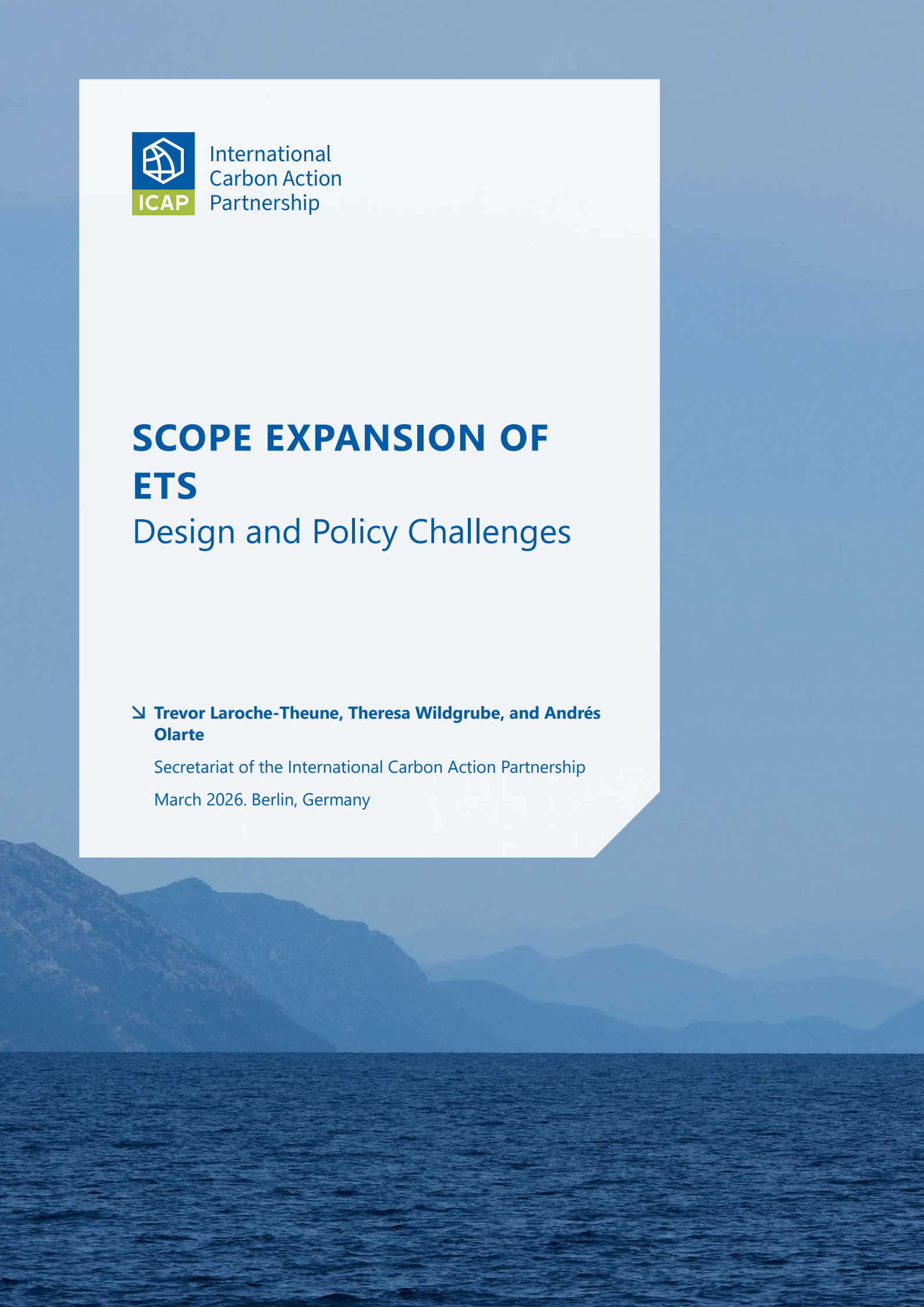

International Carbon Action Partnership

SCOPE EXPANSION OF ETS

Design and Policy Challenges

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Acronyms

APCR	Allowance Price Containment Reserve
ARP	Auction Reserve Price
BECCS	Bioenergy with Carbon Capture and Storage
CCR	Cost Containment Reserve
CH4	Methane
CO2	Carbon Dioxide
ETS	Emissions Trading System
EU	European Union
GEMM	Greenhouse Gas and Energy Management for Manufacturing Regulation
GHG	Greenhouse Gas
ICAP	International Carbon Action Partnership
LRF	Linear Reduction Factor
MSR	Market Stability Reserve
MRV	Monitoring, Reporting, and Verification
NGO	Non-Governmental Organization
NZ ETS	New Zealand Emissions Trading Scheme
N2O	Nitrous Oxide
PFCs	Perfluorocarbons
RGGI	Regional Greenhouse Gas Initiative
TNAC	Total Number of Allowances in Circulation
UK	United Kingdom
UK ETS	United Kingdom Emissions Trading Scheme

1 INTRODUCTION

As jurisdictions around the world set more ambitious climate targets, emissions trading systems (ETSs) are increasingly turned to as a core policy instrument to achieve emissions reductions. As a result, policy makers, researchers, and industry experts are looking to the opportunities and challenges of expanding the scope of existing ETSs.

1.1 Benefits and outcomes of scope expansion

Expanding the scope of an ETS, creating a larger carbon market, can significantly enhance the efficiency of reducing emissions (Eden et al., 2018). First, a broader scope allows for a more extensive array of abatement options. Including entities from different sectors provides a diversity of emissions reduction alternatives. This inclusivity ensures that the most cost-effective and impactful emissions reduction measures are incorporated into the trading system. Second, by including a wider range of entities, those with higher abatement costs are not as strictly compelled to reduce emissions early on. This flexibility can prevent economic inefficiencies by allowing these entities to trade with those that are better suited to reduce in the near term, ensuring that reductions are achieved where they are most economically feasible.

Furthermore, expanding the scope of an ETS can generate a range of environmental and social co-benefits beyond greenhouse gas reduction. A well-designed ETS can deliver improvements in public health through reductions in local air pollutants, such as sulfur dioxide, nitrogen oxides, and mercury. Broader ETS coverage can also support energy security, job creation, and land-use objectives. The inclusion of additional sectors or greenhouse gases can also help achieve broader environmental objectives, such as enhanced water and soil quality, reduced deforestation, and the restoration of biodiversity and habitats. Thus, ETS scope expansion not only enhances emissions reductions but also advances wider societal and environmental priorities (Eden et al., 2018).

Broadening the scope of an ETS can cultivate a more consistent and integrated climate policy mix. Encompassing a wider array of sectors or GHGs not only promotes a unified approach to emissions reductions on the side of regulated entities but also helps avoid fragmented policy measures in jurisdictions where the ETS serves as the main instrument for driving mitigation action in the covered sectors. This allows for improved alignment with other energy and environmental policies, lessening the likelihood of countervailing or duplicative measures. Moreover, it provides a harmonized schedule for emission reductions across all covered entities. This uniform timeline not only streamlines regulatory compliance but also facilitates long-term planning and investment strategies.

Including more entities from different sectors in the same system can also help reduce cross-sectoral carbon leakage, which, if unaddressed, can lead to economic, social, and political challenges (Acworth et al., 2020). Broader coverage reduces the incentive for businesses and industries to relocate emissions and production based on regulatory disparities, by subjecting potential activities for substitution and competitors to the same carbon price.

Finally, an ETS that covers more participants includes more tradable allowances, and likely increases buying and selling activity (Eden et al., 2018). Heightened trading volumes enhance market liquidity, making it easier to achieve least-cost reductions and providing greater flexibility in emission reduction strategies. This is an important consideration in view of tighter future caps when economies are heading towards climate neutrality.

To harness the benefits of scope expansion, the process needs to be implemented smoothly. For a successful scope expansion, it is recommended to keep in mind the following main outcomes that should be achieved by the process:

1. The scope expansion is politically accepted by different stakeholder groups. Market-based climate policy for the new regulated entities is understood as an efficient way to reduce emissions across sectors.
2. The expanded scope is aligned with overlapping policies and the climate policy mix for the covered emissions is consistent. Double regulation is avoided or, where necessary, harmonized.
3. The top-up cap is set consistent with the current newly covered emissions, the emission reduction target of the sector or jurisdiction, and the overall level of ambition of the ETS. This is made easier by establishing MRV requirements in place prior to the expansion.
4. New regulated entities are able to comply with the MRV requirements and surrender obligations. They can bear the financial burden and/or have possibilities to abate their emissions. They have the required knowledge and capacities as well as access to the necessary infrastructure to handle the administrative burden.
5. The market is stable, and price volatility remains at a low level before and during the expansion of scope. Sufficient information on the new market participants and their abatement costs allows for a robust price formulation.

1.2 Types of scope expansion

Two primary types of scope expansion stand out: broadening and deepening. Broadening involves adding new (sub)sectors or fuels, extending the ETS's reach into areas that were previously unregulated. On the other hand, deepening refers to enhancing the ETS's impact within its existing scope, which can be achieved through measures like lowering the threshold for inclusion, covering more types of greenhouse gases (GHGs), or considering emissions from production inputs, such as Scope 2 or Scope 3 emissions.[1] We identify six types of scope expansion:

1. **Major Broadening: Inclusion of New Sectors -** extending an ETS to cover entire new sectors of the economy that were previously outside the system, significantly increasing covered emissions under the ETS.

Example: The EU ETS expanded to include the aviation sector (in 2012) and is in the process of adding maritime transport (from 2024). Similarly, California and Québec's Cap-and-Trade programs broadened to include transport fuels and buildings (from 2015) (ICAP, 2024a).

[1] Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect greenhouse gas emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the reporting entity. Scope 3 emissions are all other indirect greenhouse gas emissions that occur in the value chain of the reporting entity, including both upstream and downstream activities (GHG Protocol 2013, Technical Guidance for Calculating Scope 3 Emissions, **https://ghgprotocol.org/scope-3-technical-calculation-guidance**)

2. **Major Broadening: Inclusion of New Fuels -** expanding an ETS to cover additional fuel types, thereby capturing a broader array of emission sources.

Example: Germany's national ETS was initially limited to natural gas and oil products but later expanded to include coal (from 2023) and waste incineration (from 2024) (ICAP, 2024a).

3. **Major Broadening: Inclusion of New Geographic Area –** expanding an ETS to new regions or through linking with other trading systems, creating a larger, more integrated carbon market.

Example: After coming into force in 2005 with seven participating states, the Regional Greenhouse Gas Initiative (RGGI) expanded the market's geographic area with the addition of different states (Massachusetts, Rhode Island, and Maryland in 2007; New Jersey rejoining in 2020 after its 2012 withdrawal; Virginia in 2021 until 2023; and Pennsylvania in 2022) (RGGI, Inc., n.d.-a).

4. **Minor Broadening: Wider Coverage within a Sector** – expanding an ETS coverage within an already regulated sector, for example by including additional sub-sectors, or types of activities within the sector.

Example: Indonesia's ETS is evolving from covering only coal-fired power plants to eventually cover all fossil fuel power plants with a capacity above its inclusion threshold (ICAP, 2024a).

5. **Deepening: Lowering the Inclusion Threshold** – expanding an ETS by reducing the emissions or output threshold for participation, including smaller facilities or businesses, whether for mandatorily covered entities or voluntary opt-in.

Example: China's Beijing and Chongqing Pilot ETSs have included more emitters by lowering the minimum emissions threshold for inclusion (ICAP, 2024-a).

6. **Deepening: Expanding GHG Coverage** – expanding an ETS to cover additional greenhouse gases beyond CO_2, such as methane (CH_4), nitrous oxide (N_2O), or perfluorocarbons (PFCs).

Example: The EU ETS and New Zealand ETS have both expanded to include gases like N_2O and PFCs (ICAP, 2024a).

7. **Deepening: Inclusion of Scope 2 or Scope 3 Emissions** – expanding an ETS to cover scope 2 emissions (from purchased electricity) and scope 3 emissions (other indirect emissions along the value chain, such as those from fuel production).

Example: New York State's Cap-and-Invest Program has explored including upstream fuel production emissions (Scope 3), setting a precedent for more inclusive GHG accounting.

1.3 Purpose and structure of the paper

This paper explores potential challenges associated with expanding the scope of an ETS as well as the strategies that can be implemented to overcome them. While existing literature often discusses the design and implementation of ETS frameworks, this paper focuses specifically on the considerations and complexities that arise when expanding the scope of these systems.

Specific case study examples are used to illustrate how the strategies have been implemented in real-world ETS contexts. Where external sources are not referenced within the case studies, they are informed by interviews with representatives of the respective jurisdictions.

We are focusing on scope expansion in the narrow sense, meaning a policy decision to expand an existing ETS. Scope expansion is different from pre-planned sector phase-ins that are legislated at the start of an ETS and can be alternatively characterized as delays in the inclusion of certain sectors. In many ways, phase-ins are less challenging than scope expansions since regulations can be drafted for the final coverage and correct expectations can be formed from the outset. Still, we draw from certain phase-in expansions to shed light on common challenges and strategies.

The paper is divided into two main sections: design challenges and policy challenges. In Section 2, we delve into the design challenges inherent in expanding the scope of ETS. A design challenge arises when the original ETS design and its implementing regulations are not fit for its expanded scope. These challenges usually require an adjustment of the ETS regulation. This section covers key challenges associated with setting the adjusted ETS cap, navigating new interactions with market stability mechanisms, mitigating the risk of double counting when incorporating entities with varying points of regulation, and accommodating different MRV requirements for entities emitting different GHGs or subject to different points of regulation.

Section 3 examines the policy challenges that arise through the process of ETS scope expansion. In contrast to design challenges, policy challenges arise when broader governance issues, stakeholder concerns, and political dynamics require management to ensure the expanded system is both effective and acceptable. Here, we explore the potential impacts on price dynamics, the complexities of overlapping policies specifically related to price increases for existing regulated entities and price volatility as a result of market anticipation, as well as the forms of political opposition that may impede the expansion process.

By adopting an analytic perspective to scope expansion, our intention is to offer a comprehensive resource that can inform policy makers, stakeholders, and practitioners involved in the expansion of ETSs across different sectors and jurisdictions. We intentionally abstain from looking into the specificities of scope expansion to individual sectors which is a separate complex question we leave to future work. Ultimately, we aim to contribute to the advancement of climate action by providing results and recommendations that transcend sectoral boundaries and facilitate more effective ETS implementation as they expand in scope.

2 DESIGN CHALLENGES

2.1 Cap setting 1: Determining the top-up cap

Challenge

Cap setting for a scope expansion consists of two activities: the determination of the top-up cap for the base year to include new emitters and gases, covered in 2.1, and aligning the overall cap trajectory to the needs of the larger scope and potential sectoral climate targets in place, covered in 2.2.[2] If the jurisdiction does not already have MRV in place, exact data can be challenging to obtain, even if the scope expansion concerns an entire sector like maritime transport or waste. True values will only be known when MRV processes are fully in place for new emitters. The challenge is that estimates for the top-up cap will likely under- or overestimate true emissions levels which then leads to a potential under- or oversupply of allowances. While large deviations might cause imbalance, this should not cause a significant problem since abatement strategies, emissions levels and allowances prices will not be formed only considering the base year cap but the expected cap trajectory.

Another challenge arises when certain sectors or entities are granted exemptions from ETS obligations. This can create uncertainty during the cap-setting process, as it can become difficult to accurately determine the share of the cap for these entities. Without clarity on which emitters will ultimately be exempt, jurisdictions may face challenges in balancing the overall cap for the expanded scope. Such exemptions can complicate efforts to ensure that the top-up cap reflects true emissions levels.

Strategies

Initial MRV-only phase: Substantial scope expansion should entail an initial MRV phase before new emitters are fully incorporated into an ETS, i.e. the cap is increased, and surrender obligations accrued. This is crucial for gathering real-world data, which is instrumental in accurately setting the top-up cap. This implementation of an initial MRV-only phase is common practice in most cases of scope expansion, as it enables the top-up cap to be set based on robust and reliable data. This applies for all forms of major and minor scope expansion. However, where MRV precedes surrender obligations, additional emphasis on enforcement through verification and other checks may be necessary to ensure the reliability of reported emissions data.

Case studies

EU ETS accesses maritime MRV system to enable expansion: On 1 January 2024, the EU expanded the scope of its ETS to incorporate the maritime sector (ICAP, 2024b). In line with the challenges highlighted above, the initial core challenge when the EU was first considering maritime expansion was the lack of robust data. Therefore, in 2015, the EU Monitoring, Reporting, and Verification (MRV) system for the maritime sector was established. This required MRV

[2] Here, the cap is understood as the total volume of conventional allowances (as opposed to, for example, removal-backed allowances), which determines net emissions from ETS regulated sectors. The availability of other compliance units would allow for an increase in gross emissions without increasing net emissions.

sufficient to prepare the sector for eventual inclusion in the ETS and to provide real-world data to inform the top-up cap (European Parliament and Council, 2015).

California Cap-and-Trade Program's use of interim data sources to prepare MRV: In some cases, MRV is not fully ready in the newly regulated sectors. This was the case for fuel distributors in the lead up to the start of compliance obligations in California's Cap-and-Trade Program in 2013. Therefore, California opted to phase in the fuel distributors to begin compliance in 2015 to afford time for transport sector MRV development. While the MRV was not yet available, California accessed data from other energy agencies as well as information collected through fuel taxes. This facilitated cap setting for the expanded system.

New Zealand ETS' gradual expansion with preliminary MRV: The New Zealand ETS provides a clear example of phased, data-driven scope expansion. Launched in 2008, the system initially covered only the forestry sector, with a deliberate strategy to broaden coverage over time. Rather than including all sectors from the outset, New Zealand adopted a staged approach: stationary energy, industrial processes, and transport sectors were brought under compliance obligations in 2010, followed by synthetic gas and waste in 2013.

This gradual expansion was supported by preliminary MRV obligations for new sectors before full compliance. In the case of New Zealand, the preliminary MRV was phased in with a period of voluntary reporting. For example, the transport sector began voluntary reporting in January 2009 (18 months before the beginning of the first compliance period, and mandatory reporting commenced for both transport and stationary energy only in January 2010 (six months before the beginning of the first compliance period). Waste and synthetic gas sectors followed a similar process, with voluntary reporting two years ahead and mandatory reporting one year before the beginning of the first compliance period (Leining, 2022). The order of the staged entry of individual sectors was decided based on sectors' preparedness for trading, administrative feasibility, and consideration of price effects through the economy (see sections 3.1 and 3.2) (Ministry for the Environment & The Treasury, 2007).

This phased approach allowed the government to collect robust data and ensure a smoother transition for newly regulated entities.

2.2 Cap setting 2: Adjusting the cap trajectory

Challenges

Not only does the base-year cap need to reflect the scope expansion but also the cap trajectory under the ETS. If the cap decrease is determined by a certain percentage or linear reduction factor (LRF), this share can be transferred to the new base-year cap which includes the top-up cap for the scope expansion. In most cases, the cap trajectory, in terms of the percentage or linear reduction factor does not need to be changed.

There are cases in which the cap reduction rate needs adjustment. If the scope of an ETS is expanded to a sector with significant emissions, the cap trajectory might need to be realigned with a jurisdiction's overall emission reduction target. In particular, emissions reduction burdens for sectors outside and inside the ETS need to be carefully calibrated in response to major broadening of an ETS scope.

Similarly, if a newly included sector has its own sectoral emissions reduction target, including it in an existing ETS alone might not be sufficient to achieve the sectoral target. Complementary measures might be necessary or a re-assessment of whether parallel ETS-wide and sectoral emission reduction targets are needed and sensible.

Strategies

Maintaining original cap decrease rate: In most cases, the cap trajectory, as an annual decrease in percentage terms of the previous year, should not fundamentally change. The application of the same reduction factor to the larger group of entities is a simple and effective strategy to maintain the reduction path while accounting for the expanded coverage of entities with similar characteristics to existing regulated entities.

Application of complementary policies: For sectors requiring faster reductions, complementary measures can help to accelerate reductions without impacting the cap trajectory. Such measures could include targeted subsidies or performance standards, among others.

Alignment with climate targets: Similarly to setting the new capped amount of emissions, the cap trajectory can be adjusted in accordance with the newly covered sectors' anticipated role in achieving climate targets. This can help to align the expanded ETS with the jurisdictions net zero commitments or broader climate goals.

Case studies

EU ETS expansion to the maritime sector: In January 2024, the EU ETS underwent 'major broadening' expansion to include CO2 emissions from maritime transport from large ships entering or departing from EU ports, employing a combination of both the strategies discussed. The newly covered maritime emissions were included in the overall ETS cap, and the reduction path was maintained for the system as a whole. However, the EU employed a transitional phase with reduced surrender obligations, starting at 40% in 2025, 70% in 2026, and reaching 100% by 2027, to ensure a smooth transition for newly regulated entities (ICAP, 2024b). This allows a degree of flexibility for newly regulated entities while maintaining the cap trajectory.

RGGI expansion to new states: On both occasions when RGGI has undergone major broadening expansion by including new states, it has kept its cap trajectory consistent through uniform percentage reductions. To date, RGGI's cap trajectory shifts have only occurred in accordance with each of its program reviews (in 2013 and 2017) (RGGI, Inc., 2025).

UK ETS top-up cap based on sectoral climate targets: The cap adjustments in UK ETS proposals for its expansion to domestic maritime and waste sectors are based on an additional amount of emissions equivalent to the emissions from each sector that were deemed to be consistent with delivering net zero and the most up-to-date carbon budgets. For domestic maritime, this required a sector emissions trajectory consistent with the UK's Net Zero Strategy from implementation to the end of the phase (2026-2030), as well as accounting for all exemptions and derogations over that same period.

2.3 Interaction with price or market stability mechanisms

Challenges

The expansion of the overall market size of an ETS, regardless of whether it is done through broadening or deepening, can render existing market stability mechanisms less effective if they are not appropriately adjusted. A quantity-based ETS stability mechanism like the EU ETS Market Stability Reserve (MSR) removes allowances from the market or releases them into the market by adjusting the auction volume when the total number of allowances in circulation (TNAC) reaches a specified threshold. Quantity-based stability mechanism thresholds are usually fixed and set based on historical data (allowance supply, private allowance bank, etc.). The expansion of an ETS changes the supply and demand for allowances. As a result, this can render the trigger threshold of the market stability mechanism too high or too low to achieve the originally intended effect. This can lead to delayed corrections to market imbalances or too frequent and unnecessary interventions.

Price-based ETS stability mechanisms like RGGI or the New Zealand ETS price floors or cost containment reserves (CCR) remove or release allowances when a specified price level is reached. Price-based thresholds are less vulnerable to an extended ETS scope than quantity-based thresholds, since a larger system usually does not change the price level that is considered necessary to trigger allowance supply intervention.

A second element of stability mechanisms is the number of allowances released to or removed from the market. If the numbers are fixed (e.g. a release of 100 million allowances from the MSR), the effect might be weakened under an extended scope. If, however, this number increases with the ETS scope, the effect would remain intact. One can argue that this is the case for the MSR intake that is calculated based on the TNAC which potentially increases with an extended scope.

Another layer of complexity is added when newly regulated entities have characteristics that greatly differ from existing ones. For instance, new entities might have different abatement costs, hedging behavior or resilience towards high carbon prices and price fluctuations. This can challenge the purpose of an existing stability mechanism and the way it is designed. In particular, it might change the desirable price range and the acceptable level of price variability.

Strategies

Recalibration of thresholds: If the ETS scope expands significantly, market stability mechanism thresholds may need to be recalibrated. This is, in a simple scenario, a direct proportional increase to align with the new ETS size in terms of cap or verified emissions. It can go beyond that in cases where the extended scope changes the rationale for the stability mechanism or the desirable price range of the ETS.

Proportionally increased intake and release quantities: Increasing the number of allowances moved to or released by a reserve with a directly proportionate ratio to the top-up cap is the most straightforward way to adjust the stability mechanism in response to scope expansion. For example, if the cap is increased by 15%, the number of allowances taken in or released by a reserve should also increase by 15%.

Confirm or adjust mechanism design: In cases in which a large number of new regulated entities possess significantly different characteristics to existing regulated entities, the regulator should assess if the current purpose and design of a stability mechanism still fits the new ETS scope. While

the exact adjustment strategy depends on the individual circumstances, assessing the need for potential changes is recommended for cases of larger scope expansions.

Case studies

To date, there are no recorded instances of ETS market stability mechanisms being recalibrated specifically as a direct response to scope expansion. For example, while the EU ETS Market Stability Reserve (MSR) is currently under revision to consider adjustments to its trigger and release parameters in light of a changing system scope, this process is still ongoing ((European Commission, n.d.-a). Similarly, California's Cost Containment Reserve (CCR) has not been formally recalibrated in response to the system's expansions, because the decision to include transportation fuels and supplied natural gas from 2015 was taken when the Allowance Price Containment Reserve was initially designed.

The following case studies illustrate how these mechanisms have interacted with scope expansion in practice, highlighting both their vulnerabilities and the lessons that can be drawn for future system adjustments.

EU ETS Market Stability Reserve: The EU ETS Market Stability Reserve (MSR) is a quantity-based stability mechanism designed to address surplus allowances and mitigate price volatility in the market. The MSR operates by adjusting the auction volume of allowances based on the TNAC, using fixed thresholds to trigger intake or release actions and defined quantities for these adjustments. When the TNAC exceeds a predetermined upper threshold, a share of allowances is withheld from auctions and placed in the reserve. Conversely, when the TNAC falls below a lower threshold, allowances are released back into the market.

However, the fixed nature of these thresholds to trigger intake or release actions make the MSR vulnerable to scope expansion, as a larger ETS changes the TNAC and the overall dynamics of supply and demand. Without recalibration, the upper threshold for intake may become too high, delaying necessary adjustments, while the lower threshold for release may become too low, leading to excessive interventions. These vulnerabilities can be mitigated if the thresholds and quantities are updated to align with the new system characteristics.

Additionally, while the intake quantity is dynamically set as a percentage of TNAC, ensuring proportionality with market size, the release quantity is fixed at 100 million allowances per tranche (European Commission, n.d.-c). As a result, the intake quantity is not weakened by scope expansion, but the release quantity is, unless it is altered to reflect the expansion. The ongoing revision of the MSR aims to address these issues, particularly as the EU ETS continues to broaden its coverage.

California Allowance Price Containment Reserve: The California Cap-and-Trade Program employs a price-based stability mechanism, the Allowance Price Containment Reserve (APCR), to mitigate extreme price volatility. Unlike the EU ETS MSR, the APCR operates without a TNAC-based trigger. Instead, it responds to price thresholds that are predetermined and increase annually by a fixed percentage plus inflation, ensuring that the mechanism adapts over time to reflect economic conditions.

Allowances are automatically allocated to the APCR each year, and if auction settlement prices exceed the designated threshold, allowances from the APCR are released into the market (California Air Resources Board, 2025). The price-based nature of the APCR ensures that its stability function is largely unaffected by changes in market size. However, the reserve's effectiveness may

be diminished by scope expansion if the number of allowances allocated to the reserve is not proportionally increased.[3] The reserve quantity is set to decline over time, which, if unchanged during an expansion, could reduce the mechanism's capacity to stabilize prices in a larger market. These vulnerabilities can be addressed if the reserve's size and price triggers are adjusted to align with the expanded market characteristics.

California also employs another price-based instrument to prevent prices dropping too low: the auction reserve price (ARP), which acts as a price floor for allowance auctions. The ARP increases annually by 5% plus inflation, irrespective of the market size, and has remained consistent through California's scope expansions (California Air Resources Board. (2025).

The table below summarizes the key technical features of these stability mechanisms and highlights which aspects are most susceptible to negative impacts if not recalibrated during scope expansion.

Table 1: Interactions between the EU ETS MSR and California APCR and scope expansion

	EU ETS MARKET STABILITY RESERVE	CALIFORNIA ALLOWANCE PRICE CONTAINMENT RESERVE
Intake trigger	Allowances in circulation above a fixed threshold → mechanism **weakened** by scope expansion	No trigger. Allowances are allocated to the reserve every year as established in regulatory text → **no interaction** with scope expansion
Intake quantity	Share of allowances in circulation → **no interaction** with scope expansion	Gradually decreasing quantity stipulated in the regulation (California Air Resources Board, 2019, p.164) → mechanism **weakened** by scope expansion
Release trigger	Allowances in circulation below a fixed threshold → mechanism **weakened** by scope expansion	Auction settlement price is greater than a threshold that increases by a consistent percentage plus inflation → **no interaction** with scope expansion
Release quantity	Tranches of 100 million allowances → effect potentially **weakened** by scope expansion	All allowances within the reserve are offered for sale → **no interaction** with scope expansion

Source: ICAP, 2025

[3] Here, it is important to note that California's program covers about 80% of the State's GHG emissions, and so there is very limited likelihood of scope expansion that would significantly expand the market.

2.4 Risk of double regulation

Challenges

ETSs that undergo major broadening to sectors that have different points of regulation are at risk of double regulating emissions. Double counting can occur when multiple entities at different stages of production processes both have the same tonne of CO2e emissions attributed to them and the same ton of CO2e emissions is paid for twice. The risk of double regulation is high if some sectors or fuels are regulated at the point of production or upstream, while others are regulated downstream at the point of consumption or use. It can be challenging to determine which emissions emitted at the point of consumption have already been effectively covered at the point of production.

Imagine, for instance, an ETS regulating electricity and industrial emissions at point source. The ETS is extended to gas and oil that are covered upstream at the fuel distributor level. There needs to be clear regulation on whether gas and oil consumption of industrial installations is regulated at point source or upstream. If industrial fuel consumption is exempted from upstream regulation, installations should be able to either pass on the exemption to the fuel distributor or deduct double payments at a later stage. If there is no clear process for this, an installation will end up in a situation where it paid twice for some of its emissions implying an unnecessary additional economic burden. Although double regulation is sometimes deliberately used to address market failures or strengthen price signals, it is generally regarded as problematic and should be avoided. While there may be certain instances where double regulation is deliberately employed to address market failures or increase the strength of the price signal, it is generally better to avoid such instances. The inconsistent compliance cost is a competitive disadvantage and can lead to carbon leakage, even if carbon leakage provisions were included in the ETS design.

Furthermore, the overall overestimation of emissions covered by the ETS that results from double regulation may hinder effective policy making. It can result in inaccurate emission reduction assessments and hence create difficulty in monitoring the progress toward targets and commitments. This overestimation can result in a misallocation of government resources that could have gone to other policy priorities and ultimately the oversupply of allowances can weaken the effectiveness of the ETS and decrease confidence in the instrument.

While the risk of double regulation is a general feature of ETSs with mixed points of regulation and when different levels of government can regulate GHG emissions reduction, it needs specific attention in the context of scope expansion. The focus of the process of scope expansion is on the newly regulated sectors and emissions, but the authorities need to carefully assess if and how already covered emissions might fall under the new regulation. It might be the case that existing regulated entities see a decrease in their compliance obligations, as those emissions fall under the obligation of newly covered regulated entities.

Strategies

Regulatory clarity for emissions accounting: The regulatory framework needs to be clear on how potentially overlapping regulation is resolved, i.e. which emitter is the primary regulated entity for a type of emissions. Provisions should be in place to clarify how the secondary regulated entity can avoid double counting, for instance by reducing its emissions report by the already covered emissions or being compensated afterwards. Any changes in reporting obligations for existing regulated entities due to the expanded scope should be communicated early for them to actively manage the risk of double counting.

Cases study

Québec's attestation system for fuel suppliers: In 2015, Québec's Cap-and-Trade Program expanded to cover upstream fuel suppliers in addition to industrial emitters. Fuel suppliers are required to declare all volumes of fuel sold for consumption in Québec including those sold to industry. This form of coverage could present the risk of double counting of emissions when fuel is supplied to facilities already regulated at the point of consumption. To address this, Québec has established a system of attestations: industrial emitters provide signed attestations to their fuel suppliers, specifying the volume and the use of fuel purchased for which they already pay a carbon price. Upon submission of these attestations, industrial emitters receive an exemption of the upstream carbon charge for these volumes. This dual reporting allows Québec's regulatory authorities to cross-check fuel volumes between suppliers and industrial emitters. In this way, Québec minimizes the risk of double regulation.

2.5 Different MRV requirements

Challenges

A core challenge in expanding the scope of an ETS is effectively integrating the diverse profiles of new entities into the existing MRV framework. Regulators typically seek to establish generic rules applicable across entity types. However, this entails a trade-off between simplicity and data quality, and robust MRV may require sector-specific provisions.

This challenge is particularly prevalent when the expansion involves entities subject to different points of regulation or those emitting different GHGs, each requiring distinct MRV methodologies tailored to their sources and emissions characteristics.

Different points of regulation

Different points of regulation come with varying regulatory costs and degrees of administrative complexity for regulated entities. If the MRV system in place is tailored to a specific point of regulation, it might not be suitable for other points of regulation targeted in a scope expansion. New monitoring methodologies may need to be developed with the inclusion of new entities. Expanding to cover downstream emissions without sufficient standardization and communication of MRV rules, guidelines, and procedures creates challenges in ensuring precise MRV at the level of each regulated entity.

Consider for example an ETS that regulates industrial facilities at the point of combustion (point source) and wants to expand to regulating fuel distributors upstream. The point-source regulation involves detailed and continuous monitoring of emissions at the point of combustion. This includes specific methodologies for different installation types which often have frequent data collection. The upstream regulation requires relatively simpler MRV with a lower frequency to check individual data points. It focuses on the quantity and carbon content of the fuels distributed. The stringency of the existing regulation might not be necessary for them. In turn, they might require another set of control measures, e.g. a link to other tax regulations to check that all fuels sold are reported under the ETS. Because of path dependency dynamics, the regulator might take the existing regulation as an anchor instead of finding the most adequate approach for the newly regulated entities.

Different GHGs

When an ETS expands to cover emissions of different GHGs, it encounters a host of challenges associated with accommodating the diverse MRV requirements specific to each gas. All ETSs start by covering at least CO2 (ICAP ETS Handbook). However, unlike CO2, which predominantly originates from combustion processes and fossil fuel consumption, other GHGs such as methane (CH4) and nitrous oxide (N2O) emanate from diverse sectors such as agriculture, waste management, and industrial activities. Consequently, measuring and verifying emissions for these gases entail distinct methodologies and monitoring techniques tailored to the specific sources and emissions pathways. Utilizing CO2-focused MRV methodologies for other GHGs can result in inaccurate quantification and incomplete monitoring, leading to under- or overestimations of total emissions.

One of the many ways that this challenge could manifest is an ETS covering CO2 from combustion processes and expanding to cover N2O from chemical manufacturing processes. While the CO2 MRV is well-established and widely implemented, N2O MRV requires more specialized monitoring techniques that are tailored to specific industrial processes and can be associated with additional costs. An example of these additional costs is highlighted in a report by the UK's Department of Energy & Climate Change (2011). N2O is often emitted during chemical processes, such as the manufacture of nitric acid or adipic acid, glyoxylic acids and glyoxal, where complex chemical reactions occur (European Commission, n.d.-d). Unlike CO2, which is primarily released during combustion and is relatively easy to monitor at the point of emission, N2O emissions are complex to measure (Umweltbundesamt, 2024). However, protocols for MRV of N2O emissions from various processes are used in the EU ETS.

Strategies

Addressing different points of regulation

Point-specific MRV protocols: Creating MRV methodologies tailored to the specific characteristics of each point of regulation (e.g., upstream fuel suppliers vs. downstream industrial installations) ensures that reporting requirements are appropriate for the type of entity and its emissions source. For example, upstream reporting may focus on fuel volumes and carbon content, while point-source reporting may require continuous emissions monitoring at facilities.

Tiered data-quality levels: Calibrating uncertainty requirements and effort to installation size, ensuring that the use of a lower tier for selected parameters is only possible when the operator evidences that the highest tier is technically infeasible or disproportionately expensive.

Transaction-based tracking and reconciliation: Introducing systems that track the movement of regulated fuels through the supply chain helps to ensure emissions are only regulated at the desired point. This can be done via registries or attestation mechanisms, such as that introduced in Québec (see Section 2.4).

Reporting processes tailored to sectoral realities: Designing MRV processes that reflect the operational characteristics of each regulatory point means aligning reporting timelines and compliance deadlines with sectoral practices (e.g., annual reporting for upstream suppliers, quarterly for large emitters). Where possible, integrate MRV obligations with existing sectoral reporting systems, such as fuel excise tax records or energy supply registries, to streamline compliance, minimize duplication, and reduce administrative burden for regulated entities.

Targeted stakeholder engagement and guidance: Developing sector-specific training and guidance materials for entities newly regulated at a different point in the supply chain can help newly regulated entities overcome early hurdles. These materials should focus on their unique MRV obligations and data needs.

Addressing coverage of different GHGs

Gas-specific monitoring methodologies: It is important to design or adopt measurements, calculation, and reporting protocols tailored to the physical and chemical properties of each new GHG.

Careful phase-in of new GHGs: Implementing a period during which regulated entities are required to monitor and report emissions from new GHGs, but not yet comply with surrender obligations, can allow both regulators and market participants to test and refine methodologies, identify practical challenges, and build capacity in a low-risk environment. This can also be done on a voluntary basis before the stage of mandatory reporting. Insights gained during these phases can inform necessary adjustments and help ensure a smooth transition to full compliance.

Harmonization of reporting formats but not measurement approaches: A key strategy is to ensure that the principles and standards used to measure emissions are consistent across all GHGs covered by an ETS. While the technical methods for measuring different gases (such as CO_2, CH_4, or N_2O) differ due to their distinct properties and sources, harmonization means applying similar levels of data quality and verification requirements for each gas. This involves setting comparable standards for how emissions are calculated or measured, how uncertainties are managed, and how results are reported and verified. For example, regulators might require that all GHGs are reported using the same reporting periods, are subject to the same materiality thresholds, and are verified by independent third parties to ensure consistency. By doing so, emissions data for different gases can be reliably compared, reducing the risk of under- or overestimating total emissions as the ETS expands to cover more gases.

Case studies

Different points of regulation

New Zealand adapts ETS entry to sector-specific MRV challenges: The New Zealand ETS regulates upstream sectors such as power, aviation, buildings, forestry, and transport, while applying point source regulation to industry and waste. New Zealand was able to integrate the liquid fossil fuels sector relatively early, partially due to the straightforwardness of MRV. In contrast, the inclusion of the agriculture sector was delayed due to difficulties measuring emissions. Unlike CO2 emissions from combustion, agricultural emissions, such as methane from livestock digestion and nitrous oxide from soil management, require specialized methodologies. Developing reliable MRV practices for these emissions can require country-specific models and measurement systems that are tailored to national circumstances, that can be repeated over time and draw upon reliable sub-national datasets (Ministry for Primary Industries, 2025). When a jurisdiction does not have the capacity to develop these MRV practices, it can sometimes make delaying sector inclusion a good option.

California Cap-and-Trade Program's use of interim data for the transport sector: California's delayed phase-in was partially to afford time for transport sector MRV development. While the MRV was not yet available, California accessed data from other energy agencies as well as information collected through fuel taxes. As referenced in Section 2.1, this facilitated cap setting

for the expanded system. This approach provided interim data sources to maintain progress toward regulation while allowing sufficient time to refine MRV methodologies for long-term compliance. By doing so, California demonstrated how reliance on auxiliary data sources can bridge gaps in MRV readiness.

Different GHGs

EU ETS' staggered approach to maritime coverage: The EU ETS expanded to include maritime CO2 emissions starting in 2024, with a phased approach to add N2O and CH4 emissions from the sector by 2026 (European Commission). This staggered timeline allows time to address the unique MRV challenges associated with non-CO2 GHGs in this sector, such as the need for specialized monitoring equipment and protocols to measure methane leaks and nitrous oxide emissions accurately. By focusing on CO2 initially, the EU ETS builds on its existing infrastructure while allowing for gradual capacity-building and technology adoption to address the additional gases.

New Zealand ETS' expert-led MRV development: The New Zealand ETS benefitted from technical advisory groups made up of industry and inventory experts, supported by independent consultancy advisors, to develop MRV regulations during scope expansion. After the engagement and consultation processes on the proposals, guidance was published, along with a staggered implementation process of voluntary reporting, followed by mandatory reporting, and then mandatory reporting with surrender obligations applied to most sectors. This phasing-in of reporting requirements builds capacity for participants and ensures a transition to effective administration during a period without penalties for noncompliance.

UK ETS MRV-only periods for waste: The UK is implementing a voluntary MRV-only period for the waste sector ahead of its introduction to the scheme. The waste sector is already regulated and has significant monitoring and reporting practices in place. The MRV-only period will benefit both operators and their customers, improving their understanding of how the scheme will work and the potential costs involved. Data from the MRV-only period will also inform further policy development ahead of the sector's full inclusion in the scheme. This approach reflects a pragmatic effort to ensure the sector is well prepared for full ETS participation.

3 POLICY CHALLENGES

3.1 Price effect 1: Price increasing for existing regulated entities

Challenge

When an ETS expands, especially in cases of broadening, there is a high chance that the newly covered entities have different marginal abatement costs than those already in the system. If marginal abatement costs of new entities are higher than those of existing ones, then new entities will purchase more allowances for their activities rather than investing in emissions reduction measures. If the top-up cap is set with the same level of ambition post-expansion, all else being equal, the increased purchasing activity of the high abatement cost entities will drive up the price for all regulated entities. This higher allowance price sends a positive signal that the ETS is working as intended and capturing the real costs of decarbonization.

However, in this scenario, existing regulated entities will bear potentially unforeseen higher costs for ETS compliance post-expansion, and they might need to revise their decarbonization strategies. This is problematic if the price movement lies significantly outside the confidence margin of pre-expansion long-term price projections and is particularly challenging for sectors with long investment cycles like industry.

Strategies

Impact assessment for scope expansion: Modeling exercises can help assess the potential price effects of scope expansion. Transparently communicating model results helps existing entities to prepare for potential price increases and adjust their long-term strategies as early as possible.

Support for decarbonization: To prevent unforeseen allowance price increases as a result of adding high abatement cost entities, governments can also provide targeted support to reduce abatement costs ahead of ETS integration. Financial incentives, subsidies, and research support to help new sectors invest in cleaner technologies can reduce abatement costs and reduce price shocks.

Separate system: In certain instances, the risk of unexpected price shifts may be deemed too significant. In such cases, creating a parallel ETS instead of expanding the scope of a pre-existing system can help ensure the stability and efficiency of the pre-existing system. A new system may be optimal in situations where the newly regulated entities have vastly different emissions characteristics, regulatory objectives differ, or uncertainty is significant. In cases of very distinct stakeholder interests, establishing a separate system can allow for more tailored rules for compliance.

Case study

EU ETS 2: The development of the EU ETS 2 instead of expanding the scope of the EU ETS 1, illustrates the potential to develop a parallel ETS when price uncertainties are deemed too substantial. The price trajectory for ETS 2 remains challenging to predict primarily for two reasons.

First, marginal abatement costs remain uncertain and can vary significantly. Second, price formation is influenced by variables beyond those market fundamentals (Günther et al., 2025). By keeping the two systems divided, EU ETS 1 is insulated against price increases that may have come with the added coverage of new sectors.

3.2 Price effect 2: Uncertainty regarding future prices

Challenge

Before the implementation of a planned ETS scope expansion, market participants will form an expectation of the resulting price effects. This includes anticipation of two primary factors: adjustments to the cap (changes on the supply side) and the addition of new emitters with different abatement costs (changes on the demand side). If this expectation is based on incomplete information, it can lead to two main problems in cases of substantial scope expansion: First, market participants might under- or overestimate the price after the ETS scope has been expanded which leads to inefficient decisions regarding their market or abatement behavior. On the market, this can cause price volatility as participants adjust their strategy when new information becomes available. There could be speculative market behavior on price changes that exacerbate this. Second, a lack of information on new emitters can cause uncertainty, potentially leading to risk-averse market participants to postpone decision making about investment into abatement technologies and in the worst case to a lock-in of emission-intensive technologies.

Drawing on the experiences of jurisdictions like the EU, New Zealand, and California can offer valuable lessons, guiding future efforts to broaden ETSs while managing the potential negative effects of price uncertainty.

Strategies

To address the challenges associated with price uncertainty, policy makers and regulators should focus on improving the availability and quality of information. This can help market participants make more informed decisions and reduce the likelihood of inefficient market behavior. Strategies can include the following actions.

Enhanced transparency: Transparency regarding emission levels and abatement costs of the group of new market participants and the planned cap adjustments can play a key role in limiting price uncertainty. Publishing the available information of new entities that will be covered in the expanded ETS provides market participants with a clearer understanding of what to expect from the new demand side of the market. Similarly, announcing planned adjustments to the cap well in advance, including the total number of allowances that will be added to the market through free allocation and/or auctioning, helps participants anticipate the new market supply.

Predictive models: Using predictive models to estimate the likely range of price changes following scope expansion can account for diverse variables like technology adoption rates, economic conditions, and policy changes. The predictive model results should be shared with market participants. Providing a realistic range of possible outcomes can help reduce uncertainty and prevent overreactions based on incomplete information.

Temporary price stability mechanisms: Implementing price stability mechanisms, such as auction price floors, cost containment reserves, or price corridors can help to limit excessive price fluctuation following scope expansion. These can be implemented as temporary measures until scope expansion is fully completed. The presence of such measures affords confidence to regulated entities by reducing the degree of price uncertainty.

Case studies

New Zealand ETS' gradual phase-in: New Zealand's implementation of its system using a gradual sectoral phase-in as well as safeguard mechanisms was useful in limiting price effects, and consequently, increasing price certainty for market participants.

California Cap-and-Trade Program's price corridor and early communication: Effective strategies combatting price uncertainty for the California C&T included the implementation of its price corridor and clear and early communication of the planned transport fuels and natural gas phase-in. The auction price floor and cost containment reserves were in place from the beginning of the program to limit any large price fluctuations. Auction prices were at or near the auction price floor during the first few years of the program. This remained steady throughout the phase-in. The phase-in of the additional coverage was communicated before the initial start of the program. Since all market participants expected it from the start, the transport fuels and natural gas phase-in did not catalyze any significant changes in market liquidity or hedging behavior.

3.3 Overlapping policy 1: Inconsistent policy mix

Challenge

Integrating an ETS with existing climate and energy policies is always complex, but this challenge can become even more pronounced during scope expansion. This is because expanding the scope of an ETS increases the likelihood of overlapping with regulations that were previously planned to reduce emissions outside the original scope of the ETS. If that double regulation is not deliberate, it has the potential to undermine the effectiveness and integrity of the overall climate policy mix, as it can complicate compliance and impose unnecessary burdens on regulated entities. It potentially catalyzes the so-called water-bed effect, where overlapping policies drive additional abatement in sectors now covered by the ETS but reduce allowance demand and lower the carbon price, ultimately shifting away from other sectors and potentially increasing the overall cost of decarbonization.

Take the example of an ETS undergoing major broadening to cover the transport sector in which a low carbon fuel standard is already in place. If the fuel standard drives more abatement action than the ETS, then the abatement driven by the low carbon fuel standard will reduce the allowance demand – and, consequently, reduce the allowance price – if its effect had not been factored in when setting the ETS cap. The lower price, in turn, leads to less abatement action in other sectors covered by the ETS – at overall higher costs for the economy.

Another example is overlapping building energy efficiency standards and an expanding ETS. If energy efficiency mandates (e.g., requirements for better insulation or energy efficient windows) are implemented in some regions of an ETS jurisdiction but not others, it creates disparities in compliance costs. For instance, entities subject to stricter efficiency mandates may invest heavily in sustainable building upgrades to meet these standards. In addition to the discrepancy between

the same type of regulated entity in different regions of a jurisdiction, if the interaction with this type of overlapping policy is not carefully considered, it can create inefficiencies relative to the investment strategies of other types of regulated entities under the ETS. For example, electricity suppliers might invest in renewable energy or energy storage to meet ETS compliance requirements. In this scenario, the investments to comply with the energy efficiency standard and to meet ETS compliance requirements may both achieve emissions reductions but in an economically inefficient way—where one pathway could have delivered the same reduction at a lower cost.

The underlying challenge behind the two examples is that in some sectors the ETS is meant to be the main driver for decarbonization while it is rather a backstop policy for other sectors. For the latter, stronger complementary policies are needed. Each approach could require different design choices, for instance, regarding the choice of market stability mechanisms.

Strategies

Harmonization of the policy mix: To address the challenges of overlapping climate policies, enhanced policy coordination is pivotal. Active harmonization and calibration of climate policies is necessary. This proactive approach involves adjusting policies to ensure they work in unison towards unified climate goals, preventing conflicts and promoting synergies among complementary policies, rather than allowing them to operate in opposition or redundancy.

Careful timing of expansion: Timing is a critical factor when considering scope expansion. Aligning the introduction of newly covered entities with adjustments to the broader policy environment can help avoid unnecessary overlaps. If related regulatory initiatives are under development, such as legislation that may overlap with the expanded ETS, delaying the expansion until the policy landscape is clearer can provide important advantages. Waiting until the legislative outcome is known allows policymakers to integrate the ETS with the existing or forthcoming measures, reducing risks of conflicting incentives or duplicative compliance obligations. Equally, the other overlapping policy could be delayed in favor of the ETS. Ideally, policymakers can coordinate on policy development in parallel. Harmonized timing of implementation ensures that regulated entities face clear and coordinated signals, increasing the likelihood of each policy achieving its intended objectives.

System evaluations: In the longer term, conducting coordinated policy reviews of the ETS and related policies can help to preventatively avoid any inconsistencies and conflicting incentives. These reviews should include the ETS as well as the broader policy landscape that is affecting regulated entities.

Case studies

New Zealand's choice to delay phase-in: When the New Zealand Emissions Trading Scheme (NZ ETS) commenced in 2008, the government was simultaneously introducing a national waste levy under the Waste Minimisation Act 2008. To allow the waste sector time to adjust to the new levy before facing an additional carbon price, the government opted for a staggered entry into the NZ ETS. As a result, voluntary reporting for the waste sector began in 2011, followed by mandatory reporting in 2012, and unit surrender obligations commencing in 2013. This phased approach enabled landfill operators to adapt to the operational and reporting requirements of the waste levy before taking on emissions pricing responsibilities under the ETS (Leining & Kerr, 2017).

3.4 Overlapping policy 2: Unnecessary regulatory burden for new emitters

Challenge

When an ETS broadens its scope to include new sectors, entities often face challenges in adapting to a new regulatory environment, particularly when existing environmental or energy policies are already in place. This can lead to increased administrative complexity, as companies must navigate and reconcile multiple regulatory requirements, which can blur incentives for cost-effective emissions reductions. For example, where companies must adhere to ETS regulations as well as specific energy efficiency requirements, the expansion may result in the duplication of efforts. Entities might have to report similar or identical data to different regulators that achieve very similar outcomes, leading to redundant efforts and wasted resources. This is particularly prevalent where MRV schedules or methodological requirements for the different policies vary. As previewed in Section 3.3, issues relating to an inconsistent policy mix, such as when the requirements of the ETS directly conflict with those of existing policies, can create an unnecessary burden for new emitters, forcing entities to navigate contradictory regulations.

Strategies

Streamline and simplify the regulatory landscape: To minimize unnecessary regulatory burdens for new emitters, policymakers should harmonize reporting requirements and align new ETS obligations with existing policies wherever possible. Consolidating data collection and compliance processes, such as through a single reporting portal, can help entities fulfill multiple regulatory obligations efficiently and avoid duplicative efforts. Where full harmonization is not feasible, clear communication and detailed guidance on the interaction between the ETS and existing policies are essential to prevent confusion and conflicts. Policymakers should also consider the timing of new requirements: if another policy is being developed that could overlap with the expanded ETS, delaying sector inclusion until the policy landscape is settled can provide greater certainty for regulated entities. Leveraging existing infrastructure, such as data systems from carbon taxes or other environmental policies, further reduces administrative complexity and supports a smoother transition for new participants. Periodic, coordinated policy reviews of the ETS and related regulations can help identify and address potential inefficiencies or conflicts in the broader policy landscape.

Support mechanisms: Support mechanisms should be introduced to assist regulated entities in navigating new or changing obligations. This includes providing clear and accessible guidance materials, establishing help desks or support lines for compliance queries, and offering training sessions on new requirements. By ensuring that regulated entities have direct access to support and resources, policymakers can further reduce administrative burdens and facilitate smoother compliance transitions.

Case studies

New Zealand ETS' use of existing infrastructure: When New Zealand expanded its ETS in 2013 to include unit obligations for landfill operators, a significant area of overlap was with the Waste Disposal Levy. As introduced in 3.3, this levy required municipal landfills to install weighbridges for measuring waste. While overlapping policies, if not carefully coordinated, have the potential to create administrative complexity, in this instance, the Waste Levy's existing infrastructure facilitated compliance with the ETS's MRV requirements. The weighbridge data, already collected under the Waste Levy, became the foundation for calculating landfill emissions under the ETS using a straightforward formula: waste crossing the weighbridge multiplied by an emissions factor.

This integration reduced the administrative burden on landfill operators and avoided duplicative reporting, demonstrating how overlaps can be navigated to mutual advantage.

The alignment of New Zealand's MRV processes highlights how jurisdictions can minimize inefficiencies by leveraging existing policy frameworks. However, it also underscores the importance of clear communication and regulatory coherence when overlapping policies interact, ensuring entities can meet their obligations without confusion or redundancy.

Québec Cap-and-Trade Program's use of existing infrastructure: When Québec expanded its cap-and-trade system in 2015 to include fuel distributors, it highlighted the complexities of integrating small to very small and less market ready entities into the system. Compared to industrial emitters, who had been regulated since 2013 and were required to quantify and report emissions since 2007, fuel distributors were less familiar with the cap-and-trade framework and sometimes lacked the resources to manage participation in the cap-and-trade program. Québec's approach to addressing these challenges included extensive support for new emitters, such as assistance with registration, auctions, and compliance processes.

Québec's experience underscores the importance of tailoring outreach and regulatory frameworks to the unique characteristics of newly covered sectors. While the existing fuel levy infrastructure facilitated data collection and initial targeting, the absence of sector-specific engagement early in the process created inefficiencies. Nevertheless, the successful implementation of the system for industrial emitters in the first compliance period proved instrumental in building credibility and confidence among fuel distributors. This phased approach allowed Québec to address challenges incrementally, demonstrating how leveraging existing infrastructure, combined with strategic timing and stakeholder engagement, can ease the integration of new sectors into an ETS.

The Québec case study illustrates that while overlapping policies and existing infrastructure can reduce administrative complexity, they must be complemented by proactive engagement and tailored support for new participants. It also highlights the need for clear communication and regulatory coherence to manage the interplay between existing and expanded systems, ensuring that new entities can meet their obligations without unnecessary confusion or delays.

3.5 Political opposition

Challenge

Political opposition to the scope expansion of an existing ETS frequently emerges from concerns about increased regulatory burdens and the economic impact on specific sectors, coupled with ideological disagreements over climate policy approaches. This resistance can manifest in various forms, including legislative roadblocks, industry pushback, or public dissent, which can significantly challenge the implementation and effectiveness of the ETS expansion. The principal challenge lies in addressing and mitigating these political obstacles. Industries are more likely to strongly resist being subject to an existing carbon price if they do not have the financial capacity to handle the incurred costs. Furthermore, newly covered sectors may already be subject to pre-existing national or regional regulations, leading to a perceived or real overlapping of regulations increasing the complexity of compliance. Additionally, these sectors might not have the necessary infrastructure, know-how, or operational capacity to efficiently participate in trading.

While this challenge is inherent to ETSs in general, as they often face opposition from stakeholders who have vested interests in the regulated sectors, it is particularly relevant in cases of scope

expansion for several reasons. First, soon to be regulated entities will be subject to an existing carbon price with a set of regulations that might not reflect their abatement potential or ability to bear the burden of additional costs. Unlike new ETSs, which often begin with lower ambition and gradually ramp up, newly included entities in a scope expansion do not always benefit from a similar phased approach. These entities are often immediately subject to the full stringency of the existing system, without the opportunity to adapt through a pilot phase or generous rules for non-compliance. Second, the aforementioned effect of existing regulations can contribute to a complex regulatory environment. Third, industries newly included in the ETS might not be as prepared for or experienced with emissions trading, leading to the timely need for operational know-how.

On the other hand, some argue that emissions trading systems can do more to address local air pollution concerns in communities disproportionately impacted by air pollution, favoring requirements for onsite emissions reductions. These groups contend that, when an ETS scope expands, the broader inclusion of sectors and entities may exacerbate environmental justice issues, as allowance trading allows for emissions to continue in areas already suffering from pollution. Expanding the scope of an ETS without ensuring direct emissions reductions can fail to provide immediate localized air quality improvements, challenging the perceived benefits of emissions trading systems and prompting calls for more direct and localized solutions.

Similarly, this challenge that can apply to emissions trading more broadly, becomes more pronounced in cases of scope expansion. As the system grows to include more sectors and entities, the potential for emissions trading to overlook localized pollution issues increases, necessitating careful consideration and integration of environmental justice principles into the expansion process.

Strategies

Stakeholder engagement: Engaging stakeholders directly affected by the ETS expansion is crucial for understanding their concerns and involving them in the policy design process. This approach should focus on the particular needs and challenges faced by new sectors and community groups that reside in the area where the newly regulated entities are.

Impact assessments: Conducting comprehensive impact assessments, including sector-specific modeling, will help to identify and address negative economic and social consequences for particular industries or regions as well as environmental outcomes. Based on the findings, tailored mitigation strategies can be developed, such as phased implementation, support for technology upgrades, or free allocation to support a smooth transition.

Education and communication campaigns: Transparent communication and educational initiatives are vital for clarifying the objectives and benefits of the ETS expansion, addressing misinformation and public skepticism, and tailoring communication to take up concerns of critical stakeholders such as affected industries, civil society, and policymakers. These should clarify how the ETS will benefit both the environment and the economy, while addressing the concerns of newly covered entities. Such campaigns can effectively highlight successful examples for other sectors or jurisdictions to build trust in the initiative.

Political negotiation and flexibility: Additionally, political negotiation and compromise play a key role in finding common ground with opponents, potentially by adjusting certain aspects of the expansion plan to address specific concerns while maintaining the overall environmental

integrity of the ETS. This could also include introducing support through more flexible compliance mechanisms such as the aforementioned use of free allocation.

Requirement for onsite emissions reductions: To address political opposition to ETS scope expansion relating to concerns about environmental justice, requiring additional onsite emissions reductions (of GHG emissions and/or co-pollutants) before entities can participate in trading, or in parallel with normal trading practices, can help to alleviate fears that trading systems merely shift emissions geographically without addressing localized pollution. Additionally, this strategy builds trust among stakeholders by demonstrating a commitment to immediate air quality improvements and equitable outcomes. The inclusion of both initial onsite reductions and emissions trading exemplifies a balance between flexibility for regulated entities and prioritizing community health and environmental justice.

Enforcement and credibility building measures: While the ideal scenario is to achieve compliance through proactive engagement and support, enforcement mechanisms are essential as a safeguard to ensure accountability. Measures such as notices of non-compliance or monetary sanctions should serve as a last resort to address resistance or non-compliance. At the same time, demonstrating the system's effectiveness through the successful participation of existing entities can build trust and reduce skepticism among new entrants. Together, these approaches can help mitigate political opposition and foster compliance.

Case Studies

Building support through economic and environmental benefits in RGGI's expansion to additional states: The Regional Greenhouse Gas Initiative (RGGI), founded in 2009, has expanded multiple times to include additional states by engaging in thorough negotiations and consultations with state governments, industry stakeholders, and the public. Key to their strategy was demonstrating the economic and environmental benefits of joining RGGI by showcasing successful results from existing member states (Hibbard et al., 2018). They also established revenue recycling practices to support energy efficiency and renewable energy projects, which is a good way to improve the social acceptability of an ETS (RGGI, Inc., n.d.-b). However, expansion to new states has not always been a straightforward endeavor. New Jersey, one of RGGI's founding states, withdrew from the initiative in 2011 due to stated concerns over the effectiveness of the program. Key lessons from RGGI's expansion efforts are the importance of tailoring engagement strategies to address specific political contexts and stakeholder concerns, as well as demonstrating tangible economic and environmental benefits to build support and promote long-term program stability.

Addressing environmental justice concerns in Colorado's GEMM expansion to midstream oil and gas emissions: Colorado's expansion of its baseline-and-credit system to include midstream oil and gas operations provides a compelling example of how a requirement of additional onsite emissions reductions can address political and community resistance. During the rulemaking process, opposition arose from environmental NGO representatives due to concerns that credit trading is not beneficial to communities that are disproportionately impacted by air pollution. In response, Colorado's Air Pollution Control Division incorporated robust community protection into the final rule. For midstream operators, the rule requires onsite emissions reductions (of co-pollutants associated with the operations of the regulated midstream and manufacturing sources, such as nitrogen oxides and sulfur dioxide) at facilities located in disproportionately impacted areas, such as the Front Range ozone non-attainment area (which is largely in or near

disproportionately impacted communities).[45] This provision ensures that communities most affected by pollution see tangible air quality improvements. Furthermore, the Division engaged extensively with stakeholders through transparent communication, technical discussions, and one-on-one meetings, resulting in reduced resistance during the final rulemaking hearing. This balanced approach addressed environmental justice concerns and set a precedent for integrating community protections into ETS expansions.

Balancing enforcement and credibility in Québec's expansion to include fuel distributors: When Québec expanded its cap-and-trade system in 2015 to include fuel distributors, it encountered resistance from some entities that were skeptical about the system's longevity. To address this, Québec issued notices of non-compliance and monetary sanctions to non-compliant distributors, reinforcing the seriousness of the regulatory framework. These enforcement measures were supported by the credibility established during the first compliance period, where industrial emitters had successfully participated and demonstrated the system's viability. This combination of enforcement and credibility-building supported Québec to overcome initial resistance, ensuring compliance while fostering trust in the expanded system.

[4] **https://cdphe.colorado.gov/GEMM-phase-2-rule**

[5] An ozone non-attainment area is an area that does not meet (or contributes to air quality in a nearby area that does not meet) the National Ambient Air Quality Standards (NAAQS) designations. These categorizations predated the adoption of the Colorado ETS. **https://air.weld.gov/Air-Quality-101/What-is-a-Nonattainment-Area**

4 RESULTS AND RECOMMENDATIONS

This assessment is grounded in the understanding that expanding the scope of ETSs presents significant opportunities to enhance market efficiency, reduce emissions across a broader spectrum, and align climate policies with ambitious targets. However, the scope expansion process also introduces a range of design and policy challenges that must be addressed to ensure the smooth and efficient running of the system and maintain stakeholder confidence. This section synthesizes the insights from this paper and provides actionable recommendations to navigate each of the common challenges associated with ETS scope expansion.

The challenges associated with ETS scope expansion can be divided into two core areas: design challenges and policy challenges. On the design side, authorities must determine a robust top-up cap, align the cap trajectory post-expansion, preserve the effectiveness of market stability mechanisms, avoid double regulation across different points of regulation, and integrate diverse MRV requirements for new sectors and gases. On the policy side, they must manage price effects on existing entities, reduce uncertainty-driven volatility as markets anticipate changes, align with overlapping policies to avoid inefficiencies and unnecessary burdens on newly regulated entities, and build durable political support.

A number of challenge-specific strategies and considerations are set out in the following subsection summaries, but several strategies cut across almost all aspects of scope expansion. Phased implementation, often beginning with an MRV-only period, reduces data uncertainty, allows regulators to refine design elements, and facilitates readiness among new participants before full compliance. Also, early and sustained stakeholder engagement helps surface practical issues, strengthens political acceptance, and supports smoother coordination with overlapping policies. Furthermore, careful planning and timing is important when addressing most challenges that can arise through scope expansion. There is a trade-off between pace and perfection, requiring a good balance and introducing regulations that are good enough and assessing the possibility of fine tuning them later, for instance when it comes to addressing double regulation. Together, these cross-cutting practices create the space to calibrate caps and market stability mechanisms transparently, maintain ETS integrity, and manage distributional and communication risks as coverage expands.

4.1 Design challenges and recommendations

Determining the top-up cap is the immediate technical task in any expansion. Without robust data, there is a risk of over- or undersupplying allowances, which can lead to market imbalances. To minimize this risk, regulators should stage entry with an MRV-only phase, moving from voluntary to mandatory reporting, so that real-world emissions data can inform the cap increase wherever possible. Predictive modelling can be used to develop estimates and update as MRV data becomes available, while the sequencing of sector inclusion can be guided by MRV and administrative readiness alongside consideration of expected price effects.

Beyond the base-year adjustment, expansion may necessitate changes to the cap trajectory. In many cases, maintaining the existing linear reduction factor or percentage decrease remains appropriate, particularly where new entities have similar characteristics. Where the expansion is large enough, or where newly covered sectors have their own reduction targets, jurisdictions may need to realign the trajectory to economy-wide goals. Transitional approaches such as phased surrender obligations can smooth integration for new sectors when they are time-bound and pre-announced, as demonstrated in the EU's maritime inclusion.

Scope expansion also interacts with market stability mechanisms. A larger market can erode the effectiveness of quantity-based mechanisms if trigger thresholds and release or intake volumes remain fixed at levels calibrated to a smaller system. Moreover, the abatement costs and hedging behavior of newly covered entities can shift the desirable price corridor. Regulators should recalibrate quantity-based thresholds and scale intake and release quantities in proportion to the expanded cap or verified emissions and reassess mechanism objectives and design where sector characteristics differ materially. Price-based tools such as floors and cost-containment reserves are generally less sensitive to system size but may still warrant review when changes are significant.

Where expansions introduce or mix points of regulation, for example, adding upstream fuel suppliers alongside downstream installations, overlaps can generate unintended double regulation that distorts compliance costs. The regulatory framework should define the primary regulated entity for each emission source and include clear processes for secondary entities to adjust reporting or be compensated to prevent double payment. Data harmonization across sectors supports consistent attribution and early detection of overlaps; where suitable, more integrated registries and standardized reporting can reinforce these safeguards. Phased integration and targeted consultations can help surface and resolve overlapping issues before full compliance begins.

MRV practices designed for point source emissions will require adjustment to fit upstream actors or non-CO2 gases. MRV should match the realities of each sector and gas, and, where possible, build on existing reporting (for example, tax or energy datasets that entities are already subject to) to keep the burden low. A phased rollout is recommendable, starting with voluntary reporting, moving to mandatory reporting, and then introducing compliance obligations. When adding non-CO2 gases, use customized measurement methods, strengthen verification where needed, and provide clear, sector-specific guidance so data quality stays high as coverage grows.

4.2 Policy challenges and recommendations

Price effects on existing entities can be significant when newly covered entities face higher abatement costs and therefore demand more allowances. While a higher system-wide price may better reflect economy-wide transition costs, it can strain the strategies of entities in already-regulated sectors with long investment cycles. Jurisdictions can anticipate these distributional impacts by conducting and publishing impact assessments with transparent model assumptions, enabling early planning by market participants. Targeted support to reduce abatement costs, such as technology support or investment incentives can also temper upward pressure on prices if deemed necessary. Where sector characteristics diverge substantially or uncertainties are high,

establishing a parallel ETS is an alternative to protect the stability and integrity of the existing system, as reflected in the rationale for the EU ETS 2.

Uncertainty regarding the future price in advance of expansion can increase volatility and delay investment if information about cap changes and significant changes in the demand for allowances is not communicated clearly. Regulators can reduce this by publishing cap adjustments, allocation and auction schedules, and emissions data early and predictably, and by sharing predictive modelling results that are updated iteratively as MRV improves. Clear communication of phase-in timelines and the presence of price corridors, such as auction floors and reserves, can further bound expectations, as evidenced in California's phase-ins.

Overlapping policies require particular attention when ETS scope expands into sectors with existing decarbonization instruments or regulations. These overlaps result from an inconsistent policy mix and can create an unnecessary regulatory burden for new emitters. Before expansion, jurisdictions can undertake policy audits to clarify the roles of the ETS and complementary measures and coordinate the timing of reforms and scope additions. For example, New Zealand delayed its expansion to the waste sector due to ongoing considerations around introducing a separate waste levy. Standardizing data and reporting requirements, wherever feasible, reduces administrative burden for new entrants. Over time, coordinated reviews can maintain coherence, recognizing that the ETS may be the main driver in some sectors and a backstop in others.

Finally, political opposition can hinder scope expansion even where technical design is sound. Early and proactive engagement with affected sectors helps tailor communication to operational realities, demonstrate local economic and environmental benefits, and co-develop transitional guidance. Program credibility reinforces trust during expansion. This can be supported by transparent milestones, consistent implementation of transitional measures, and evidence from comparable cases.

Figure 1: Strategy toolbox

In conclusion, scope expansion can unlock efficiency gains, liquidity, and policy coherence, provided design and political challenges are addressed head-on. Determining a robust top-up cap, aligning the cap trajectory, recalibrating stability mechanisms, preventing double regulation, and tailoring MRV are central design tasks. On the policy side, anticipating price effects, reducing uncertainty, harmonizing overlapping policies, and building durable support are decisive. A phased, transparent, capacity focused approach, underpinned by integrity guardrails and fit-for-purpose stability tools, can deliver a stable, efficient, and politically acceptable transition as jurisdictions broaden their ETSs. Proactive planning, collaboration, and ongoing learning and adaptation in response to early data and practice, will be important to sustain an expanded ETS's ambition and integrity going forward.

Finally, it is important to understand that jurisdictions that are expanding their ETS must learn to accept a certain degree of uncertainty. Treading the line between accuracy and simplicity is an important balancing act, and the right dosage of the strategies presented in this paper can help

to understand where complexity can be reduced by undermining an ETS's integrity in favor of short-term convenience.

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