

The Role of Carbon Pricing in Combating Climate Change: Mechanisms, Implementation and Impact

23 June 2025

Executive Summary

- Carbon pricing, primarily in the form of a carbon tax or an Emissions Trading System (ETS) is utilised as a cost-effective way of encouraging green innovation, emissions reductions, and the global transition to a low-carbon economy
- As of 2025, there are 113 active carbon pricing instruments globally, comprising 43 carbon taxes, 37 ETS. The remaining 33 are governmental carbon crediting mechanisms.
- These instruments cover 28% of global GHG emissions, a substantial rise from 24% in 2023
- Countries with carbon pricing mechanisms in place now represent nearly two-thirds of global GDP.
- Although progress with carbon pricing has been swift in recent years, the actual prices of carbon are still insufficient if we are to achieve the Paris Agreement goals

The carbon pricing landscape continues to be a cost-effective policy lever in the global effort to combat climate change, as highlighted by the release of the World Bank's annual <u>State and Trends</u> of <u>Carbon Pricing Report</u>, published this month. At their core, carbon pricing mechanisms are market-based strategies aimed at lowering global emissions by assigning a monetary value to greenhouse gas emissions and revolve around the idea of internalizing the external costs of carbon emissions. These costs, often borne by society in the form of health impacts, property and infrastructure damage, livelihood loss, and ecosystem degradation, are not typically factored into the price of goods and services.

The map below (chart 1) shows jurisdictions with carbon taxes or emissions trading systems implemented, under development or under consideration

Chart 1. Compliance carbon pricing instruments around the world

Carbon pricing instruments around the world, 2025

Map shows jurisdictions that have implemented Direct Carbon Pricing Instruments - Compliance instruments (Emissions Trading Systems (ETS) and Carbon taxes) and/or domestic carbon crediting mechanisms, subject to any filters applied. The year can be adjusted using the slider below the map.



Source: 2025- https://carbonpricingdashboard.worldbank.org/i.



Why Price Carbon?

There are primarily two approaches to carbon pricing: implementing carbon taxes or utilising a market-based emissions trading system (ETS), both of which can be implemented at sub- national, national, and international levels. According to the World Bank's <u>2025 State and Trends of Carbon</u> <u>Pricing Report</u>, there are now 113 carbon pricing instruments implemented globally, of which 43 are carbon taxes and 37 are ETS. The remaining 33 are governmental carbon crediting mechanisms. These instruments cover around 28% of global emissions, a promising increase from a decade ago, when only 7% of global greenhouse gas emissions were covered by carbon pricing policiesⁱⁱ ^{III.}



Chart 2. Global GHG emissions covered by ETS and carbon taxes

Source: 2025 State and Trends of Carbon Pricing, World Bank, page 21

By imposing a price on carbon, policymakers seek to facilitate an equitable transition to a lowcarbon economy in three key ways.

- Firstly, by imposing costs on polluting activities carbon pricing aims to render low-carbon alternatives more economical and change both consumer and corporate preferences, stimulating investment for low-carbon alternatives^{iv}.
- Secondly, and also relating to stimulating green investment, carbon pricing is based on the "polluter pays" principle and aims to have the ability to transfer the burden back to



those responsible for greenhouse gas emissions^v. By holding emitters accountable economically, carbon pricing provides a clear economic signal, encouraging companies to invest in emission reduction measures and innovate towards cleaner production methods. Not only does it hope to be a cost-effective means of encouraging clean innovation within the market, it also aims to promote equitability by transferring the burden of emitting back to the emitter^{vi}.

Finally, the revenue generated from carbon pricing can be reinvested into initiatives aimed at further reducing emissions or mitigating the impacts of climate change, such as decarbonisation schemes or low-carbon infrastructure. Revenues from carbon pricing are also sometimes used to re-distribute to low-income households disproportionately affected by carbon pricing due to their higher energy expenditures, ensuring the policy levers remain equitable^{vii}. According to the 2025 World Bank Report, 2024 saw carbon pricing revenues decline slightly but continue to deliver over USD 100 billion to government budgets. Over 50% of these funds were directed toward environmental protection, infrastructure, and development projects ^{viii}.



Chart 3. Total Revenues from ETSs and carbon taxes 2015 -2024

Source: 2024 State and Trends of Carbon Pricing, World Bank, page 40



The Actual and Ideal Price of Carbon

The actual price of carbon from these mechanisms can vary significantly, however, depending on the region, the method of pricing, and the current market conditions. For example, the European Union's Emissions Trading System (ETS), saw a sharp price drop of over 35% in 2024 (from \$96 to \$61.30 USD/tCO₂e). This drop has been attributed to a range of market, regulatory and macroeconomic factors, however, in early 2025 the price has now rebounded by 15% in 2025, reaching \$70.37 USD/tCO₂e. The UK Emissions Trading Scheme (UK ETS) also saw a sharp drop in allowance prices, falling to 45.06 USD/tCO₂e in mid-2024. Reflecting lower market confidence, weaker demand due to lower industrial output and concerns over policy divergence from the EU ETS. Carbon Prices in developing countries or regions with less stringent environmental regulations, can also be considerably lower, with the Chinese National ETS pricing carbon at just \$12.57 USD/tCO₂e ^{ix}.

It is largely acknowledged that the ideal price of carbon would reflect the marginal abatement costs of greenhouse gas emission reduction^x. However, high carbon prices are generally seen as more effective in driving significant emission reductions and send a stronger economic signal. This works to promote investment in clean energy technologies, whereas lower prices may not provide adequate financial incentives to spur substantial corporate and consumer behaviour. Whilst carbon pricing levels have continued to rise in recent years, the World Bank reports only 3.2% of global emissions are priced at or above the recommended level^{xi}.

The map below (chart 4) shows the level of the main price set by emissions trading systems or carbon taxes in each jurisdiction (US\$/tCO2e).

Chart 4: Price of carbon around the world, 2025

Price of carbon around the world, 2025

Heat map shows the level of the main price set by emissions trading sytems or Carbon taxes in each jurisdiction (US\$/tCO2e), subject to any filters applied. The year can be adjusted using the slider below the map.



Source: Price of carbon around the world, 2025 <u>https://carbonpricingdashboard.worldbank.org/</u>



Carbon Taxes

Under a carbon tax system, governments impose a price on each tonne of greenhouse gas emissions produced by entities. There are two main forms of carbon taxes: emission-based taxes, which are levied based on the quantity of carbon emitted by an entity, and taxes on goods that are carbon-intensive. These taxes can be imposed on sub-national, national and international levels^{xii}.

Carbon taxes are utilised by both developed and emerging market countries. Many EU member states have adopted carbon taxes, with Scandinavian countries, Norway, Finland, and Sweden implementing them in the early 1990s. Recently, other developed nations have followed suit: Canada introduced subnational carbon taxes between 2008 and 2019, Japan established a national carbon tax in 2012, and France and Spain implemented national taxes in 2014. Notably, the USA lacks both a national carbon tax and subnational regional carbon taxes. Emerging market nations have also started implementing carbon taxes. Mexico introduced a carbon tax in 2014, South Africa in 2019, and both Chile and Colombia in 2017^{xiii}. However, the carbon price of these taxes tends to be lower than those in developed nations, with the carbon price of aforementioned emerging market taxes ranging from \$4.31 to \$10.09 per TCO₂e^{xiv}.

Whilst carbon pricing is often heralded as a cost-effective emissions reduction strategy, the mechanisms can sometimes result in carbon leakage, where companies or economies shift carbon-intensive production to countries with less stringent climate policies therefore undermining global transition efforts. To address this issue, carbon taxes like the Carbon Border Adjustment Mechanism (CBAM) have been introduced on imported goods. CBAMs aim to apply a carbon price to a range of goods to prevent ambitious domestic climate actions from leading to carbon leakage and seek to encourage cleaner industrial production in countries with lower climate ambitions, thus facilitating the global transition to a low-carbon economy^{xv}. Further, supporters of CBAM carbon taxation argue that it is likely to become a particularly useful tool in reducing emissions from heavy coal users such as India, China, and South Africa, as they are pressured to reduce emissions in their exports^{xvi}.

The European Union (EU) has been at the forefront of implementing CBAM, introducing the world's first carbon border tax as a regulation in May 2023^{xvii}, with a transition period extending until the end of 2025^{xviii}. Following suit, the United Kingdom (UK) is introducing a CBAM in 2027. The decision came after a consultation process, which ran from March to June 2023, assessing carbon leakage and decarbonisation efforts^{xix}. In the UK's CBAM, the liability will solely rest on importers of products covered by the scheme, based on the emissions contained in those imported goods. Unlike some systems, the UK CBAM will not involve the buying or trading of emission certificates. It will instead place a carbon price on some of the most emission-intensive industrial goods imports and will primarily focus on sectors such as aluminium, cement, ceramics, fertiliser, glass, hydrogen, iron, and steel. The UK CBAM will apply to Scopes 1 and 2 emissions, as well as select embodied emissions, and aims to result in a reduction in global emissions "rather than simply displacing emissions overseas"^{xx}.



Emissions Trading Systems (ETS)

Emissions Trading Systems (ETS) have emerged as vital mechanisms in the global fight against climate change, providing a market-based approach to reducing greenhouse gas emissions. The concept of ETS was first launched in the USA during the 1990s, with a programme addressing SOx and NOx emissions, specifically targeting those from power plants responsible for acid rain. Subsequently, the US delegation played a significant role in negotiating the establishment of capand-trade mechanisms at the Kyoto Protocol in 1997^{xxi}.

Emissions Trading Systems often work on a 'cap and trade' principle: the regulator sets a fixed quantity of carbon allowances, known as the 'cap,' and requires polluters to surrender these allowances for each unit of greenhouse gas emissions. By establishing both supply and demand for emission allowances, ETS creates a market value for emissions^{xxii}. An annually declining 'cap' ensures emission reductions over time and corporations are encouraged to reduce emissions through innovative measures and technologies as low-emitters can sell surplus allowances to those facing higher reduction costs^{xxii}. Similarly to carbon taxes, revenues from ETS are often earmarked for decarbonisation funds to support the global low-carbon transition^{xxiv}.

Emissions Trading Systems (ETS) continue to expand globally, both at national and subnational levels, across developed and emerging markets. Notable ETS programs are operational in jurisdictions such as the United Kingdom, Canada, Australia, New Zealand, China, South Africa, and South Korea. While the World Bank notes that overall adoption of new carbon pricing instruments in 2024 remained moderate, it highlights accelerated momentum in the design and piloting of ETSs in middle-income countries—notably India, Turkey, and Brazil^{xxv}.

In India, following the legal groundwork laid in 2022, the government advanced technical preparations for a national ETS in 2024, building on its Perform, Achieve, and Trade (PAT) scheme, as well as developing a voluntary carbon crediting programme. Pilot trading phases are being designed with support from international partners. Turkey, after announcing its intent at COP28, formally adopted the legislation required to launch a two-year pilot ETS, which will begin operations in 2026 and aims to cut industrial emissions, as well as adapt to the EU's CBAM^{xxvixxvii}. Brazil, meanwhile, made significant progress in 2024 by advancing a legislative bill in the National Congress aimed at establishing a national ETS by the end of the decade ^{xxviii}. The bill outlines a phased approach with potential integration of voluntary market elements ^{xxix}. The development of ETSs in these large middle-income economies is a vital development in global climate policy, as the systems under consideration in Brazil, India, and Turkey collectively have the potential to significantly broaden the global emissions coverage of carbon markets.

Like carbon taxes, one of the most notable carbon ETS systems comes from EU regulators. The EU's Emissions Trading System, launched in 2005, stands as the largest and most renowned capand-trade system globally^{xxx}. Regulating a wide array of industries, including power plants, industrial facilities, and, more recently, aviation and maritime transport^{xxxi}, the EU ETS is heralded as a key factor in driving emissions reductions across Europe and notably, between 2013 and 2022, 76% of all EU ETS auctioning revenues were spent on climate programmes, such as renewable energy and energy efficiency^{xxxii}. Further, the EU ETS 2 will become fully operational in 2027, and cover additional sectors such as building and road transport^{xxxiii}.



Similarities and Differences between Carbon Pricing Mechanisms

Both carbon tax and emission trading schemes (ETS) serve as crucial tools in carbon pricing mechanisms, sharing commonalities such as assigning a price to carbon emissions, promoting cost-effectiveness, and generating revenue for governments. These mechanisms aim to internalise the environmental cost of carbon emissions, incentivising businesses and individuals to adopt more sustainable practices^{xxxiv}.

Despite these similarities, the two main types of carbon pricing differ significantly in terms of emissions reduction certainty and implementation complexity. An ETS provides emissions reduction certainty by setting a declining cap on the total allowable emissions, thus ensuring that the mitigation targets are met. In contrast, a carbon tax offers price certainty by fixing the tax rate on greenhouse gas emissions, though it does not guarantee a specific mitigation outcome.

In some ways, a carbon tax is more straightforward to implement, as it provides pre-determined costs that are easier for businesses to factor into their investment decisions. However, an ETS is more flexible, as it offers mechanisms such as offsets and allowance trading, which can lead to more cost-effective emissions reductions but also introduce greater complexity in its implementation^{xxxv}. Ultimately, as both carbon pricing methods have their own set of advantages and disadvantages, many regulators chose to implement these mechanisms in tandem, like some EU member states, Mexico, Canada and the UK, to name a few.

The Future of Carbon Pricing

Quantifying the exact impact of carbon pricing mechanisms is challenging, but they are widely recognised as a crucial market-based tool for encouraging emissions reductions and promoting cleaner innovation and investment^{xxxvi}. However, if we want to meet the warming targets of Paris, carbon is still underpriced globally by these mechanisms. It is important therefore that these mechanisms are utilised alongside other emission reduction efforts and policies.

Despite this, the World Bank's annual carbon pricing review remains cautiously optimistic about the future of carbon pricing, focusing specifically on the trend of increasing adoption of carbon pricing instruments in middle-income countries such as India, Turkey, and Brazil. The report acknowledges, however, that to realise its full potential carbon pricing must be more ambitious in pricing levels, cover a wider share of emissions and continue to be integrated into broader climate and economic strategies.



ⁱ https://carbonpricingdashboard.worldbank.org/

ⁱⁱ https://openknowledge.worldbank.org/bitstreams/152de0c2-e2be-49d6-aec1-3be8ebad4f74/download

pricing#:~:text=Carbon%20pricing%20curbs%20greenhouse%20gas, development%20compatible%20 with%20clim ate%20protect ion.

^v https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2014/02/PB_case-carbon-pricing_Bowen.pdf
 ^{vi} https://carbonpricingdashboard.worldbank.org/what-carbon-

pricing#:~:text=lt%20can%20help%20to%20mobilize,transition%20to%20a%20decarbonized%20economy.

^{vii} https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2015/11/Bowen-policy-brief-2015.pdf

^{viii} https://openknowledge.worldbank.org/bitstreams/152de0c2-e2be-49d6-aec1-3be8ebad4f74/download ^{ix} https://carbonpricingdashboard.worldbank.org/compliance/price

^x https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation

xi https://carbonpricingdashboard.worldbank.org/compliance/price

xii https://www.c2es.org/content/carbon-tax-

basics/#:~:text=Under%20a%20carbon%20tax%2C%20the,greenhouse%20gas%20emissions%20they%20emit.

xiii https://carbonpricingdashboard.worldbank.org/compliance/instrument-detail

xiv https://carbonpricingdashboard.worldbank.org/compliance/price

^{xv} https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en#:~:text=Why%20CBAM%3F-,CBAM,production%20in%20non%2DEU%20countries.

^{xvi} https://www.imf.org/en/Publications/fandd/issues/2019/06/what-is-carbon-taxation-basics

^{xvii} https://www.carbontrust.com/news-and-insights/insights/what-is-cbam-and-how-will-it-impact-yourbusiness

xviii https://researchbriefings.files.parliament.uk/documents/CBP-9935/CBP-9935.pdf

xix https://www.gov.uk/government/consultations/addressing-carbon-leakage-risk-to-support-

decarbonisation/outcome/factsheet-uk-carbon-border-adjustment-mechanism

^{xx} https://www.gov.uk/government/publications/factsheet-carbon-border-adjustment-mechanismcbam/factsheet-carbon-border-adjustment-

mechanism#:~:text=2.%20The%20UK%20Carbon%20Border%20Adjustment%20Mechanism,rather%20tha n%20simply%20displacing%20carbon%20emis.

xxi https://www.lse.ac.uk/granthaminstitute/explainers/how-do-emissions-trading-systems-

work/#:~:text=The%20origins%20of%20cap%2Dand,emissions%20to%20combat%20acid%20rain.

xxii https://icapcarbonaction.com/en/about-emissions-trading-systems

xxiii https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/what-eu-ets_en

xxiv https://www.ecb.europa.eu/press/economic-

bulletin/articles/2022/html/ecb.ebart202206_01~8324008da7.en.html

xxv https://openknowledge.worldbank.org/bitstreams/152de0c2-e2be-49d6-aec1-3be8ebad4f74/download
xxvi

https://climateactiontracker.org/countries/turkey/#:~:text=The%20ETS%2C%20which%20will%20also%20apply%20to,emissions%20reduction%20path%20for%20companies%20to%20follow.&text=T%C3%BCrkiye%20is%20launching%20an%20Emissions%20Trading%20System,thus%20maintai.

xxvii https://www.qcintel.com/carbon/article/turkey-to-start-ets-in-2026-with-two-year-pilot-phase-event-38805.html#:~:text=Markets,upcoming%20scheme%20have%20been%20sparse.

*** https://openknowledge.worldbank.org/bitstreams/152de0c2-e2be-49d6-aec1-3be8ebad4f74/download
 *** https://openknowledge.worldbank.org/bitstreams/152de0c2-e2be-49d6-aec1-3be8ebad4f74/download
 *** https://ourworldindata.org/carbon-pricing

^{xxxi} https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/scope-eu-emissions-tradingsystem_en

xxxii https://www.eea.europa.eu/en/analysis/indicators/use-of-auctioning-revenues-generated

xxxiii https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2-buildings-road-transport-and-additional-sectors_en

xxxiv https://www.epa.ie/our-services/licensing/climate-change/eu-emissions-trading-system-/

xxxv https://icapcarbonaction.com/system/files/document/icap_briefs-en-brief-9.pdf

xxxvi https://www.lse.ac.uk/granthaminstitute/news/how-robust-is-the-evidence-on-carbon-pricing/

ⁱⁱⁱ https://carbonpricingdashboard.worldbank.org/

^{iv} https://unfccc.int/about-us/regional-collaboration-centres/the-ciaca/about-carbon-