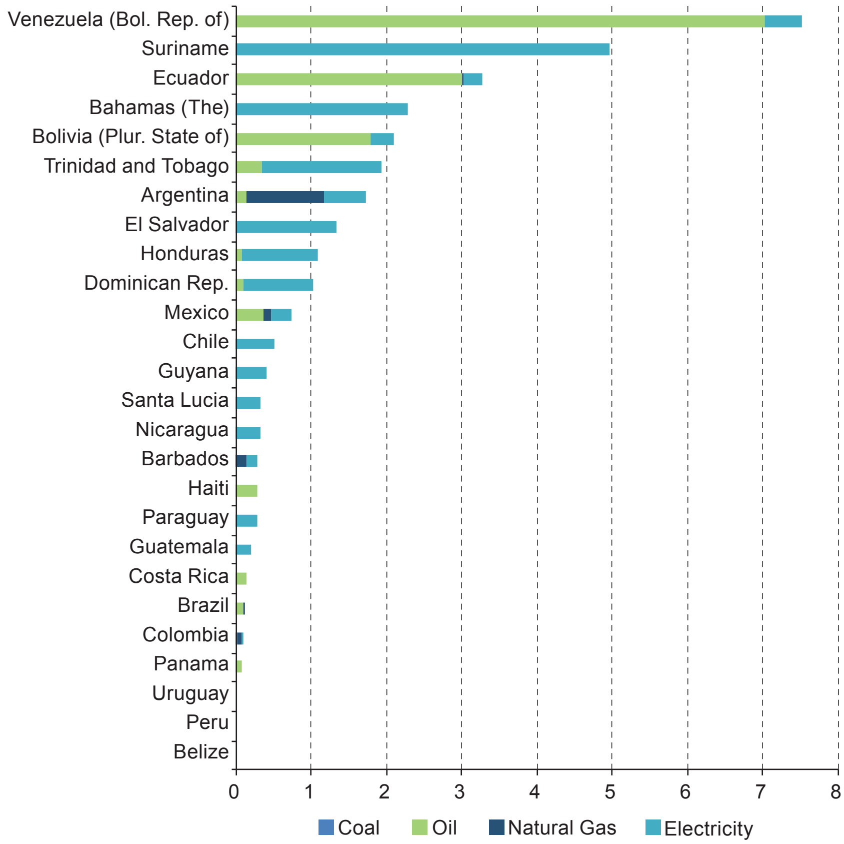
Source: Prepared by the authors, on the basis of International Monetary Fund. (2024). *Fossil fuel subsidies*. https://climatedata.imf.org/datasets/d48cfd2124954fb0900cef95f2db2724_0/explore.

A breakdown of explicit subsidies by fuel type shows that 45.7% are targeted to petroleum products (gasoline, diesel, kerosene and LPG), 33.1% to electricity, 20.6% to natural gas and just 1% to coal. A review of explicit subsidies in the region's countries reveals a quite heterogeneous picture, with some countries provide little or no funding for fossil fuel subsidies (Belize, Peru and Uruguay), while others spend up to 3% or more of their GDP on explicit fossil fuel subsidies (Bolivarian Republic of Venezuela, Ecuador and Suriname) (see figure 17).

In comparative terms, **aggregating the five countries that apply a carbon tax in Latin America shows that, in 2017–2024, for every dollar collected from carbon taxes, US$ 22 was spent on explicit fossil fuel subsidies**. When the costs of externalities from climate change, air pollution, traffic congestion and traffic accidents (implicit subsidies) are included in the subsidies for the same group of five countries, **for every dollar collected from this tax between 2017 and 2024, US$ 163 was allocated to fossil fuel subsidies.**

Data on climate finance and explicit fossil fuel subsidies also show that **in Latin America and the Caribbean, for every dollar invested in climate action in 2021 and 2022, another dollar was allocated to explicit fossil fuel subsidies (**financing of support for producers and the mismatch between the lower retail price and the actual cost of fuel supply) (see figure 18.A). If the external costs not included in the retail price of fuels (e.g. climate change, air quality and accidents) were taken into account, the climate finance ratio would show that **for every dollar invested in climate action** in the region **in 2021 and 2022, US$ 6.40 was spent on fossil fuel subsidies (explicit and implicit)** (see figure 18 B).

Figure 17
Latin America and the Caribbean (selected countries): explicit fossil fuel subsidies, by fuel type, 2024
(Percentages of GDP)

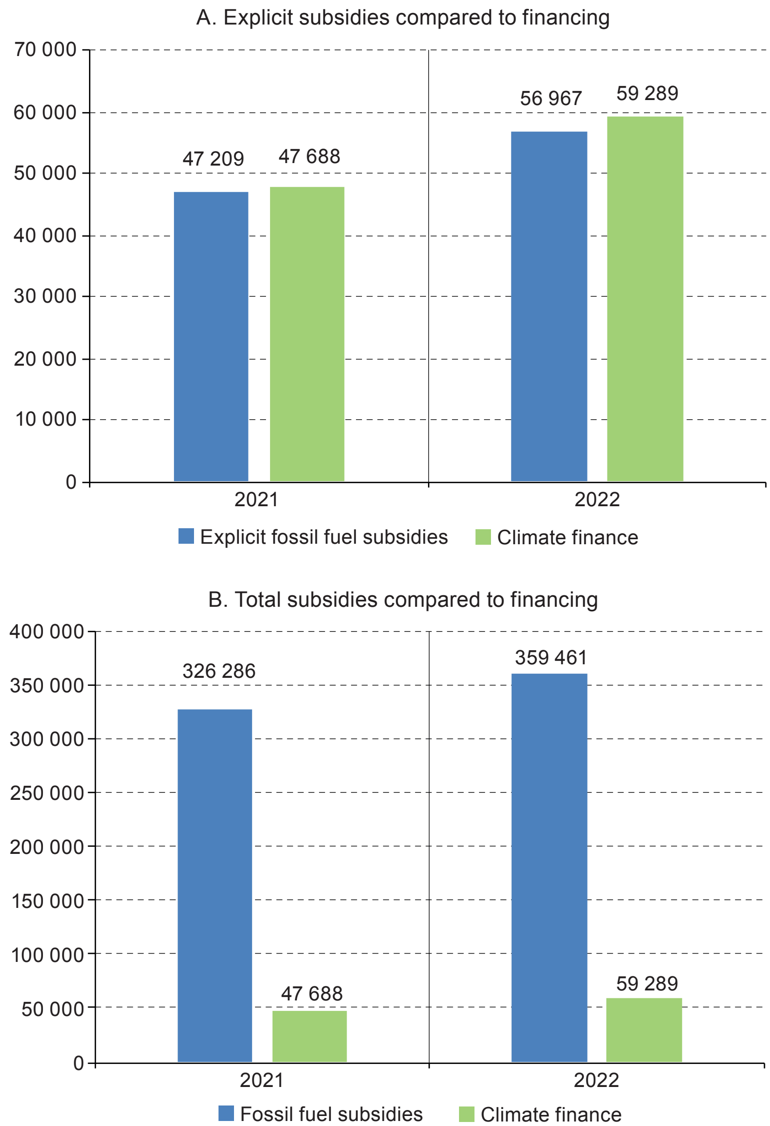


Source: Prepared by the authors, on the basis of International Monetary Fund. (2024). *Fossil fuel subsidies*. https://climatedata.imf.org/datasets/d48cfd2124954fb0900cef95f2db2724_0/explore.

Carbon pricing, including the reform of fossil fuel subsidies, is thus a policy measure that is more consistent with fostering development that is less carbon-intensive, which also contributes to releasing and mobilizing resources from the national budget to finance the climate transition. Reducing fossil fuel subsidies would not only help to reduce CO_2 emissions, but would also provide greater fiscal space, improve macroeconomic outcomes and yield other environmental and sustainable development benefits. An IMF study finds that comprehensive fuel price reform would generate revenues equivalent to approximately 3.6% of global GDP, which could be used to reduce taxes, such as those on labour, contribute to debt sustainability or finance productive investments (Black et al., 2023). The same study reports that, for developing countries as a whole, the increase in revenue from comprehensive price reform exceeds the estimated additional expenditure needed to achieve the Sustainable Development Goals (Black et al., 2023).

OECD and the United Nations Development Programme estimate that eliminating subsidies for carbon-intensive activities makes economic sense, because they place a heavy burden on already weakened public finances and absorb funds that could be used for other priorities (OECD and United Nations Development Programme [UNDP], 2025). Moreover, reallocating budgets earmarked for fossil fuel subsidies can ensure that the benefits of the transition are distributed equitably, thereby reducing inequality and contributing to more sustainable, low carbon development (World Bank, 2024).

Figure 18
Latin America and the Caribbean: explicit and total fossil fuel subsidies and climate finance, 2021–2022
(Billions of dollars at 2021 prices)



Source: Prepared by the authors, on the basis of International Monetary Fund. (2024). *Fossil fuel subsidies*. https://climatedata.imf.org/datasets/d48cfd2124954fb0900cef95f2db2724_0/explore; Naran, B., Buchner, B., Price, M., Stout, S., Taylor, M. (2024, 31 October). *Global Landscape of Climate Finance*. Climate Policy Initiative. https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2024/.

To avoid social and economic difficulties, however, subsidy reforms need to be structured carefully and supported by complementary measures and social dialogue. These may include direct compensatory transfers, strengthening of support networks and social security, strengthening of the labour market through vocational training programmes and development of innovation laboratories. Their implementation requires strengthening the TOPP capabilities of the institutions involved, as discussed below.

2. Effective carbon rate[8]

Fuel taxes and subsidies can modify the effect of the carbon price on GHG emissions, resulting in the application of carbon prices that in practice could be higher or lower than would be indicated by the rate alone. In this regard, estimates of both the effective carbon rate and the net effective carbon rate were made for the five Latin American countries that apply a carbon tax, following the OECD methodology. The latter is based on the relationship between effective tax revenue and emissions, in which tax revenues, or revenues collected through instruments that affect the price of carbon emissions —either explicitly (such as carbon taxes) or implicitly (such as fossil fuel taxes)—, are divided by the total energy-based emissions of CO_2eq in a given country (OECD, 2024).

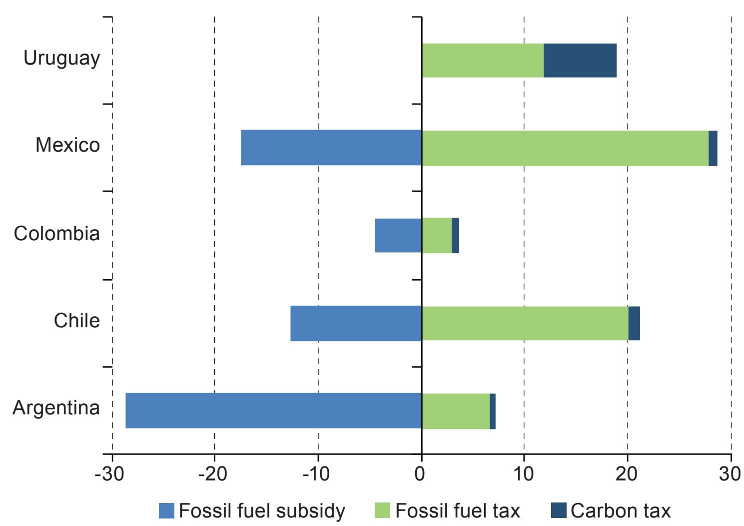
In short, the net effective carbon rate represents the net effective price faced by emitters per unit of CO_2eq, taking account of both the taxes applied (such as carbon and fossil fuel taxes) and the budget transfers that reduce the pre-tax price of fossil fuels (explicit subsidies) (OECD, 2024).[9] The indicator thus assesses the net fiscal incentive associated with the use of carbon-emitting fuels and reflects the degree to which tax policy (including both taxes and subsidies) is aligned with the social costs of emissions. Table 9 and figure 19 show the results of the calculation of the effective carbon rate and the net effective carbon rate for Argentina, Chile, Colombia, Mexico and Uruguay.

Table 9
Latin America (selected countries): net effective carbon rate, 2024
(Dollars per tCO_2eq)

Country	Fossil fuel tax	Carbon tax	Effective carbon rate	Fossil fuel subsidy	Net effective carbon tax rate
Argentina	6.66	0.58	7.24	28.64	-21.40
Chile	20.05	1.10	21.15	12.65	8.50
Colombia	2.97	0.64	3.61	4.54	-0.93
Mexico	27.86	0.76	28.62	17.50	11.12
Uruguay	11.86	7.10	18.96	0.00	18.96

Source: Prepared by the authors, on the basis of data from the International Monetary Fund and official information.

Figure 19
Latin America (selected countries): net effective carbon tax rate, 2024
(Dollars per tCO_2eq)



Source: Prepared by the authors, on the basis of data from the International Monetary Fund and official information.

[8] The authors are grateful to Nicolás Bravo for his contribution to this section.
[9] A detailed explanation of the methodology can be found in OECD (2024).

The results show that, when fossil fuel tax revenues are taken into account, the effective carbon rate is clearly higher than the carbon tax, particularly in Chile, Mexico and Uruguay. When fossil fuel subsidies are considered, however, the net effective carbon rate turns negative in Argentina and Colombia and is significantly lower in Chile and Mexico. Thus, by capturing not only the taxes that make emissions more costly, but also the subsidy policies that, on the contrary, make them less expensive, the net effective carbon rate represents the net fiscal cost of carbon.

The net effective carbon rate is thus an indicator of the real economic incentive faced by economic agents (OECD, 2024). In the case of Latin American countries, it shows not only that carbon prices are still low (except in Uruguay), but also that subsidies render the carbon tax increasingly ineffective in discouraging investment decisions that give rise to GHG emissions.

B. Environmental effectiveness

Evidence shows that carbon pricing policies reduce emissions; however, estimating the emissions reductions attributable to a specific policy is difficult, owing to overlapping policy effects and exogenous factors such as changes in fossil fuel prices and economic conditions (IPCC, 2022; Aydin and Esen 2018). A carbon tax tends to be more effective in countries where the tax represents a large proportion of the price of fossil fuels (Andersson 2019). The main advantage of a carbon pricing policy is that it encourages low-cost emissions reductions. However, a limitation of these policies is that they have less of an impact on the adoption of mitigation measures, when decisions (demand) are not price sensitive and do not encourage the adoption of such measures. Efficacy in terms of influencing long-term investments thus depends on the belief that the policy will be maintained on expected future tax rates or on the prices of emissions rights (Brunner, et al., 2012; IPCC, 2022).

1. Environmental effectiveness of the carbon tax applied in Latin America

Carbon pricing instruments used as a public policy tool, to internalize the costs of emissions in investment and consumption decisions, have been discussed widely in the international literature. However, despite being a topic of intense debate among decision makers and academics around the world, only a small portion of this literature has studied the effectiveness of carbon taxes in reducing GHGs (Green, 2021). Most of the studies that have been conducted have analysed experiences of carbon taxes and emissions trading systems in European countries (Dussaux, 2020; Andersson, 2019; Hajek et al., 2019; Aydin and Esen, 2018; Metcalf, 2019; Lin and Li, 2011; Anderson and Di Maria, 2011; Dechezlepretre et al., 2018). In the case of Latin America and the Caribbean, there is very little quantitative evidence on the effect that carbon taxes are having on emissions, because they have only been implemented recently.

Within this literature, Andersson (2019) analysed the environmental effectiveness of the carbon tax in Sweden, which was one of the first countries to implement a carbon tax in 1991. The author made an empirical estimation of the effect of the tax on reducing CO_2 emissions in the transport sector, using panel data and the synthetic control method. In this study, the counterfactual was constructed by selecting OECD countries that did not impose a carbon tax or similar measures in the period analysed. The selected countries previously had similarities with Sweden in terms of a group of key predictors of CO_2 emissions in the transport sector; and their CO_2 emissions behaviour was similar to that of Sweden. Applying the synthetic control method for the 1990–2005 post-treatment period yielded an estimated 10.9% reduction in transport sector emissions(Andersson, 2019). When the effect of the carbon tax was separated from that of value added tax on gasoline and diesel, the same study found that the carbon tax alone generates an average annual emissions reduction of 6.3%. Using the same methodology in the case of Finland, Mideksa (2024) found that increases in the carbon tax during the treatment period were associated with lower emissions and that the elasticity of emissions reductions with respect to the tax is close to 9% (Mideksa, 2024).

The effectiveness of environmental taxes as a policy instrument for reducing emissions was also studied by Alper (2018), through a panel data analysis for 18 European countries. The results for 1995–2015, using control variables consisting of environmental taxes, natural gas use, oil consumption, GDP growth and urbanization, indicate that a 1% hike in environmental taxes reduces CO_2 emissions by 0.9%. Hájek et al. (2019) evaluated the environmental efficacy of carbon taxation in the energy sectors of selected European Union countries (Denmark, Finland, Ireland, Slovenia and Sweden) using multiple panel regression. In this study, the control variables were the price of emissions rights, household final consumption expenditure, corporate investments, solid fuel consumption and renewable energy consumption. The results of the analysis show that carbon taxation in the energy sector is an efficient economic instrument for reducing emissions. The coefficient produced by the model indicates that raising the carbon tax by one euro per ton can reduce annual per capita emissions by 11.58 kg (Hájek et al., 2019).

Carbon taxes are generally introduced in the context of tax reforms; and, in some cases, they are one of the components of the green or ecological tax reforms that have been implemented in European countries. Shmelev and Speck (2018) used a macroeconometric time series model to evaluate the effectiveness of carbon and energy taxes in Sweden. The study used annual data from 1960 to 2010 to explain CO_2 emissions as a function of fiscal policy variables, technological factors and macroeconomic variables. The results showed that a CO_2 tax alone was not sufficient to cause a significant change in CO_2 emissions in Sweden, except in the case of gasoline. In contrast, energy taxes on coal and LPG have had a statistically significant effect. It was also found that technological innovation, in the form of nuclear and hydroelectric power development, played a major role in reducing CO_2 emissions, as did the rise in oil prices in reducing national CO_2 emissions. Similarly, Lin and Li (2011) studied the mitigation effect of carbon taxation in five northern European countries, using the difference-in-differences method and data for 1990–2008. The results obtained show that, in Finland the carbon tax reduced the growth of per capita CO_2 emissions by 1.7%; but in Denmark, the Kingdom of the Netherlands and Sweden, the estimated effect of the tax on emissions, despite being negative, is not statistically significant (Lin and Li, 2011).

To study the environmental effectiveness of the carbon tax in Latin America and the Caribbean, a panel data econometric model was constructed for the five countries in the region that implement a carbon tax (Argentina, Chile, Colombia, Mexico and Uruguay), with data for 2010–2024. The model aims to explain per capita CO_2 emissions as a function of fiscal, economic and technological policy variables.

In this analysis, the process of generating data for the dependent variable takes the form shown in equation (1):

$$CO2_{it} = \alpha + \beta_1 Imp_{it} + \beta_2 PIB_{it} + \beta_3 Renovable_{it} + \beta_4 Intensi_{it} + \beta_5 Fosil_{it} + \beta_6 Indus_{it} + \mu_i + \theta_t + \epsilon_{it} \qquad (1)$$

Where: $CO2_{it}, Imp_{it}, PIB_{it}, Renovable_{it}, Intensi_{it}, Fosil_{it} y Indus_{it}$ are stochastic processes of the selected variables; $\beta_1, \beta_2, ..., \beta_6$ are unknown regression coefficients; μ_i are unobserved country-specific effects that are constant over time; θ_t are fixed effects per year; ε_{it} represents the idiosyncratic error; t represents the time index (t = 1, 2, ..., 15); and i represents the cross-sectional index (country) (i = 1, 2,..., 5).

$CO2_{it}$ represents total and transport sector CO_2 emissions per capita for each country i in year t; Imp_{it} is the carbon tax value or rate (in dollars); PIB_{it} is GDP per capita (PPP); $Renovable_{it}$, is renewable energy consumption (as a percentage of total energy consumption); $Intensi_{it}$ is the energy intensity of the economy (primary energy used per unit of GDP); $Fosil_{it}$ is fossil fuel consumption (as a percentage of total energy consumption); and $Indus_{it}$ is the value added of the industrial sector, including construction (as a percentage of GDP).

The emissions data were obtained from the Our World in Data database; carbon tax values or rates came from the World Bank's Carbon Pricing Dashboard; and economic and technological change variables were sourced from the World Bank's World Development Indicators. The latter is also the source of data on transport sector emissions.

To capture the effectiveness of the carbon tax policy, two variables were constructed: (i) a continuous variable that measures the value or rate of the tax in dollars, which takes the value zero when the tax has not yet been implemented and the corresponding amount thereafter; and (ii) a dichotomous variable that takes the value 1 from the year the tax comes into effect in each country, and zero before that. The effective dates and tax values were obtained from official documents from each country.

To isolate the impact of the carbon tax on emissions, the model incorporates control variables that describe each country's energy mix. These variables make it possible to distinguish the relative share of different energy sources (both renewables and fossil fuels) as well as the efficiency with which the economy transforms energy into output. Including this information is essential, because differences in the energy mix can influence both emissions levels and the effectiveness of the tax. The final database has an unbalanced panel structure and includes observations for the five countries that currently apply the carbon tax in the region, with different pathways for adopting environmental taxes. The differences between countries in the year of implementation of the tax make it possible to exploit the variation over time and between units, to estimate the effect of the tax on transport emissions.

In the estimated models, the dependent variables —CO_2 emissions per capita, both total and those from the transport sector— were transformed into natural logarithms. The explanatory variables were also transformed into logarithms, except for the value of the tax and the implementation dummy, as both can take the value 0. This transformation makes it possible to interpret the coefficients on the independent variables as elasticities or semi-elasticities; and it also facilitates proportional comparison between variables and enhances the linearity of the model by reducing asymmetry in the distributions. The logarithmic specification produced a better statistical fit and facilitated a more intuitive economic interpretation of the coefficients, without compromising the validity of the findings.

Four models were estimated. The dependent variable in models (1) and (2) was the logarithm of total per capita CO_2 emissions, while models (3) and (4) used the logarithm of per capita emissions from the transport sector. Table 10 presents the results of the four estimations.

In models (1) and (2), where the dependent variable is the logarithm of total per capita CO_2 emissions, the estimations report both the tax value (*Imp*) and its entry into force (*Dummy imp*) as statistically significant and associated with a reduction in emissions. The results of model (1) indicate that **a US$ 1 increase in the carbon tax rate is associated with a 0.5% reduction in per capita CO_2 emissions**. In model (2), the results indicate that **implementation of the tax is related to a 2.9% emissions reduction**.

In models (3) and (4), the dependent variable corresponds to per capita emissions from the transport sector. This specification is justified because, in several countries that implement the carbon tax, it is indirectly passed on to the transport sector through the fossil fuel pricing structure. Given that this sector accounts for a large share of liquid fuel consumption, prices influenced by the tax are expected to have a direct impact on emissions generated by transport activities. Unlike the results of the first two models, the estimation of models (3) and (4) finds no statistically significant relationship with either the value of the tax or its entry into force. This finding is counter-intuitive, because transport emissions were expected to diminish as a result of the tax, especially as this sector is often one of the direct channels of policy transmission, through the increased cost of fossil fuels. The absence of a significant effect might be because the transport sector has structural rigidities and technological constraints that hinder an immediate response in terms of emissions reduction. Furthermore, the results reinforce the importance of considering other sector-specific variables when analysing the effect of the tax, such as the level of fossil fuel consumption.

Table 10
Latin America (selected countries):[a] environmental effectiveness of carbon tax, by model

	(1) CO_2 per capita	(2) CO_2 per capita	(3) CO_2 per capita transport	(4) CO_2 per capita transport
Imp	-0.005***		0.004	
	(0.002)		(0.004)	
DummyImp		-0.029***		0.004
		(0.009)		(0.021)
PIB	0.764***	0.775***	0.979***	0.961***
	(0.072)	(0.072)	(0.162)	(0.163)
Renovable	-0.169***	-0.158***	-0.761***	-0.752***
	(0.048)	(0.049)	(0.108)	(0.110)
Intensi	0.699***	0.659***	0.519***	0.472***
	(0.071)	(0.077)	(0.159)	(0.174)
Fosil	0.790***	0.804***	-0.424**	-0.410**
	(0.071)	(0.073)	(0.161)	(0.164)
Indus	0.075	0.065	-0.010	-0.049
	(0.045)	(0.047)	(0.101)	(0.106)
Constante	-10.444***	-10.565***	-6.267***	-5.982**
	(0.994)	(0.998)	(2.232)	(2.257)
Observaciones	60	60	60	60
R-squared	0.903	0.902	0.739	0.731
Número de países	5	5	5	5

Source: Prepared by the authors, on the basis of the results of the panel data model estimates.
Note: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
[a] Argentina, Chile, Colombia, Mexico and Uruguay.

Income, measured by GDP per capita, displays a positive and statistically significant relationship with emissions in all of the models. This is consistent with the literature on the environmental Kuznets curve (Grossman and Krueger, 1995), which suggests that, in the early stages of economic development, growth is associated with an increase in emissions owing to higher energy demand, industrialization and the consumption of carbon-intensive goods. In the total per capita emissions models (1 and 2), the coefficient is between 0.76 and 0.78, while in the transport-specific models (3 and 4), it is between 0.96 and 0.98. This indicates that **transport sector emissions grow almost proportionally to income, which may be reflecting an increase in motorization levels and fossil fuel use as purchasing power increases**.

Renewable energy consumption displays a negative and statistically significant relationship with emissions in all of the models. This is consistent with the environmental goal of replacing fossil fuels with clean energy. The coefficients are higher in the transport sector emissions models (-0.75), possibly be because countries that have made progress in the energy transition also tend to electrify public transport or implement complementary measures that reduce its carbon footprint. This variable acts as a proxy for the quality of the national energy mix and reinforces the idea that **climate policy depends not only on prices, but also on technology supply and structural transformation**.

Energy intensity, defined as the amount of primary energy used per unit of economic output, is positively related to emissions each model; and the coefficients are statistically significant at either 1% (models 1 and 2) or 5% (models 3 and 4). **The results indicate that economies that are less efficient in their energy use tend to emit more CO_2 per capita**. This variable captures structural differences in technological efficiency, the sector composition of GDP and degree of electrification; and it **highlights the importance of complementary policies, such as energy efficiency, for effectively reducing emissions**.

Fossil fuel energy consumption displays a statistically significant relationship with emissions in all models. In specifications (1) and (2), the coefficients are around 0.80, indicating that **greater reliance on fossil fuels results in higher levels of emissions per capita**. In the transport-specific models (3 and 4), the coefficients are negative (-0.42 and -0.41, respectively). This difference may reflect the fact that transport, although intensive in fossil fuel, may also be influenced by factors such as vehicle efficiency or the degree of electrification that is starting to occur in some of the countries in the sample. **Fossil fuel consumption is a major component of countries' energy structures and reinforces the link between emissions and the type of energy consumed**.

Industry value added, as a proportion of GDP, is incorporated into the models as a measure of the economy's industrial intensity, which may be associated with higher levels of energy consumption and, hence, emissions. However, the estimated coefficients are not statistically significant in any of the models, which suggests that the industry share of GDP does not explain per capita emissions independently for this sample of countries and years. Nonetheless, the variable is retained in the specification because of its theoretical relevance. It helps to control for structural differences between economies that are oriented more towards the industrial sector and those with a relatively smaller manufacturing sector. Its inclusion makes it possible to isolate more effectively the effects of other variables, such as fossil fuel consumption or overall energy intensity.

Overall, the results of the control variables are consistent both with economic theory and with the available empirical evidence. **Economic growth and low energy efficiency are associated with higher emissions levels, while a cleaner energy mix —with a larger share of renewables— helps to reduce them**. Despite not reporting a significant association in this sample, the industry share of GDP, is incorporated to reflect important structural differences between countries. Fossil fuel **consumption remains a robust and positive determinant of emissions, thus underscoring the need for comprehensive policies that combine price signals with changes in the energy mix and efficiency improvements**.

The estimated models show a good statistical fit, especially in the case of total CO_2 emissions per capita. The values of the adjusted coefficient of determination (R^2) are high —0.903 and 0.902 in models (1) and (2), respectively— which indicates that a considerable proportion of the variation in emissions is explained by the variables included. In models (3) and (4), which use emissions from the transport sector as the dependent variable, the adjusted R^2 values are 0.739 and 0.731, which are also consistent with robust explanatory capacity. These results suggest that the model is appropriately specified and that the selected variables capture the structural and policy determinants of emissions in the countries analysed, to a significant degree.

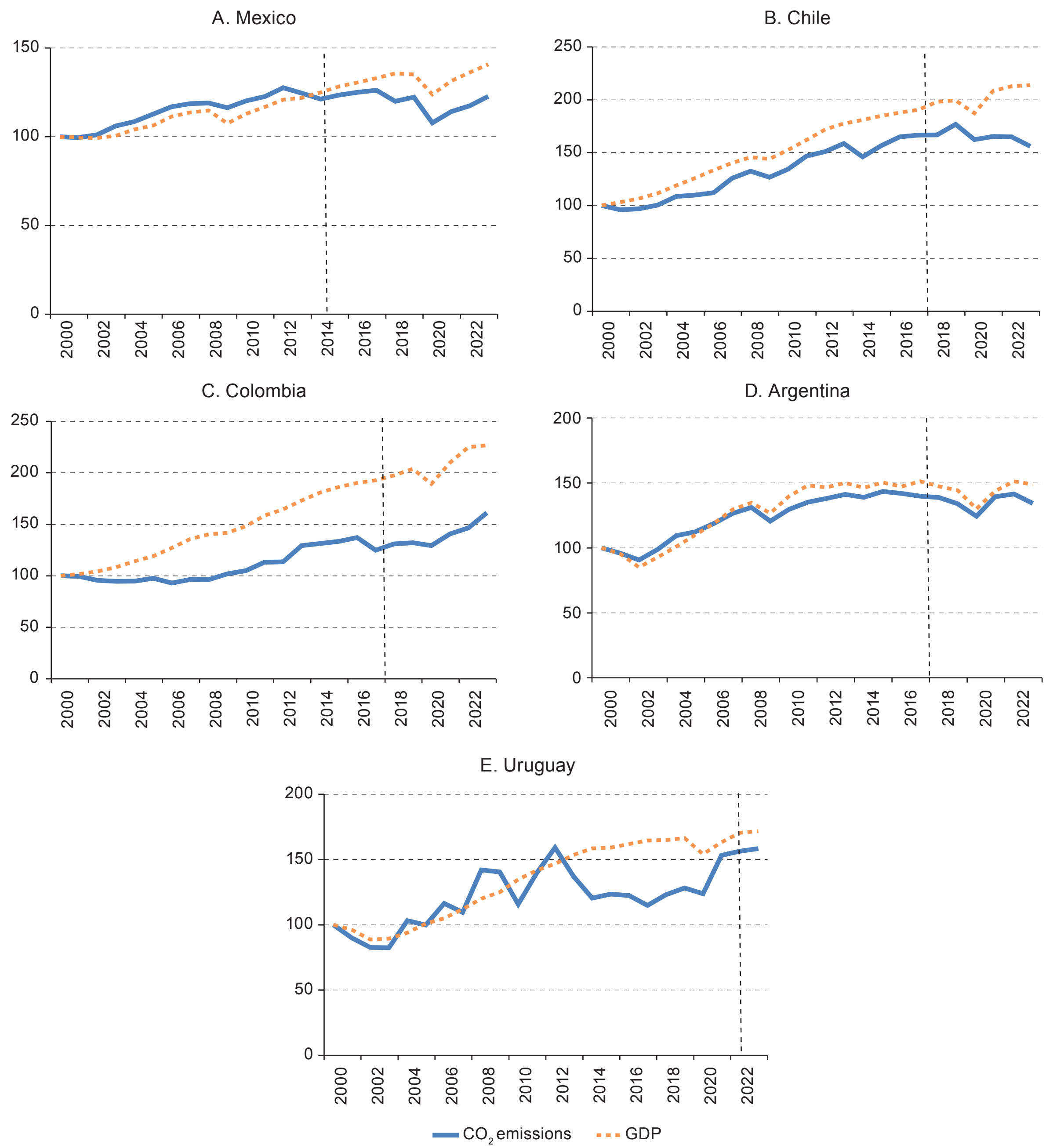
For the four estimated models, the fixed-effects F-test reports a value of Prob > F = 0.000, which makes it possible to reject the null hypothesis that the individual effects (by country) are equal to zero. This means that there is unobserved heterogeneity between countries that needs to be controlled for. To explore possible differences between countries in the effectiveness of the carbon tax, a model was estimated with interactions between the tax value (measured in purchasing power parity dollars) and country dummies. The results are presented in annex A1.

2. Emissions and economic growth

Policies on climate and the environment are not in competition with a country's economic aspirations and development objectives. In fact, many of the sectors that are key to advancing decarbonization goals can boost economic growth and create formal jobs. Investments in sectors such as renewable energies, electromobility, the bioeconomy and the circular economy can play a key role in this. Progress can be made simultaneously in closing social, economic and environmental gaps with the right combination of investments and policies in areas that are strategic for development (ECLAC, 2022). Conversely, failing to consider negative environmental externalities erodes the natural basis for development and creates increasing risks to a country's people and assets.

For these sectors to receive the necessary investments and become competitive with their fossil-based alternatives, it is essential to put instruments, regulatory frameworks and incentives in place that lead to changes in relative prices. Carbon prices play a key role in shifting investment returns in favour of low carbon alternatives, thereby facilitating a gradual decoupling of economic performance from carbon emissions (see figure 20).

Figure 20
Latin America (selected countries): trend of GDP and carbon emissions, 2000–2023
(Index base 2000 = 100)



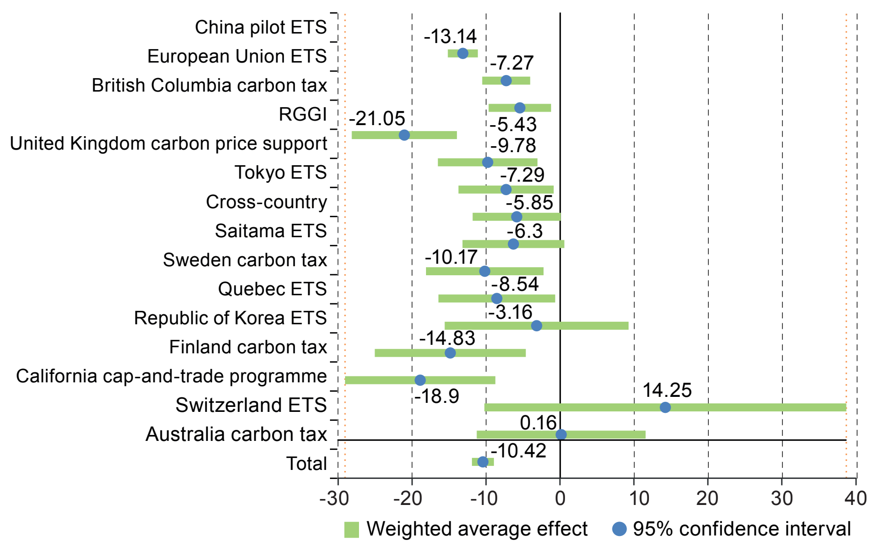
Source: Prepared by the authors, on the basis of International Monetary Fund. (2025). World Economic Outlook (WEO) database. https://www.imf.org/en/Publications/WEO/weo-database/2025/april; and International Monetary Fund. (2025). *National Emissions Inventories and Targets*. https://climatedata.imf.org/pages/greenhouse-gas-emissions#gg2.
Note: The vertical dotted lines in the figure indicate the year in which the carbon tax was first implemented in each country.

To decouple economic growth from carbon emissions and thus help to mitigate the causes of climate change, measures can be adopted to reduce energy demand and the carbon content of fuels. Such measures have an associated cost and therefore require significant political and fiscal effort by the country to implement them (ECLAC, 2015). In Latin America, although carbon taxes are still generally low compared to what is needed to achieve the Paris Agreement targets, there has been a degree of decoupling between GDP growth and CO_2 emissions. This process is more pronounced in countries such as Chile and Colombia, where the carbon tax is accompanied by other carbon pricing instruments, such as offsets that stimulate the domestic carbon market. Command and control instruments are also being used, including the closure of coal-fired power plants and incentives for renewable energy in Chile and decisive policies to move towards a low carbon economy in Colombia, such as the fight against deforestation, the promotion of energy efficiency and the development of renewable energy.

3. Meta-analysis of the environmental effectiveness of carbon taxes and emissions trading systems

In Latin America and the Caribbean, the effectiveness of carbon pricing is constantly under debate, given the low carbon tax rates applied in some countries. Several studies have measured the effectiveness of carbon pricing instruments in reducing emissions. The estimated effects on emissions range from approximately -21% to -5%, with the policy reducing emissions by an average of 10.4% (see figure 21) (Döbbeling-Hildebrandt et al., 2024), without distinguishing between the types of carbon pricing instrument.

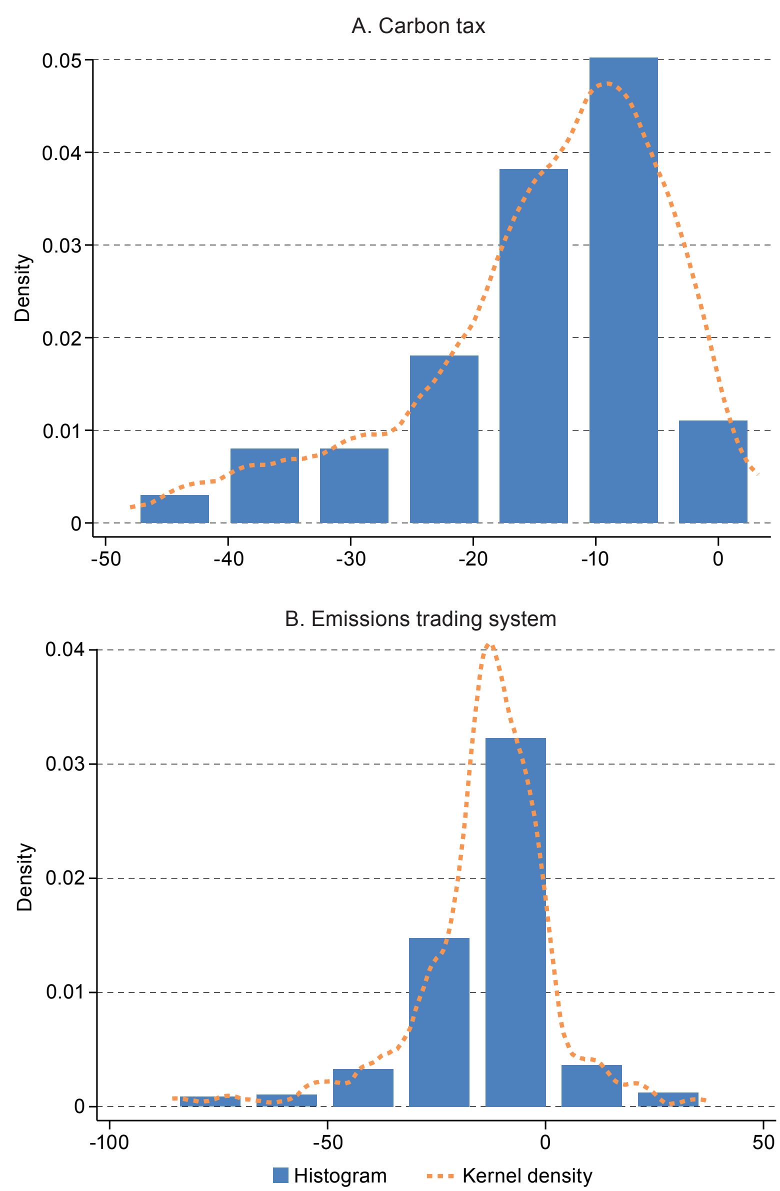
Figure 21
Average variation in emissions under selected carbon pricing instruments
(Percentages)



Source: Döbbeling-Hildebrandt, N., Miersch, K. Khanna, T.M., Bachelet, M., Bruns, S. B., Callaghan, M. Edenhofer, O., Flachsland, C., Forster, P. M., Kalkuhl, M., Koch, N., Lamb, W. F., Ohlendorf, N., Steckel, J. C. and Minx, J. C. (2024). Systematic review and meta-analysis of ex-post evaluations on the effectiveness of carbon pricing. Nature Communications, 15. https://doi.org/10.1038/s41467-024-48512-w.
Nota: Abbreviations: ETS, emissions trading system; RGGI, Regional Greenhouse Gas Initiative.

The various estimated effects, along with their volatility and potential publication bias, can be analysed and synthesized through a meta-analysis. This technique makes it possible to calculate an average effect from different empirical studies. It is based on the statistical analysis of the available set of empirical research studies and results on a specific topic, to identify common characteristics and their sources of heterogeneity (Stanley, 2001; Lipsey and Wilson, 2001). Thus, a meta-regression was performed using data from a review of 80 articles covering 21 carbon pricing schemes, which report 465 effects of carbon taxes and emissions trading systems. Figure 22 shows the distribution of the effects of these two carbon pricing instruments.

Figure 22
Distribution of estimations of the effect of carbon pricing instruments on greenhouse gas emissions



Source: Prepared by the authors, on the basis of official information.

The results of the meta-regression show that carbon pricing does effectively reduce emissions by an average of 3.87%, while the emissions trading system reduces them by 5.49% (see table 11). The treatment effect is statistically significant for both carbon pricing instruments.

Table 11
Average effect of carbon taxes and emissions trading systems on the reduction of greenhouse gas emissions

Dependent variable: t-statistic	Carbon tax	Emissions trading system
Corrected effect (*1/standard error*)	-3.872***	-5.495***
	(0.000)	(0.000)
standard error	-0.071***	-0.001
	(0.000)	(0.515)
No. of observations	136	329
χ^2 likelihood-ratio test	150.08***	215.40***

Source: Prepared by the authors on the basis of the mixed-effects model.
Note: Values in parentheses are standard errors. ***, **, and * indicate rejection at the 1%, 5%, and 10% significance levels, respectively. The joint significance test is performed using the X_2 statistic.

Various political economy factors may also restrict the scope of carbon pricing policies. These include opposition from industrial sectors or unions that could be affected by these policies; the collective nature of climate mitigation action; failings by key actors; and the relative unwillingness of citizens to pay for climate mitigation (Jenkins, 2014).

III. Technical, operational, political and prospective capabilities for the design and implementation of carbon pricing

The mobilization of funding for sustainable development and climate change needs to engage all possible financing sources: the national budget and public financial management (budget preparation, procurement and public investment); alignment of private investment; development cooperation, and other sources. It also entails combining capabilities from various sources, both within and outside the government; designing innovative financing instruments; updating policy formulation and implementation processes; and facilitating information exchange and coordination.

Managing the transformations needed to address climate change effectively involves not only the technical aspects of the policies, but also the capacity to steer and coordinate the collective action of the institutions involved. Governments can thus make carbon pricing more effective by strengthening the TOPP capabilities of the institutions tasked with defining and implementing carbon prices. This also needs to be complemented by better regulatory frameworks that are consistent with Paris Agreement targets.

A. Technical capabilities

The effective implementation of carbon pricing instruments requires institutional capacities to be strengthened, to improve the technical skills of their teams in the design, formulation and implementation of the different carbon pricing alternatives, public policies for mobilizing public and private finance and innovation in financing instruments. Here, it is important to set the carbon price at a level that reflects the true social cost of emissions and to define the tax base according to the externality being faced, to thus foster sectors and activities that are key to building strong low carbon economies.

In addition, technical capabilities need to be strengthened to create information systems for the implementation of associated policies, in which the various government institutions tasked with implementation throughout the cycle can coexist. Another technical capability that is essential for the effective implementation of carbon pricing instruments concerns the evaluation of potential impacts, both on emissions reduction and on the country's economic and competitiveness variables. Assessing the potential regressivity or progressivity of the policy is an element that has repercussions even for the instrument's political viability.

B. Operational capabilities

Moving from the design of one or more carbon pricing instruments to their implementation requires capacities to create tools to improve budgetary procedures; guidelines to enable the application of carbon pricing in the sectors and activities affected; and information systems to facilitate the monitoring, reporting and verification of the emissions targeted by the instrument in question. Another essential operational capability for implementation relates to the collection and distribution of functions at each stage, from the moment when the tax liability arises until the corresponding revenues are appropriated.

Weak operational capabilities limit the capacity of governments to implement effective carbon pricing policies and respond efficiently to the challenge of shifting investments on to a low carbon development path. Conversely, strong operational capabilities are needed to manage implementation and achieve the objectives specified in the design stage.

C. Political capabilities

The nature of carbon pricing means that its introduction is not widely accepted by society, so institutional capabilities need to be strengthened to create a management strategy that makes its implementation viable. The political economy of this type of initiative requires forging national consensuses for efficient and effective implementation relative to the objective being pursued, such as revenue collection, environmental protection and improving competitiveness.

It is essential to strengthen capabilities to create social dialogue mechanisms in order to clearly communicate the objectives of the new instrument, demonstrate the benefits of its implementation, present compensatory measures to mitigate potential undesirable effects and make clear how the revenue collected will be used. Lastly, work must be done on the governance of the various government institutions vis-à-vis the private sector and on coordination between the institutions that comprise the system that implements the carbon pricing instrument.

D. Prospective capabilities

The Paris Agreement called upon countries to submit their long-term development strategies and achieve carbon neutrality by 2050. This underscores the need to think about the country and its development style 25 years hence and to consider the policies and instruments that need to be designed today to achieve this goal of net zero emissions. Formulating these long-term strategies requires a robust prospective component, scenario modelling, commitments to sectors that contribute to decarbonization and are at the take-off stage, the creation of new regulatory frameworks and the formulation of disincentives for carbon-intensive sectors, among other elements.

The implementation of carbon pricing therefore entails strengthening capacities to continuously monitor scenarios that could be beneficial for implementation and those that pose a risk. Long-term regulatory impacts need to be analysed when considering the introduction of regulations, laws and resolutions that make the implementation of carbon pricing viable.

IV. Guidelines for enhancing the design and implementation of carbon pricing

Designing and implementing carbon pricing instruments is a complex enterprise, not only because of the technical issues involved but also because of the non-measurable aspects of economic policy, potential unintended effects and second-round impacts, to name just a few. In view of this, the following set of guidelines seek to draw decision makers' attention to aspects that need to be considered when designing and implementing some or all carbon pricing instruments, in the context of economic and climate policies that aim to address climate change and modify incentives. This is not intended to be an exhaustive list, but instead to set forth some of the guidelines that arise most frequently in technical discussions with national authorities from ministries of finance, economy, planning, energy and environment in the Latin American and Caribbean region.

A. Seek to alter relative prices

Carbon pricing instruments aim to create incentives for changes in investment decisions that result in a larger number of low carbon projects being implemented. However, for this change in project prioritization to occur as described, carbon prices need to be high enough to internalize the social cost of each ton of GHG emitted into the atmosphere. In other words, carbon pricing makes it possible to alter relative prices, so as to make carbon-intensive activities and sectors less profitable and low carbon projects more profitable.

B. Recognize that carbon pricing alone is insufficient to achieve the climate goals

Carbon prices are only one part of the instruments and policies needed to reduce GHGs and fulfil nationally determined contributions. Achieving climate goals requires a broader set of instruments and policies that discourage carbon-intensive activities and investments. Regulatory frameworks and financial system rules that include climate change criteria are also needed, to speed up investments that contribute to the transition from an unsustainable development model to a low carbon one. In addition, the application of these carbon pricing instruments must be backed by robust supervision guidelines, in which fundamental elements include the registration and oversight of entities subject to the instrument, monitoring, reporting and verification, selective audits, penalty schemes and compliance mechanisms.

This is key to ensuring that carbon pricing instruments can boost investments in renewable energies, green hydrogen, lithium, sustainable mobility based on electromobility, the circular economy, the bioeconomy, sustainable tourism and sustainable agriculture, among other low carbon sectors and activities.

C. Undertake compensatory measures to minimize distributional effects

The distributional impact of policies that promote decarbonization, resilience and sustainable development can be progressive (e.g. policies that have both environmental and distributional benefits and policies that benefit everyone) neutral (as in the case of transition policies that do not alter the distribution of income) or regressive (instruments within a set of policies that have a negative impact on the income distribution unless accompanied by compensatory measures, as in the case of carbon pricing instruments) (Alatorre et al., 2024).

Carbon prices can often affect low-income population groups adversely. Accordingly, implementation of the carbon pricing instrument can be made more feasible by taking into account its potential regressive effects from the moment it is designed. Studies on the distributional impacts of carbon pricing have yielded ambiguous results, showing that they depend largely on a variety of factors, often specific to each country (Metayer and Cardenas Monar, 2025).

There is evidence that taxes on vehicles have either neutral or progressive effects, while taxes on energy sources are more likely to be regressive (Sterner and Coria, 2012; Flues and Thomas, 2015). This is because the carbon price increases energy costs, which represent a larger share of income in low-income households (Dorband et al., 2019; Ohlendorf et al., 2021). One response to this situation is to consider measures to compensate households that are affected. Another way to address the distributional impacts is to specify pass-through restrictions in the legislation, which can cap the proportion of the carbon price that can be passed on directly to consumers in the form of higher prices (Metayer and Cardenas Monar, 2025). Chile has adopted measures of this type. Under the legislation in question, the carbon tax (part of the green tax) is not included when calculating the marginal price of electricity; in other words, it is not passed through to the system wholesale price, which limits its impact on final tariffs.

Compensation measures that can be used to mitigate the undesired impacts of carbon prices include tax exemptions, reduced rates, tax refunds and cash transfer programmes for vulnerable groups.

D. Assess impact on competitiveness

One of the criticisms of carbon pricing is that it tends to harm economic competitiveness; however, the evidence on this is unclear. On the contrary, carbon pricing is likely to trigger technological change in the sectors or activities in which it is applied, thereby making them environmentally cleaner and thus more competitive internationally. Given the lack of evidence in a clear direction, it is recommended that carbon pricing be supported by ex ante assessments to measure and quantify the potential economic and competitiveness costs or benefits involved. The results of these assessments will provide key inputs for modifying the design of the instrument and planning measures to mitigate undesired impacts on firms and the economy at large.

Measures to mitigate the economic impacts and the damage to enterprise competitiveness include support for efficient resource use and cleaner production, production-based rebates, fixed payments and broad-based (non-carbon-related) tax reductions.

E. Recognize the need for social dialogue to make implementation viable

A good communication strategy is very important for the successful implementation of carbon pricing which, naturally, tends to attract little social acceptance. Communicating to society and being transparent about the reasons for setting carbon prices will always be an advisable strategy to make this decision more viable and politically acceptable.

Defining and publicizing how the expected revenues will be used —whether to compensate affected population groups or to finance part of the climate action, or for any other purpose— is positive and generates public trust. The objectives of the carbon pricing instrument to be implemented need to be communicated clearly, as do its benefits, the potential costs and the population groups that will be affected, as well as the compensatory measures that will be adopted to mitigate undesired effects. Emphasizing co-benefits to health resulting from better air quality, deaths avoided and a reduced disease burden also helps to gain acceptance for this type of measure.

F. Ensure consistency with other public policies

Carbon pricing uses price signals to discourage sectors, activities and behaviours that are carbon-intensive and to incorporate the social cost of GHG emissions into investment decisions. However, other policies may subvert these objectives. This underscores the urgent need for carbon pricing policies to be supported by policies to reduce and eliminate fossil fuel subsidies; for, in effect, fuel subsidies act as a negative carbon price (Carbon Pricing Leadership Coalition, 2017).

G. Recognize that various carbon pricing instruments are not mutually exclusive

The application of a carbon tax does not rule out the possibility of implementing an emissions trading system, nor does it prevent the use of a social price of carbon. On the contrary, the two measures can coexist and complement each other as part of an emissions reduction and climate finance strategy. Mexico applies a carbon tax simultaneously with an emissions trading system, while Chile applies both a carbon tax and a social price of carbon. Argentina and Colombia apply carbon taxes and are each progressing towards establishing carbon markets.

Fossil fuel taxes are another way to set carbon prices indirectly. They can provide the same incentive as direct or explicit carbon pricing instruments, and other energy tax reforms often accompany the introduction of carbon pricing (Metayer and Cardenas Monar, 2025). Regulatory arrangements can be made to avoid double taxation, and different carbon pricing instruments can set tax rates on different activities.

H. Use revenue to finance climate action

Climate finance remains one of the greatest constraints on climate action in developing countries. Carbon pricing not only discourages carbon-intensive investments, but also expands the fiscal space and generates resources that can be used to finance projects that reduce emissions and increase climate change resilience. The revenue thus obtained can be recycled to reduce other conventional taxes. There is evidence that economic agents are more willing to pay environmental taxes when they know how the revenue will be used or when it is used to finance environmental protection.

In Latin American and Caribbean countries, it is relatively unusual for taxes to be assigned to a specific purpose. In most cases, the revenue enters the national budget and is then distributed among multiple expenditures. However, in countries such as Colombia, the carbon tax generates resources that are used to finance projects that aim to contribute to environmental sustainability. In Uruguay also, carbon tax revenues can be used to finance public policies that promote GHG emissions reduction and climate resilience.

I. Recognize the fundamental role of ministries of finance

Given the nature of carbon pricing instruments, the role to be played by finance ministries is not merely necessary but fundamental for their implementation. In the case of a carbon tax, the tax rate, the tax base and the taxable event all have to be defined, along with other fiscal decisions such as potentially reducing taxes on other areas (such as the payroll), in order to promote stimulate economic growth. The revenues obtained from the carbon tax and the possibility of complementing it by cutting fossil fuel subsidies also help to create fiscal space.

Moreover, the process of designing carbon pricing instruments includes deciding whether or not to earmark the revenue to be generated from them for a specific use. All of the foregoing means that finance ministries must be involved in the design and implementation of carbon taxes.

J. Strengthen institutional capabilities

The design, communication and implementation of carbon pricing instruments require robust institutional capabilities for them to be applied successfully and to achieve the objectives proposed for them. Contributions from the academic sector, public policy dialogue among experts in the region and peer-to-peer exchanges of experiences often bridge knowledge gaps and help to avoid repeating mistakes that others have made when implementing their own schemes. The previous section mentioned the strategic need to strengthen the TOPP capabilities of the national teams involved in the design and implementation of carbon pricing. Understanding the implications of the price and income elasticities of the goods taxed by the carbon pricing instrument (e.g. gasoline and energy) is relevant for the public finances. This also requires strengthening the teams' technical capabilities.

V. Conclusions

Climate change is one of the greatest challenges facing humanity. Keeping the rise in global temperatures below the limits set in the Paris Agreement requires GHGs to be reduced drastically, and this will entail major transformations in the way economies currently operate. Through their various instruments, carbon pricing policies are an essential element in the set of actions needed for the transition to productive, inclusive and sustainable development.

In Latin America and the Caribbean**, offset systems and carbon credit mechanisms are the instruments that have made the most progress in recent years**. At the same time, several countries continue to roll out emissions trading systems among policies to reduce emissions, engage the private sector and streamline the financing of climate action. **The use of carbon taxes remains limited in the region, and none has been created at the national level in the last two years.** Mexico continues to be a special case, with several subnational carbon taxes in place alongside the national tax and emissions trading system.

A review of carbon taxes implemented at the national level shows that rates are generally low relative to the carbon prices considered necessary to meet the targets of the Paris Agreement. The GHG coverage of these carbon taxes in different countries is also limited. It is therefore **necessary to increase carbon prices to reflect the true social cost of GHGs and even consider broadening the tax base** (that is, the sectors or activities on which this tax is levied). This would enable significant GHG reductions to be achieved to help to meet the targets set in nationally determined contributions and generate revenue levels that contribute to the financing of climate mitigation and adaptation. These price hikes need to be supported by measures that minimize undesired impacts on lower-income populations.

For carbon taxes or fuel taxes to be effective as a public policy instrument for reducing emissions, they must be coordinated and consistent with other policies. In the region, countries such as Chile, Colombia and Mexico allow carbon tax payments to be offset through certified emissions reductions, the implementation of emissions reduction projects or carbon credits. **Offset mechanisms in the region have facilitated progress in creating domestic carbon markets and have achieved GHG emissions reductions at a lower cost.**

Article 6.2 of the Paris Agreement allows the use of internationally transferred mitigation outcomes, thereby opening up the possibility of linking emissions trading systems between countries or regions (while avoiding double counting and ensuring environmental integrity). To this end, projects with emissions reductions that are not considered by the countries for the fulfilment of their own nationally determined contributions can be traded internationally for emissions reduction transactions. This provides a mechanism of flexibility and a window of opportunity for fulfilling climate commitments, mobilizing climate finance and engaging the private sector in climate action.

In the case of publicly funded investments, the social cost of carbon helps to ensure that policy decisions in government programmes and projects are consistent with national climate change objectives and commitments. This instrument, which is used to evaluate public investment, is already being implemented by several countries in the region, including some in which a carbon tax already exists, and is being prepared for implementation by another group of countries. Its incorporation into private sector investment decisions, within the framework of environmental, social and governance indicators or criteria, would help to deepen its application and impact.

The carbon tax is expected to discourage carbon-intensive investments; however, the persistence of fossil fuel subsidies results in higher GHG emissions and reduces the fiscal space available to finance other types of expenditure. Considering the five countries that apply a carbon tax (Argentina, Chile, Colombia, Mexico and Uruguay), it was found that, on aggregate, **for every dollar collected from the carbon tax between 2017 and 2024, US$ 22 was allocated to explicit fossil fuel subsidies**. This is also reflected in the fact that the effective net carbon rate is negative in some countries, which means that **these countries are, in practice, applying "negative" carbon prices**.

A comparison of data on climate finance and fossil fuel subsidies revealed that, **for every dollar invested in climate action in the region in 2021 and 2022, another dollar was allocated to explicit fossil fuel subsidies**. Given the persistence of a financing gap for climate action and compliance with nationally determined contributions, this finding is paradoxical. This calls for greater efforts to coordinate and harmonize national and sectoral policies, economic instruments and regulatory frameworks.

A review of international evidence on evaluations of the implementation of carbon pricing confirms that price-based mechanisms are effective in reducing GHG emissions. An evaluation of the environmental effectiveness of carbon taxes implemented in Argentina, Chile, Colombia, Mexico and Uruguay, using a panel data econometric model, finds that carbon taxes have a statistically significant effect on reducing per capita CO_2 emissions. The results of the study show that **a US$ 1 increase in the carbon tax rate is associated with a 0.5% reduction in per capita CO_2 emissions**, although its effectiveness depends on various factors, such as the tax level, elasticities and complementary policies. The greater presence of renewable energies in the energy mix also helps to reduce per capita CO_2 emissions, which reinforces the idea that **climate policy does not depend on prices alone, but also on technology supply and structural transformation**.

A meta-regression using the results of studies evaluating carbon pricing instruments implemented in different jurisdictions estimated that **carbon taxes reduce GHG emissions by an average of 3.87%, while emissions trading systems reduce them by 5.49%**. These results reveal the potential of both of these instruments to contribute to emissions reduction, although their implementation has different implications.

The analysis of public carbon pricing policies highlights the fact that that climate policies are compatible with growth, development and poverty reduction. To make progress in this direction requires a high degree of policy coordination. Indeed, data on emissions and GDP for **Latin American countries that apply a carbon tax reveal a gradual process in which economic performance is becoming decoupled from carbon emissions**.

Lastly, the role played by finance ministries in the design and implementation of carbon pricing instruments alongside environment ministries needs to be stressed. However, **to enhance effectiveness, it is imperative to strengthen TOPP capabilities and coordination with both sectoral and complementary policies** to mitigate undesired secondary impacts.

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Annex A1

Heterogeneous effects by country

To explore possible differences in the effectiveness of carbon taxes between countries, a model was estimated with interactions between the tax value (in dollars) and country dummies (see table A1.1). This type of specification makes it possible to capture heterogeneous effects in different national contexts, where the structure of the energy market, elasticity of demand and coverage of the tax can alter its impact on emissions. The results of the model with interactions show that the average effect of the tax on emissions is not statistically significant, but a significant differential effect is identified in the case of Mexico, where each US$ 1 increase is associated with an additional 1.3% reduction in per capita CO_2 emissions, relative to the base country (Argentina). This effect is significant at the 1% level. In the other countries, the interactions are not significant, which suggests that the marginal impact of the tax does not differ substantially from that of the base country.

This approach with interactions is particularly useful when it is not feasible to estimate separate models for each country, because it makes it possible to take advantage of the variation between countries without sacrificing degrees of freedom. Although running a specific model for each country could provide more accurate estimations for each context, this strategy is not currently practicable, owing to the limitations of the sample size for each country in the available panel. The model with interactions is thus a robust alternative for detecting patterns of heterogeneity in the effectiveness of the carbon tax without compromising the statistical validity of the exercise.

Table A1.1
Latin America (selected countries): heterogeneous effects, by country

Variable	CO_2 *per capita*	Standard error
Imp	-0.001	(0.001)
Chile dummy	0.336***	(0.053)
Colombia dummy	0.172**	(0.075)
Mexico dummy	0.157***	(0.030)
Uruguay dummy	0.229***	(0.085)
Chile dummy x *Imp*	0.000	(0.000)
Colombia dummy x *Imp*	-0.002	(0.002)
Mexico dummy x *Imp*	-0.005***	(0.002)
Uruguay dummy x *Imp*	-0.002	(0.004)
Argentina dummy x *Imp*	0.000	(0.000)
GDP	0.830***	(0.077)
Renewables	-0.165***	(0.054)
Intensity	0.655***	(0.088)
Fossil fuels	0.861***	(0.077)
Industry	0.018	(0.048)
Constant	-11.367***	(1.029)
No. of observations	60	
No. of countries	5	

Source: Prepared by the authors.
Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

This document presents an overview of carbon pricing policies in Latin America and the Caribbean. It focuses on the characteristics of carbon pricing instruments, both explicit, such as carbon taxes and emissions trading systems, and implicit, such as fuel taxes, the social price of carbon and the reduction of fossil fuel subsidies. The document also provides an analysis of the effects of related policies (e.g. subsidies and elasticities) on the effectiveness of carbon pricing, and includes the estimation of an econometric model that measures the effectiveness of carbon pricing in terms of reducing emissions. The results of this estimation identify a statistical link between the carbon tax rate and a reduction in emissions in the five countries of the region that implement a carbon tax. However, to ensure that carbon taxes are an effective public policy instrument for reducing emissions, they must be coordinated and consistent with other policies.

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