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Carbon Action
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USE OF REVENUE FROM EMISSIONS TRADING SYSTEMS: FROM AUCTION REVENUES TO ADAPTATION BENEFITS

Fellowship research report

↳ **María del Pilar Salazar Vargas**

Alexander von Humboldt Fellow

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Author

María del Pilar Salazar Vargas

Alexander von Humboldt Fellow in International Climate Protection (ICP)

Supervisors

Santiago Ramirez Niembro

International Carbon Action Partnership

Stefano de Clara

International Carbon Action Partnership

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EXECUTIVE SUMMARY

The present report examines how revenues from Emissions Trading Systems (ETSs) can finance climate change adaptation across key jurisdictions, and what good practices could enhance their contribution. These jurisdictions are the European Union, California, and Québec. The study analyzes allocation patterns, quantifies adaptation spending where data are available, and distills governance lessons to inform policy design and stakeholder action.

As climate impacts intensify and adaptation finance gaps widen, ETSs have emerged as a pragmatic tool not only for mitigation but also for generating revenue that can support adaptation measures. Among systems with explicit references to the use of revenues for adaptation and with publicly available revenue data, namely, the European Union (EU), California, and Québec, adaptation related expenditures identified in this analysis represent a modest but growing share of proceeds (0.37%, 8.6% and 4.4% respectively), reflecting significant room to scale up its prioritization. Advancing earmarking provisions, raising political salience, and developing better metrics for vulnerability reduction outcomes are key levers to unlock additional investment.

Nevertheless, there are notable bright spots (Figure 1). All three jurisdictions require that 100% of auctioning revenues be used for climate purposes. EU member states decide on their specific spending on priority populations¹ and tracking results transparently. Québec earmarks funds for urban areas, research, and international cooperation, supported by accessible monitoring mechanisms, including action-tracking systems and publicly available reporting tools.

The analysis highlights common enabling conditions for channeling ETS revenues towards adaptation. These include a mature ETS design with substantial auction shares and stable price signals, as well as transparent spending governance, such as legal mandates, specialized institutions, and dedicated funds. When these conditions are in place, they support diversified and flexible adaptation portfolios, strengthen institutional capacities, and generate a potential multiplier effect in climate finance.

The potential multiplier effect means that finance invested in specific instruments can catalyze additional finance, such as Payment for Ecosystems Services (PES) type mechanisms, research into innovative instruments, and international cooperation. This potential effect opens additional design explorations, including seeding new financing vehicles (guarantees, insurance, results-based finance, among others).

Additionally, a potential subsidiarity model was identified to support local climate efforts, particularly relevant for the adaptation agenda. For instance, California and Québec, through revenue use, have directly promoted support for and empowerment of local authorities, local communities, Indigenous nations, and vulnerable populations.

¹ Californian communities living in areas exposed to multiple sources of pollution or lacking sufficient resources to invest in low-carbon practices, clean transportation, or climate resilience.

Table 1: Main findings in adaptation use of revenues by jurisdiction

Criterion	European Union ETS	California Cap and Invest (C&I)	Québec C&T
Revenues to adaptation	0.37% (2023). Additional 0.25% international funds (2023)	8.6% (2024). No international projects (2024)	4.4% (2024). Additional 1% international funds (2024)
Main Adaptation types (contextual)	<ul style="list-style-type: none"> • Water management. • Nature-based Solutions (NbS). • Urban areas. • Flood and forest protection. 	<ul style="list-style-type: none"> • General Programs. • Forest Protection. • NbS. • Water management and coastal protection. 	<ul style="list-style-type: none"> • Urban areas. • Research • Capacity building. • Coastal protection.
Transparency & Monitoring, Evaluation and Learning (MEL)	<ul style="list-style-type: none"> • General information available; no reporting criteria. • Beneficiaries and impact unknown. 	<ul style="list-style-type: none"> • Robust reporting system. • Beneficiaries known, impacts and lessons learned unknown. 	<ul style="list-style-type: none"> • Accessible and audited information. • Beneficiaries are known; impacts and lessons learned are unknown.
Good practices	<ul style="list-style-type: none"> • Mandate to allocate 100% of revenue to climate action. • Use according to national priorities. • Support for international cooperation. • Broad territorial scale and diversity. 	<ul style="list-style-type: none"> • Mandate to allocate 100% of revenue to climate action. • 35% to vulnerable communities. • Community engagement models. • Projects with adaptation-mitigation (A-M) synergies. 	<ul style="list-style-type: none"> • Mandate to allocate 100% of revenue to climate action. • Revenue use is based on planning, is flexible, and diversified. • Direct support and international cooperation.
Opportunities	<ul style="list-style-type: none"> • Including all members. • Strengthen balance a-m expenditures, including projects with synergies. • Explore adaptation inclusion in available funds. • Develop an MEL mechanism. 	<ul style="list-style-type: none"> • Strengthen balance A-M expenditures. • Where feasible, explore potential use of international channels. • Develop an MEL mechanism. 	<ul style="list-style-type: none"> • Strengthen balance A-M expenditures, including projects with synergies. • Integrate available information into a coherent MEL system.

Source: Own elaboration based on CCI (2025), EEA (2023) & Gouvernement du Québec (2024a). Note: Adaptation shares include direct adaptation measures, enabling activities, and mitigation measures with explicit adaptation co-benefits according to the study typology.

Addressing existing gaps, including the need to increase adaptation shares relative to mitigation, harmonize definitions of adaptation, and build robust Monitoring, Evaluation and Learning (MEL) systems, represents a clear pathway to evidence-based scaling and lasting policy impact. These findings may also inform future ETS reviews by highlighting practical opportunities to strengthen adaptation considerations in revenue allocation systems.

Based on this analysis, this report presents six general recommendations for jurisdictions:

1. **Enabling framework:** Adapt ETS design to jurisdictional contexts, build institutional and public capacities, and promote transparent, inclusive governance of revenue allocation and use.
2. **Budgetary signal and allocation:** Explore indicative allocation benchmarks for adaptation and adaptation-mitigation synergies, as well as dedicated funding windows where feasible, and apply climate budget tagging to strengthen traceability and accountability.
3. **Mainstreaming in existing funds:** Integrate adaptation criteria into existing financial instruments as an eligibility condition and differentiating factor and develop business cases and incentive structures that embed climate risk assessment.
4. **Specialized vehicles:** Support the development of long-term, dedicated adaptation financing vehicles, including funds, trusts, and blended finance instruments, seed capital, guarantees, insurance, PES, and results-based mechanisms.
5. **MEL:** Develop MEL systems by establishing clear objectives and indicators that support transparency, adaptive management, and the identification and correction of maladaptation risks.
6. **ETS design:** Explore opportunities in future ETS reviews to strengthen adaptation considerations in revenue allocation frameworks. Potential measures may include improving transparency and traceability of adaptation expenditures, strengthening adaptation-mitigation synergies, developing MEL mechanisms, and considering adaptation-related criteria in funding allocation processes where appropriate.

For research institutions, immediate opportunities lie in codifying best practices, supporting revenue-governance design, advancing Monitoring, Reporting, and Verification (MRV) for finance and MEL for adaptation, and strengthening subnational capabilities -bridging research, policy, and implementation to close the adaptation financing gap.

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Acronyms

CAD	Canadian Dollar
C&I	Cap and Invest
CAF	Cancun Adaptation Framework
CalCRAI	California Climate Risk and Adaptation Index
CARB	California Air Resources Board
CCI	California Climate Investments
CECI	Centre for International Studies and Cooperation
CPI	Climate Policy Initiative
C&T	Cap and Trade
EEA	European Environment Agency
ECCF	Electrification and Climate Change Fund
EC	European Commission
EEE	European Energy Exchange
EP&CEU	European Parliament and Council of the European Union
ERCST	European Roundtable on Climate Change and Sustainable Transition
ETS	Emissions Trading System
EU	European Union
EU ETS	European Union Emissions Trading System
EUR	Euro
FECC	Fonds d'électrification et de changements climatiques
FY	Fiscal Year
GDP	Gross Domestic Product
GGRF	Greenhouse Gas Reduction Fund
GHG	Greenhouse Gas
ICAP	International Carbon Action Partnership
ICCP	International Climate Cooperation Programme
ICP	International Climate Protection Programme
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
K ETS	Korea Emissions Trading System
MbMs	Market based Mechanisms
MAMH	Ministère des Affaires municipales et de l'Habitation
MCCAC	Municipal Climate Change Action Centre
MEL	Monitoring, Evaluation and Learning
MEL-CCFP	Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs

MRV	Monitoring, Reporting and Verification
NAP	National Adaptation Plan
NbS	Nature based Solutions
NZ ETS	New Zealand Emissions Trading System
OECD	Organisation for Economic Co-operation and Development
PES	Payments for Ecosystem Services
PEV	Plan for a Green Economy (Plan pour une économie verte)
PIMA	Environmental Promotion Plan
PMR	Partnership for Market Readiness
QOP	Québec Official Publisher
RGGI	Regional Greenhouse Gas Initiative
TIER	Technology Innovation and Emissions Reduction
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
WB	World Bank

INTRODUCTION

Climate change has already generated multiple negative impacts on human and natural systems, including water security, food production, health, and infrastructure, exacerbating existing socio-ecological problems such as poverty, inequality, and limited access to basic services (IPCC, 2022).

According to the Climate Risk Index 2025, between 1993 and 2022, more than 765,000 people lost their lives worldwide, and nearly EUR 3.71 trillion² (USD 4.19 trillion) in losses occurred as a direct result of more than 9,400 extreme weather events (German Watch, 2025), costing around EUR 14.15 million (USD 16 million) per hour. Furthermore, between 3.3 and 3.6 billion people live in conditions of high vulnerability to climate change, and even under decarbonization scenarios, they will face increased and more concentrated losses and damage (Collins et al., 2024; IPCC, 2022).

Given the severity of the current and future impacts, it is urgent to implement multisectoral and multiscale measures to address the causes and consequences of this phenomenon. Mitigation and adaptation actions play a critical role in addressing the causes and impacts of climate change.

However, unlike mitigation, adaptation still lacks public incentives to encourage participation in this process, leading to lower levels of adaptation than are socially desirable. To reduce adaptation gaps, it is necessary to ensure sustainable financial flows by mobilizing investments beyond traditional sources and adopting innovative financial mechanisms. These findings align with recent scholarship on carbon pricing and adaptation finance (see Cardenas, 2024; Watkiss & England, 2025; UNEP, 2025).

Market-based mechanisms (MbMs), such as an ETS, represent public instruments that use market signals to incentivize environmental behavior, promote private participation, and generate revenue. Despite these benefits, no systematic analysis is available to identify how ETSs have contributed to the adaptation agenda and how to maximize their contribution.

In this regard, this research aims to examine the following question: how and to what extent have ETSs' revenues contributed to climate change adaptation financing in key jurisdictions (EU, California, and Québec), and what good practices and opportunities exist to enhance this contribution? In line with this, this paper seeks to analyze how jurisdictions allocate ETSs' revenues, quantify revenue contribution to climate change adaptation financing, distil transferable best practices, and provide evidence-based recommendations for enhancing and sustaining their role as a climate finance source.

The EU ETS, California, and Québec were selected as case studies based on three criteria: (1) the maturity and scale of their emissions trading systems; (2) explicit references to adaptation in their revenue-use regulations; and (3) the availability of publicly accessible, disaggregated data on revenue allocation. Together, these jurisdictions represent over 85% of global ETS auction revenues and offer diverse governance models (supranational, subnational, and linked systems) that provide transferable insights for other jurisdictions.

The research design relied on international and national sources, including ICAP and World Bank (WB) reports, government reports, jurisdictional databases on revenue use, and expert opinion.

² All figures are expressed in their original currency unless otherwise stated. Exchange rates used throughout this document are 1 EUR = 1.1306 USD (European Central Bank, 2025) and 1 CAD = 0.7154 USD (Bank of Canada, 2025).

The methods employed in this report included a systematic literature review and a comparative analysis of three case studies. The thematic literature review used the concepts of adaptation, resilience, and climate vulnerability as search criteria, which together formed the study's analytical framework. Subsequently, the author conducted a comparative analysis of three case studies, selected for their robust ETSs, explicit mention of adaptation in their documents, and available revenue data.

This analysis combined a quantitative component, based on the collection, classification, and statistical description of revenues and their allocation, with a qualitative component, which included the use of storytelling to describe relevant adaptation projects, as well as interviews with three experts using an open-ended questionnaire, to provide critical insights into the analysis. These experts are Linda Hölscher, Senior Advisor for Program Adaptation to Climate Change at adelphi; Sonakshi Saha, MSc in Public Policy Analysis at the Hertie School, expert in ETS revenue and adaptation; and Diana Cardenas Monar, an expert in climate financing at the Institute for Climate Economics. Finally, each case study includes a box of adaptation stories that help contextualize data analysis and visualize the local impact of revenue.

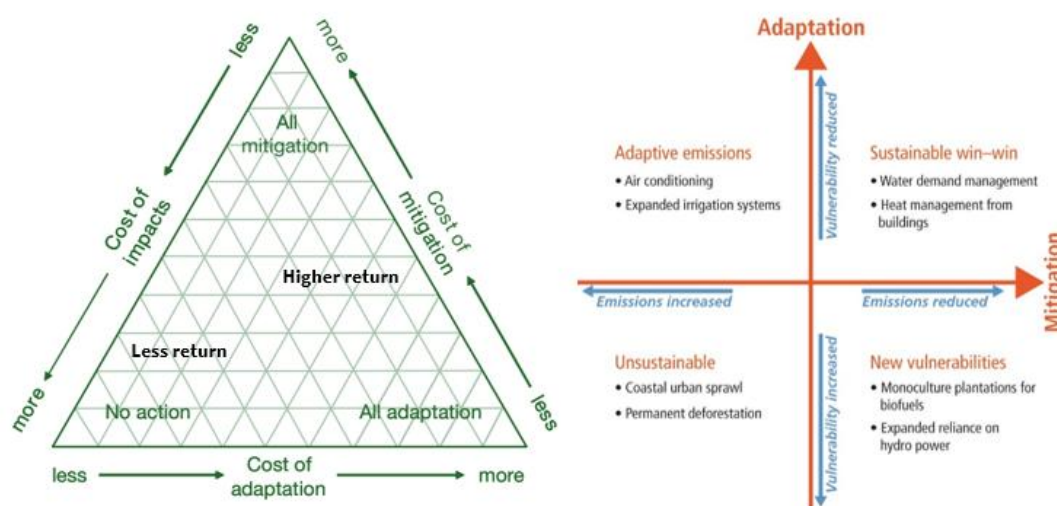
This analysis draws on available reported data across jurisdictions. Improving data quality and developing impact evaluation frameworks for vulnerability reduction would further strengthen future analyses on this matter.

1 CONCEPTUAL FRAMEWORK ON POLITICAL ECONOMICS OF ADAPTATION

Under a simplified scenario of full mitigation (Figure 1a), the costs of climate impacts may be reduced, but the costs of mitigation measures are high. The "no action" extreme implies the highest costs due to impacts, while the "full adaptation" extreme reduces these impacts but increases adaptation costs (IPCC, 2007; UNFCCC, 2022). This dynamic recognizes the dual need for adaptation and mitigation, and the importance of a balanced strategy that combines both actions to reduce loss and damage from climate change. That also highlights that focusing exclusively on a single option can be inefficient or unsustainable in the long term (IPCC, 2007; UNFCCC, 2022).

At the same time, adaptation actions can generate positive or negative effects on mitigation, and vice versa. Given these interrelationships, the design of comprehensive climate policies and actions is essential to maximize synergies, where possible, and minimize conflicts between adaptation and mitigation objectives. Recent evidence highlights that comprehensive and integrated responses can harness synergies and reduce trade-offs between both agendas, contributing to more effective climate-resilient development pathways. (Figure 1b; Jones et al., 2014; IPCC, 2023). For instance, measures that improve thermal comfort and reduce exposure to extreme temperatures in buildings can help protect populations from heat stress while also reducing greenhouse gas (GHG) emissions. There are also potential conflicts or trade-offs, such as when one adaptation or mitigation measure can hinder the other. For example, monoculture-based biofuel production can exacerbate specific vulnerabilities, such as ecosystem fragility or limited water or food availability. Given these interrelationships, the design of comprehensive climate policies and actions is essential to maximize synergies, where possible, and minimize conflicts between the two objectives.

Figure 1. Inter-relationships between adaptation and mitigation



Source: Adapted from IPCC (2007) and Jones et al. (2014). Note: (a) Cost of adaptation, mitigation, and impacts. (b) Trade-offs and synergies between agendas.

Nevertheless, despite the urgency of climate change, conventional climate change strategies have historically prioritized measures and finance aimed at reducing GHG emissions (IPCC, 2014). Tra-

ditionally, the primary focus of international climate policy was on mitigation, which paid little attention to adaptation (IPCC, 2007). It was only in the 2000s that adaptation began to gain international attention. However, in 2010, with the adoption of the Cancun Adaptation Framework (CAF), that adaptation gained equal priority with mitigation (UNFCCC, 2019). This late consideration of adaptation on the international agenda underscores the importance of adjusting public policies to better focus on adaptation.

Adaptation to climate change

In this regard, adaptation is the process of adjustment to the actual or projected climate and its effects. In human systems, the goal is to moderate damage or take advantage of opportunities; in natural systems, human intervention can facilitate their adjustments to the projected climate and its effects (IPCC, 2022). From the perspective of resilience, this concept also captures the capacity to learn, integrate experience and knowledge, adjust responses to changing external drivers and internal processes, and continue to develop (Folke et al., 2010). Adaptation measures must respond to a risk or vulnerability associated with climate change, which may occur at different temporal and spatial scales of application, but often entail long planning and implementation times, with benefits that also accrue in the long term. Their implementation involves diverse stakeholders, including governments, civil society, and the private sector, who may be affected or have different influences and interests (WB, 2010; Smit et al., 1999).

In addition to climate vulnerability or risk reduction, diverse adaptation measures can generate multiple additional benefits such as improving agricultural productivity, innovation, health and well-being, food security, livelihoods, and biodiversity conservation, as well as reducing risks and damages (IPCC, 2022).

These measures can be categorized into distinct types, such as physical, for instance, engineering and built or natural environment actions and technology; social, as educational, informative, and behavioral measures; and institutional measures, such as economic instruments, laws and regulations, policies, and programs, to mention some (IPCC, 2014). However, some measures may cross more than one category.

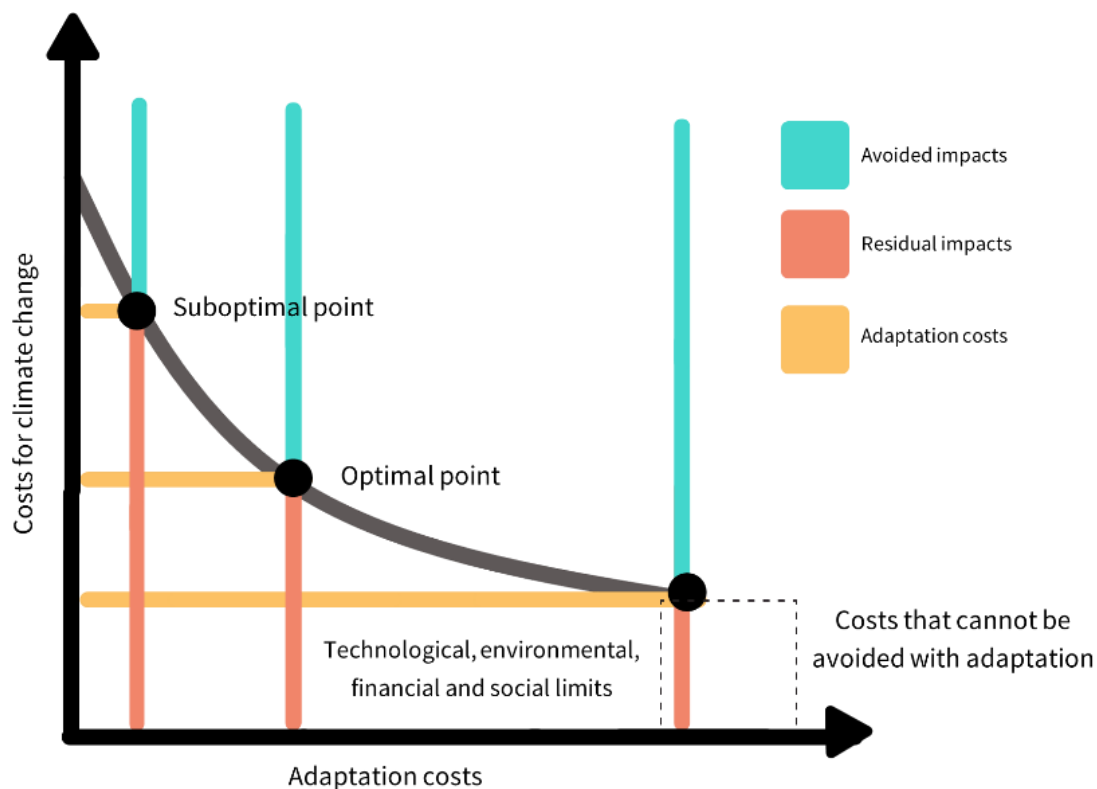
Additionally, MEL is a critical component of climate change adaptation. Monitoring involves tracking progress in implementing an adaptation measure against its objectives, while evaluation assesses the effectiveness of the measure (UNFCCC, 2023). It allows policymakers to understand, learn, and implement more suitable and sustainable decisions to reduce climate vulnerability. MEL can also provide helpful information to reduce the risk of maladaptation, understood as measures that inadvertently increase vulnerabilities and climate impacts, generate greater emissions, or entail disproportionate burdens for the most vulnerable populations (Moure et al., 2023; Noble et al., 2014).

Fundamentals of public intervention for adaptation

According to adaptation economics, the optimal point for planning and implementing adaptation actions is where both damage and adaptation expenditures are minimized and savings from avoided losses and damages are maximized (Chambwera et al., 2014; Watkiss, 2015).

However, delayed or insufficient adaptation reduces effectiveness and increases residual risks, while additional human and natural systems are increasingly reaching adaptation limits as climate change intensifies (IPCC, 2023). Furthermore, biophysical, institutional, financial, social, and cultural causes (barriers) can create limits to adaptation, and additional financial, institutional, or technological support can often help overcome some of these limits (IPCC, 2022) (Figure 2).

Figure 2. Investment in adaptation and the cost of climate change



Source: Modified from Chambwera et al., 2014.

In this regard, adaptation gaps exist across different territories, due in part to the growing disparity between the estimated costs of adaptation and the documented financing allocated to adaptation (IPCC, 2022). It is still necessary to deploy and scale up adaptation activities across sectors, such as the private sector, which can adapt to climate change, finance adaptation, and support others through products and services for resilience (Cochu et al., 2019).

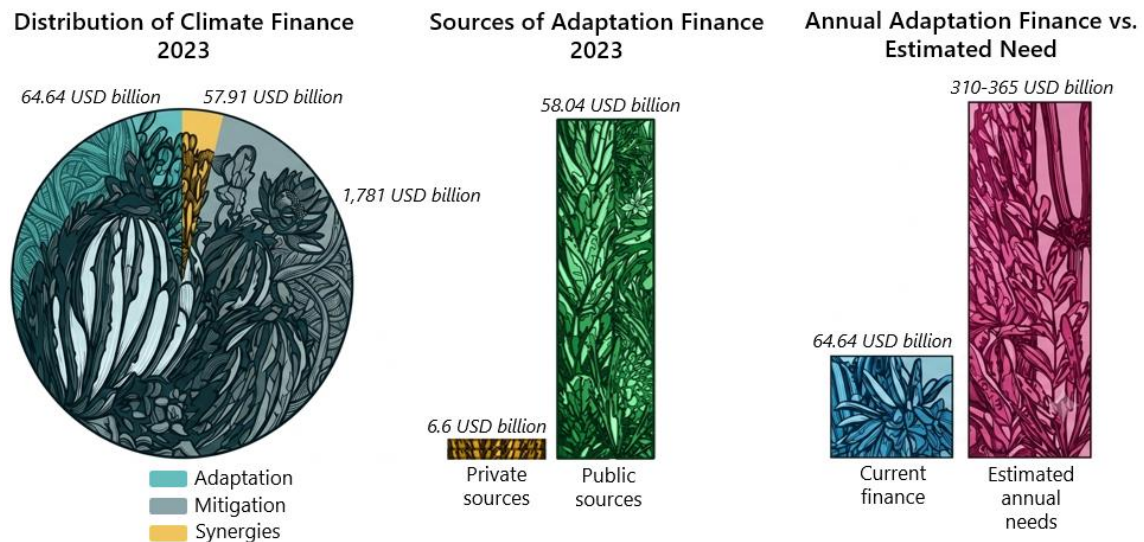
Economics explains this adaptation gap by treating adaptation as a public good, meaning stakeholders cannot be excluded from its benefits even if they have not invested in it. This characteristic of adaptation disincentivizes private-sector investment and concentrates the provision of this good in specific sectors (such as the public and social sectors), leading to levels of adaptation below those that are socially desirable or necessary (Chambwera et al., 2014). Furthermore, adaptation measures are planned and implemented under conditions of uncertainty regarding climate impacts, decision-making processes, and the socio-environmental outcomes of interventions, which can affect the effectiveness and prioritization of adaptation actions (Moure et al., 2023).

Government involvement in adaptation is therefore justified on the grounds of efficiency and equity in resource allocation (Bellon & Massetti, 2022). Effective adaptation outcomes depend on strong enabling governance frameworks. Governments play a central coordinating role in establishing the legal, institutional, and fiscal conditions that allow diverse stakeholders to contribute to adaptation goals, for example, through direct regulations, research and monitoring, infrastructure investment, reallocation measures, or market-based instruments, among others (Markandya et al., 2014; Jacobi & Maia, 2016).

Financial needs

Given this dynamic, it is urgent to mobilize financial resources on a sufficient scale and in the necessary timeframe to address adaptation needs. However, despite the growth of global climate flows, these still represent around 1% of global Gross Domestic Product (GDP), of which only 3.4% is allocated to adaptation (USD 57.49 billion). In comparison, mitigation accounts for 94% and activities with synergistic objectives for 3%, respectively (CPI, 2025).

Figure 3. Gaps in adaptation finance



Source: Own elaboration based on CPI (2025) and UNEP (2025). Note: Figure sizes are not equivalent.

These financial flows come predominantly from public sources (almost 90%), while the private sector contributes just around 10% of the total. These public sources cover only 30% of financing needs³ (CPI, 2025), indicating that at least USD 217 billion is required to meet adaptation financing needs. These needs could reach up to USD 354 billion per year in developing countries by 2035 to effectively address adaptation requirements (Watkiss & England, 2025), representing a needed increase of at least sixfold as quickly as possible to avoid the worst impacts of climate change (Figure 3). This reflects a substantial financing gap, as adaptation financing needs in developing countries are estimated to be approximately 12–14 times current adaptation finance flows (UNEP, 2025).

Market-based mechanisms to bolster adaptation

To reduce adaptation gaps, it is necessary to guarantee funding streams for climate adaptation, which requires unlocking investment beyond traditional sources and moving towards innovative financial mechanisms (NAP Global Network, n.d). Market-based mechanisms (MbMs) represent a relevant public policy to make climate action more cost-effective and promote private-sector financing, not only for mitigation but also for adaptation, and even generate income for poorer countries (Watkiss & England, 2025; UNCTAD, 2025).

MbMs are public policy instruments that use market signals to incentivize environmental behavior by creating economic incentives for businesses and individuals to reduce their environmental impact (Stavins, 1998). Current international climate negotiations highlight the role MbMs could play

³ The Adaptation Gap Report 2025 highlights a current public financing of only 23 billion in 2023 (UNEP, 2025).

in increasing adaptation finance to support developing countries, particularly those vulnerable to the adverse effects of climate change (Climate Analytics, 2018; UNDP Climate Promise, 2023).

While the literature specifically linking ETS revenues to adaptation remains limited, broader studies on carbon pricing and climate finance (e.g., Cochu et al., 2019; CPI, 2025; NAP Global Network, n.d) provide relevant context. This gap in the literature underscores the need for further research on the role of ETS revenues in supporting adaptation. This study focuses on ETSs rather than carbon taxes because ETSs provide environmental certainty through an emissions cap, generate substantial revenues through auctioning, and offer more transparent and systematically documented information on revenue allocation, enabling a robust comparative analysis. While carbon taxes also play an important role in climate finance, and examples from Colombia and Mexican states are discussed in Section 3, differences in revenue reporting make cross-jurisdictional comparisons more challenging.

One of the most relevant MbMs is the ETS. An ETS is a market-based policy designed to mitigate GHG emissions by setting a cap on emissions across one or more economic sectors and issuing tradable allowances. In most ETSs, Governments allocate allowances, typically a mix of free allocation and auctioning, and firms can trade them, establishing a market price for emissions. Most systems reduce the cap over time to drive cumulative emissions down. In 2026, 41 ETSs are in force worldwide, covering over 26% of global GHG emissions (ICAP, 2026).

ETSs can incentivize not only GHG mitigation but also a wide range of positive environmental, economic, and social outcomes, such as stimulating private-sector low-carbon investment and innovation, improving air quality and health, enhancing energy security, and creating green jobs, among others. At the same time, ETSs can deliver additional benefits through revenue generation and use (Santikarn et al., 2019).

2 SYSTEMS REVENUE GENERATION AND USE OF EMISSIONS TRADING SYSTEMS

The amount of revenue generated through ETSs depends largely on the share of emission allowances sold through auctions and the carbon price. Revenue generation in ETSs begins with the auctioning of emission allowances. While some jurisdictions auction most allowances, others allocate a larger share free of charge, directly influencing the amount of revenue generated.

On one hand, auctioning is considered more efficient, promoting early emission reductions and aligning with the “polluters pay” principle (ICAP, 2023; WB, 2021). In contrast, free allocation often offsets initial ETS costs, protects competitiveness against carbon leakage, and secures political support. The chosen approach depends on the jurisdiction’s priorities (PMR, 2019). Currently, around 68% of jurisdictions use auctions to allocate allowances, though the extent varies widely⁴ (ICAP, 2025).

In addition to auctions, revenue collection depends on the allowance price (I4CE, 2023). This price can be driven by several factors, such as the availability of allowances, changes in economic conditions, revisions to system standards, and interactions with other climate and energy policies, to name some. Typically, jurisdictions with robust prices remain among the top revenue generators, for instance, around 86% of 2024 revenue came from the EU⁵, Germany, and California. This concentration reflects not only their above-average allowance prices but also the large absolute volume of allowances auctioned in these markets (ICAP, 2025; WB, 2025)⁶.

While knowing how jurisdictions can generate revenue from ETS is significant, understanding how they use it is equally relevant. This revenue use plays a pivotal role in ETS outcomes, as strategic use can enhance the environmental, economic, and social benefits of carbon pricing. Several governments are prioritizing revenue recycling mechanisms to support additional climate initiatives and to mitigate economic burdens on vulnerable communities and stakeholders. Revenue usage can also be a lever to reinforce public support for emissions trading as a socially equitable and politically sustainable tool for decarbonization (I4CE, 2023; ICAP, 2025).

Alternative uses of revenue depend on whether jurisdictions' rules include earmarking provisions. Jurisdictions can use revenues for multiple public objectives, such as:

- To gain fiscal space and implement fiscal reforms to address distortionary taxes.
- To leverage private finance through blended finance mechanisms, guarantees, and public-private partnerships, among others.

⁴ Jurisdictions such as Austria, Germany, and Massachusetts rely entirely on auctioning, while others, like the EU, United Kingdom, Québec, and California, auction about half of their allowances. In contrast, countries such as Korea, Switzerland, and Montenegro auction only a small share of the cap (ICAP, 2025).

⁵ Only the EU ETS maintained a carbon price level consisting of limiting temperature rise to below 2°C, with a carbon price around EUR 62 (USD 70). The price range recommended by the High-Level Commission on Carbon Prices to limit temperature rise to well below 2°C is EUR 56-112 (USD 63-127) per tCO₂e (WB, 2024). The EU ETS revenues grew as the allowance prices rose from an average of EUR 5 per ton of CO₂ in 2017 to EUR 83 in 2023 (EEA, 2024). However, this income stream is also volatile. Between 2023 and 2024, total ETS revenues decreased, resulting in approximately 3.54 billion in forgone revenue. A combination of factors drove this decline, including the injection of additional allowances to manage energy market dynamics, a slowdown in industrial activity, and the broader energy transition (I4CE, 2025; Vyasan, 2024).

⁶ Jurisdictions with similarly high prices but smaller market sizes, such as Washington and Switzerland, generate proportionally less revenue. On the other hand, other factors generate additional revenues, including the international trend towards increasing auction percentages and rising prices, the escalation of climate ambitions under stricter targets, and the apparent progress of newer and emerging systems (ICAP, 2025; WB, 2021).

- To address potential adverse distributional effects of carbon pricing, especially on vulnerable communities.
- To fund climate action programs, including energy and mitigation measures, as well as climate adaptation.
- To invest in jobs and local economic benefits.
- To contribute to international climate finance.

Use in adaptation

According to the literature review, seven jurisdictions explicitly mention revenue use for adaptation to climate change (Cardenas, 2024; ICAP, 2025, ICAP,2026, Table 2). Although these systems allocate funds to climate adaptation, the information is often general, lacking specific breakdowns or clear indicators of vulnerability or risk reduction. However, in general terms, these jurisdictions exhibit substantial heterogeneity in how they allocate and report these funds. This is a clear opportunity to enhance the granularity of reporting to improve the comparability and usefulness of available information.

This governance diversity is evident in some jurisdictions that have established robust reinvestment mechanisms, while others maintain flexible or less transparent allocation processes. For example, California and Québec channel their revenues through dedicated climate funds with clear spending frameworks and traceable allocations for adaptation. At the same time, systems such as Alberta or the EU ETS allow for discretion over revenue use, often reporting aggregated data.

In the EU ETS and Korea ETS (K ETS), adaptation is generally reported as a broad expenditure category, whereas mitigation-related areas such as energy supply, grids and storage, energy efficiency, and transport are presented with more detailed expenditure categories and receive a larger share of reporting attention, limiting the granularity of adaptation expenditure tracking (EEA, 2024). Similarly, in the Regional Greenhouse Gas Initiative (RGGI) and Alberta Technology Innovation and Emissions Reduction (Alberta TIER), the incorporation of this topic is recent, so specific budgets and consolidated indicators are still lacking. Furthermore, political decisions to freeze prices in Alberta and the reallocation of revenues in the New Zealand ETS (NZ ETS) add uncertainty to the systematic and long-term access required for adaptation.

Moreover, although no developing country has yet implemented an ETS that generates revenue and allocates it to adaptation, some countries use carbon tax revenues for this purpose. In Colombia, the carbon tax has financed 80% of the Fund for Life and Biodiversity, supporting climate resilience initiatives such as ecosystem restoration and Payments for Environmental Services (Fidulcolex, 2025; Función Pública, 2022; 2023a; 2023b).

In Mexico, subnational carbon taxes include explicit provisions for adaptation projects, with regulations in states like Tamaulipas, Querétaro, Baja California, and Mexico City addressing disaster risk management and resilience, even if specific budget allocations are not defined (MexiCO₂, 2023; 2024a, 2024b). Overall, while adaptation is gaining ground in revenue use, its financing remains uncertain, requiring a more substantial allocation, dedicated budgets, MRV systems for financing flows, MEL of results, and clarity on the types of interventions.

Table 2: Jurisdictions with revenue use mention on adaptation

Jurisdiction	Allowances Auctioned & Price (Eur & Usd Per Unit)	Revenue Generated and Use	Inclusion Of Adaptation
European Union (EU) Emission Trading System (EU ETS)	57%, €73.43 (\$82.97) (EEE, 2024; ICAP, 2026).	Members must spend 100% of auctioning revenues to support climate action and energy transformation. Each country decides the specific use of proceeds. Tracking expenditure depends on national reporting.	Adaptation included in ETS regulation but not earmarked ; receives residual economic flows (EEE, 2024; ICAP, 2025). Strengthening monitoring and results evaluation represents an opportunity to enhance accountability.
California Cap and Invest (C&I)	42.8%, €24.90 (\$28.14) (ICAP, 2026).	The State’s portion of the auction proceeds is deposited into the Greenhouse Gas Reduction Fund and appropriated by the Legislature to California Climate Investments, which supports projects that facilitate GHG emissions reductions while delivering co-benefits. Total revenue since inception is 35.42 billion.	Adaptation earmarked and relevant , with detailed information available; however, no specific data on vulnerability reduction impacts (ICAP, 2025).
Québec Cap and Trade (C&T)	59%, €39.39 (\$44.53) (ICAP, 2026).	Proceeds (10.97 billion) (USD 7.85 billion) are allocated to the Electrification and Climate Change Fund, supporting Québec’s climate policy framework through the 2030 Plan for a Green Economy (PEV) and its implementation plans. (ICAP, 2026; MELCCFP, 2025a).	Adaptation explicitly included and earmarked in climate change policies and action plans, with available tracking information (MELCCFP, 2025a).
Regional Greenhouse Gas Initiative (RGGI)	91%, €21.30 (\$24.04) (ICAP, 2026).	Since 2009, 10.1 billion has been collected. Program revenues fund diverse climate and energy initiatives (ICAP, 2026).	Adaptation recently incorporated; partial earmarking in some states (i.e., Massachusetts). Indicators of adaptation under development (RGGI, 2024; MassDEP, 2025).

Alberta Technology Innovation and Emissions Reduction (TIER)	Free allocation; €51.7 (\$58.42) (ICAP, 2025); €84 (\$95) in 2025 (CBC News, 2025).	Revenues from payments exceeding the cap are invested in mitigation, clean technology, and community resilience programs—708 million for 2023–26, and 571.4 million planned for 2025–2028 (Government of Alberta, 2024; 2025).	Adaptation included indirectly through resilience and capacity-building programs such as the Municipal Climate Change Action Centre (MCCAC, 2025). No earmarking or tracking of adaptation investments. Alberta announced a freeze on carbon prices in May 2025, which may affect planned revenues (CBC News, 2025).
Korea ETS (K ETS)	3.3%, €6.1 (\$6.99) (ICAP, 2026).	100% of proceeds are directed to environmental and climate projects, including mitigation, green finance, technology, and regulatory support (ICAP, 2025).	Adaptation included but not earmarked ; supports vulnerable regions and groups without specific allocation (ICAP, 2025).
New Zealand ETS (NZ ETS)	51%, €28.34 (\$31.99) (ICAP, 2026).	Revenues were initially planned to fund climate-related activities, later redirected to tax rebates following political pressure over price increases (Cardenas, 2024).	Adaptation initially earmarked (National Adaptation Plan), later removed due to policy changes (Cardenas, 2024).

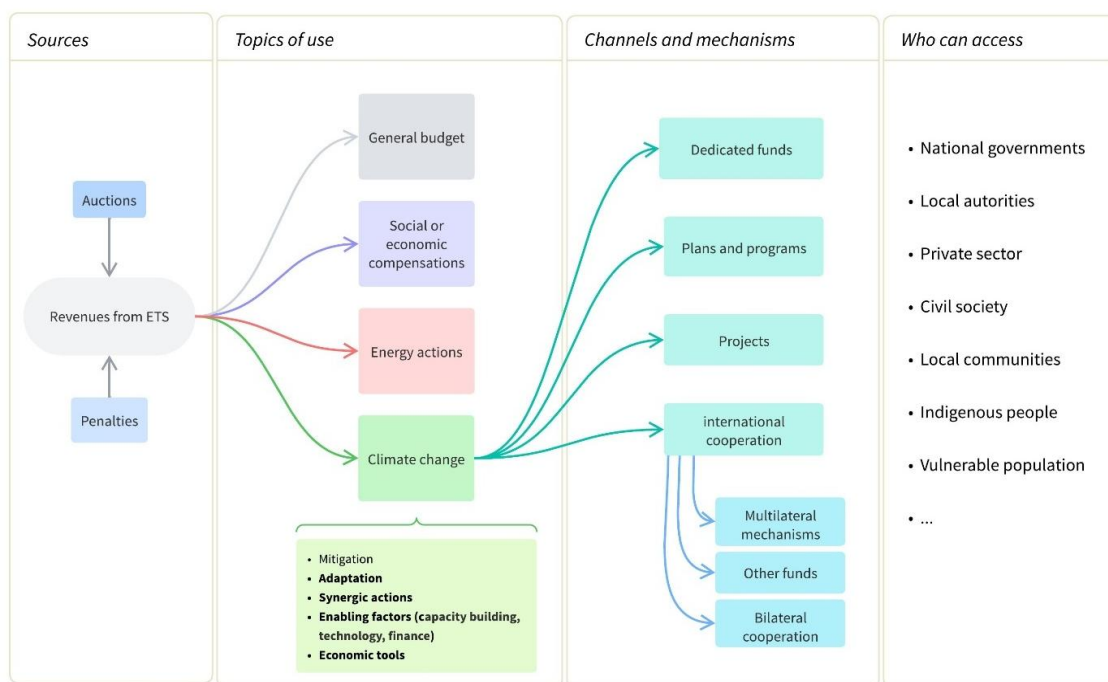
Source: Own elaboration.

3 ADAPTATION FINANCING SCHEMES VIA ETS

Conceptualizing the flow

After examining how ETSs generate and distribute their revenues for different purposes, including adaptation, it is fundamental to understand the path these funds follow from their origin to their destination. The following diagram (Figure 4) summarizes the main institutional and operational routes identified across the various jurisdictions through which jurisdictions channel ETS revenues toward climate action, particularly adaptation. This diagram characterizes the sources, allocation channels, mechanisms of revenue allocation (e.g., dedicated funds, sectoral programs, or specific calls), and the different actors who can access these funds, from public entities to civil society organizations and local communities.

Figure 4. Schemes for adaptation finance



Source: Own elaboration.

The starting point is the revenues generated by ETSs, primarily through the auctioning of emissions allowances. Depending on the regulations, the systems can allocate funds for various purposes, such as climate action and other uses. However, including adaptation in regulatory frameworks in ETSs is only a first step. Once the uses are defined, jurisdictions channel revenues through various institutional mechanisms, such as dedicated funds, sectoral plans and programs, calls for proposals, and direct grants. The framework defines who can access these resources, including governments, the private sector, civil society, and communities.

As will be seen in the case studies, depending on the ETS design, the use of revenues can generate significant additional effects. For example, revenues can create a subsidiarity effect, enabling jurisdictions to allocate resources directly to municipalities and communities, which often bear the adverse effects of climate change firsthand and implement adaptation actions in their territories.

Similarly, as will be documented in the case of the EU and Québec, ETSs can have an investment multiplier effect, meaning that resources can fund other financing schemes, such as PES, international financing based on grants and concessional loans, and other innovative financing mechanisms. Visualizing these flows at the level of each ETS can help identify critical areas, such as good practices, bottlenecks, and opportunities for improvement in allocation, including transparency and MEL of funding allocation. In this regard, we will now analyze how this framework is implemented in practice across three jurisdictions, followed by a discussion of best practices and opportunities to better channel resources toward adaptation.

4 STUDY CASES

This section further analyzes the use of revenues across three case studies. The selected jurisdictions were the EU ETS, California Cap and Invest (C&I), and Québec C&T. This selection was based on the size of their ETSs, the explicit inclusion of adaptation in their regulations, and the availability of data.

For each case study, the revenue figures, the regulations governing the use of these funds, and the priority sectors for funding are analyzed, including those related to adaptation. Then, the use of revenues for adaptation is characterized by type, and some mechanisms for accessing funds and transparency aspects are identified. Finally, a couple of specific cases of funded adaptation are presented.

To facilitate analysis and based on available information, the following classification typology will be used for funded institutional adaptation measures (Table 2). These ten-type action groups, according to their primary nature, provide a clear framework for assessing the approaches and priorities adopted in different contexts. This typology was developed based on the categories identified in EU ETS reporting, which provides a well-established framework for disaggregated data that facilitates cross-jurisdictional comparison. However, this standardized approach has inherent limitations: it may not fully capture context-specific adaptation measures in California and Québec, such as health-related interventions, agricultural resilience programs, or community-based initiatives tailored to local vulnerabilities. To address these gaps, sector-specific measures and jurisdiction specific approaches are discussed in detail within the narrative of each case study.

Table 3: Typology of adaptation measures

Type	Description
Capacity building	Includes activities aimed at strengthening institutional, technical, and human capacities to address the adverse effects of climate change. Examples include training, knowledge platforms, support for local authorities, international cooperation, and awareness-raising events.
Monitoring systems	Actions dedicated to the creation, modernization, and operation of systems for monitoring climate, meteorological, and environmental parameters, as well as the development of observation networks and territorial information technologies. Its objective is to improve decision-making and adaptive planning.
Research	Applied research projects, scientific studies, and the generation of knowledge on adaptation, impacts, and vulnerabilities. Includes collaboration with universities, research centers, and the development of innovative methodologies.
Urban areas	Measures focused on adaptation in urban environments, such as infrastructure improvements, resilient urban planning, and sustainable resource management.

Type	Description
Flood protection	Includes physical interventions, such as the construction and maintenance of drainage systems, watershed management, and hydrogeological risk mitigation projects to prevent or reduce flooding.
Forest protection	Actions to prevent deforestation, promote reforestation, restore forest ecosystems, and increase the resilience of forests to fires and other climate risks. Includes both physical interventions and institutional and educational frameworks.
Coastal and island protection	Measures to protect vulnerable coastal areas and islands, such as engineering works, ecosystem restoration, and territorial planning to reduce erosion and storm risks.
Water management	Actions aimed at the sustainable management of water resources, including improving water supply and sanitation infrastructure, increasing water-use efficiency, protecting water sources and watersheds, and promoting water reuse and treatment to address the challenges of climate change.
Other Nature-based Solutions (NbS)	NbS that do not fall into the previous categories, such as biodiversity protection, agricultural measures, and sustainable natural resource management.
General measures	Crosscutting or integrated actions that span several categories, such as national adaptation programs, climate change policies, general adaptation finance, and pilot projects that are not limited to a single type of measure.

Source: own elaboration. *Note: measures can be understood as projects, interventions or programs.*

4.1 EUROPEAN UNION ETS

Under the EU ETS, most allowances are distributed through auctions, covering up to 57% of the total cap (EP&CEU, 2024). In 2024, this system generated approximately EUR 38.8 billion (USD 43.87 billion) in auction revenues (EEA, 2025). These revenues are primarily allocated to national budgets and to the Innovation and Modernization Funds, which support the development of low-carbon technologies and energy system improvements in lower-income member states. Currently, member states receive 63% of revenues, followed by the Modernization Fund (16%)⁷, the Recovery and Resilience Facility (14%), and the Innovation Fund (6%), among other uses (EEA, 2025).

Regarding the regulation for national revenue use, by 2024, members are required to spend 100% of auctioning revenues on climate action and energy transformation except in cases of indirect carbon costs aid to reduce the risk of carbon leakage, which are required to allocate no more than 25% for this purpose (EEA, 2024)⁸. According to the EU ETS Directive, adaptation to climate change is among the possible uses of revenue (EP&CEU, 2024).

⁷ The Modernisation Fund is based on revenues from the auctioning of 2% of the total allowances for 2021-2030 under the EU ETS. Additionally, from 2024 to 2030, an extra 2.5% of the total quantity of EU ETS allowances auctioned is allocated to the fund. The innovation fund has an estimated budget of EUR 40 billion until 2030 (dependent on the carbon price) (EC, n.d.).

⁸ It is important to mention that although this quota explicitly gears members' climate actions toward adaptation, the EU has not extended this obligation to the funds that finance those members' actions.

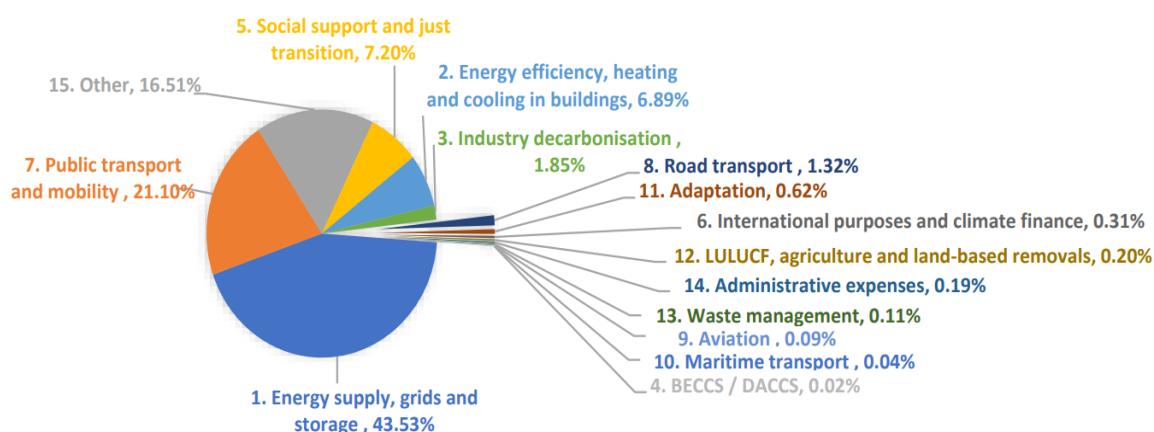
The directive outlines several potential uses of revenues that can generate significant benefits for climate adaptation. These primarily include channeling funds to:

- Implement Nature-based Solutions (NbS), including protection, restoration, and better management of terrestrial and marine ecosystems, particularly marine protected areas, and afforestation, forestry, and reforestation.
- Additionally, revenues may be allocated to the transfer of technologies and climate action finance to facilitate adaptation in vulnerable third countries, and to the Adaptation Fund over the UNFCCC, to fund research and development as well as demonstration projects (Article 10(3)).

In 2023, member states disbursed 95% of their revenues to energy systems, public mobility, social support, just transition, and energy efficiency (EEA, 2024). International purposes and climate finance, which include support for climate actions in vulnerable countries, accounted for a smaller share (0.31%). Adaptation to climate change receives approximately 0.62% of the total revenue disbursed that year (ERCST, 2025) (Figure 5).

However, this reported percentage is, in fact, lower. By discounting projects labeled as adaptation that do not actually contribute to this agenda (mainly mitigation and air quality projects), it is possible to estimate that adaptation support amounted to around EUR 157 million (USD 177.5 million) (EEA, 2023), corresponding to 0.37% of the total revenue disbursed that year⁹.

Figure 5. EU ETS percentage revenues EU per category (2023)



Source: ERCST (2025).

Domestic use for adaptation

Specifically, adaptation funding by countries amounted to EUR 556 million (USD 628.6 million) between 2020 and 2023¹⁰, supporting around 123 projects across the EU¹¹, with 85% concentrated in only six countries: Italy, Portugal, Slovenia, Spain, Greece, and Slovakia (Figure 6). There is limited participation from the other eight countries, whilst the 13 EU ETS members have not

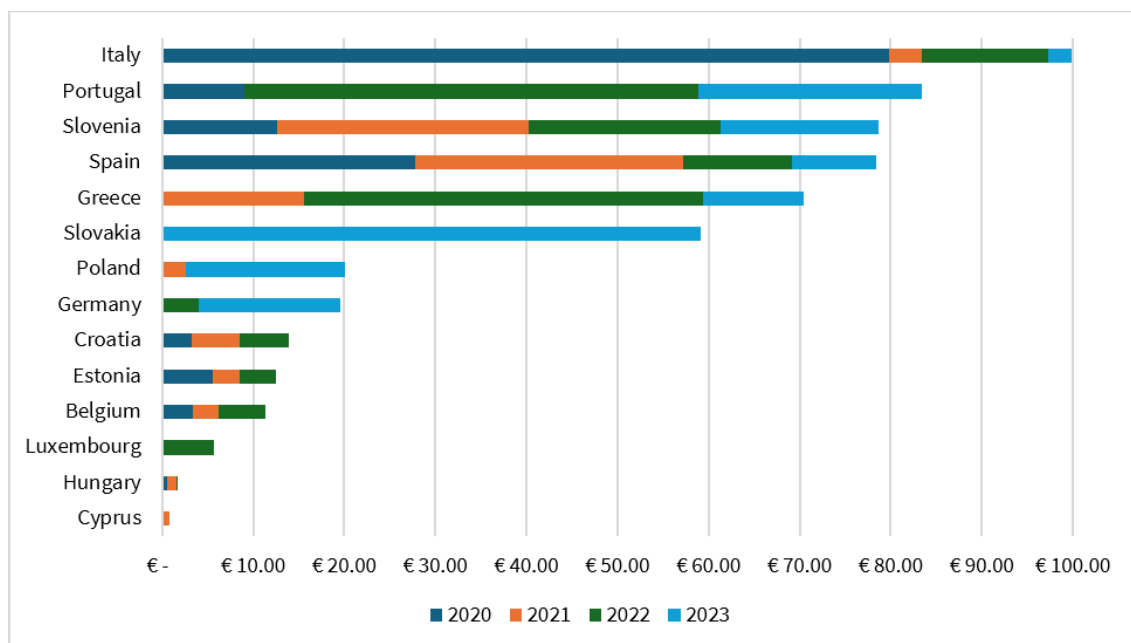
⁹ This amount is less than that allocated a decade ago. From 2013 to 2015, adaptation spending amounted to EUR 94 million, representing around 1.3% of total domestic revenue use (Le Den et al., 2017).

¹⁰ Data not available for 2024 at the time of this report.

¹¹ Projects that lacked an explicit mention or relationship with adaptation, or that only addressed mitigation, air quality, and punctual pollution issues, were discarded.

reported any use of revenues for adaptation. Furthermore, over these 4 years, total resources have grown by 10%.

Figure 6. Revenue use in adaptation by country and year (Million EUR)

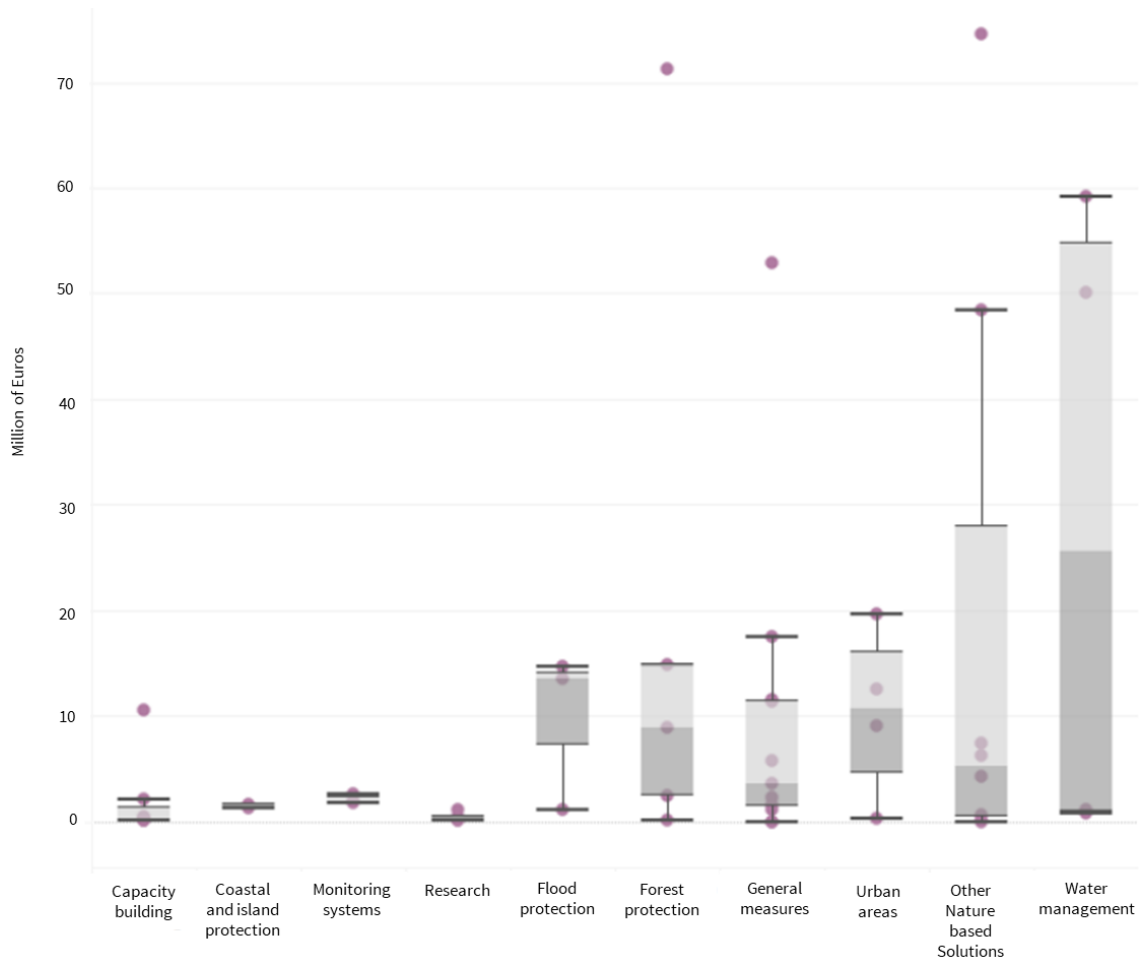


Source: Own elaboration with information from EEA (2025). Note: 2024 data is still not available. Values are calculated across EU member states that reported adaptation expenditures. Values are not weighted by member state size or total revenue.

Regarding adaptation types funded, water management, NbS, and urban areas are sectors that have concentrated more than half of the total adaptation investment. Water management alone, with only 10 projects across four countries, accounts for around 20% of total adaptation resources and shows the most extensive investment range, reaching EUR 60 million (USD 67.8 million) per project (Figure 7).

NbS projects receive low average funding, but there are exceptional projects within this category with remarkably high financing. Flood protection, forest protection, urban areas, and general have more modest medians with moderate dispersion. At the same time, subject to the scale and scope of each project, activities related to adaptive capacity strengthening are usually less costly than infrastructure-related activities, which show more diverse and heterogeneous values across projects. Notably, only a pair of projects on water research and management addressed the agricultural sector.

Figure 7. Spent on adaptation by project type



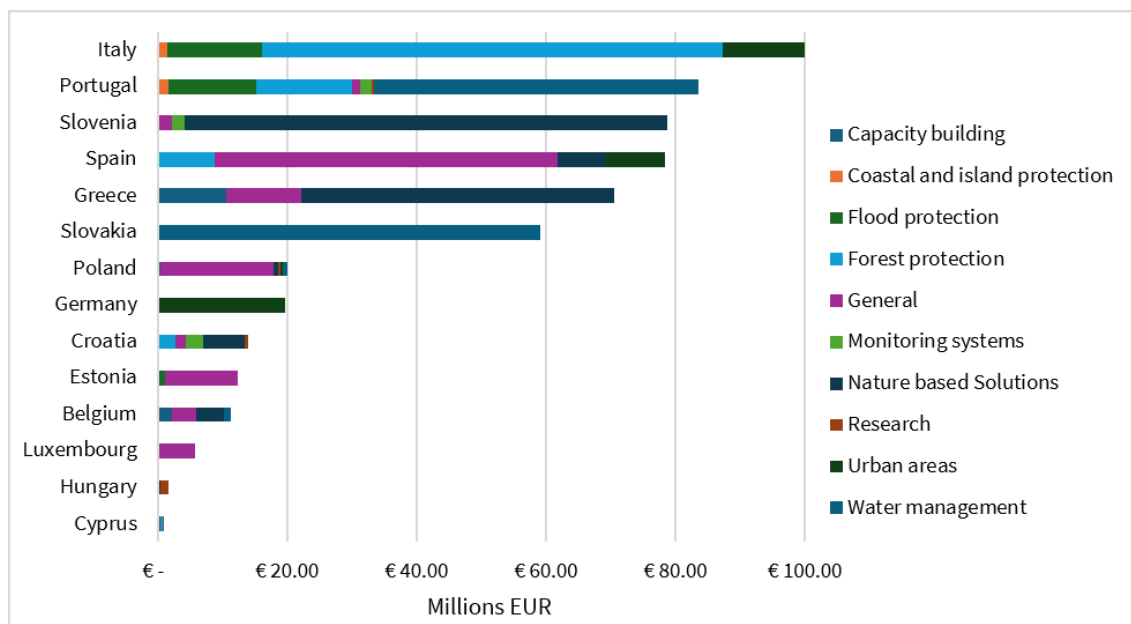
Source: Own elaboration with information from EEA (2025).

Focusing on adaptation types financed by country, these amounts depend primarily on revenues from the ETS, climate vulnerabilities, adaptation investment priorities, and public spending guidelines set within each jurisdiction. The most significant disbursements in water management and NbS are in Spain and Poland. At the same time, Italy and Portugal have funded measures such as coastal and island protection (Figure 8).

Countries such as Italy¹², Portugal, and Croatia have opted to diversify their adaptation funding. In contrast, countries such as Germany, Luxembourg, Slovakia, and Cyprus have strategies focused on a less diversified use of revenues for adaptation. In Germany, these have focused on modernizing urban areas.

¹² According to an Ecologic Institute study (Haase et al., 2022), the influx of resources is not guaranteed nor continuous, which alternates the revenue among topics and impedes the creation of long-lasting projects, especially for recurring damages.

Figure 8. Adaptation finance from revenues by country and type of project 2020-2023



Source: Own elaboration with information from EEA (2025).

Supporting adaptation with international finance

In addition to providing direct national adaptation finance, the EU ETS also supports climate adaptation through international finance. International support includes donations to United Nations Framework Convention on Climate Change (UNFCCC) bodies such as the Green Climate Fund, the Global Environment Facility, the Adaptation Fund, and the Least Developed Countries Fund, as well as other initiatives¹³. In 2023, the EU ETS contributed approximately EUR 109 million (USD 123.2 million) from the carbon market to international financing, representing around 0.25% of total revenues¹⁴. In the case of the Adaptation Fund, this one received around EUR 51 million (USD 57.7 million) from ETS revenues, mainly from Belgium (the only country that has consistently reported its annual donations), Spain, and Italy.

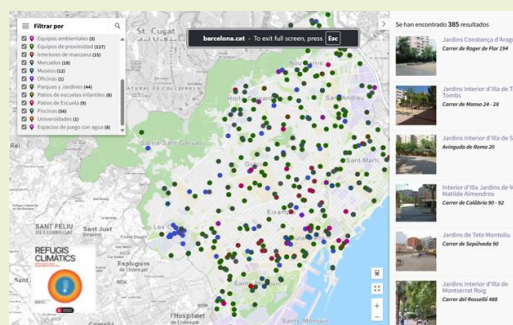
¹³ Like UNDP Climate Promise, NDC Partnership, and UNEP. It is not possible to reliably account for each of these resources due to the heterogeneity of the information reported by the countries.

¹⁴ In bilateral cooperation, Belgium has also supported and reported adaptation projects in developing countries, such as resilient waste management in India, climate-resilient river basins in Ecuador-Peru, climate education in South Africa, and desert regeneration in Egypt (totaling EUR 3.6 million).

Imagine Spanish cities facing increasingly hot summers.

Thanks to the Environmental Promotion Plan (PIMA), funded by ETS revenue, the Spanish community could transform urban and peri-urban spaces into climate shelters. In 2023, these "climate shelters" became oases of fresh air, with water, vegetation, and better-insulated buildings, designed to protect both people and animals from extreme heat.

Climate shelters in Barcelona



Source: Ajuntament de Barcelona, n.d.

Infrastructure against floods in Estonia



Source: European Commission et al., 2024.

Prepared for Floods. In Estonia, floods have posed a threat to health, the environment, and the local economy. With support from ETS revenues, Estonia studied risks and established co-financing mechanisms to prevent and manage the effects of flooding. This program has raised awareness of funding opportunities for risk-based adaptation (European Commission et al., 2024).

When Small Funding makes the difference for Forest Protection. In Italy, following devastating fires that ravaged protected areas, an opportunity for recovery emerged. While ETS funding was modest, it supported the implementation of a national program to restore natural and semi-natural forests. Teams worked on the structural and functional recovery of ecosystems, protecting flora and fauna, and revitalizing.

Main findings

Although the EU ETS mandates allocating 100% of its revenues to climate action, it does not require a minimum allocation to adaptation, leaving spending decisions to individual member states within their national budgetary frameworks. This structural design, combined with adaptation's lower political salience and the inherent challenges in measuring adaptation outcomes, helps to explain why, in practice, member states assign less than 0.5% of these revenues to this climate agenda. Moreover, only 14 of the EU ETS member countries have reported any revenue financing for adaptation, leaving significant potential for funding and reporting adaptation actions in the other 13 member countries.

While reporting mechanisms for revenue use in adaptation already exists, there is significant potential to enhance their quality and consistency. Improving the standardization of information across countries and over time, including clearer criteria to distinguish adaptation actions from mitigation or other interventions, would allow for more robust and comparable analysis. Similarly, where countries do not yet earmark revenues to specific uses, developing harmonized estimation methodologies could strengthen the reliability of data and unlock deeper, evidence-based insights.

Furthermore, the implementation of a potential MEL scheme would allow for monitoring progress, tracking financial flows, and evaluating effectiveness for beneficiaries, sectors, ecosystems, and impacts on reducing climate vulnerability. This MEL provides the opportunity to exchange information across jurisdictions to learn from good practices and lessons learned.

4.2 CALIFORNIA CAP AND INVEST PROGRAM

In the case of the California C&I program, auctions cover approximately 42.8% of the 2025 emissions cap through vintage 2025 CARB-owned allowances, while the remaining allowances are consigned to electrical utilities and natural gas suppliers on behalf of the ratepayers (ICAP, 2026). For FY 2024-2025, proceeds from the sale of these allowances totaled approximately USD 5.8 billion, which were assigned to the Greenhouse Gas Reduction Fund (58%) and to energy utilities (42%) (CARB, 2025a). According to the statute, the State's portion of auction proceeds must be deposited into the Greenhouse Gas Reduction Fund (GGRF), whilst revenues from the monetization of energy utilities' allowances contribute to benefiting retail electricity ratepayers and help mitigate GHG emissions (CARB, 2019).

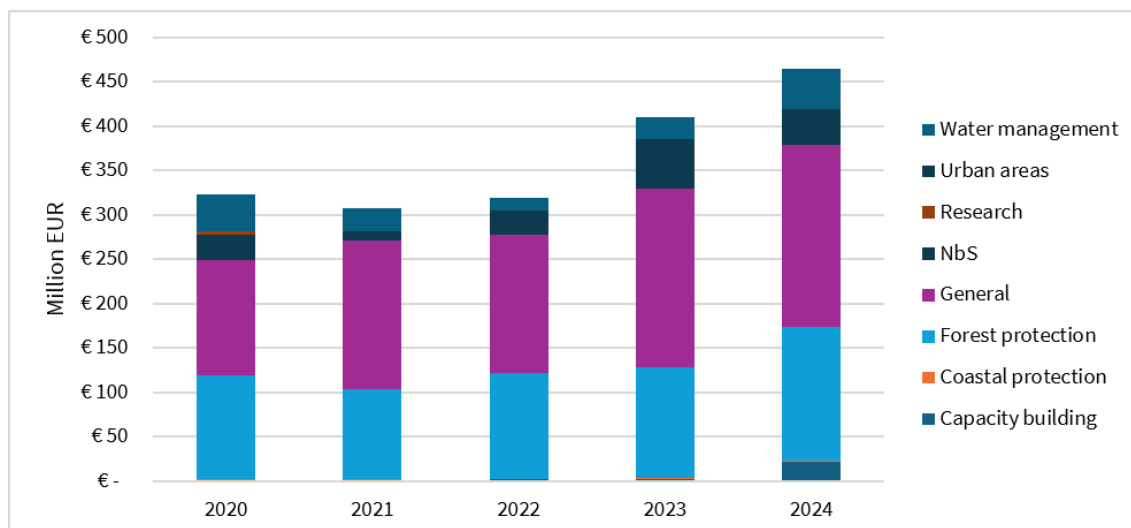
Once deposited into the Greenhouse Gas Reduction Fund (GGRF), funds are appropriated by the Legislature and administered through California Climate Investments (CCI), a statewide initiative that funds programs and projects to facilitate greenhouse gas emissions reductions while delivering economic, environmental, and public health benefits. The Legislature requires that at least 35% of funding benefit disadvantaged communities, low-income communities, and low-income households, collectively referred to as priority populations (CCI, n.d.a).

From 2020 to 2024, the California government allocated approximately EUR 1.8 billion (USD 2.04 billion) from its C&I to programs supporting 2,656 adaptation related projects and programs, enabling factors for climate action, and mitigation measures with explicit co-benefits in adaptation (CCI, 2025). In 2024 alone, these expenditures reached EUR 464.5 million (USD 525.2 million). Based on the classification developed in this study, this amount represents approximately 8.6% of the system's total revenues and 15% of CCI's total funds for this year included in the expenditure dataset used to construct Figure 9.

These resources allocated to such items have grown systematically throughout the analysis period. The measures considered as enabling factors for adaptation include strengthening the adaptive capacities of communities, small organizations, and local governments, as well as research and monitoring activities. Among mitigation measures with adaptation co-benefits are weatherization for low-income urban and rural households, as well as forest management, soil conservation, forest health improvement activities, and watershed restoration measures.

Within the proposed typology of adaptation related expenditures financed through CCI, broad adaptation and resilience initiatives accounted for approximately 47% of the analyzed funds, followed by forest protection (34%), NbS (9%), and water management (8%). The remaining share was distributed across capacity building, coastal protection, research, and urban resilience initiatives. (Figure 9).

Figure 9. Types of adaptation related expenditures identified within CCI funding (Million EUR)



Source: Own elaboration with information from CCI (2025).

Programs supporting climate resilience planning, sustainable and resilient communities, and adaptive capacity strengthening include activities aimed at strengthening local resilience capacities and supporting communities in preparing for climate risks. Forest protection focuses on forest health, fire prevention, and urban and community forestry. NbS mainly include ecosystem- and land-based interventions, particularly in sectors such as agriculture, watershed restoration, and ecosystem conservation.

Box 2: Adaptation Story: California

Thanks to California's C&T system, climate adaptation has gained momentum and is a reality for thousands of people, uniting technology, community, and nature. Some examples include (CARB, 2025b):

- During the summers, extreme heat can make homes unbearable, while electricity costs rise each month. The Low-Income Weatherization Program funds efficient insulation and rooftop solar panels, which keep homes cool, generate electricity savings, and improve the resilience of power grids.
- Likewise, affordable housing and climate-transformative community programs have enabled families to secure housing and mobility in a safe, efficient, and car-free manner, reducing their exposure to extreme temperatures and giving them access to new economic opportunities.
- Meanwhile, on the coast, programs, and projects such as Climate Ready and Wetlands and Watershed Restoration work to protect coastal environments from sea level rise and flooding, so that families can continue to enjoy beaches, and cultural and recreational spaces are maintained.

Images of climate programs for adaptation in California



Source: CARB, 2025b.

Main findings

Although California generates lower revenues than the European system, approximately 15% of CCI funds were classified as adaptation-related expenditures according to the typology adopted in this study, including direct adaptation measures, enabling activities (e.g., planning, capacity building, and research), and mitigation measures with explicit adaptation co-benefits. This represents a significantly higher share than the EU ETS, where adaptation receives approximately 0.37% of revenues. Most of this funding concentrates on programs supporting climate resilience planning, sustainable and resilient communities, and adaptive capacity strengthening, alongside investments forest protection for soil regeneration and wildfire control, NbS for soil regeneration, and coastal protection. Given these spending trends, it can be confirmed that adaptation is a priority for California.

In this regard, the spending areas align with the climate risks facing this territory, including heat waves, wildfires, storms, and sea level rise. Furthermore, these interventions include a strong social and environmental justice dimension, as they deliver benefits to priority populations, including disadvantaged communities, low-income communities, and low-income households, while strengthening adaptive capacities and supporting community resilience.

In addition to resource use, one of California's notable practices is its robust reporting system, which includes tools (a data dashboard and interactive map) with accessible and detailed information on project objectives, funding amounts, locations, timelines, beneficiaries, and estimated benefits.

However, there is an opportunity to further strengthen MEL, particularly for assessing long-term adaptation outcomes, reducing climate vulnerability, and capturing lessons learned to enhance knowledge sharing across projects.

Efforts such as California Climate Risk and Adaptation Index (CalCRAI) represent a step toward closing this gap. By combining multi-domain climate risk indicators with community-level adaptive capacity measures, it would offer a replicable framework in order to assess whether ETS-funded investments are translating into measurable vulnerability reduction. Its methodology could inform both of California's own MEL system for Cap-and-Invest programs and serve as a transferable model for other jurisdictions.

Finally, one of the best practices in California is the development of a community engagement model since 2020, which guides CCI in implementing effective community engagement and ensures that programs and projects incorporate community needs and reduce the risk of unintended negative consequences. This mechanism offers knowledge, tools, and procedures to enable equitable access to social, environmental, and climate justice, with particular focus on disadvantaged communities (CCI, n.d.b).

4.3 QUÉBEC CAP AND TRADE SYSTEM

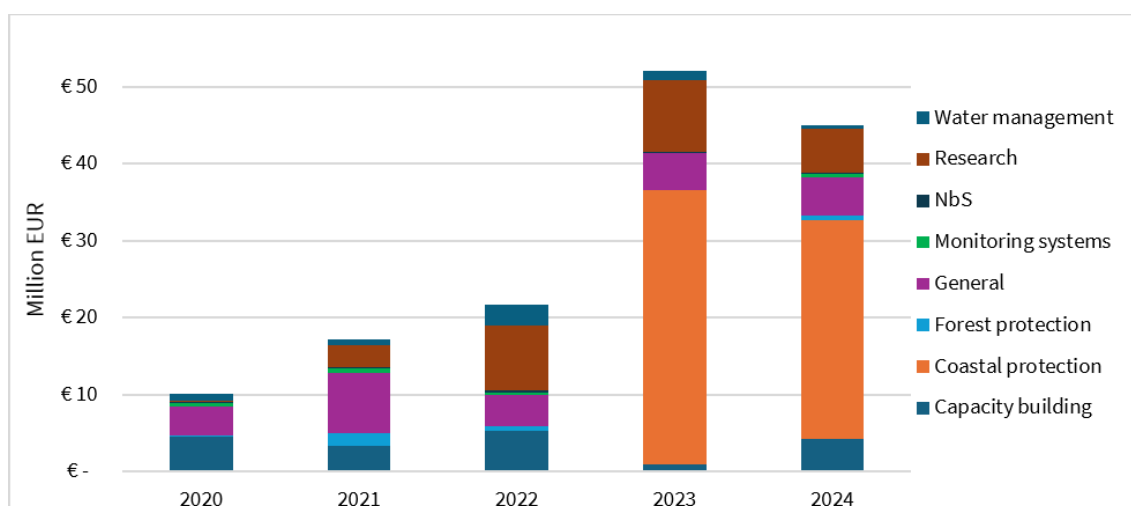
Since its launch in 2013, Québec's C&T system has auctioned around 59% of its cap allowances and generated more than EUR 7.4 billion (USD 8.37 billion, ICAP, 2026). Moreover, in 2024 alone, this system generated EUR 976 million (USD 1.10 billion) in revenue. According to system regulation, the Electrification and Climate Change Fund (ECCF) receives all auction proceeds to promote

measures that reduce GHG emissions, adapt to climate change impacts, and electrify the economy (QOP, 2025)¹⁵.

The Electrification and Climate Change Fund provides funding for the 2030 Plan for a Green Economy¹⁶, as well as other ongoing commitments (MELCCFP, 2025a). The 2030 Plan for a Green Economy aims, among other targets, to support the development of local climate change plans, regional health adaptation plans and to assess climate risks to strategic infrastructure and priority services in Québec (Gouvernement du Québec, 2020a). The following chart presents the ECCF resources allocated to programs¹⁷ that contribute to adaptation, that is, actions linked to adaptation, as well as enabling activities, such as capacity building and the development of climate change planning frameworks (Figure 10).

Over the past five years, Québec has increased and diversified the use of its C&T revenues for adaptation. Total adaptation funding has steadily increased from less than EUR 10 million (USD 11.3 million) in 2020 to more than EUR 50 million (USD 56.5 million) in 2023, then decreased slightly in 2024, totaling 112 supported measures. This exponential growth is primarily due to the inclusion of additional programs to implement adaptation solutions for coastal erosion and submergence and, to a much lesser extent, actions to address heat waves and support youth participation in climate action.

Figure 10. Adaptation programs financed from Québec C&T 2020-2024 by type (Million EUR)



Source: Own elaboration based on Gouvernement du Québec (2020b, 2021, 2022, 2023a, 2023b, 2024a, 2024b, 2024c, 2024d, 2024e, 2025) and Statista (2025). Note: Amounts originally reported in Canadian dollars (CAD) and converted to euros using annual average EUR/CAD exchange rates (Statista, 2025). Program classification follows the typology developed in Table 2 of this study.

Likewise, the province of Québec has pursued relatively long-term actions, such as research, capacity building, and other general measures for climate resilience, which have been ongoing throughout the analysis period. Research is reflected, for example, in studies on disaster protection, heat waves, and health. At the same time, capacity building focuses on supporting the inte-

¹⁵ In Québec, ETS revenues are entirely devoted to climate action. However, surpluses (which correspond to the difference between the initially planned expenditures and those actually incurred) can ultimately be reallocated to other purposes, which are themselves limited by legal provisions.

¹⁶ That relies on these revenues and, to a lesser extent, on other sources of income, including government loans.

¹⁷ Municipalities usually implement these programs, while research institutions conduct research, and youth, farmers, citizens, and businesses (MELCCFP, 2025b).

gration of adaptation into Urban areas, raising awareness, and reducing the psychosocial impacts of extreme weather events, among others.

General actions primarily refer to municipal adaptation plans¹⁸ and comprehensive actions across sectors such as health, infrastructure, and tourism. Water related actions mainly include support for municipal stormwater management and green infrastructure projects, including initiatives implemented through programs such as OASIS and ATCL. Other ongoing actions, including smaller budgets, include NbS to address pollen variability due to climate change, as well as forest protection actions¹⁹, primarily related to research on forest adaptation and wildfire risk reduction.

On the other hand, although adaptation funding has increased annually, it remains well below mitigation funding. In 2024, climate change adaptation expenditures represented approximately 4.4% of total FECC actual expenditures, while mitigation expenditures accounted for 81.5%, reflecting a stronger orientation toward mitigation actions in Québec's climate spending framework (Gouvernement du Québec, 2024a)²⁰.

Additional key topics for adaptation

In addition to addressing adaptation and mitigation, Québec also allocates part of its ECCF resources to support actions for Indigenous communities, innovative finance, and international cooperation, which indirectly contribute to adaptation for the 2020-2024 period:

- Approximately EUR 4 million (USD 4.5 million) to support First Nations, Indigenous, and Native communities in acting against climate change.
- Around EUR 634,000 (USD 716,800) was used to identify the most promising forms of innovative financing and support their development and sustainable financial projects.
- A contribution of EUR 25 million (USD 28.3 million) to the Adaptation Fund of the United Nations Framework Convention on Climate Change.

Furthermore, through its International Climate Cooperation Programme (ICCP), fully funded by C&T, Québec has allocated a total of EUR 16 million (USD 18.1 million) to financing programs focusing on capacity building and technology transfer for the most climate-vulnerable French-speaking countries, through calls for projects (MELCCFP, n.d.)²¹. Between 2020 and 2023, the ICCP has funded more than 20 projects, including capacity building for adaptation in Burkina Faso, the promotion of agroecology in Côte d'Ivoire, and disaster risk reduction in Madagascar (Gouvernement du Québec, n.d.a). The amount assigned to international collaboration in 2024 represents approximately 1% of total revenue.

¹⁸ Also, financing local projects aimed at climate risk assessment, the assessment of climate change-related development opportunities, the identification of adaptive measures, and climate-sensitive urban areas processes (Environnement Estrie, 2019).

¹⁹ Although no standalone funding category was identified for flooding and urban protection, these issues are addressed through municipal projects, including stormwater management and green infrastructure initiatives supported through programs such as OASIS and ATCL. Fluvial flooding projects are generally funded through government credits and included within Québec's climate change action plan.

²⁰ Moreover, the 2025-2030 implementation plan for the 2030 Plan for a Green Economy has procured 1.15 billion for adaptation, representing only 13% of the total budget of CAD 10.1 billion (Radio-Canada, 2024).

²¹ Thanks to this effort, Québec received the UN Global Climate Action Award in 2019 for its innovative climate cooperation and financing model.

Box 3: Adaptation Story: Québec

Across Québec, First Nations, Inuit, and Métis communities are increasingly facing the impacts of climate change, which affect ecosystems, traditional livelihoods, and community well-being. To strengthen resilience and support self-determined climate action, the government has promoted Indigenous climate leadership initiatives that recognize the unique realities, priorities, and knowledge systems of Indigenous Peoples. These initiatives support collaboration, self-determination, and the integration of Indigenous knowledge into climate governance, adaptation planning, and decision-making processes, helping communities develop responses that reflect their own needs and priorities. (Environnement et Changement climatique Canada, 2025).

Indigenous nations in Québec



Source: ITQ,2025.

Women engaged for climate resilience in Rwanda



Source: CECI,2025.

In Kirehe District, one of the most vulnerable to climate change in Rwanda, Ruth, a local farmer, remembers how the soil became increasingly arid, and crops became less abundant. Through the ICCP-funded project "Women Engaged for Climate Resilience," there are "living laboratories" where Ruth and other women in the community

have learned regenerative and agroecological farming techniques, combining their grandmothers' knowledge with scientific innovation from universities. Women, previously excluded from agricultural decisions, have assumed leadership roles in local organizations and actively participated in sustainable resource management (Gouvernement du Québec, 2024c).

Main findings

Québec C&T transparently allocates its revenues to climate action aligned with its long-term climate plans, though surpluses may be reallocated to other purposes within legal limits. Similarly, Québec has increased and diversified the use of C&T resources for adaptation, going from less than EUR 10 million (USD 11.3 million) in 2020 to EUR 45 million (USD 50.9 million) in 2024, representing 4.4% of revenues.

These resources steadily support diverse research, capacity building, and municipal planning initiatives, as well as awareness-raising and social resilience programs. Likewise, the spending structure is flexible enough to include targeted adaptation and prevention programs, addressing climate related risks such as coastal erosion, heat waves, and zoonotic diseases.

In addition to resources supporting adaptation into the jurisdiction, a portion of the funds is allocated internationally, to Indigenous communities, financial innovation, and international cooperation, supporting technology transfer and capacity building in climate-vulnerable French-speaking countries, and contributing to the UNFCCC Adaptation Fund.

As Québec case shows, one potential advantage of an ETS with clear regulations for the use of revenues is a subsidiarity effect. It offers the opportunity to directly support municipalities and other key stakeholders, who are typically responsible for implementing local adaptation actions and for collaborating with communities to address the effects of climate change on their territories.

Despite growing and diversified adaptation efforts, a financial gap persists between adaptation and mitigation. This gap reflects the secondary importance of adaptation. It highlights the need to balance investments to address both challenges, and to propose programs with comprehensive approaches that maximize the co-benefits of adaptation and mitigation.

In terms of MEL, transparency in reporting the progress of funded programs is notable: Québec monitors and publicly reports program results, presents detailed information on their key attributes, and promotes accountability for resource use. In addition, ECCF financial statements are audited annually.

Québec has developed consolidated dashboards and open data platforms that provide detailed information on funded programs, resource allocation, and implementation progress. An actionable opportunity is to further facilitate access to this information and strengthen the connections between available data sources, making it easier for external users to track programs and results over time.

5 CHALLENGES AND BARRIERS TO REVENUE USE IN ADAPTATION

Based on the analyzed cases and expert opinions, adaptation financing has yielded tangible results in policies and projects that increase climate resilience in communities, ecosystems, and infrastructure. Nevertheless, the adaptation agenda receives limited funding, a pattern consistent with broader findings in the climate finance literature (UNEP, 2023; CPI, 2025; Chambwera et al., 2014). Some barriers and main reasons are mentioned below, which also confirm and extend previous research on adaptation finance gaps (IPCC, 2022; Cochu et al., 2019).

Mitigation actions have clearly been prioritized over adaptation, partly because they already benefit from established market mechanisms²². In contrast, adaptation is a public good that generates broad societal benefits, making it more challenging to incentivize private-sector action. Furthermore, adaptation only began to feature in international negotiations after mitigation, making it a young topic that requires greater public attention (UNFCCC, 2019).

Limited understanding of adaptation among policymakers, a lack of political will, and stakeholders' pressure exacerbate this situation, complicating the allocation of resources for adaptation measures. Bellon & Massetti (2022) already argued that government intervention for adaptation is justified on grounds of efficiency and equity, yet political economy factors often favor mitigation investments with more visible and measurable outcomes (Chambwera et al., 2014).

Adaptation is not earmarked as a specific revenue use, thereby precluding it from receiving the particular attention or adequate financing it necessitates. Despite the EU allocating 100% of its revenue to climate change actions, there is no specific regulation setting up a minimum percentage for adaptation. Likewise, some jurisdictions prohibit earmarking, which complicates the traceability and accountability of climate actions. Cardenas (2024) confirms that without dedicated allocation mechanisms, adaptation competes unfavorably with mitigation priorities that benefit from established price signals and clearer return-on-investment metrics.

Revenues can flow into general budgets without precise tracking mechanisms, making it difficult to identify or guarantee funding for adaptation. This finding aligns with broader observations on climate finance governance, where the lack of labelling and traceability undermines accountability and limits the ability to assess whether resources effectively reach adaptation objectives (CPI, 2025; IACE, 2023).

Introducing systematic evaluation frameworks for projects labelled as adaptation would represent a significant step forward. Establishing clear climate change criteria at the design stage, and verifying their application, would help ensure that investments are genuinely contributing to adaptation goals and delivering meaningful outcomes. A robust MEL system is critical not only for tracking progress and avoiding maladaptation, but also for enabling learning and corrective action (IPCC, 2022; Moure et al., 2023; Noble et al., 2014).

Furthermore, greater transparency and the consolidation of information on revenue use across jurisdictions would open valuable opportunities for cross-jurisdictional learning and the identification of best practices. Building more integrated and accessible data systems would not only

²² At the same time, there are other competing agendas, such as support for socioeconomic effects and economic competitiveness.

clarify the actual allocation of resources for adaptation but also enable a clearer understanding of progress in reducing climate vulnerabilities and risks.

The difficulty in measuring the benefits of adaptation and the absence of standardized criteria and robust MEL systems mean that jurisdictions miss opportunities to communicate progress, assess effectiveness for beneficiaries and ecosystems, exchange information between jurisdictions, and learn from best practices and lessons learned. Unlike mitigation, where emissions reductions provide a clear metric, adaptation outcomes are context-specific, long-term, and multidimensional, complicating both measurement and attribution (Chambwera et al., 2014; IPCC, 2022).

6 RECOMMENDATIONS TO BOLSTER ADAPTATION FINANCE

Based on the review and analysis conducted, this report proposes several recommendations to strengthen the consideration of adaptation in the allocation of emissions trading revenues. These relate to the enabling framework, budgetary and allocation rules, including adaptation within existing funds, and the identification of potential new adaptation financing vehicles. These recommendations are as follows.

6.1 Establish the enabling framework

Designing revenue allocation mechanisms within the ETS based on the specific circumstances and needs of each country, and considering the interrelationships between mitigation and adaptation, is essential to maximizing the climate benefits of this tool. A key step along this path would be to strengthen the capacities of regional, national, and subnational policymakers regarding the importance and urgency of climate adaptation actions, and how ETS revenues can support these efforts (Cardenas, 2025).

Regarding governance for revenue use, it is necessary to strengthen transparency and accountability for how these resources are generated, allocated, and spent. A relevant governance mechanism, particularly for developing countries, could be the establishment of a collective body composed of community representatives, relevant ministries, regulated entities, and other stakeholders that democratically decides on the use of revenues from the outset (Saha, 2025).

6.2 Budgetary signal and allocation guidelines

As recognized in case studies, ETS can be a MbM that contributes to strengthening adaptation to climate change by allocating resources generated by this system. However, there are still critical opportunities in this area.

Jurisdictions may wish to consider establishing indicative benchmarks or voluntary targets for adaptation spending as a share of ETS revenues, drawing on lessons from existing good practices. Where legally feasible, dedicated earmarking mechanisms could further strengthen adaptation finance.

For example, EU ETS regulation could explicitly allocate a minimum allocation benchmark for adaptation, particularly in Article 10(3), allowing countries to decide how to invest in their specific adaptation priorities²³.

²³ As an illustrative exercise, the share of proceeds applied under the UNFCCC market mechanism, set at 5%, provides one possible benchmark. Applied to current EU ETS revenue levels, such percentage could generate approximately EUR 2.1 billion (USD 2.37 billion) per year, potentially financing around 465 adaptation policies and projects. This figure illustrates the scale of opportunity relative to the 17 adaptation projects reported in 2023 and underscores the potential impact of introducing structured allocation guidance within existing regulatory frameworks. It is acknowledged that the UNFCCC mechanism and the EU ETS operate under different institutional and market conditions; the 5% figure is presented here as an indicative scenario to illustrate potential scale, rather than as a prescriptive target.

In terms of the design of the ETS, it is worth analyzing the possible creation of a dedicated allocation fund (or allowance reserve) for adaptation (Hölscher, 2025). To ensure the environmental integrity of the system, it is necessary to include this group of allocations in the cap.

Similarly, it is advisable to explore mechanisms for labeling adaptation funds to ensure accountability for resource use, especially for EU member states (Cárdenas, 2024; 2025). In cases where jurisdictions do not allow resource labeling, other approaches may be used, for example, budget allocation, a tool that evaluates each budget measure and assigns it a label based on whether it is beneficial or detrimental to a specific objective (OECD, 2021).

6.3 Mainstreaming adaptation into existing funds

Another relevant set of actions useful for the EU and out of resources allocated to the countries involves improving the functioning of existing funds to include adaptation criteria (for example, the EU ETS Innovation Fund). This inclusion of adaptation could be implemented in at least three ways: as a precondition within the requirements, as a differentiating criterion, or as part of a bankable project.

Adaptation as:

- *Precondition or requirement.* This approach requires adaptation as a condition for applying for funding. Thus, entities regulated by the ETS could be eligible for existing mitigation funding (such as the Innovation Fund) if they demonstrate direct adaptation actions that reduce climate risk within their facilities.
- *Differentiating criterion.* This point seeks to include adaptation as a value-add into the investment plan. That means applicants for funding (whether regulated entities or jurisdictions) could access concessional funding if they demonstrate that their projects offer adaptation co-benefits.
- *Bankable project.* Finally, adaptation could qualify as a bankable action. This inclusion would entail prioritizing mitigation actions with co-benefits for adaptation, for example, financing green and blue infrastructure over gray infrastructure, as well as climate-resilient infrastructure.

This strategy can also include developing robust business cases and creating appropriate incentives for the private sector. For example, by considering companies' climate risks and the benefits of adaptation in lending decisions, lenders can encourage greater private-sector engagement.

6.4 Specialized financing vehicles

In addition to integrating adaptation into existing funds²⁴, one alternative to ensure financing for this agenda is to explore dedicated funds or trusts. This measure would structure financing flows within a more robust, planned institutional framework and guarantee the provision of long-term resources, which are fundamental to the viability and sustainability of adaptation projects.

²⁴ In this context, it would be advisable to learn from the good practices and lessons from other compliance mechanisms, such as the Fund for Life and Biodiversity in Colombia, funded by the carbon tax, which primarily finances adaptation projects.

Alternative sources of financing include the deliberate allocation of a portion of emission allowances from market reserves, as has already been done to finance energy and innovation projects²⁵. The size of this fund would be restricted to a level that effectively maintains market stability and the environmental integrity of the system.

Furthermore, with this type of resource directed toward adaptation, it is possible to secure financial backing not only for developing a broader range of adaptation measures but also for mechanisms to strengthen financing itself. These mechanisms include instruments such as seed capital, insurance, guarantees, payments for ecosystem services, or results-based payments, which help generate, scale up, and manage additional financing for adaptation.

6.5 Deployment of MEL schemes

As the case studies show, adaptation financing through the ETS has been key to supporting diverse types of adaptation measures and enabling factors. However, this report recommends that jurisdictions move forward in integrating MEL schemes for funded adaptation measures to strengthen transparency and accountability, and guide investment decision-making in contexts of uncertainty.

MEL is not only a tool to improve the performance of actions but also provides a space for learning and knowledge sharing on adaptation processes. It provides evidence of how the ETS can provide significant secondary benefits for communities and ecosystems, and, even more importantly, identify and correct flows that may be financing maladaptation. A basic MEL system should include key goals, indicators, responsible parties, sources of information, resources, and reporting mechanisms, among others.

Building on the IPCC's vulnerability framework (2022), a robust case of vulnerability reduction would demonstrate measurable improvements across three dimensions: reduced exposure to climate hazards, decreased sensitivity of affected systems, and strengthened adaptive capacity. Chambwera et al. (2014) further suggest that effective adaptation should approach the 'optimal investment point' where marginal costs equal marginal benefits.

Nonetheless, due to its complexity, operationalizing these conceptual frameworks into standardized metrics remains an evolving challenge. At international level, the UNFCCC has worked into developing specific set of indicators to measure adaptation progress, which remains incomplete and with persistent disagreements (Evans et al., 2025).

Tools such as California's CalCRAI demonstrate how multi-domain indices can implement vulnerability reduction metrics across climate hazard exposure, system sensitivity, and adaptive capacity, dimensions which have been suggested by the IPCC framework. Jurisdictions could draw on such approaches to develop standardized indicators for MEL systems applied to ETS-funded adaptation programs.

Furthermore, drawing on EU experience, it is possible to identify best practices that contribute to MEL, such as the mandatory annual reporting mechanism for Members, which generates a longi-

²⁵ The EU's Market Stability Reserve (MSR) was designed to address allowance surplus and promote long-term market balance. Under current rules, allowances above a certain threshold are invalidated annually (ICAP, 2025). However, Regulation (EU) 2023/435 (EP&CEU, 2023) exceptionally redirected 27 million allowances from the MSR to the Innovation Fund in response to the energy crisis. This precedent shows that allowances destined for cancellation can, under specific circumstances, be repurposed for climate investments. Applying a similar mechanism—redirecting 100 million allowances at €74 each—could mobilize approximately €7.4 billion (USD 8.37 billion) for adaptation, equivalent to 17% of 2023 auction proceeds and a 47-fold increase in EU adaptation resources that year. However, such an approach would require safeguards to preserve the ETS's environmental integrity.

tudinal and public database. In the case of Québec, its multi-level reporting architecture, based on audits of financial statements and open data platforms with granular levels of information relevant to measuring adaptation, is particularly noteworthy.

Jurisdictions that allocate ETS revenues to adaptation, including elements from these emerging frameworks that are useful for their own context could strengthen monitoring and evaluation systems, improve transparency, and facilitate climate adaptation learning in these jurisdictions.

6.6 Explore additional design features of ETS

Given the planned launch and expansion of several ETS globally, additional aspects of these systems can contribute indirectly to finance adaptation. One such aspect is the inclusion of additional economic sectors with a direct or explicit link to the adaptation agenda, such as agriculture, construction, and transportation. Agriculture, for example, with its evident exposure to climate risks, would facilitate the link between ETS and adaptation.

Including additional sectors in the ETS could enhance adaptation financing by increasing total revenues available for adaptation and by creating opportunities for conditional free allocation tied to the adoption of climate-resilient practices. However, the ETS itself would not inherently reduce these sectors' climate vulnerability.

Achieving this outcome would require deliberate allocation of revenues towards sector-specific adaptation measures; policy designs that promote synergistic adaptation-mitigation co-benefits; and governance mechanisms ensuring that support effectively reaches vulnerable producers, who may otherwise lack the capacity to respond to price signals alone.

Another aspect is the use of carbon credits to offset regulatory compliance in ETSs. Including adaptation rates and criteria in the regulations governing the use of offsets could also provide additional financing for adaptation. In both cases, mitigation projects can include synergies with adaptation, such as agroforestry practices, energy efficiency, and thermal comfort techniques.

7 CONCLUSIONS

Climate change adaptation faces several financial gaps in its implementation, mainly because it is a public good with lower direct financial returns than mitigation. However, policymakers can address those gaps through MbM such as ETs. These systems can allocate revenue for finance adaptation, but this will depend on whether they generate revenues and how they distribute, and channel those revenues toward adaptation.

The analysis revealed a financing structure for revenue use composed of four elements: sources of income, types of use, allocation channels and mechanisms, and the actors who access the resources. Jurisdictions can use the revenue from the sale of emission permits for various purposes, including adaptation when provided for by regulations, and channel it through institutional mechanisms such as funds, programs, calls for proposals, or grants that benefit various public and social stakeholders.

Depending on the ETS design, these flows can generate additional effects, such as the subsidiarity effect, by strengthening local capacity for action, or the investment multiplier effect, by leveraging other climate finance schemes.

Based on the specific study of three mature ETs with explicit uses for climate change adaptation, the EU, California, and Québec, it is also possible to conclude:

- The cases analyzed have established legal or policy frameworks that dedicate ETS revenues to climate action. The use of these revenues aligns with jurisdictional priorities and, to varying degrees, promotes synergies between mitigation and adaptation.
- The channeling of funds toward adaptation remains limited relative to mitigation, although it is evolving in a positive and increasingly diversified manner.
- The ETS's role is not only a potential complementary financial source to support adaptation programs and projects, but also an enabling factor for strengthening public policy and capacities within and beyond jurisdictions.
- Likewise, this report highlights the application of the subsidiarity principle in Québec and California, which favors the participation and direct support of vulnerable and Indigenous communities, as well as international cooperation. While this effect was observed in the subnational cases, national and supranational ETs can also adopt decentralized allocation mechanisms to channel revenues directly to local authorities and communities.

Despite this progress, significant barriers remain to the use of revenues for adaptation. The main one is that the use of emissions trading revenues for adaptation remains limited and exceptionally low compared to the resources allocated to mitigation. This limited finance is due, among other reasons, to the lack of political priority for adaptation, the complexity of funding processes, the lack of labeling, and the difficulty of measuring and reporting impacts.

Although reporting tools are available, jurisdictions have not yet measured the impact on vulnerability reduction from their ETs²⁶. The lack of standard criteria, detailed monitoring, and evaluation of results prevents a precise understanding of their impact on reducing vulnerabilities.

²⁶ Emerging tools such as California's CalCRAI illustrate the type of standardized frameworks that could be adapted to systematically track vulnerability reduction outcomes in ETS revenue-funded programs.

This analysis proposes several alternative approaches to ensure greater use of trading revenues for adaptation. On the one hand, to help ensure sufficient and predictable funding for adaptation, jurisdictions may wish to consider a range of complementary approaches, including:

- establishing indicative minimum benchmarks for adaptation as a share of ETS revenues within existing regulatory frameworks.
- exploring the creation of dedicated adaptation funds or ring-fenced allocation windows.
- integrating adaptation eligibility criteria into existing climate funds and spending programs.
- developing innovative financial mechanisms, such as seed capital facilities, concessional lending instruments, or PES to mobilize additional resources designing robust labelling and tracking systems to improve accountability and transparency in adaptation finance.

On the other hand, an additional recommendation is that the development of MEL schemes would allow for an in-depth understanding of the impact of ETSs on reducing vulnerability and increasing climate resilience in the territories benefiting from this resource, thereby strengthening communication of the additional socio-environmental benefits of this mechanism²⁷.

Overall, it is essential to strengthen the capacities of policymakers and regulated entities to link the ETSs to adaptation priorities. In this sense, a compelling business case for adaptation investment, grounded in the economic costs of inaction, including avoided losses and damages, is a powerful tool to drive greater political, institutional and sectoral commitment.

To conclude, it would be crucial to understand the ETS not as a source of financing itself, but as an accelerator of necessary and urgent actions to adapt to climate change. In this regard, there is a strategic opportunity to consolidate the ETS's role as an instrument of climate justice by making adaptation investments more visible and prioritizing those that directly benefit vulnerable communities, with a focus on social, economic, and ecological co-benefits.

²⁷ Future research could examine other cases such as Japan, which may offer transferable lessons from adaptation projects.

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Annex I

Guiding questions for interviews

1. From your expert perspective, do you think that ETSs can contribute to the climate adaptation agenda? If so, in what ways? If not, what are the main limitations?
2. From your perspective, how could ETS contribute to closing finance gaps for climate adaptation (including policies and projects)?
3. How do you envision the ETS mechanism supporting adaptation financing more effectively (e.g., through direct policy incentives, co-benefits, direct funding)?
4. What are the main challenges or barriers to using ETS revenues for adaptation? Why does adaptation receive fewer resources compared with mitigation agenda?



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ICAP
Alt Moabit 96
10559 Berlin
Germany

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