

Study on the best international and European experience in effective use of carbon revenues



This report aims to inform policymakers and practitioners on the lessons learned on the use of carbon revenues based on a review of international experiences

The study was prepared by the Ukrainian Climate Office (UCO) with expert inputs from Berlin Economics GmbH. The Ukrainian Climate Office is co-financed by the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN) and European Union, and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Published by:

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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Photo credits/sources: Envato

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Abbreviations

NEHG	Austria National Emissions Certificate Trading System
BMWE	German Federal Ministry of Economy and Energy
BMUKN	German Fedal Ministry on Environment and Climate Action
CARB	California Air Resources Board
CCI	California Climate Investments
CPUC	California Public Utilities Commission
CBAM	Carbon Border Adjustment Mechanism
CBAM	Carbon Pricing
CPI	Carbon Pricing Instruments
CT	Carbon Tax
CDM	Clean Development Mechanism
KTF	Climate and Transformation Fund
CBT	Climate Budget Tagging
ESR	Effort Sharing Regulation
ETS	Emission Trading System
EUA	EU allowances
CINEA	European Climate, Infrastructure and Environment Executive Agency
EEX	European Energy Exchange
EEA	European Environmental Agency

Abbreviations

EFTA	European Free Trade Association
EIB	European Investment Bank
ERDF	European Regional Development Fund
GWP	global warming potential
GGRF	Greenhouse Gas Reduction Fund
JI	Joint Implementation mechanism
LULUCF	Land use, land use change and forestry
LT-LEDS	Long-Term Low Emission Development Strategy
FCE	Luxemburg Climate and Energy Fund
MRV	Monitoring, reporting and verification
MS	Member States
NECP	National Energy and Climate Plan
NFOŚiGW	National Fund for Environmental Protection and Water Management
NDC	Nationally Determined Contribution
OBPS	Output-Based Pricing System
RRF	Recovery and Resilience Facility
RGGI	Regional Greenhouse Gas Initiative
SCF	Social Climate Fund
SDGs	Sustainable Development Goals

Summary

Ukraine's decarbonisation agenda is being set under wartime conditions. Russia's full-scale war has destroyed a substantial share of generation capacity and industrial assets, and reconstruction will have to proceed alongside the modernisation of an economy historically characterised by high energy and carbon intensity, inherited from Soviet era heavy industry and a fossil-based energy system that has not been substantially modernised. Energy intensity is estimated at around three times the level of EU Member States, with energy intensity of GDP 2.7 times higher than Poland and 3.3 times higher than Germany, and over twice the world average.¹

In parallel, Ukraine has taken on binding climate obligations as an EU candidate country: transposition of the ETS Directive under the Association Agreement and the accession process, alignment with the EU climate acquis, and addressing exposure of exporters to the EU Carbon Border Adjustment Mechanism. These obligations will shape the regulatory environment in which reconstruction investment is made, rather than following it.

During the last years Ukraine has made significant progress in line with international commitments to tackle climate change, by developing and adopting strategies and policies towards alignment with the EU climate acquis and the climate neutrality target. In 2024, Ukraine adopted a framework Climate Law envisaging climate neutrality by 2050, and its first National Energy and Climate Plan. In 2025, Ukraine adopted its second Nationally Determined Contribution to 2035 and pre-approved a new Long Term Low Emission Development Strategy, which aligns with the Climate Law's net zero target and integrates war induced changes. Reaching these targets requires structural change in the economy, substantial investment, and a just transition process for society as a whole.

The conditions under which industry would make that transition are unfavourable. Production and energy capacities have been destroyed, funding capacity is constrained, and investment attractiveness is reduced by the absence of security related guarantees. Against this background, accession and climate neutrality commitments are widely perceived by market participants as a burden rather than as an opportunity to improve competitiveness. The competitiveness argument nonetheless runs the other way over the medium term. On accession to the EU Single Market, Ukrainian producers will face the energy intensity of their own output, rising fossil-based energy prices, and the Carbon Border Adjustment Mechanism, which applies a carbon cost to imports and establishes a level playing field between Ukrainian and EU producers within the Single Market and the single carbon market. Establishing effective carbon revenue mechanisms is therefore not only a climate policy question but a competitiveness one, given that the European Union is Ukraine's principal trading partner and full membership is the country's strategic orientation.

1. Investment needs of energy sector (UkraineInvest) https://ukraineinvest.gov.ua/wp-content/uploads/2024/08/energy-sector-ua_compressed.pdf;
Ukraine energy profile (International Energy Agency) <https://iea.blob.core.windows.net/assets/ac51678f-5069-4495-9551-87040cb0c99d/UkraineEnergyProfile.pdf>;
Energy demand scenarios and policy targets on the road to Europe (Green Deal Ukraina project) <https://greendealukraina.org/uk/assets/images/reports/ukraine-demand-and-targets-long-version.pdf>

Ukraine's Long Term Low Emission Development Strategy puts the investment required to reach climate neutrality by 2050 at over EUR 1 trillion.² Revenues from the existing carbon tax are currently in the range of EUR 30 to 40 million annually.³ Carbon revenues will not close that gap in Ukraine, as they do not in any jurisdiction. Their significance lies elsewhere: Ukraine is preparing a national emissions trading system and reforming carbon taxation, so revenues will grow substantially, and decisions on how they are channelled, earmarked and overseen are being taken now. Those decisions determine whether carbon revenues leverage other finance,

including the EU and donor funding on which reconstruction depends, or are absorbed without measurable effect.

This paper reviews how other jurisdictions have answered that question. It covers the purposes to which carbon revenues are directed, the institutional channels through which they flow, the governance arrangements that determine whether they reach those purposes, and the transparency and evaluation practices that sustain public support. From the international evidence, four findings stand out.⁴

EUR 1 tn

Investment required to reach climate neutrality by 2050, per Ukraine's LT-LEDs

EUR 30–40 m

Current annual revenues from the existing carbon tax

USD 100 bn

Global carbon revenues in 2024 — 67% from emissions trading, 33% from carbon taxes



2. Draft Long-Term Low Emission Development Strategy (LT-LEDs) <https://me.gov.ua/download/ba4565a8-544b-4c90-af84-49b2b718f629/file.pdf>
 3. Budget incomes data <https://openbudget.gov.ua/national-budget/incomes>
 4. A report on "Maximising benefits of carbon pricing" developed by the Institute for climate economics (I4CE) and the World Bank annual report on "State and Trends on Carbon Pricing 2025" were used as inspirational documents to prepare this study

- **Carbon revenues are material but not transformative, and their value lies in what they leverage.** Global carbon revenues exceeded USD 100 billion in 2024, of which 67% came from emissions trading systems and 33% from carbon taxes. Set against estimated global climate investment needs of USD 6.3 to 6.7 trillion annually by 2030, this is a small share. EU ETS auction revenues represent roughly 10% of European real economy climate investment. The jurisdictions that have used these revenues to greatest effect have used them to unlock co-financing rather than to fund measures outright.
- **The choice of channel follows from the purpose, not from the size of the revenue.** Jurisdictions pursuing distributional compensation route revenues through existing transfer or social security infrastructure. Jurisdictions pursuing capital investment build or use special purpose funds. Where both objectives are pursued at once, mixed systems result. Poland being the clearest example, directing 75% of ETS revenues through the national budget and 25% through a dedicated compensation fund.
- **Institutional independence, not the legal form of the fund, determines whether revenues reach their intended purpose.** Germany's Climate and Transformation Fund is not a standalone legal entity, yet is considered effective because of independent executive agency involvement, regular audit and oversight. The EU Modernisation Fund, which spent 58% of its budget in 2022, illustrates that even well governed instruments face absorption constraints.
- **Visible revenue use is what sustains carbon pricing politically.** California's cap and trade programme survived concerted industry opposition in 2016 following a campaign that showcased spending on electric school buses, light rail and investment in low income communities. Most jurisdictions report on revenue collection far better than on revenue use, and few subject revenue use to independent external evaluation.

The paper is structured in five parts. Chapter 1 sets out the main carbon pricing instruments, price levels and coverage. Chapter 2 reviews international experience in the design of those instruments, focusing on the EU ETS and similar systems. Chapter 3 explains why carbon revenue use matters and introduces the four-step framework, strategy, operationalisation, implementation and evaluation, used to organise the evidence that follows. Chapter 4 presents the core comparative material: the purposes to which revenues are directed across jurisdictions, the institutional channels through which they flow, the governance arrangements that determine whether they reach their intended purposes, and transparency and evaluation practice. Chapter 5 examines carbon credit markets as a potential additional source of revenue. The conclusions draw out the findings most relevant to jurisdictions now designing carbon revenue systems.

1 Carbon pricing instruments

Carbon pricing is an important compliance-based tool to mobilize finance, enforce climate action and secure sustainable development outcomes. Governments are using carbon pricing to support fiscal stability, encourage innovation, and attract investments, especially in developing countries. Carbon pricing intends to align the costs related to consumption of fossil fuels or operation of carbon intensive industries with the social impacts of those activities.

Carbon pricing instruments consist of the following:

1. **Emissions trading systems (ETSSs)** — where a cap is placed on the amount of total greenhouse gas (GHG) emissions to be generated by covered installations, which is being annually reduced to meet climate targets. Installations must surrender “allowances” to cover all emissions within a compliance period, requiring them hold or buy enough allow-

ances to cover their obligations. Companies can also trade allowances with other covered entities, and the price is mainly determined by the market.

2. **Carbon taxes** — where a government applies a fee on covered entities for their GHG emissions. Under a carbon tax, the government sets the price of emissions (the tax rate), by taxing either the amount of emissions produced or the carbon content of fuels.

3. **Carbon crediting mechanisms**, where tradable credits are generated through voluntary activities that reduce emissions through either avoidance or reduction or removal.

On a global scale, 78 carbon pricing instruments (CPIs) put price on carbon emissions worldwide as of May 1, 2025, with 43 carbon taxes and 35 emissions trading systems (ETS).

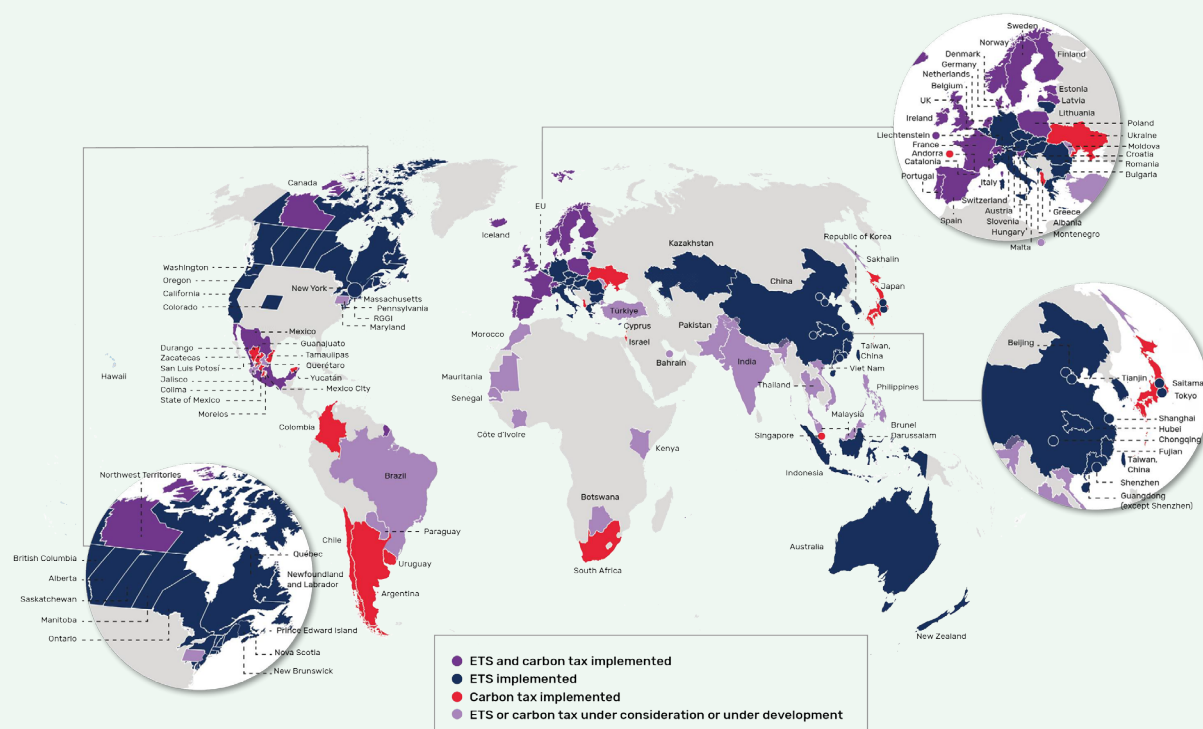


Image 1.

Global map of ETSSs and carbon taxes implemented, under development or under consideration.

Source — State Trends on Carbon Pricing 2025, World Bank.⁵

5. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

According to 2024 data, around 28% of global greenhouse gas emissions⁶ are covered by a direct carbon price, a percentage higher than in previous years due to expansion of China's national ETS beyond power sec-

tor and covering cement, steel and aluminium sectors. Countries representing two-thirds of global GDP have adopted carbon taxes or emissions trading systems.

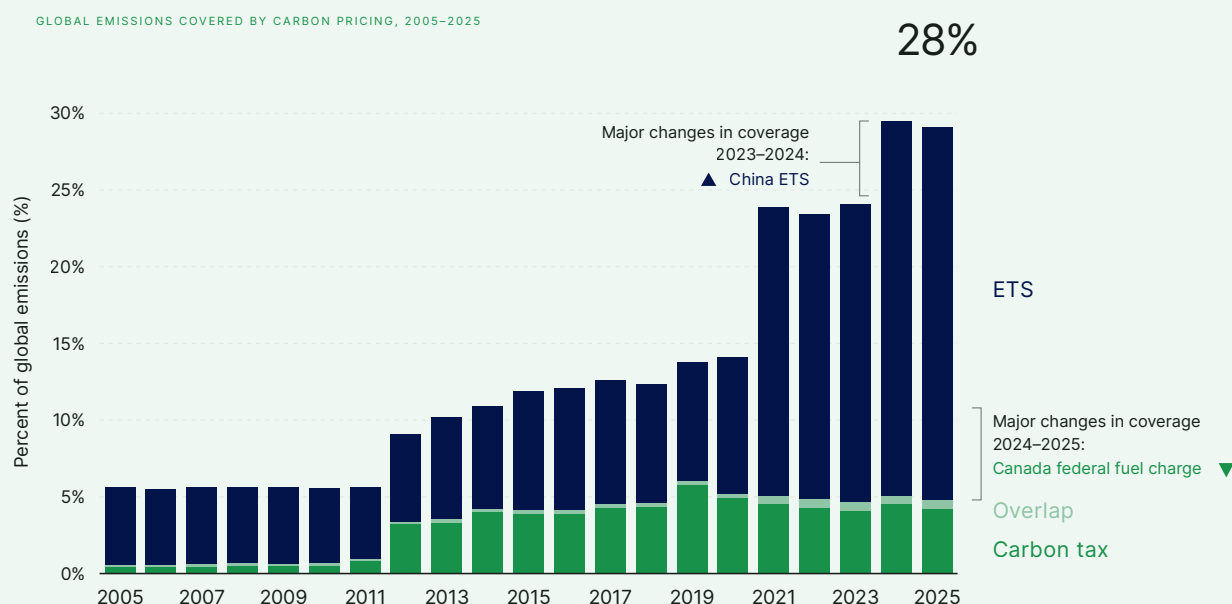


Figure 1. Global greenhouse gas (GHG) emissions by sectors, covered by ETS and carbon tax. Source — State Trends on Carbon Pricing 2025, World Bank.⁷

Ukraine prices carbon through a tax introduced in 2011, applying to installations emitting more than 500 tonnes of CO₂ annually. Against total emissions of more than 220 million tCO₂e⁸, coverage is approximately 40%.

Power and industrial sector continue to have the highest levels of carbon pricing coverage. Over half of global power sector emissions were covered by a carbon price in 2025, representing almost 30% of global GHG emissions. This high level of coverage is largely because almost all ETSS, including those in large economies such as in China, the EU, and Indonesia, cover electricity generation.

Decarbonisation of power sector can enable further emissions reductions downstream as the result of electrification of transport and industrial sectors, when fossil fuels are substituted with low carbon electricity.

The theoretical basis for carbon pricing is well-established: Increasing the price of emission intensive goods and services relative to low-carbon alternatives creates an incentive for companies and individuals to move to low-carbon options. The effectiveness of carbon pricing is increased where price signals are stable, predictable, and enduring, helping to guide long-term investment decisions.

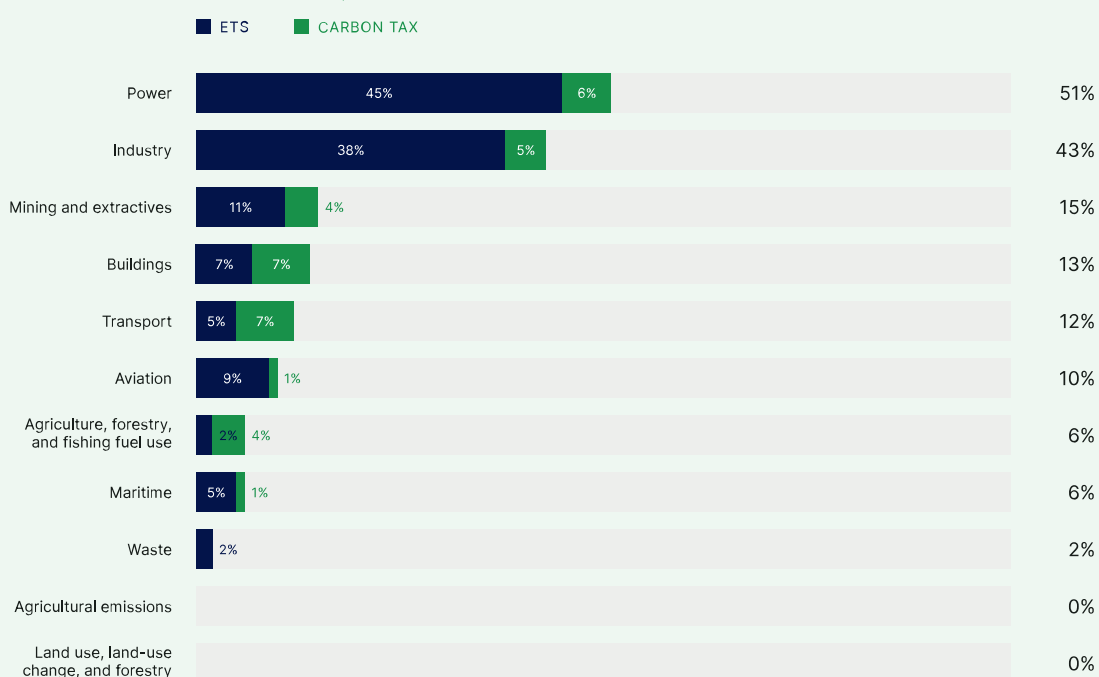
6. World emissions hit record high, but the EU leads trend reversal

https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/world-emissions-hit-record-high-eu-leads-trend-reversal-2025-09-09_en

7. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

8. United Nations Convention on Climate Change, GHG Inventory reports <https://unfccc.int/reports?f%5B0%5D>

SHARE OF EMISSIONS COVERED BY CARBON PRICING, BY SECTOR



Note: Based on World Bank analysis. Values are not additive due to rounding. Aviation and maritime carbon tax coverage are both less than 1%, waste ETS coverage is $\leq 1\%$, and carbon tax coverage is $< 1\%$.

Figure 2. Global greenhouse gas (GHG) emissions by sectors, covered by ETS and carbon tax.
Source — State Trends on Carbon Pricing 2025, World Bank.⁹

A number of studies provided robust empirical evidence reinforcing the theoretical foundation of carbon pricing as a tool to drive emissions reductions. Companies within EU ETS reduced emissions by an average of 14–16% during the period until the end of 2012.¹⁰

Sweden's emissions from manufacturing in 2015 would have been about 30% higher in absence of carbon tax.¹¹

Emissions reductions delivered by a carbon pricing instrument depend on a range of factors, including carbon price levels, sectors covered, access to affordable decarbonisation opportunities. Carbon pricing can deliver outcomes beyond emissions reductions. The World Bank's report Quantifying the Development Benefits of Carbon Pricing summarizes some of these broader

outcomes. By reducing fossil fuel combustion, carbon pricing can deliver cleaner local air and water, which leads to better human health outcomes. Additional potential outcomes include enhanced energy and food security, increased efficiency of national tax systems, higher labour productivity and thus economic growth through replacing inefficient taxes.

Governments continue to advance carbon pricing and markets in the context of broader economic, financial, and social considerations. Beyond carbon pricing as a revenue stream, governments are also adopting carbon pricing alongside regulatory standards, green industrial policies, and social welfare programs to deliver structural changes.

9. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

10. Does Pricing Carbon Mitigate Climate Change? Firm-Level Evidence from the European Union Emissions Trading System https://www.researchgate.net/publication/380851871_Does_Pricing_Carbon_Mitigate_Climate_Change_Firm-Level_Evidence_from_the_European_Union_Emissions_Trading_System

11. The Effect of Carbon Pricing on Firm Emissions: Evidence from the Swedish CO₂ Tax <https://academic.oup.com/rfs/article/37/6/1848/7564224>

12. Beyond Mitigation: Quantifying the Development Benefits of Carbon Pricing <https://documents1.worldbank.org/curated/en/685731622037838059/pdf/Beyond-Mitigation-Quantifying-the-Development-Benefits-of-Carbon-Pricing.pdf>

To summarize, carbon pricing is considered one of the most cost-effective policies to limit climate change. By applying the “polluter pays principle”, carbon pricing is expected to incentivize businesses and individuals to reduce their GHG emissions and invest in cleaner technologies and energy sources. The rationale behind is

that putting a price on carbon will promote changes in behaviour such as changes in production, consumption and investment patterns, while at the same time generating co-benefits and raising revenues which can be used by governments to achieve a wide range of policy objectives.

1.1 Price levels and price certainty

Carbon pricing design aspects are aimed at providing greater certainty on the carbon prices, which can help promote confidence in long-term investment decisions.

All carbon taxes provide near-term certainty through legislated fixed prices, with some setting out planned rate increases either linked to inflation (such as Poland) or through planned price trajectories (such as Ireland and Sweden). Together with this, inflation can have a varied effects on carbon prices, depending on policy design. In some countries tax rates in real terms have fallen over time and thus inflation has eroded the real value of carbon taxes. Also, inflation adjustments may not have immediate effect leading to decrease of real carbon prices before adjustments take effect.

ETSS are increasingly adopting design elements to improve price certainty. Almost half have market stability reserves help to manage price extremes, and around 20% have price floors or auction reserve prices. Other jurisdictions, such as Germany and Austria, have implemented a fixed price on a transitional basis. Inflation, like other macroeconomic fluctuations, affects ETSS differently from carbon taxes, because ETS prices adjust dynamically based on supply and demand within the emissions cap. Inflation can influence expectations of both supply and demand, but ultimately carbon prices in ETSS align with the ambition reflected in the cap.

Carbon price in different countries varies significantly between USD 0.1-160. While the price reached USD 160 per ton of CO₂ equivalent emissions (tCO₂e) in Uruguay, it remained below USD 10 cents per tCO₂e for Poland's carbon tax (although Poland is also part of the EU ETS). In Ukraine, level of carbon tax historically on

low level. Since 2011 it was set on the level of less than 0.41 UAH per tCO₂e, in 2019 increased to 10 UAH per tCO₂e (around 0,2 EUR) and in beginning of 2022 it has tripled to 30 UAH per tCO₂e (around 0,6 EUR). Such low levels of carbon revenues collected are insufficient to finance decarbonisation activities to reach climate neutrality targets.

Only 20% of covered emissions are priced in line with recommendation under the report of High-Level Commission on Carbon Prices¹³, which estimated in 2017 that full incentive effects require prices between USD 40-80 per tCO₂e by 2020, and USD 50-100 per tCO₂e by 2030 to be consistent with limiting temperature rises to well below 2°C. However, in 2025 around 74% of covered emissions were priced below USD 20 tCO₂e.¹⁴

On the ETSS side, around 68% of revenues or USD 44 billion have been used for climate action, while this category represents only around 11% or USD 3 billion in the case of carbon taxes. However, the important weight of the EU ETS in this number should be considered. Its share represents around 64% of the total share for climate and nature — USD 30 billion.

Any comparison to these price levels must consider the spectrum of pricing and non-pricing policies that can support decarbonisation efforts. In relation to pricing policies, indirect carbon prices, such as fuel excise taxes, provide an important price incentive that is not captured in the direct carbon pricing metrics. In most countries, due to the prevalence of fuel excise taxes, the price incentives provided through indirect carbon pricing are often considerably larger than the incentives provided by ETSS and carbon taxes.

13. Report of the High-Level Commission on Carbon Prices https://www.unclearn.org/wp-content/uploads/library/carbonpricing_fullreport.pdf

14. Global carbon accounts 2025. https://www.i4ce.org/wp-content/uploads/2025/06/Global-carbon-accounts-2025_V5.pdf

2 International experience in carbon pricing instruments

As a candidate country, Ukraine has committed under the EU-Ukraine Association Agreement and the accession process to transposing the ETS Directive and establishing a system aligned with the EU ETS. European experience is therefore directly relevant rather than merely illustrative. This chapter reviews the design of the EU ETS and of similar instruments elsewhere, as background to the treatment of revenue use that follows.

2.1 EU Emission Trading Scheme

In 2005, the European Union launched the world's first international emissions trading system, the EU ETS as a key driver for decarbonisation. It has massively reduced fossil fuel consumption, lowering the Union's dependence on imports and strengthening its resilience. In addition, it has driven major investments in the clean energy transition in renewables and low-carbon energy sources, strengthening energy security and contributing to energy independency.

The EU ETS has operated through four trading phases, over which allocation shifted from largely free allocation to auctioning as the default method, coverage expanded across sectors and gases, and national caps were replaced by a single EU-wide cap. The material change came with the 2023 revision of the Directive, which requires Member States to spend 100% of auction revenues on climate action and energy transformation, subject to limited exceptions. By 2023, emissions from covered power and industrial installations had fallen by approximately 47% against 2005 levels.

Table 1. EU ETS trading phases and their relevance to revenue use

Phase	Coverage	Allocation	Revenue relevance	Outcome
Phase 1, 2005-2007	Power generation and energy intensive industry	Almost entirely free. Non-compliance penalty EUR 40	None. No auctioning	Allowances issued exceeded emissions. Price fell to zero in 2007. Phase 1 allowances could not be banked into Phase 2
Phase 2, 2008-2012 ¹⁵	EFTA countries added, N2O added, aviation added, non-EU flights from 2013 ¹⁶	90% free. Penalty EUR 100	First auctioning: 8 Member States auctioned approximately 3% of allowances ^{17,18}	Cap set on actual data, but the 2008 crisis cut emissions further than expected, creating a large surplus that depressed prices throughout. International credits, CDM and JI, approximately 1 to 1.4 bn tCO ₂ , added to the surplus
Phase 3, 2013-2020	More sectors and gases. Single EU-wide cap replaces national caps	Auctioning becomes the default. Free allocation harmonised against benchmarks set at the top 10% most efficient installations per sector	300 m allowances set aside in the New Entrants Reserve to fund innovative renewables and carbon capture through NER 300 ¹⁹	Structural shift from allocation to auctioning establishes carbon revenue as a material fiscal flow

15. EU ETS emissions cap https://climate.ec.europa.eu/eu-action/carbon-markets/eu-emissions-trading-system-eu-ets/eu-ets-emissions-cap_en

16. Reducing emissions from aviation https://climate.ec.europa.eu/eu-action/transport-decarbonisation/reducing-emissions-aviation_en

17. UK holds Europe's first Phase II EU ETS carbon auction <https://www.power-eng.com/environmental-emissions/uk-holds-europes-first-phase-ii-eu-ets-carbon-auction/>

18. EU Emissions Trading System (EU ETS) (International Carbon Action Partnership) <https://icapcarbonaction.com/en/ets/eu-emissions-trading-system-eu-ets>

19. NER 300 programme https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/ner-300-programme_en

Table 1. EU ETS trading phases and their relevance to revenue use (*continued*)

Phase	Coverage	Allocation	Revenue relevance	Outcome
Phase 4, 2021-2028 ²⁰	Maritime added from 2024. Small installations excluded in some Member States. Northern Ireland electricity retained after Brexit ²¹	Linear reduction factor applied to the cap. EEX designated as common auction platform ²²	The 2023 revision requires Member States to spend 100% of auction revenues on climate action and energy transformation, subject to limited exceptions. International credits prohibited.	Emissions from covered power and industrial installations down approximately 47% against 2005 by 2023 ²³

Source: European Commission, EU ETS legislative history; Directive (EU) 2023/959²⁴

The requirement to spend all auction revenue on climate purposes is recent relative to the system as a whole: it has applied only since the 2023 revision, roughly two years into a twenty-year-old scheme. Full earmarking

of carbon revenue at EU level is consequently a development of the current decade rather than a founding feature of the ETS.

2.2 EU Emission Trading Scheme 2 and other instruments

Taking into the account significant gains of ETS, in May 2023, EU has amended it EU ETS Directive and has established the grounds for creation of a new emissions trading system named ETS2 to cover and address the CO₂ emissions from fuel combustion in buildings, road transport and additional sectors (mainly small industry not covered by the existing EU ETS).

Although it will be a cap-and-trade system like the existing EU ETS, the ETS2 will cover emissions upstream. It will be fuel suppliers, rather than end consumers such as households or car users, that will be required to monitor and report their emissions. These entities will be regulated under the ETS2, which means they will be required to surrender sufficient allowances to cover their emissions. The ETS2 cap will be set to bring emissions down by 42% by 2030 compared to 2005 levels.

Alongside with upcoming ETS2, EU is setting binding national targets for EU Member States for emissions outside the ETS1 for the years 2021-2030 under the

Effort Sharing Regulation (ESR). It includes domestic transport (excluding aviation), buildings, small industry, agriculture and waste, accounting for almost 60% of EU emissions. Not covered are emissions from land use, land use change and forestry (LULUCF) for which a separate LULUCF Regulation with national targets exists. National emissions reduction targets under the ESR recognise the different capacities of Member States by differentiating targets according to GDP per capita.

Member States are deciding how the national policies designed in order to achieve their emissions reduction targets under the ESR and some Member States have explicitly designed their national carbon taxes in line with the ETS2 scope. It is currently unclear whether the ESR approach will still be applied after 2030 as most ESR emissions are expected be covered by the ETS2 from 2027-2028 onwards. There are also discussions for introducing ETS3 for agriculture in the future.

20. Phase 4 of EU ETS https://climate.ec.europa.eu/news-other-reads/news/start-phase-4-eu-ets-2021-adoption-cap-and-start-auctions-2020-11-17_en

21. Changes to the existing ETS and MRV applying from 1 January 2024

https://climate.ec.europa.eu/news-other-reads/news/changes-existing-ets-and-mrv-applying-1-january-2024-2024-04-26_en

22. Start of phase 4 of the EU ETS in 2021: adoption of the cap and start of the auctions

https://climate.ec.europa.eu/news-other-reads/news/european-energy-exchange-appointed-eu-ets-common-auction-platform-2021-2020-11-09_en

23. In May 2023, amendments related to the ETS in Directive (EU) 2023/959 increased the share of revenues for the climate transition in the existing EU ETS and included revenue uses for a newly created ETS2, among other changes

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02003L0087-20240301>

24. Development of EU ETS https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/development-eu-ets-2005-2020_en;

<https://eur-lex.europa.eu/eli/dir/2023/959/oj>

2.3 Experience of other countries in carbon pricing instruments

Mexico's ETS developed through a pilot phase (2020–2021) and transitional phase (2022). Final regulations and the launch of the operational compliance phase are expected at the end of this year or in 2026. Emissions allowances are currently allocated freely based on historic emissions. Auctions will begin during the operational phase, currently institutional arrangements and preparatory measures are being implemented to start them. Participation under the pilot and transition phase has been limited to compliance entities and offset credit providers.²⁵

Canada Output-Based Pricing System (OBPS)²⁶ is a regulatory a non-traditional ETS system for large industry. It functions as a regulatory trading system for industrial emitters, allowing facilities to trade surplus credits if they emit below an intensity standard (emissions per unit of output) and pay a charge if they exceed it. If a facility's emissions are below its annual limit, it will earn surplus credits. These surplus credits can be sold to facilities that need credits for compliance or banked for future use. Canada also had a fuel charge, which was repealed in April 2025 mainly due to intense political pressure, rising cost-of-living concerns, and its unpopularity among voters.

China's national ETS represents the largest untapped source, which now covers 15% of global emissions following its 2025 expansion to include the steel, cement, and aluminium sectors, but 100% of its allowances are allocated for free. This notion of potential government revenue that is not collected due to specific policy choices is referred to as “foregone revenue” and can also apply to taxes that have exemptions or reductions in place.

Liechtenstein's carbon tax is among the most ambitious carbon pricing instrument globally, with a price reaching USD 136 in 2024 covering 72% of the country's emissions — its small amount of revenue generated is explained by the size of the country's economy.

Spain's tax only covers 2% of the country's GHG emissions (targeting fluorinated gases) at a price of USD 16.

In Norway, tax incentives combined with carbon pricing have resulted in electric cars accounting for nearly all new car sales.

25. Mexico Carbon Markets Poised for Expansion in 2026 <https://natlawreview.com/article/mexico-carbon-markets-poised-expansion-2026>

26. Output-Based Pricing System (Government of Canada)

<https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system.html>

3 Why carbon revenues matter, and how to approach their use

3.1 Why do carbon revenues matter?

The issue of financing climate action and sustainable development is a global and major challenge, requiring substantial investments into innovative, low-carbon and efficient technologies.

The estimated annual investment gap for climate action and achieving Sustainable Development Goals (SDGs) only in developing countries has exceeded the level of 4 trillion USD in 2023 and is much higher on the global level²⁷. According to top-down estimates of the Independent High-Level Expert Group on Climate Finance, USD 6.3–6.7 trillion are needed each year for global climate investments by 2030²⁸.

Carbon pricing instruments could generate approximately USD 2.6 trillion of revenues if all 2024 emissions are priced at USD 50 per tCO₂e. Even though carbon pricing revenues cannot fill all investment gaps, they can make significant contribution and serve as a multiplier to additional co-investments to finance the climate transition, decarbonisation and support the most vulnerable to avoid negative socio-economic consequences towards achieving SDGs.

As for Ukrainian context, according to result of modelling in LT-LEDS, investment needs for decarbonisation of Ukrainian economy and reaching climate neutrality in Ukraine by 2050 will exceed 1 trillion EUR Ukrainian economy. This means that Ukraine will need to find ways on how to significantly increase sources of funding and effectively use them to reduce energy and carbon intensity of Ukrainian economy, and it will be important to generate and integrate carbon revenues

and additional financing into such climate related strategies as LT-LEDS and NDC.

In order to ensure effective integration, a broader discussion of how to finance climate action should be carried out during development and implementation of financing plans under the climate strategies. These plans can then serve as effective tools that provide a clear picture of the investments needed, as well as required policy and funding options to fill the finance gap and address macroeconomic implications.

In 2024, over 100 billion USD of carbon revenues (67% by ETSs and 33% by carbon taxes) were mobilized for national budgets globally. Despite slow reduction in collected volumes during the recent years, largely as the result of lower allowances prices in ETSs in 2023–2024, since 2015 revenues have increased by four times mainly by the EU ETS accounting for 44% of global carbon revenues.

Together with this, it should also be noted that the total amount is just a fraction of total government tax revenues collected globally and significantly less than money spent on fossil fuel consumption subsidies (USD 620 billion³¹). In Ukraine fossil fuels subsidies varied significantly between UAH 145 billion (EUR 2.9 billion) in 2018 to UAH 8,3 billion (EUR 166 million) in 2021 due to different reasons (compensation to utility providers, targeted subsidies etc.)³².

27. SGD Trends Monitor https://unctad.org/system/files/official-document/diaemisc2023d6_en.pdf

28. New report recommends COP29 negotiations on climate finance should focus on mobilising \$1 trillion per year for developing countries by 2030 <https://www.lse.ac.uk/granthaminstitute/news/new-report-recommends-cop29-negotiations-on-climate-finance-should-focus-on-mobilising-1-trillion-per-year-for-developing-countries-by-2030/>

29. Report “Maximising benefits of carbon pricing” (I4CE) https://www.i4ce.org/wp-content/uploads/2024/05/Maximising-benefits-of-carbon-pricing_27june.pdf

30. Draft Long-Term Low Emission Development Strategy (LT-LEDS) <https://me.gov.ua/download/ba4565a8-544b-4c90-af84-49b2b718f629/file.pdf>

31. Fossil Fuel Subsidies Tracking the impact of government support <https://www.iea.org/topics/fossil-fuel-subsidies>

32. Review of energy subsidies in the context of energy sector reforms in Ukraine (OECD) https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/12/review-of-energy-subsidies-in-the-context-of-energy-sector-reforms-in-ukraine_26ed6eac/0fdb33b3-en.pdf

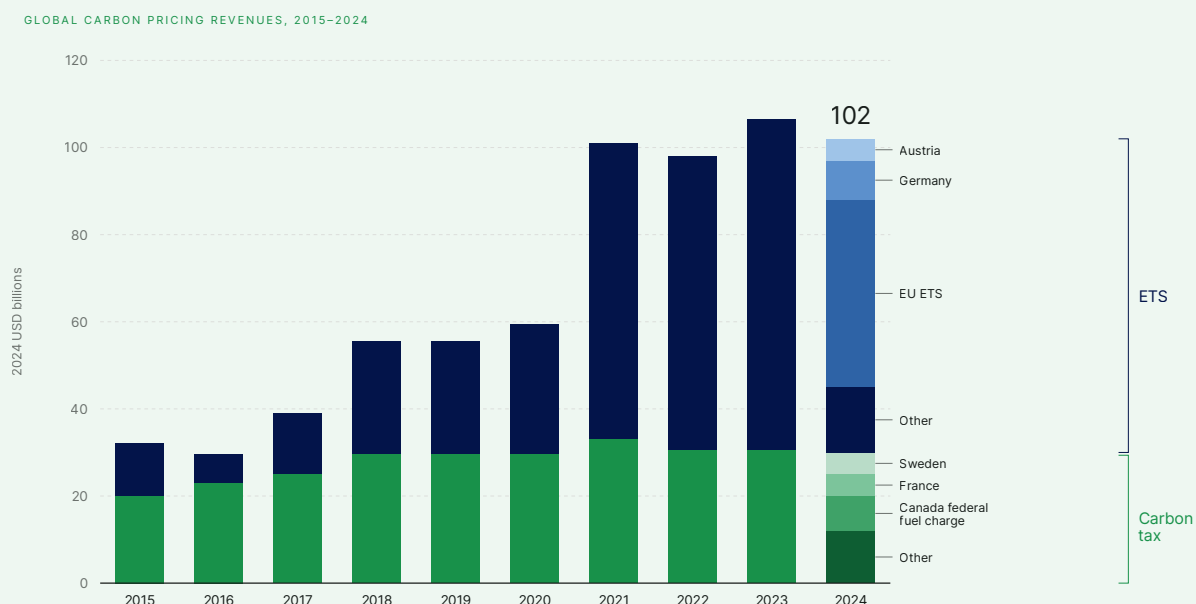


Figure 3. Total revenues from ETSs and carbon taxes, 2015-2024 — State Trends on Carbon Pricing 2025, World Bank³³

Carbon revenues continue to provide small but important source of revenues towards decarbonisation, building resilience, protect nature and biodiversity and also for other necessary budget expenditures, however they need to be well managed to avoid impacts of carbon pricing and maximize benefits for climate policy and other objectives. Good decisions on the use of carbon revenues generate a double benefit, meaning they can have more than one positive effect ensuring public acceptability of carbon pricing.

Possible ways forward on the use of carbon revenues should carefully consider country-specific contexts and constraints. International experience demonstrates that countries adopt various approaches of using

carbon revenues to pursue specific policy objectives, from injecting the revenues into the general budget without dedicated use or to address fiscal pressure, to supporting implementation of low-carbon and climate resilient pathways and addressing economic and social implications of carbon pricing.

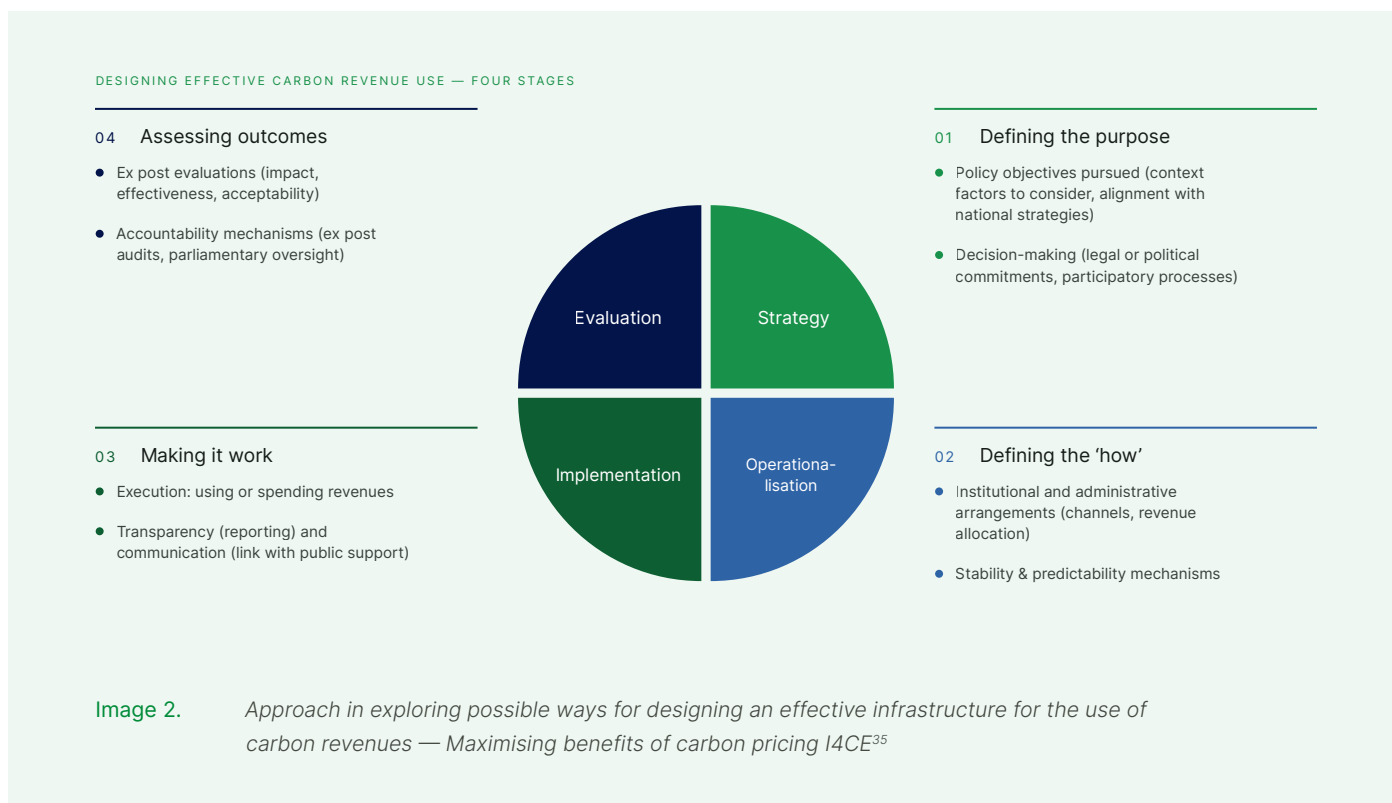
Considering what was mentioned above, targeted and effective use of carbon revenues towards decarbonisation and social justice leads to a number of co-benefits, eventually leading to enhancement of the competitiveness of the economy, social well-being, deliver cleaner local air and water, which leads to better human health outcomes.

33. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

3.2 Approach to designing effective carbon revenue use

In order to develop a comprehensive and effective system of carbon revenue use it is necessary to follow structured approach from planning to implementation with evaluation of the results in the end. A report developed by the Institute of Climate Economics (I4CE)

on “Maximising benefits of carbon pricing”³⁴ developed by the Institute for climate economics, proposed the following four step approach in exploring possible ways and designing and effective infrastructure for the use of carbon revenues:



1. **Strategy:** when policy makers define specific purposes for carbon revenue use — focusing on environmental, social, and/or economic aspects to maximise the benefits and minimise negative impacts of carbon pricing on society and the economy, which can be aligned with broader policy objectives in strategic planning documents.
2. **Operationalisation:** depending on the purpose, considering several options for institutional and administrative arrangements to operationalise carbon revenue use (e.g. using special-purpose fund to channel revenues for climate), which should be assessed to consider possible trade-offs and be based on the choice of policy objectives.
3. **Implementation:** this step entails using carbon revenues as planned — through the institutions and channels defined for different purposes — but considering transparency and communication as key aspects to generate trust and increase public support.
4. **Evaluation:** in the end of each process assess outcomes and their alignment with policy objectives pursued, which translates into having accountability mechanisms in place including internal evaluations, external audits, and/or oversight mechanisms. The dimension of acceptability of carbon revenue use can be included among outcomes to assess.

34. Report “Maximising benefits of carbon pricing” (I4CE)

https://www.i4ce.org/wp-content/uploads/2024/05/Maximising-benefits-of-carbon-pricing_27june.pdf

35. Report “Maximising benefits of carbon pricing” (I4CE)

https://www.i4ce.org/wp-content/uploads/2024/05/Maximising-benefits-of-carbon-pricing_27june.pdf

The overall process should ensure that the:

- costs and benefits are distributed fairly, efficiently and effectively,
- policies are aligned with strategic documents and overall objectives,
- developed system is ensuring stability and predictability by sending consistent and credible signals
- infrastructure is designed transparently, ensuring clarity during design stage and implementation
- environmental/climate, economic and social consideration are taken into the account.

The next blocs will review each step in detail.

3.2.1 Strategy: Defining the purpose

Environmental / climate sphere is connected to acceleration of ecological transition and climate action (including prevention carbon leakage), economic sphere — with addressing issues related to economic sphere in terms of competitiveness and fiscal stability, and the social sphere is related to addressing issues faced by citizens due to carbon pricing impacts. In real life, specific focuses can be decided upon, such as:

- addressing all three spheres by supporting decarbonisation, adaptation to climate change, and implementation of clean technologies by households and businesses,
- supporting mainly economic and social objectives in overcoming carbon pricing impacts, and other purposes such as debt reduction.

When the strategy is developed, the following purposes and aspects should be taken into the account:

1. Carbon revenues use can provide “double dividend” in improvement of both environmental and economic aspects via carbon pricing system rather than by applying distortionary taxes to generate revenues for such needs. This means that to prevent possible negative impacts and to achieve positive outcomes beyond environmental ones, revenues can be used to reduce other taxes.
2. When developing a strategy for the use of carbon revenues use system (especially within ETS) it is necessary to address and avoid the “waterbed” effect, when decarbonisation efforts in one sector are leading to increase of emission in other sectors due to overall cap of emissions. Even when additional funding beyond carbon revenues is

provided to other sectors, this can lead to reduction of demand on allowances leading to lower incentives in reduction of GHG emissions and lower carbon prices. It's therefore necessary to address different sectors wisely and also use market stability reserve mechanisms to have a space for adjustments framework. But there are ways to offset the ‘waterbed effect’ that should be considered as part of the design of ETs, such as mechanisms that allow to adjust the supply of allowances.

3. Public preferences on the use of carbon revenues and acceptability of carbon pricing: Some studies suggest public support is higher when carbon revenues are given specific purpose, as this allows the public to see clearly what they are funding.

Putting a chosen strategy into a financial plan starts from an investment needs assessment, identifying which actors and sectors require investment and drawing on the targets already set in national climate legislation, NDCs and the LT-LEDS. Responsibility is then split between central government, public agencies and regional or local government, and between support directed to households and to businesses. Financing tools, price signals, co-investment, loans, subsidies, de-risking measures, should be combined into a single funding procedure rather than allocated project by project, and can be supplemented by green bonds, international climate finance and other fiscal instruments.

The country evidence reviewed in this paper is concentrated in the operationalisation, implementation and evaluation steps below. Comparable evidence on how countries actually arrived at their strategic choice of purpose, as distinct from the purpose itself, was not identified in the sources consulted.

3.2.2 Operationalisation: Defining the 'how'

Operationalisation of carbon revenue use can be addressed in the broader context of climate governance architecture and coordination aspects, as decisions on institutional and administrative arrangements are needed depending on aims pursued and ways to channel carbon revenues that could better serve the purpose. These can be existing or created funds and/or instruments specifically for this purpose.

Generally, there are three different options for institutional and administrative arrangements for carbon revenue use having their pros and cons:

1. Channelling revenues through the general budget with a possibility to combine with special accounts or programs under the budget to address issues of transparency and accountability. It is a simpler from an administrative standpoint, however this may not maximize effectiveness and can be less transparent depending on the mechanisms in place to track the use of revenues.
2. Channelling through special-purpose funds ensures transparency and high visibility of the benefits from fund measures, as well as increases public support. However, they are complex to set

up and manage as they require cross-government coordination and collaboration.

3. Channelling via other structures to ensure a low administrative burden, such as social security or tax system. This option is better suited for purposes like supporting households affected by carbon pricing with transfers or tax credits ensuring transparency, however effective in terms of communication and visibility.

Decisions on institutional and administrative arrangements for the use of carbon revenues should consider possible trade-offs and be based on strategic and policy objectives.

Together with this, in order to implement and manage an efficient carbon revenue use system it is necessary to ensure public coordination process, requiring significant inter-ministerial and inter-agency collaboration. It also raises questions as to the separation of powers between the executive and the legislative branches, as some countries choose to handle the revenues outside of the budgetary process. In the end of the day, it can also challenge traditional public spending processes and require specific oversight and control organisations.

3.2.3 Implementation: Making it work

The actual use of revenues can be seen as an implementation phase. At this stage, revenues directed to fund initiatives.

Specific purposes of carbon revenue use can be divided into the following categories:

1. Climate change mitigation and adaptation, including other environmental protection measures (nature, biodiversity),
2. Infrastructure development, health protection and education,
3. Transfers to households with just transition focus,
4. Transfers to businesses with a focus on competitiveness and carbon leakage prevention,
5. Reduction of other taxes or tax rebates to lower the impacts of carbon pricing,
6. Reduction of national debt levels,
7. International support to other countries to advance with climate action,
8. Other national priorities and objectives,
9. Transfers to the national budget without specific purpose.

Policy makers will need to reflect on and define the best way to report on how the money is used, and what strategies and channels are the most suitable to ensure effective communication and foster acceptability of carbon pricing. The level of transparency will largely determine the accuracy of the picture presented on how proceeds from carbon pricing have been used.

Transparency and communication

Reporting, transparency, and communication which are key aspects that ensure public support. People are more likely to accept a carbon price when the revenues are spent on projects that are consistent with environmental goals, are of high public concern or are returned to the public as rebates or tax cuts.

In some countries visible use of carbon price revenues is often essential to ensure acceptability of carbon pricing, instead of complex and highly technical arguments in favour of the policy. This is particularly relevant in contexts where narratives around negative impacts of carbon pricing can be easily used for political purposes in times of elections.

International experience shows that the level of addressing transparency of revenues use can be high (reports with detailed information on the use of revenues with amounts allocated, measures funded, funding conditions and beneficiaries), medium (with general information without key details and detailed reports) and low (with limited or not easily accessible information).

Together with this, understanding public opinion on carbon pricing is a key step that will help governments to decide what kind of communication strategy they should pursue. Citizens are usually more focusing on how the revenues are used rather than regarding expected environmental and climate impacts.

The Guide to Communicating Carbon Pricing³⁶ highlights three narratives used to frame communications on the use of carbon revenues that have worked well (fairness, balance, and shift to clean energy) and other that were less effective (cost, expert consensus, and threat of climate change).

People tend to accept that taxes pay for government services and accept that the costs need to fall somewhere, especially when revenues are spent in ways they support or are consistent with the stated goals of the tax. Presenting carbon pricing as revenues generator for more popular policies can be an effective approach to communications, compared to making communications around the cost and price of the reform.

Also, focus on the revenue use towards improvement of people's lives, such as funding green energy subsidies for energy efficiency enhancements and implementation of climate and energy strategies can be beneficial. Different polls have consistently found that earmarking of carbon revenues for green infrastructure and technology, with provision of direct rebates to the public, attracts more support than approaches favoured by economists (i.e. revenue recycling through tax cuts or deficit reduction).

Visibility can be increased with branding (i.e. signs reading "supported by revenue from the carbon price" at project sites and nearby). In addition, governments can develop clear and regular reports and other communications materials describing how revenue has been used, which should be available and accessible for the public.

Public trust in carbon pricing cannot be separated from trust on how the revenues are used. On one hand, institutions and funds managing revenues need to be trusted to do so in effective, honest and transparent way and, on the other hand, beneficiaries of revenues are trustworthy and effective in terms of responsible use of revenues.

3.2.4 Evaluation: Assessing outcomes

At this final stage outcomes of carbon revenue use can be assessed, with a focus on evaluation, external oversight, or accountability mechanisms.

Firstly, an evaluation process should be conducted to ensure accountability and, secondly, an external oversight should be conducted in forms of assessments and audits as a control measure. Evaluating carbon revenue use is intended to prove that revenues are being used effectively, beyond only making information available on factual or intended uses. External oversight should involve participation of independent

bodies in evaluation procedures. These can include ex-post assessments or audits. Independent auditors, committees, state agencies, parliament, civil society or international organisations are the actors that can be involved in this process.

Finally, assessment of issue of carbon revenues acceptability can be beneficial. It can be done by assessing the level of public support towards carbon pricing as the result of used revenues via surveys and interviews among general population and/or connected stakeholders.

36. Guide to Communicating Carbon Pricing <https://documents1.worldbank.org/curated/en/668481543351717355/pdf/132534-WP-WBFINALonline.pdf>

4 International experience in carbon revenues use

Having established why the use of carbon revenues matters, this chapter turns to how jurisdictions have approached it in practice. Currently, carbon revenues remain relatively concentrated among a few major mechanisms: the EU ETS alone accounts for 41% of total revenues, followed by the German national ETS 14%, and the Canadian carbon tax (9% prior to its repeal in April 2025).

Different countries develop various approaches to decision-making on policy objectives for carbon revenue use. Some countries are earmarking revenues strongly by making it legally binding and some countries earmarking softly in a form of political commitments and strategies/plans without legal force. Other countries can apply hybrid approach, it is stronger when a share of carbon revenues is earmarked legally and the rest are fed into the general budget, and it is weaker when earmarking of certain share is not legally binding. Finally, the least efficient approaches are not earmarking revenues for certain purposes at all.

In 2024, 56% of carbon revenues globally were earmarked for activities contributing to climate change mitigation and adaptation, environmental protection, or development. 25% total revenues are redistributed either directly through transfers to households or businesses (19%) or indirectly via tax exemptions or reductions (6%) to economically impacted actors (companies and citizens). 19% were transferred to national budgets without specific earmarking.

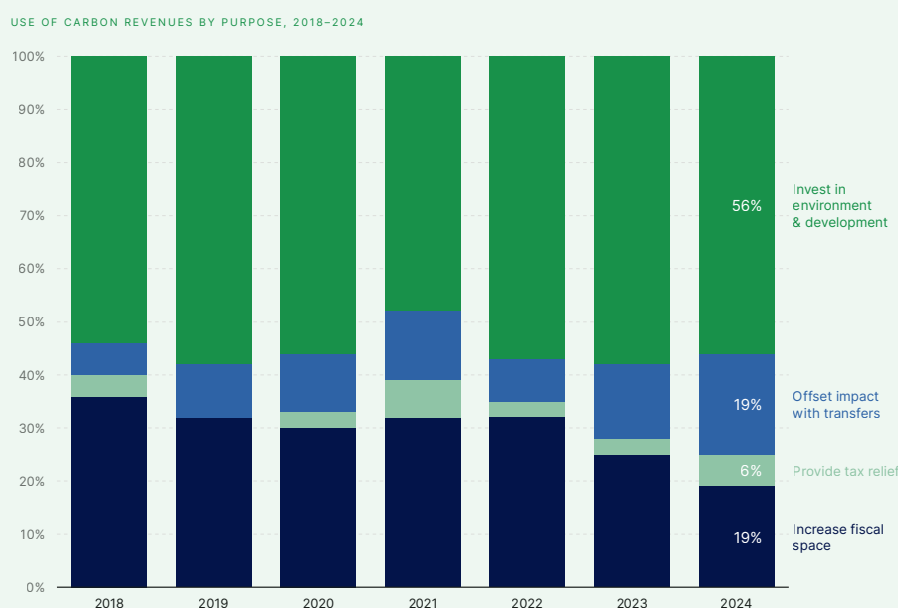


Figure 4. Share of ETS and carbon tax revenues by category — State Trends on Carbon Pricing 2025, World Bank³⁸

A number of countries are directing revenues to decarbonisation purposes in priority areas in line with their strategic documents. Also, in some cases carbon revenues are used for operationalisation and maintenance of ETSs and carbon taxations systems.

37. This system places a price on CO₂ emissions from fuel used in heating and transport, which are sectors largely outside the scope of EU ETS 1

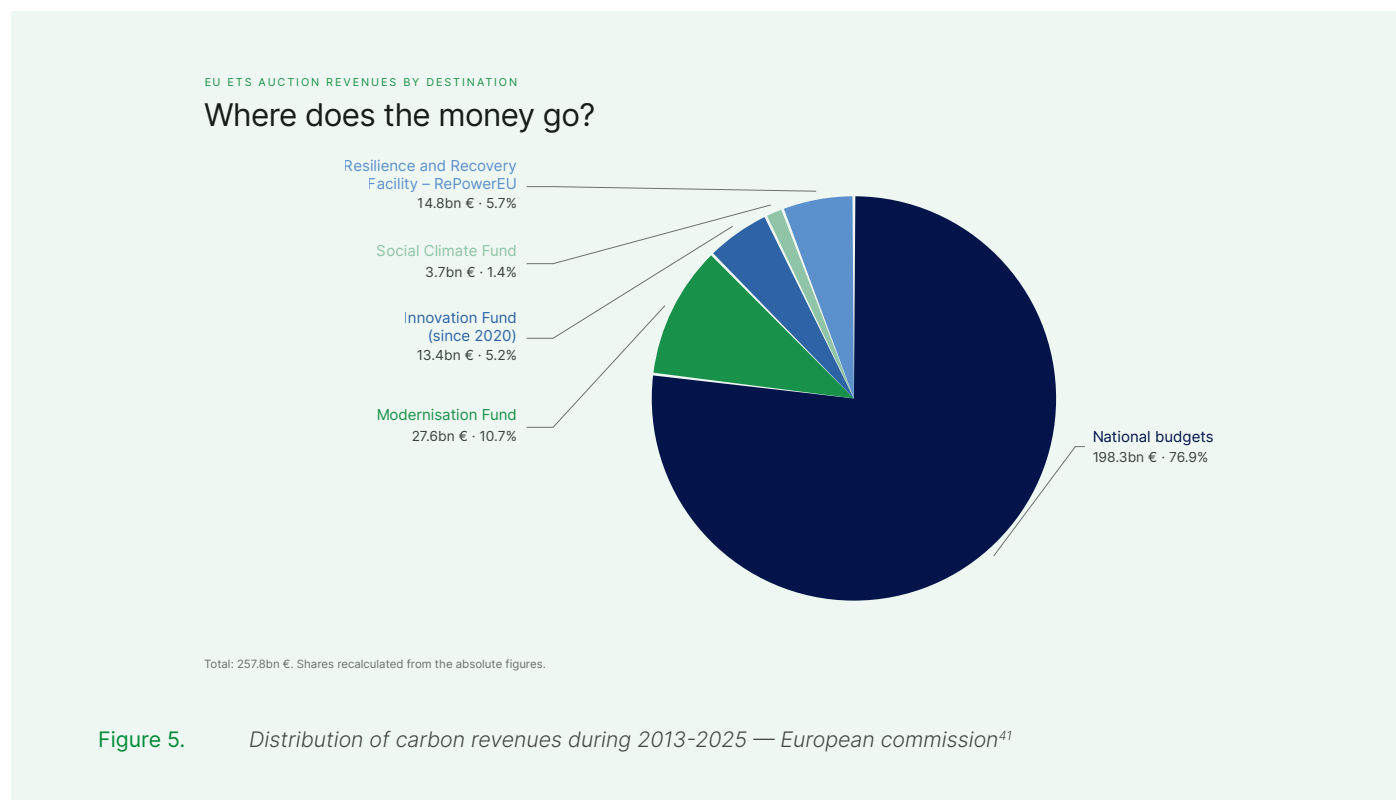
38. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

4.1 Carbon revenues use by EU Member States

Under the EU ETS Directive, 90% of the total quantity of allowances to be auctioned is distributed among Member States, and 10% is distributed among certain Member States for the purposes of solidarity, growth and interconnections within the Union.

From 2013 and until the end of 2025, the EU ETS generated over €258 billion in auction revenues³⁹. Out of

this amount, €198.3 billion (77%⁴⁰) went to the national budgets of Member States, €27.6 billion (10,7%) to Modernisation fund, €13.4 billion (5.2%) to Innovation fund (since 2020), €3,7 billion (1,4%) to Social Climate Fund (2025), €14,8 billion (5,7%) to Resilience and Recovery Facility (RePowerEU) (since 2023).



All countries receiving EU ETS revenues could decide whether to channel them through their national budgets or other means such as special purpose funds. It should be noted that around 75% of revenues directed to the national budgets of Member States were earmarked for specific purposes, which can be considered as a significant level of revenues utilisation, taking into the account that 25% of revenues can be used by Member States to address the risk of carbon leakage due to significant indirect costs that are actually incurred from greenhouse gas emission costs passed on in electricity prices.

In 2025 alone, the system generated a total of €43 billion in auction revenues. Out of this amount, some €24 billion was distributed directly to EU Member States that are required to spend at least 50% on climate-related purposes and could use up to 25% for financial measures that support carbon intensive industries in addressing carbon leakage risks due to indirect carbon costs. Remaining funds went to Innovation Fund (€2,4 billion, 5.5%), the Modernisation Fund (€6,3 billion, 14,6%), the Recovery and Resilience Facility (€5.6 billion, 13%), and the EFTA countries and Northern Ireland (€0,25 billion)⁴². In 2025, EU ETS allowances have also been auctioned for the Social Climate Fund.

39. How do Member States use ETS revenues?

https://climate.ec.europa.eu/eu-action/carbon-markets/eu-emissions-trading-system-eu-ets/how-do-member-states-use-ets-revenues_en

40. Although 90% of the auctioned allowances allocated to countries are distributed proportionally, the actual share of revenues that goes to national budgets (after all deductions to central funds) is typically 60–75% of the total ETS auctioned allowances.

41. How do Member States use ETS revenues?

https://climate.ec.europa.eu/eu-action/carbon-markets/eu-emissions-trading-system-eu-ets/how-do-member-states-use-ets-revenues_en

42. Use of auctioning revenues generated under the EU Emissions Trading System

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

It should be taken into the account that EU ETS auctioning revenues represent only 10%, of the real economy climate investments in key sectors that reached €407 billion in 2022, while the European climate investment deficit estimated at €406 billion annually⁴³.

As the result of amendment of EU ETS Directive in 2023, the lists of climate related activities that can be implemented using carbon revenues was expanded to cover additional purposes to be used by Member States and channelled through Innovation, Modernisation and Social Climate Funds. The list of activities is provided below:

- Industrial decarbonisation
- Deployment of renewable energy, development of electricity grids and energy efficiency improvement
- Development of clean technologies
- Decarbonisation of transport sector
- Carbon sequestration and carbon capture and storage (CCS)

- Avoiding deforestation and support in protection and restoration of peatlands, forests and other land-based ecosystems or marine-based ecosystems by increasing biodiversity-friendly afforestation and reforestation
- Climate change adaptation
- Green skills, education and capacity development
- Just transition and support to vulnerable population (addressing social aspects in lower- and middle-income households and energy poverty)
- Addressing leakage in the sectors by supporting the transition and promoting their decarbonisation
- Covering administrative expenses of the management of the ETS
- Financing climate actions in third countries

Around 9% of EU ETS revenues are directed to support positive social outcome, capacity development and education.



43. European Climate Investment Deficit report, I4CE https://www.i4ce.org/wp-content/uploads/2024/02/20240222-i4ce3859-Panorama-EU_VA-40p.pdf

44. Report "Maximising benefits of carbon pricing" https://www.i4ce.org/wp-content/uploads/2024/05/Maximising-benefits-of-carbon-pricing_27june.pdf

4.2 Purposes of carbon revenue use across jurisdictions

Across the jurisdictions reviewed, carbon revenue purposes cluster into four broad groups: capital investment in decarbonisation, compensation to households or vulnerable groups, support to energy-intensive industry, and administration of the pricing system itself. The balance between these purposes, and the channel through which revenue reaches them, varies systematically by jurisdiction.

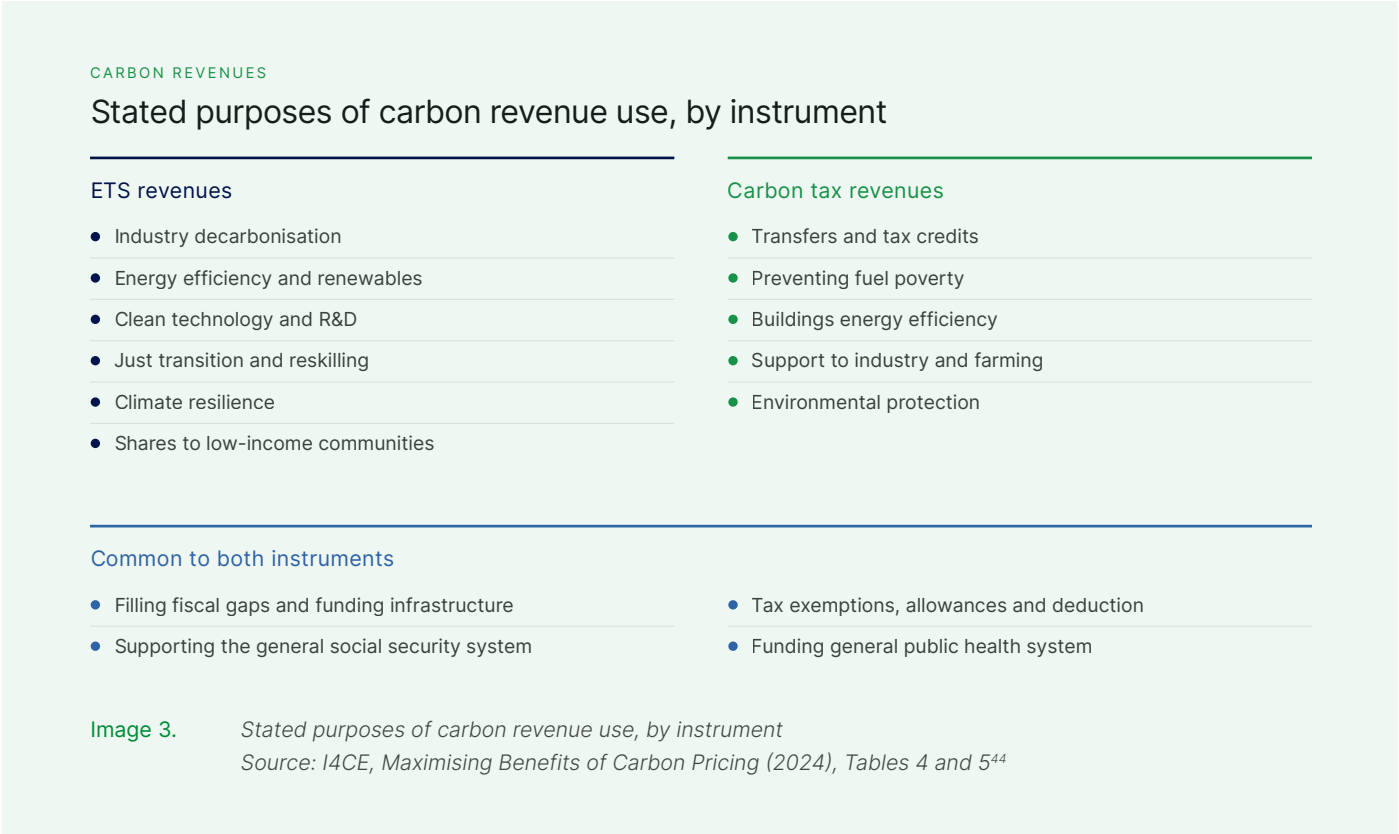


Table 2. International experience: purposes of carbon revenue use

Jurisdiction	Instrument	Channel	Earmarking	Principal purposes
Germany ⁴⁵	National ETS	Special purpose fund (KTF), special account within the budget	Legal	Renewables, building efficiency, industry/transport decarbonisation, R&D, vulnerable households, energy-intensive industry compensation
Austria ⁴⁶	NEHG	Tax system, via the Office for National Emissions Certificates Trading	Legal (2022-2024; redistribution mechanism abolished from 2025, revenue now to general budget)	Two tier per capita payment with geographic adjustment
Poland ⁴⁷	EU ETS	Mixed: 75% national budget, 25% Indirect Emissions Cost Compensation Fund. Separately, NFOŚiGW	Legal, partial	Climate and energy measures; compensation to energy intensive companies for indirect ETS costs in electricity prices
Croatia ⁴⁸	EU ETS	Special purpose fund: EPEEF, established by law 2003	Legal	Energy efficient technology, forest management, afforestation, adaptation, ETS administration
Greece ⁴⁹	EU ETS	Primarily the Green Fund (Law 3889/2010); new Decarbonisation Fund for the islands (2024)	Legal	Just transition reskilling and relocation, vulnerable households, climate resilience
Cyprus ⁵⁰	EU ETS	General budget, tracked against ETS Directive Art. 10(3) categories	Political/administrative	Forest sequestration, renewables, low emission public transport
California ⁵¹	Cap and trade	Special purpose fund (GGRF), plus CPUC	Legal	High speed rail, affordable housing and sustainable communities, low carbon transportation, clean technology. 47% of revenues to disadvantaged communities, 26.5% to low-income communities, 26.5% to other areas
Quebec	Cap and trade	Special fund (ECCF), separate accounts and distinct reporting obligation, managed by Ministry of Environment	Legal	Climate action under the 2030 Plan for a Green Economy

45. Germany's emissions trading revenues rise to record 21.4 billion euros (Clean Energy Wire)

<https://www.cleanenergywire.org/news/germanys-emissions-trading-revenues-rise-record-214-billion-euros>

46. ICAP, Austria National Emissions Certificate Trading System <https://icapcarbonaction.com/en/ets/austrian-national-emissions-certificate-trading-system>

47. Revenues from ETS auctioning as source of financing for low-emission Modernisation in Poland (Forum Energii)

<https://www.forum-energii.eu/en/revenues-from-ets-auctioning-as-source-of-financing-for-low-emission-modernization-in-poland>;

Poland has record revenue from CO₂ sales. What is it spending it on? (Wysokie Napięcie)

<https://wysokienapiecie.pl/en/102922-poland-has-record-revenue-from-co2-sales-what-is-it-spending-it-on/>

48. Climate Action Progress Report 2024, Croatia (European Commission)

https://climate.ec.europa.eu/document/download/84d24d64-ab83-4239-be10-c89688b768f0_en?filename=hr_2024_factsheet_en.pdf

49. Climate Action Progress Report 2024, Greece (European Commission)

https://climate.ec.europa.eu/document/download/ed870f48-1758-41d5-be98-adadd79ca3fe_en?filename=el_2024_factsheet_en.pdf

50. Climate Action Progress Report 2024, Cyprus (European Commission)

https://climate.ec.europa.eu/document/download/cdccc78c-80bf-4a5d-9d6d-62c26aab1ff0_en?filename=cy_2024_factsheet_en.pdf

51. Greenhouse Gas Reduction Fund (US EPA) <https://www.epa.gov/aboutepa/greenhouse-gas-reduction-fund>;

California Climate Investments <https://www.caclimateinvestments.ca.gov/>; California Public Utilities Commission <https://www.cpuc.ca.gov/>

Table 2. International experience: purposes of carbon revenue use (*continued*)

Jurisdiction	Instrument	Channel	Earmarking	Principal purposes
Korea	K-ETS	Special purpose fund (Climate Action Fund)	Legal	Emissions-reduction investment aligned with national climate targets, low-carbon technology, support for carbon-intensive sectors in transition, operation of the trading system
Canada ⁵²	OBPS	OBPS Proceeds Funds, DIP and FEF	Partial	Return to jurisdiction of origin, decarbonisation incentives, electricity
Japan	GX scheme	Special account within the budget plus GX bonds	Legal	Industry decarbonisation, bond reimbursement
Ireland	Carbon tax	General budget, allocation published annually	Political, tracked	Allocated via departments, published in a budget annex by the Department of Public Expenditure and Reform
Norway	Carbon tax	General budget	Political, partial (road-duty offset only)	Compensation for tax increase via reduced road-use duty
Switzerland	Carbon tax	Mixed: social security system (2/3) + Buildings Programme/Technology Fund. Separately, the Swiss ETS uses the general budget with no earmarking at all	Carbon tax: legal. ETS: none	Per capita redistribution via health insurers, building efficiency, Technology Fund
Luxembourg ⁵³	Carbon tax	Special purpose fund (FCE), oversight from Interministerial Management Committee and Ministry of Finance	Legal	Klimabonus: mobility, housing, renewables, ecosystem services, international support

Source: IACE (2024); European Commission Climate Action Progress Report country factsheets (2024); national sources as footnoted

Three patterns emerge from this comparison. First, channel choice tracks the purpose pursued rather than the size of the revenue involved: jurisdictions pursuing household compensation route revenue through tax or social security infrastructure that already reaches households, as in Austria and the Swiss carbon tax, while jurisdictions pursuing capital investment build dedicated funds, as in Germany, California, Quebec, Korea and Luxembourg. Second, legal earmarking is the norm rather than the exception once a jurisdiction commits to a purpose, thirteen of the fifteen jurisdictions

above carry some form of legal or statutory commitment, though legal status does not guarantee permanence: Austria's mechanism was legally earmarked and was nonetheless discontinued under fiscal pressure in 2025. Third, a single country can run more than one carbon-pricing instrument with entirely different governance: Switzerland's carbon tax is earmarked by law while its emissions trading system is not, illustrating that revenue governance is a property of the individual instrument rather than of the country as a whole.

52. Climate Funds in Canada, OBPS Proceeds Fund (Government of Canada) <https://www.canada.ca/en/environment-climate-change/services/climate-change/carbon-pollution-pricing-proceeds-programming/output-based-pricing-system-proceeds-fund.html>

53. Climate and Energy Fund (Klima-Agence) <https://www.klima-agence.lu/en/>; Klimabonus subsidies <https://www.klima-agence.lu/en/about-klimabonus>

4.3 Institutional and administrative arrangements

The operationalisation of carbon revenue use is a part of climate governance architecture involving a complexity of actors, roles, and interactions.

Observed practices on decision-making processes in different countries on the allocation of carbon revenue (e.g. UK through the general budget, California with a special purpose fund and Switzerland with social security system) show the need for effective coordination among different institutions, with a key role of Ministries of Finance, as well as of the legislative power.

Roles and interactions can complexify when specific structures such as special purpose funds are involved in channelling revenues, even more complex and time consuming in cases where other steering or coordination instances such as boards take part in decision making. However, such complex approaches have demonstrated high level of transparency and effectiveness in use of carbon revenues.

Ensuring stability and predictability of carbon revenues is a key step in the process, and these practices are strongly linked to the determinants of carbon revenues: prices and coverage. They can include increases in prices and scope in the case of carbon tax, and several others in the case of ETSs including back-loading of allowances, market stability mechanisms, decreasing caps, and phasing out of free allocations.

For the purpose of this study, it is important to learn the experience of the countries that are channelling carbon revenues via special purpose funds and mixed systems, as such approaches demonstrate how to ensure high integrity, transparency and effectiveness of utilizing such revenues. Experience of using carbon revenues through national and subnational budgets and special accounts within the budget could be relevant for Ukraine in case if such system would ensure their channelling and effective use for the needs of decarbonisation and vulnerable population, or as a part of mixed system. It is also important that the rules for State aid are applied in accordance with Guidelines on State aid for climate, environmental protection and energy⁵⁴ and Guidelines on certain State aid measures in the context of the system for greenhouse gas emission allowance trading post-2021⁵⁵ for all activities funded with carbon revenues.

Table 2 above sets out what each jurisdiction funds. The matrix below examines a different question: whether the choice of channel is related to the strength of the commitment.

1. **The channel** is the route revenue takes from collection to end use:

- **General budget**, where revenue enters national or subnational budgets with no separate identity
- **Special account within the budget**, where revenue is held in a distinct budget line or target programme
- **Special purpose fund**, where revenue is held by a dedicated body, either newly created or an existing fund
- **Tax or social security system**, where revenue is returned through existing transfer infrastructure
- **Mixed**, where more than one of the above operates in parallel

2. **The earmarking strength** is how firmly revenue is committed to a stated purpose:

- **Legal**, where the commitment is written into legislation and can be changed only by amending it
- **Political**, where the commitment rests on a strategy, plan or budget practice without legal force
- **None**, where revenue is not committed to any stated purpose

The distinction matters because the two are often assumed to be the same choice. A jurisdiction can commit strongly without building an institution and can build an institution without committing strongly.

54. Guidelines on State aid for climate, environmental protection and energy 2022

[https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022XC0218\(03\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022XC0218(03))

55. Guidelines on certain State aid measures in the context of the system for greenhouse gas emission allowance trading post-2021

[https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020XC0925\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020XC0925(01))

Table 3. Channel and earmarking strength across jurisdictions

	Legally earmarked	Politically committed, not legally binding	Principal purposes
Special purpose fund	Germany (Climate and Transformations Fund), Luxembourg (Climate and Energy Fund), Korea (Climate Action Fund), Quebec (Electrification and Climate Change Fund), Japan (Green Transformation special account)		
Mixed: budget + dedicated fund	Poland (75% budget / 25% compensation fund, plus National Fund for Environmental Protection and Water Management)		
General budget, tracked separately		Ireland (increment tracked since 2020)	
General budget, untracked			Norway (partial road-duty offset)
Social security / tax system	Switzerland (75% via health insurers), Austria		
Other structure	Canada (OBPS Proceeds Funds, Decarbonisation Incentive Program, Future Electricity Fund)	Legal	Climate action un

Source: IACE, *Maximising Benefits of Carbon Pricing* (2024)

Dedicated special funds are used almost exclusively where the underlying commitment is also legally binding. No jurisdiction in the sample operates a dedicated fund without a corresponding legal earmark, suggesting the two choices are not independent: establishing a fund is itself a form of legal commitment, since a fund that could be redirected at will would offer little advantage over the general budget it replaces. The reverse does not hold, legal earmarking appears across every channel type, including the general budget, meaning a jurisdiction can commit strongly to a purpose without creating any new institution. Across the wider sample, 21 of 30 instruments studied carry some form of earmarking, and legal earmarking is roughly three times more common than political commitment alone.

The classification above shows where revenue goes, but not how the decision to send it there is taken. Across the jurisdictions reviewed, what distinguishes effective arrangements from formal ones is less the legal form of the channel than the way allocation decisions are made and who is accountable for them.

- **Separation of decision from beneficiary.** In Germany, the Climate and Transformation Fund is managed by the Ministry of Finance together with the lead line ministries for economy and environment, and with sectoral executive agencies including the environmental agency and the ETS administrator. Although the fund was not established as a stand-alone institution, it is regarded

as efficient and transparent because independent executive agencies participate in its management and it is subject to regular audit and oversight mechanisms. In Luxembourg, the Climate and Energy Fund is managed by the Ministry of the Environment, Climate and Sustainable Development, with an Interministerial Management Committee determining mission priorities and operational methods, and the Ministry of Finance providing oversight of its national and international climate activities.

- **Delegation to executive agencies.** In South Korea, the Ministry of Economy and Finance holds the authority to decide on allocation, while the Centre for Climate Action Fund, under the Korea Environment Corporation, is designated as the trusted agency supporting the fund's operation. In California, the Air Resources Board proposes an investment plan and develops guidance for the state agencies receiving appropriations, while the State Legislature decides the allocation between those agencies.
- **Distinct accounting and reporting.** In Quebec, the fund is managed by the Ministry of the Environment but maintains separate accounts and a distinct reporting obligation. In Poland, the National Fund for Environmental Protection and Water Management, established in 1989 as a state legal entity under the law, is formally accountable to and coordinated by the Ministry of Climate and

Environment, while other ministries, including development and technology, regional development, and agriculture and rural development, influence its activities through joint programmes, coordination councils and interagency committees. Projects co-financed by the fund have delivered CO₂ emission reductions of 14.8 million tonnes.

- **Political level oversight.** In Japan, bond issuances and government investments under the Green Transformation scheme are managed by the GX implementation council, presided over by the Prime Minister, which evaluates the progress of the policy.
- **Allocation through existing departments.** In Ireland, revenue is allocated to specific policy objectives

through government departments and state agencies, including the Department of Environment, Climate and Communications and the Sustainable Energy Authority of Ireland. In Switzerland, statutory ceilings govern the shares: no more than CHF 450 million annually for building energy efficiency, and CHF 25 million through the Technology Fund.

A common feature runs through these arrangements: the body deciding on allocation is institutionally separate from the body receiving the funds. The same principle is applied, in a more developed form, in the EU instruments financed from carbon revenues, to which the paper now turns.

4.4 EU experience in institutional and administrative arrangements

The most advances approaches for funding activities using carbon revenues that ensure effective governance, transparency, effectiveness in implementation and alignment with strategic documents are applied in various funds using carbon revenues and established on the EU level for the benefit of its Member States.

Table 4. Overview of the funds⁵⁶

	Modernisation Fund ⁵⁷	Innovation Fund ⁵⁸	Social Climate Fund ⁵⁹	RRF, ETS-fi-nanced share	Just Transition Fund ⁶⁰
Funded from	~2% of allowances 2021-30, plus 2.5% 2024-30	≥530 m allowances 2020-30	25% of ETS2 revenues, plus 50 m ETS1 allowances	EUR 20 bn ETS earmark	EU budget, not carbon revenues
Size	EUR 27.6 bn to end 2025	Up to EUR 40 bn to 2030	EUR 86.7 bn, 2026-2032	EUR 20 bn ETS share	EUR 17.5 billion base, up to approximately EUR 25.4 billion with co-financing
Eligible	Lower GDP per capita Member States. Shares fixed in the Directive: 34-43% Poland, 12-15% Czech Republic, 9-11% Romania	All Member States, ETS sectors	Member States via National Social Climate Plans	All Member States via national plans	Transition affected territories
Governance	European Commission and European Investment Bank, via an investment committee	European Commission, via competitive calls and auctions	European Commission, based on approved national plans	European Commission, milestone-based disbursement	Shared management between the Commission and Member States
National co-financing	/	/	At least 25% of plan cost, capped at 37.5% for direct income support		Standard cohesion-policy co-financing rates

Source: European Commission; EU ETS Directive as revised by Directive (EU) 2023/959

56. More detailed overview of each Fund is provided in Annex I

57. <https://modernisationfund.eu/>

58. https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund_en

59. https://employment-social-affairs.ec.europa.eu/policies-and-activities/funding/social-climate-fund_en

60. https://ec.europa.eu/regional_policy/funding/just-transition-fund_en

The five instruments fall into two groups. The Modernisation and Innovation Funds are the earlier instruments, established alongside the ETS’s move to full auctioning and governed through dedicated Commission-EIB structures built specifically for them. The Social Climate Fund and the ETS-financed share of the RRF are more recent, introduced respectively to cushion the impact of the new ETS2 system and to support recovery from the Covid-19 pandemic and the 2022 energy crisis, and both disburse against national plans rather than individual project appraisal. The Just Transition Fund, though often discussed alongside the other four, is financed from the general EU budget and the NextGenerationEU recovery instrument rather than from carbon revenue.

Two procedural features are worth setting out, because both are transferable to systems being designed now.

- The Modernisation Fund investment committee. Before a beneficiary Member State draws on its share, it presents the investment proposal to an investment committee and to the European Investment Bank. The EIB releases funds on a Commission disbursement decision taken in line with the committee’s recommendations. Decision making is therefore separated from the beneficiary, which is the central governance safeguard in the design.
- The Innovation Fund auction mechanism. Introduced in 2023 to complement grant funding, competitive bidding supports more mature low carbon technologies at lower cost per tonne than project by project grant assessment. Projects are scored against emissions avoidance, degree of innovation, maturity, replicability and cost efficiency, and a public dashboard tracks funded projects.

4.5 Good practices in transparency and communication on carbon revenues use

This section demonstrates the importance of transparency and communication for carbon revenue use based on the international experience.

International experience currently has low levels of effectiveness in addressing transparency. One of the best experiences would be on the EU ETS and EU Member States levels side under its funding mechanisms. According to available information, carbon revenues were directed to the following categories:

1. Climate change mitigation and adaptation, including other environmental protection measures (nature, biodiversity) — around 52% of all revenues,
2. Transfers to the national budget without specific purpose,
3. Transfers to households with just transition focus,
4. Other national priorities and objectives,
5. International support to other countries to advance with climate action.

Table 5. Transparency and reporting practice across jurisdictions

Jurisdiction	What is published	Granularity
California ⁶¹	Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds, released each spring. Administering agencies required to report project status and expected benefits	Project level, with fiscal information, estimated GHG reductions, benefits to disadvantaged and low income communities and households, and co-benefit estimates
Quebec	Two separate sources: auction results on the ministry’s carbon market pages, and a government page on fund use with annual climate action reports and a dashboard	Action level, tracking each action of the 2030 Plan for a Green Economy

61. Annual report 2025 Factsheet <https://www.caclimateinvestments.ca.gov/annual-report-2025>

Table 5. Transparency and reporting practice across jurisdictions (*continued*)

Jurisdiction	What is published	Granularity
Austria ⁶²	Dedicated transparency portal explaining the NEHG redistribution mechanism, giving citizens access to revenues and expenditures	Mechanism level
Ireland ⁶³	Annual budget annex prepared by the Department of Public Expenditure and Reform, published on a government website	Allocation level
EU Member States ⁶⁴	Annual reporting to the Commission under the ETS Directive and Governance Regulation, published via Reportnet, compiled into the report on the functioning of the EU carbon market	Member State level. Bulgaria, Estonia and Hungary restrict their data from public view
EU funds	Innovation Fund and Modernisation Fund project dashboards; EEA good practice publications	Project level

Source: National government publications as footnoted; European Commission, Climate Action Progress Report (2024)

The jurisdictions with the most detailed public reporting, California and Quebec, are also the two with a dedicated fund carrying its own statutory reporting obligation. Detailed public reporting on carbon revenue use appears closely linked to the existence of a dedicated institutional channel for that revenue, rather than to political commitment or country size.

EU Member States are required to report annually on the use of ETS auctioning revenues to the Commission in line with the ETS Directive and Governance regulation. Data on auctioning revenue is publicly available in the Reportnet platform⁶⁵ for all Member States except Bulgaria, Estonia, Hungary, which decided to restrict their data from public view. After that, reporting is then analysed and compiled in the report on functioning of EU carbon market (latest report published in 2025 covering year 2024⁶⁶).

European Environmental Agency regularly posts the good practices of EU ETS carbon revenues use⁶⁷, and in 2024 European Commission has published report “Use

of EU ETS auctioning revenues in the Member States”.⁶⁸ In addition, dedicated websites of the Innovation Fund⁶⁹ and Modernisation Fund⁷⁰ provide information about projects financed on their dashboards.

Recipients of EU funding should communicate and ensure EU visibility for all EU funded projects, including the ones funded using carbon revenues⁷¹. This transparency is crucial for demonstrating the positive impact of the carbon pricing on people and businesses across the EU, and for building public trust and support for the EU's climate action and energy transition efforts.

This visibility requirement also enhances accountability, highlights tangible benefits, and enables Member States to share best practices and learn from each other, ultimately amplifying the effectiveness of EU climate and energy policy.

When using ETS revenues to fund projects or support private entities, Member States should ensure that the EU's contribution is clearly visible. To achieve this,

62. ICAP, Austria National Emissions Certificate Trading System <https://icapcarbonaction.com/en/ets/austrian-national-emissions-certificate-trading-system>

63. Ireland <https://assets.gov.ie/static/documents/budget-2025-the-use-of-the-carbon-tax-funds.pdf>

64. Reportnet <https://reportnet.europa.eu/public/dataflows>; Report on the functioning of the European carbon market in 2024 https://climate.ec.europa.eu/document/download/ddc1b1de-652b-49ed-8f15-d9fa8badd39f_en?filename=com_2025_735_en.pdf

65. Reportnet <https://reportnet.europa.eu/public/dataflows>

66. Report on the functioning of the European carbon market in 2024

https://climate.ec.europa.eu/document/download/ddc1b1de-652b-49ed-8f15-d9fa8badd39f_en?filename=com_2025_735_en.pdf

67. Good Practices of EU ETS carbon revenues use, EEA

https://climate-energy.eea.europa.eu/topics/climate-finance/use-of-ets-auctioning-revenues/good_practices

68. Report “Use of EU ETS auctioning revenues in the Member States”

<https://op.europa.eu/en/publication-detail/-/publication/d7353a74-6f19-11ef-a8ba-01aa75ed71a1/language-en>

69. Innovation fund https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/6e4815c8-1f4c-4664-b9ca-8454f77d758d/sheet/bac74ac8-b5c7-4cd1-87ad-9f8d6d238eae/state/analysis

70. Modernisation fund <https://www.modernisationfund.eu/investments-2/>

71. Communicating and raising EU visibility https://commission.europa.eu/funding-tenders/managing-your-project/communicating-and-raising-eu-visibility_en

Member States can take the following steps:

- Share project details and results through relevant communication channels,
- Display plates and / or billboards on project sites and equipment,
- Use promotional materials, both physical (i.e., brochure) and digital (i.e., videos),
- When engaging in the above, Member States should always designate a focal point for project communication to coordinate outreach activities, ensuring consistency,
- Inform the implementing body well in advance of any specific project communication or dissemination activities that may have a substantial media

impact.

Together with this, it is expected that EU ETS label will be introduced to acknowledge the contribution of EU ETS revenues to climate action. Among other measures to ensure the visibility of funding from the EU ETS, Member States and the European Commission should ensure that projects and activities supported through the Modernisation Fund and the Innovation Fund are clearly indicated as coming from EU ETS revenues by displaying an appropriate label.



CASE STUDY

How carbon revenues expenditures are communicated within Californian cap-and-trade

As of November 2024, the California Cap and Trade program had generated nearly \$12.8 billion in total, including funding of high-speed rail, affordable housing and sustainable communities, low carbon transportation, and other clean technology programs. 47% of revenues went to disadvantaged communities, 26,5% to low-income communities and 26,5% to other areas⁷².

The program survived concerted opposition from industry lobbies in 2016 because of a campaign to showcase spending cap-and-trade proceeds on visible solutions with broad popular support: electric school buses, electric cars and trucks, new light rail stations, car sharing programs and investments in low-income communities.

Campaign under the California Climate Investments program "Dollars at work"⁷³ required that all grantees of the program (receiving buses, light rail and zero-emission trucks) are required display specific logo below to ensure high visibility.

Together with this, an Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds is released each spring and describes the status of funded programs and lists the projects funded⁷⁴. This report provides cumulative and annual outcomes including fiscal information, estimated GHG emissions reductions, information on benefits to disadvantaged communities and low-income communities and households, and estimates of co-benefits attributed to California Climate Investments programs. Project highlights in report demonstrate how these funds are improving lives of ordinary people.

72. California Climate Investments program dashboard <https://www.caclimateinvestments.ca.gov/cc-i-data-dashboard>

73. California Climate Investments program "Dollars at work" <https://www.caclimateinvestments.ca.gov/about-cci>

74. Annual report 2025 Factsheet <https://www.caclimateinvestments.ca.gov/annual-report-2025>

4.6 Strengthening evaluation practices

Experience on evaluation is similar to good practices on transparency and communication. However, in terms of the scope what is evaluated they are different. In majority of countries evaluations or auditing remains quite general as they carried out with regards to carbon pricing mechanisms themselves, without establishing a direct connection with revenue use.

Regardless of that, evaluations are necessary to make a strong case on how carbon revenues can maximise benefits of carbon pricing or to determine the necessity to rethink the strategy.

Based on the general international experiences reviewed, such assessments do not lead to accountabilities and only few countries have evaluations or audits carried out by independent external actors.

On the other hand, experience on the EU level is more sophisticated, however still has a space for improvements. In accordance with amendment to ETS Directive, capacity of the European Commission to assess member states and the two European Funds on auctioning revenue use should be improved. This means that reporting shall be sufficiently detailed to enable the European Commission to assess Member States. Together with this, to increase transparency and assess impact, the

Modernisation Fund and Innovation Funds are required to report annually to the Climate Change Committee on experience with the evaluation of investments.

Currently Commission must report annually to the Climate Change Committee, the EU Council and to the European Parliament on progress in implementing the Innovation Fund. Its first progress report was released in 2022⁷⁵. The Commission also chairs the Investment Committee of the Modernisation Fund and is in charge, among other tasks, of adopting disbursement decisions and reviewing and evaluating its performance.

A recently published policy brief⁷⁶ concludes that EU ETS has “increasingly matched environmentally effective and economically efficient purposes”, a change that has been “accompanied by a greater use of revenue recycling options”, seeking to balance fairness with four dimensions: environmental, economic efficiency, social/developmental and competitiveness. This means that efforts to ensure fairness and acceptability in the EU ETS are strongly tied to revenue use. Regardless of how ambitious the EU ETS is, there is still potential for carbon revenues in the EU to help fill the climate investment deficit and to comply with international commitments of climate finance for developing countries.

75. Innovation fund progress report <https://op.europa.eu/webpub/clima/innovation-fund-2021/en/>

76. Fairness and acceptability of environmental externality in pricing in Europe

<https://feeps-europe.eu/wp-content/uploads/2023/04/Fairness-and-acceptability-of-environmental-externality-pricing-in-Europe.pdf>

5 Possibilities for attracting additional carbon revenues by private actors and current international trends

Carbon revenues from compliance instruments are not the only source available. Crediting mechanisms also generate revenue, and where credits are admitted into compliance instruments, they reduce revenue that would otherwise accrue to the public purse. This chapter reviews both aspects. Climate action needs far more funding than is currently available. Global investments are estimated to be three to six times lower than required by 2030, especially in poorer regions. While compliance carbon pricing instruments (CPIs) help generate public revenue, significant additional private carbon revenue may be mobilized by carbon credit markets. Between 2021–2024, 43 billion USD were raised towards developing new carbon credit projects globally with estimated 14 billion USD during 9 months of 2024⁷⁷. Thus, they can help channel private capital to development projects, support private actors to meet their climate and environmental goals, and act as bridging tool to prevent carbon leakage in CO₂-intensive industries while helping to implement compliance measures like CPIs.

One carbon credit equals one tonne CO_{2e} in emission reduction, avoidance or removal, carried out by

voluntarily implemented mitigation activities⁷⁸. Credit supply stems from governmental crediting mechanisms, international crediting mechanisms, or independent crediting mechanisms. Carbon credits are created by activities that reduce, remove or avoid greenhouse gas emissions such as protecting forests, restoring wetlands, switching to renewable energy or improving energy efficiency in buildings and industries⁷⁹. Companies and organisations can engage in such carbon reducing activities, have them verified by the independent verification bodies, and then sell them as carbon credit, translating their environmental activities into a direct profit. By “retiring” these credits, purchasing parties can claim the underlying emission reduction for themselves and offset it from their own emission reduction goals. Demand stems from a diverse range of buyers: Corporations may use them to fulfil domestic compliance frameworks, international compliance frameworks like CORSIA or their own voluntary climate goals. Likewise, countries may use them trying to meet ambitious Nationally Determined Contributions (NDCs) targets that exceed their own climate mitigation capabilities.

5.1 Carbon credit mechanisms under the Paris Agreement

As the landscape of carbon credit markets has grown more diverse and complex, key framework conditions for voluntary climate mitigation cooperation have been set out in the Paris Agreement Article 6. Herein, carbon credit markets are a key component, although their regulation varies significantly, depending on the form of the market. Article 6.2 specifies governmental crediting mechanisms, wherein countries can trade carbon credits bilaterally, with a host country selling units to a buyer country in return for financial investment, capacity-building support and access to technologies that may not yet be available domestically⁸¹. Although not yet fully in action, Article 6.4 lays out the foundation for the Paris Agreement Crediting Mechanism (PACM),

where carbon credits can be traded internationally. Lastly, while Article 6.8 forms a general approach for diverse voluntary climate mitigation activities, carbon credit trading on voluntary carbon credit markets remains largely without any international oversight. It mainly consists of privately organized carbon crediting schemes, for example, Verra's Verified Carbon Standard or Gold Standard, which supply private buyers. In order to ensure price premiums for voluntary carbon credits, countries are required to build capacities — from setting up institutional and regulatory frameworks for authorisation to deploying market infrastructure, such as registries.

77. Investment Trends and Outcomes in the Global Carbon-Credit Market-2024

<https://www.msci.com/research-and-insights/paper/investment-trends-and-outcomes-in-the-global-carbon-credit-market-2024>

78. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

79. What Are Carbon Markets and How Do They Work? (UNDP)

<https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-how-do-they-work>

80. Exploring Governments' Efforts to Shape Carbon Credit Markets: Possible Actions to Enhance Integrity (OECD) https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/exploring-governments-efforts-to-shape-carbon-credit-markets_dac6ff0f/0baf9af-en.pdf

81. United Nations Framework Convention on Climate Change (UNFCCC): Article 6 of the Paris Agreement.

<https://unfccc.int/process-and-meetings/the-paris-agreement/article6>

5.2 Integrity of carbon credits

According to the United Nations Development Programme (UNDP), currently “nearly 1 billion older credits remain unused in the market, often tied to projects with questionable environmental value”⁸². A core objective of growing regulation is to ensure the high integrity of carbon credits. High integrity means, that one credit unit corresponds to one tonne CO_{2e} in real, additional, permanent emissions reductions or removal and is therefore key to the effectiveness of carbon credits. Without high standards in place, poor monitoring may cause misattributions, crediting projects with little to no environmental benefit, or promote double counting, where the same emission reduction is claimed multiple times by different parties. This would not only impair carbon pricing on the market due to the extra amount of unused, low-quality carbon credits but undermine the environmental relevance of these credits altogether, as weak standards allow offsets to substitute for domestic climate action in wealthier countries while simultaneously incentivizing developing countries to sell low-cost mitigation options instead of using them to accelerate their own decarbonisation⁸³.

Integrity standards also pay attention to the social impact by upholding human rights and protecting biodiversity. Otherwise, carbon market projects could negatively affect local communities and ecosystems, for instance, when failing to distribute benefits locally. To address this, projects must guarantee free,

prior and informed consent and should contribute directly to the Sustainable Development Goals (SDGs). Respecting these principles is fundamental for the legitimacy of carbon credit mechanisms as functional and reliable climate mitigation tools⁸⁴. While Article 6.2 and 6.4 of the Paris Agreement aim for high integrity in national and international carbon crediting mechanisms, standards in voluntary crediting mechanisms can differ significantly. Consequently, the EU and other political entities have reacted by implementing stricter policies regarding carbon offsets. Although, varying in their extent, they generally emphasize high social and environmental integrity, by carefully reviewing carbon credit-related climate claims⁸⁵.

Overall, carbon credit prices have recently experienced a slight decline, although certain types of credits continue to command premiums. Nature-based removal credits, like reforestation and other forestry or land-use removal projects, attracted both higher premiums and forward prices, indicating a preference for these credits by voluntary buyers with prices typically ranging from 5.3 to 15.5 USD per tonne CO_{2e}. In contrast, credits from renewable energy and industrial projects are generally considered lower integrity and have seen price declines, now averaging around 1.0 to 1.4 USD per tonne CO_{2e}, largely because these projects have become increasingly bankable and less dependent on carbon credit revenues⁸⁶.

5.3 Use of carbon credits in carbon pricing mechanisms

Governments are increasingly allowing carbon credits to be used to offset carbon pricing liabilities. Almost two-thirds of ETSs and almost 20% of carbon taxes allow using eligible carbon credits as a compliance option for offsetting emissions⁸⁷. Using carbon credits as offsets provides greater flexibility to CO₂-intensive sectors that would otherwise fail to meet their net-zero targets. It could also extend price incentives to uncovered sectors, thus stimulating investment and supporting the

implementation of carbon pricing mechanisms in these sectors. But it also reduces potential carbon revenue collected.

For example, the EU has recently introduced a significant policy shift by adopting a contribution of up to 5% of 1990 emissions toward its 2040 climate target, enabled through carbon credits via Paris Agreement Article 6. This effectively positions the EU as the largest

82. United Nations Development Programme (UNDP): What Are Carbon Markets and How Do They Work?

<https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-how-do-they-work>

83. How Article 6 Could Undermine Climate Ambition, New Climate Institute https://newclimate.org/news/how-article-6-could-undermine-climate-ambition?utm_source=linkedin&utm_medium=social&utm_campaign=article-6-blog-mar-26

84. United Nations Development Programme (UNDP): High-Integrity Carbon Markets Toolkit

<https://climatepromise.undp.org/carbonmarketstoolkit>

85. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

86. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

87. State Trends on Carbon Pricing 2025, World Bank <https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing>

88. How Article 6 Could Undermine Climate Ambition, New Climate Institute https://newclimate.org/news/how-article-6-could-undermine-climate-ambition?utm_source=linkedin&utm_medium=social&utm_campaign=article-6-blog-mar-26

prospective buyer of carbon credits under the mechanism, marking a notable departure from its previous stance of excluding carbon credits from compliance mechanisms⁸⁸. Given the variety of crediting mechanisms that issue carbon credits of different types and qualities, i.e. allowing or prohibiting offsetting credits, international fragmentation presents an additional

challenge to the integration of carbon markets, as emissions trading mechanisms are more likely to link with those that have similar structures. For example, projects in countries that restrict Article 6 authorisations will miss out on major buyer groups, while projects with authorisations could secure substantial premiums⁸⁹.

5.4 Carbon credit insurance

With carbon credit markets growing in size and relevance, new insurance products have emerged to secure investments. Carbon credit related insurances could prove crucial to help manage uncertainty and facilitate investment for climate mitigating projects. For example, carbon delivery insurances cover physical and political risks potentially faced when purchasing voluntary carbon credits on a forward basis⁹⁰. Specialized political

risk insurances protect against confiscation, nationalisation, license cancellation, or revocation of authorisation under Article 6. Warranty and indemnity policies on the other side protect buyers and investors against environmental integrity issues. To ensure greater capacity and resilience, the market is also exploring options for reinsurance.

5.5 Summary on carbon credit markets

Revenue from carbon credit markets is projected to remain relatively small compared to revenue from compliance mechanisms. However, it can make a significant contribution to climate mitigation for business actors, especially in case of possibility of using carbon credits for offsetting emissions under the compliance-based carbon pricing instruments (CPIs). Together with this,

apart from channelling additional private investment to support local, socially responsible climate mitigation activities, it may ease the introduction of climate reduction policies where CPIs do not yet apply. To harvest these benefits, high integrity standards are crucial for the proper functioning of carbon credit markets.

89. Sylvera, 2025: Understanding Carbon Credit Pricing: A Playbook for the Carbon Market. Understanding Carbon Credit Pricing: A Playbook for the Carbon Market

90. ClickforCover (CFC), 2024: CFC Launches Groundbreaking Carbon Delivery Insurance Policy

<https://www.cfc.com/en-gb/knowledge/news/2024/03/cfc-launches-groundbreaking-carbon-delivery-insurance-policy/>

6 Conclusions

As the result of conducted assessment of the best international and European experience regarding the use of carbon revenues, the following conclusions can be made:

1. Carbon revenues are a small share of climate investment need, and their value lies in leverage.

Global carbon revenues exceeded USD 100 billion in 2024, against estimated annual global climate investment requirements of USD 6.3 to 6.7 trillion by 2030. EU ETS auction revenues correspond to roughly 10% of European real economy climate investment, against an estimated annual European investment deficit of EUR 406 billion. Jurisdictions treating carbon revenue as co-financing that unlocks other capital have achieved more than those treating it as a standalone funding source.

2. Instrument type predicts how revenues are used.

In 2024, 68% of ETS revenues went to climate action against 11% of carbon tax revenues. Carbon tax revenues are more often directed to distributional compensation. Systems designed to raise revenue for investment and systems designed to price emissions while returning proceeds are answering different questions, and the design follows the question.

3. Channel choice follows purpose.

Compensation objectives are served through existing transfer and social security infrastructure, Austria and Switzerland being the clearest cases. Investment objectives are served through special purpose funds, as in Germany, California, Quebec, Luxembourg and Korea. Where both are pursued, mixed systems result, as in Poland, which splits ETS revenues 75% to the national budget and 25% to a dedicated compensation fund.

4. Governance arrangements matter more than legal form.

Germany's Climate and Transformation Fund is not a standalone legal entity, yet is regarded as effective because independent executive agencies participate in its management and it is subject to regular audit and oversight. The EU Modernisation Fund separates the decision from the beneficiary by requiring Member States to present investments proposals to an investment committee and the EIB before drawing on their share. Both cases indicate that independence in decision making, not incorporation, is the operative safeguard.

5. Absorption is a real constraint.

The Modernisation Fund spent 58% of its budget in 2022. Establishing a fund does not by itself ensure revenues are deployed, and pipeline development deserves as much design attention as revenue allocation.

6. Transparency follows accounting structure.

Reporting is strongest where a dedicated fund carries its own reporting obligation and weakest where revenues enter a general budget, because revenues that are not separately tracked cannot be separately reported. Even within the EU reporting framework, three Member States restrict their data from public view.

7. Visible revenue use sustains carbon pricing politically.

California's programme survived organised industry opposition in 2016 after a campaign showcasing spending on electric school buses, light rail and low-income community investment. Polling consistently finds that earmarking for green infrastructure with direct rebates attracts more support than revenue recycling through tax cuts or deficit reduction. Evaluation practice is the weakest link: most jurisdictions evaluate the pricing instrument rather than the use of its revenues, and few involve independent external actors.

Several of these findings bear directly on choices now facing Ukrainian policy makers: whether revenues are channelled through the general budget or a dedicated fund, how independence in allocation decisions is secured, how absorption capacity is built alongside revenue growth, and how revenue use is reported. The assessment of Ukrainian institutions against these findings, and the identification of options for Ukraine, follows in a separate paper.

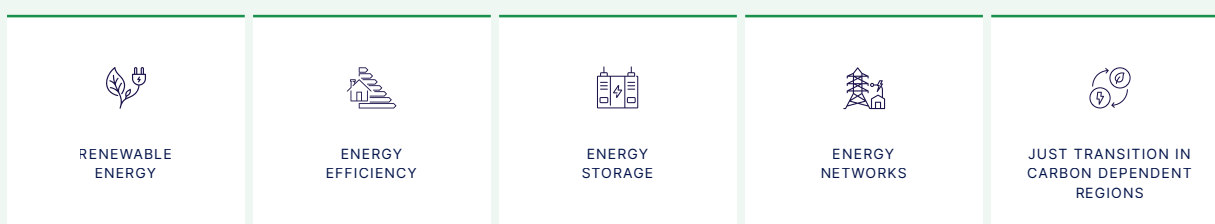
Detailed overview of the funds

EU ETS Modernisation Fund

Modernisation fund is established under the ETS Directive until 2030 to support lower-income Member States to meet energy targets by helping to modernise energy systems and improve energy efficiency. It is managed by European Commission, the European Investment Bank and beneficiary Member States

MODERNISATION FUND

Supporting investments in:



in 13 lower-income Member States

- | | | | | |
|------------|------------|-------------|-----------|-----------|
| • Bulgaria | • Czechia | • Estonia | • Greece | • Croatia |
| • Latvia | • Slovakia | • Lithuania | • Hungary | • Poland |
| • Portugal | • Romania | • Slovenia | | |

Funded by the EU Emissions Trading System

Image 4

Modernisation fund: areas of support and coverage — European Commission⁹¹

91. Modernisation Fund https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/modernisation-fund_en

Modernisation fund is funded from around 2% of carbon revenues from the total quantity of allowances auctioned between 2021 and 2030 (directed to Member States with a GDP per capita at market prices below 60 % of the Union average in 2013) and additional 2.5% of allowances auctioned 2024-2030 (directed to Member States with a GDP per capita at market prices below 75% of the Union average during the period from 2016 to 2018) to support certain Member States with lower levels of GDP per capita. Distribution is conducted in accordance with determined shares in ETS Directive (34-43% to Poland, 12-15% to Czech Republic, 9-11% to Romania etc.).

In 2022, Modernisation Fund spent 58% of its respective budget, which means that the effectiveness of usage of carbon revenues is yet to be increased.

Modernisation fund is funding investment projects proposed by the beneficiary Member States, including the financing of small-scale investment projects, to modernise energy systems and improve energy efficiency.

Support is provided for the following priority activities:

- generation and use of electricity from renewable sources, including renewable hydrogen,
- heating and cooling from renewable sources,
- the reduction of overall energy use through energy efficiency, including in industry, transport, buildings, agriculture and waste,
- energy storage, modernisation of energy networks, demand-side management, modernisation of district heating pipelines, grids for electricity transmission, increase of interconnections between Member States and infrastructure for zero-emission mobility,
- support for low-income households, including in rural and remote areas by addressing energy poverty and to modernising their heating systems,
- a just transition in carbon-dependent regions in the beneficiary Member States to support the re-skilling of workers and capacity development.

MODERNISATION FUND

Key steps in the financing process

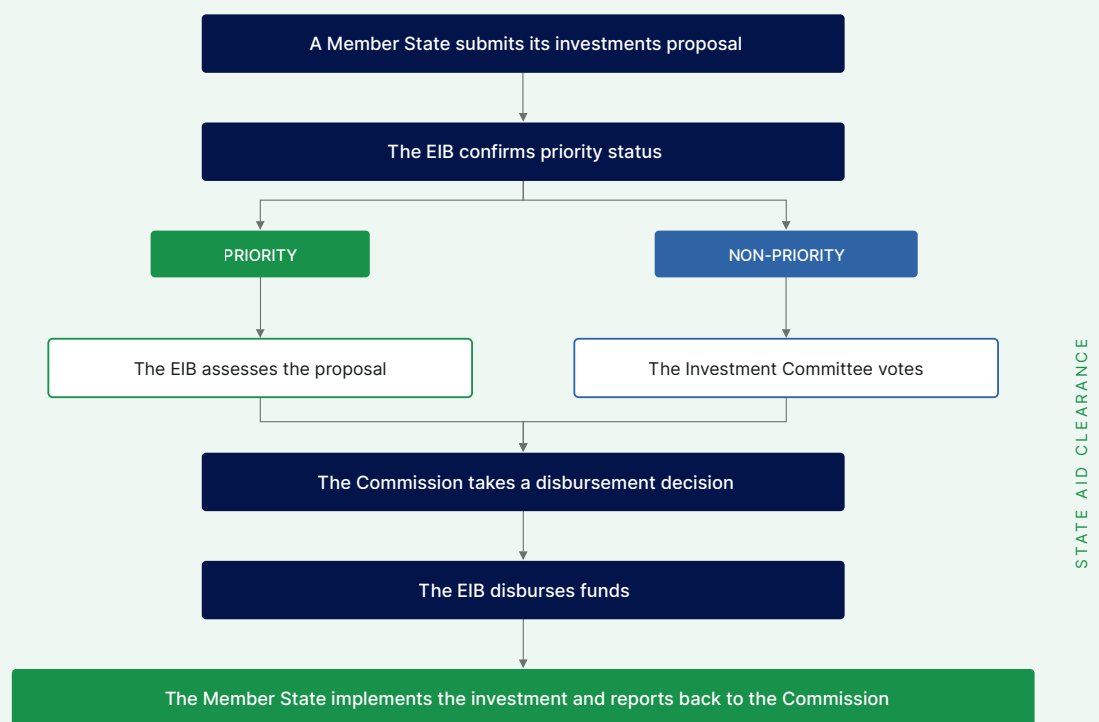


Image 5

Modernisation fund: procedure for granting financing — European Commission⁹²

92. Modernisation Fund https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/modernisation-fund_en

Up to 70% of the relevant costs of an investment which does not fall into the priority areas may be supported with resources from the Modernisation Fund provided that the remaining costs are financed by private legal entities.

Modernisation Fund is not providing support to energy generation facilities that use fossil fuels, with certain exceptions when revenues from either free allowances or allowances for the purposes of solidarity, growth and interconnections are used for investments involving gaseous fossil fuels. Also, maximum of 20% of the Modernisation Fund can be used to support non-priority investments.

With regard to the procedure, before a beneficiary Member State decides to finance an investment from its share in the Modernisation Fund, it shall present the

investment project to the investment committee and to the European Investment Bank (EIB). EIB passes on the revenues to the Member States upon a disbursement decision from the Commission is in line with the recommendations of the investment committee.

Detailed rules on operation of Modernisation fund are laid down in Implementing regulation on operation of the Modernisation Fund supporting investments to modernise the energy systems and to improve energy efficiency of certain Member States⁹³. Procedure for approval of investments is conducted in accordance with the Assessment Guidance Document and appendices⁹⁴. List of confirmed and recommended investment proposals can be found on the official website of Modernisation fund⁹⁵ and on it page related to investment decisions on priority investments⁹⁶.

EU ETS Innovation fund

The Innovation Fund⁹⁷ is one of the world's largest funding programmes for the deployment of net-zero and innovative technologies using carbon revenues. Innovation fund was created to support breakthrough innovative low- and zero-carbon techniques, processes and technologies that contribute significantly to the decarbonisation and contribute to zero pollution and circularity objectives, including projects aimed at scaling up such techniques, processes and technologies. Innovation fund is funded from auctioning of at least 530 million allowances during the period of 2020-2030 and the total budget of the fund is expected to reach 40 billion EUR by 2030.

The overall management of the Innovation Fund is handled by the European Commission, which has delegated specific tasks to the implementing bodies CINEA (implementing body) and EIB (providing and managing project development assistance⁹⁸ and manages innovation fund revenues).

In order to receive funding projects should possess significant greenhouse gas emissions abatement potential and contribute to energy and resource savings in line with the EU climate and energy targets for 2030.

The Innovation Fund shall cover ETS sectors, including the focus on innovative renewable energy and energy storage technologies and environmentally safe carbon capture and utilisation (CCU) that contributes substantially to mitigating climate change, in particular for unavoidable process emissions, and shall help stimulate

the construction and operation of projects aimed at the environmentally safe capture, transport and geological storage (CCS) of CO₂, in particular for unavoidable industrial process emissions, and the direct capture of CO₂ from the atmosphere with safe, sustainable and permanent storage (DACs), in geographically balanced locations.

The scope of the Innovation Fund was extended to support low- and zero-carbon technologies / fuels and processes linked to fuel consumption in the buildings, road transport and additional sectors — including public transport, and to decarbonise aviation, rail and road transport sectors. Together with this and starting from 2025, Do Not Significant Harm (DNSH) principle is applied with a stronger reference to multiple environmental impacts.

93. Commission Implementing Regulation (EU) 2020/1001 of 9 July 2020 laying down detailed rules for the application of Directive 2003/87/EC of the European Parliament and of the Council as regards the operation of the Modernisation Fund supporting investments to modernise the energy systems and to improve energy efficiency of certain Member States <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1594367056919&uri=CELEX:32020R1001>

94. Modernisation fund: Assessment Guidance Document and appendices <https://www.modernisationfund.eu/documents/assessment-guidance-document/>

95. Modernisation fund: List of confirmed and recommended investment proposals <https://www.modernisationfund.eu/investments-2/>

96. Modernisation fund: Decisions on priority investments <https://www.modernisationfund.eu/documents/confirmations/>

97. Innovation Fund https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund_en

98. EIB Project Development Assistance https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/project-development-assistance_en

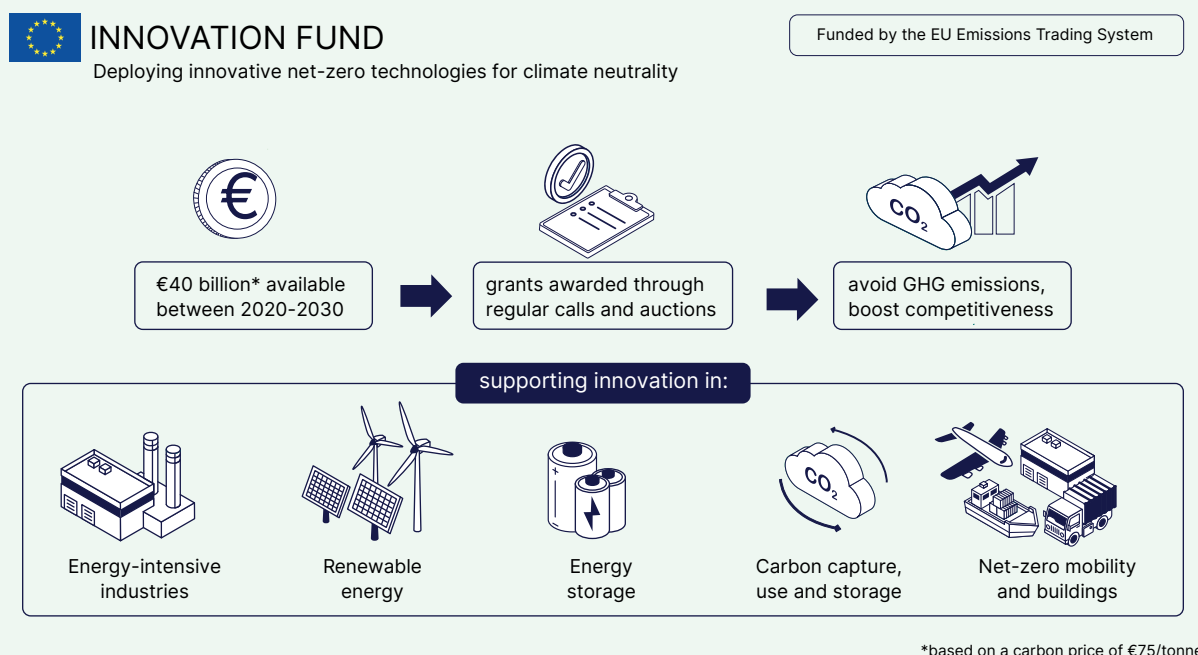


Image 6

Innovation fund — European Commission

Innovation fund is characterized as an effective instrument with high level of carbon revenues utilisation. Currently fund provides project support via grants, auctions, project development assistance and blended financial instruments such as InvestEU⁹⁹.

In 2023, the Commission developed a new competitive bidding mechanism (auctions¹⁰⁰) to complement its grants programme. Auctions expand the portfolio of support mechanisms available under the Fund, fostering faster and more cost-efficient support for the roll-out of more mature, low-carbon technologies needed for the green transition based on open calls for proposals.

Each call is assessing projects based on award criteria (effectiveness of GHG emissions avoidance, degree of innovation, project maturity, replicability, cost efficiency). Guidelines and tutorial are provided together with each separate call for proposals. Priority is given to innovative technologies and processes addressing multiple environmental impacts. A special dashboard is developed to track information on funded projects¹⁰¹. In the case of grants provided through calls for proposals, up to 60% of the relevant costs of projects may be supported, out of which up to 40% does not need to be dependent on verified avoidance of greenhouse gas emissions. In the case of support provided through competitive bidding and in the case of technical assistance support, up to 100% of the relevant costs of projects may be supported.

99. InvestEU https://investeu.europa.eu/index_en

100. Auctions — Innovation Fund https://cinea.ec.europa.eu/programmes/innovation-fund/auctions_en

101. Innovation fund project dashboard https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/6e4815c8-1f4c-4664-b9ca-8454f77d758d/sheet/bac47ac8-b5c7-4cd1-87ad-9f8d6d238eae/state/analysis

Social Climate Fund

Social Climate Fund (SCF) was created in EU to sit alongside the forthcoming EU ETS2 covering road transport, buildings and additional sectors (small industry not covered by ETS) to support vulnerable groups affected by it and ensure the acceptability of the policy. Taking into the account that ETS2 will have significant distributional effects, namely on increasing the costs for the most vulnerable low-income households, a significant support is required to mitigate such regressive effects. The Social Climate Fund is expected to become fully operational in 2027 in order to provide vulnerable sectors and groups with financial support in the transition to net zero¹⁰². Support is expected to be available in form of direct targeted transfers and supports to investments in energy renovation and clean mobility.

A key component is the development of National Social Climate Plans, through which financial support will be directed to identified affected groups. Measures can include energy efficiency and renovation of buildings; low-carbon transport; and clean heating and cooling.

From 2027-2028 onwards, the ETS2 of the European Union will also generate revenues, which will partly serve to alleviate the impact of carbon pricing on the most affected vulnerable groups, such as households in energy or transport poverty or micro-enterprises. Under ETS2, Member States will receive 75% of estimated revenues, and the remaining 25% would go to a newly created Social Climate Fund. SCF will use these revenues together with additional revenues generated from auctioning of 50 million allowances from ETS1. In total, it is expected to reach EUR 86.7 billion for the period between 2026-2032 period.

Activities that can be supported by SCF:

- measures contributing to decarbonisation of heating and cooling of buildings or to the reduction of the energy needs of buildings, including the integration of renewable energies.
- measures to provide financial support for low-income households in worst-performing buildings.
- measures to accelerate the uptake of zero-emission vehicles or to provide financial support for the deployment of fully interoperable refuelling and re-charging infrastructure for zero-emission vehicles.
- measures to encourage a shift to public transport and improve multimodality, or to provide financial support in order to address social aspects concerning low- and middle-income transport users.
- provide financial compensation to the final consumers of fuels in cases where it has not been possible to avoid double counting of emissions.

102. EU ETS2 and Social Climate Fund: Enabling decarbonisation in transport and buildings that works for all
<https://www.eionet.europa.eu/etcs/etc-cm/products/etc-cm-report-2025-09>

Recovery and Resilience Facility

The Recovery and Resilience Facility¹⁰³, created in response to the Covid-19 crisis, is funded in part from carbon revenues: the ETS Directive earmarks EUR 20 billion, of which EUR 8 billion derives from frontloaded allowances and EUR 12 billion from the Innovation Fund. National plans were required to allocate at least 37% of their budget to green measures. Disbursement is performance based, with payment released only on achievement of agreed milestones and targets, which is the feature of most interest for revenue governance design.

RRF is also crucial for implementing the REPowerEU plan the Commission's initiative to the socio-economic hardships and global energy market disruption caused by russia's full-scale invasion of Ukraine towards phasing out of russian fossil fuel imports.

Just transition fund

Just Transition Fund (JTF)¹⁰⁴ is established to provide support to the people, economies and environment of territories which face serious socio-economic challenges deriving from the transition process. Fund should contribute to the single specific objective of enabling regions and people to address the social, employment, economic and environmental impacts of the transition and which contribute to the implementation of the territorial just transition plan. The fund is funded from EU budgetary commitments.

103. Recovery and Resilience Facility (RRF) https://reforms-investments.ec.europa.eu/recovery-and-resilience-facility-1_en

104. Just Transition Fund regulation <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1056>