International Carbon
Action Partnership

Striving to Keep ETS Simple:

Current practices to manage complexity in emissions trading.

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Alexander Eden, Mariza Montes De Oca and Constanze Haug

Background

In line with the 2016-2017 work program of the International Carbon Action Partnership (ICAP), the Secretariat facilitated a discussion among ICAP Members and Observers as to how emissions trading systems (ETSs) can be designed in a way that is easy to administer and lowers costs. The aim of this discussion paper is to promote a dialogue among ETS policymakers and operational staff by mapping options for ETS simplification, highlighting experiences and good practice from existing systems around the world.

The paper is based on a survey of ICAP Members conducted in November 2016. The survey was structured based on the ETS design elements outlined in the ICAP-PMR Handbook 'Emissions Trading in Practice'. The paper also draws on published discussion papers and the academic literature dealing with administrative transaction costs of ETSs. Respondents to the survey included policymakers and operational staff of seven official departments, representing five ETS jurisdictions – The European Union Emissions Trading System (EU ETS – represented by Netherlands, Spain and Italy), California Cap-and-Trade Program, Québec Cap-and-Trade System, the Regional Greenhouse Gas Initiative (RGGI), the Tokyo Cap-and-Trade Program, and the New Zealand Emissions Trading System (NZ ETS).

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Executive Summary

Setting up and operating an emissions trading system (ETS) involves both technical and administrative complexity. Policymakers and administrators need to navigate trade-offs between the procedures and requirements needed to ensure the environmentally sound operation of the system, and the resulting administrative burden both for the regulator and for covered entities.

The question of how to keep ETS simple yet robust has therefore attracted significant interest among policymakers, experts and stakeholders. The present paper identifies general and transferable lessons for simplification in ETS design and operation, based on a review of experiences and best practices from existing ETS around the world. These insights are relevant to existing systems, which may consider options for ETS simplification as part of a review process. Yet they are perhaps even more crucial for the next generation of ETS, many of which will be implemented in emerging economies facing additional challenges in terms of institutional capacity.

Against this background the paper finds that considering simplicity as one objective among others already at the inception stage can yield important benefits. Once legislation or information systems are in place, making changes can require significant administrative effort. Key determinants of complexity in ETS design revolve around the choice of allocation method, point of regulation, scope setting, and a potential offset component of a system.

Most of the opportunities for ETS simplification, however, lie in the realm of ETS operations. Policymakers have implemented a variety of measures to reduce the administrative burden and increase user-friendliness. This includes threshold setting for small emitter exclusion, monitoring, reporting and verification (MRV) and data management techniques, options for streamlining the administration of free allocation, and secure but simple registry operation. Several 'soft' approaches to simplification are also explored.

One key focus for these efforts is small emitters in an ETS, who face disproportionately higher administrative costs than larger entities. Examples from practice show that jurisdictions have engaged with the issue of small emitters and have implemented two main approaches. The first is to set thresholds for their exclusion, with supporting policies in place to maintain a level playing field and to manage distortionary effects. The second approach is to reduce the MRV obligations proportionately for smaller emitters and those with simpler processes through the use of tiered systems, with the application of default emissions factors where appropriate. In using a proportionate approach, a basic principle has been applied - simple and conservative methods are applied first, with the option to move to more accurate and less conservative methods.

The collection, management, and quality assurance of emissions data are fundamental aspects of ETS operation, with a clear operational trade-off between data quality and administrative burden. Several approaches to simplifying reporting and verification have been successfully implemented. Firstly, finding synergies with existing data gathering and reporting obligations has the potential to minimize reporting tasks. Secondly, the standardization of reporting formats can streamline and simplify data management, with some jurisdictions applying more advanced integrated software platforms for this purpose. Third-party verification is still the most robust approach to quality control, with limited options for simplifying procedures.

Free allocation also entails potentially high levels of complexity in operation. One basic approach to simplification of free allocation is to reduce the differentiation of rules and procedures in the legislation,

yet this reduces the potential for targeted treatment of sectors and industries. Integrated electronic platforms have been used to automatically calculate free allocation based on reporting data. Of the various approaches to free allocation via benchmarking, dedicated product benchmarks are found to be the most straightforward to apply, particularly for small- and medium-sized entities. However, establishing such benchmarks requires complex data collection and significant upfront administrative effort from the regulator.

A secure registry is essential for an ETS, with only limited potential to reduce the administrative burden. Measures such as automatic compliance options or dedicated compliance accounts may be considered to reduce the security requirements proportionately for some users.

More broadly, the 'soft' approaches to simplification, such as knowledge sharing, capacity building, guidance documents and help desks, inter-agency communication and coordination, and stakeholder consultation, can increase the efficiency of operations over time. Providing participants with structured feedback has been found to increase the quality of information provided and to reduce the need for checking and correcting. Over time, operational experience gained via learning-by-doing can help both covered entities and regulators to reduce costs and optimize resources. Furthermore, ongoing stakeholder engagement can uncover opportunities for streamlining and simplifying, which become more apparent after systems are operationalized.

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Acronyms

ACRONYM	Use tabs to separate acronym from text
Cal-eGGRT	California Air Resource Board's electronic Greenhouse Gas Emissions Tool
CEMS	Continuous Emissions Measurement Systems
CITSS	Compliance Instrument Tracking System Service
DEHst	Deutsche Emissionshandelsstelle
EPA	US Environmental Protection Agency
ETS	Emissions Trading System
ETSWAP	Emissions Trading Scheme Workflow Automation Project
FMS	Formula Management System
GHG	Greenhouse Gas
HFC	Hydrofluorocarbons
ICAP	International Carbon Action Partnership
IQEA	Inventaire québécois des émissions atmosphériques
ISO	International Organization for Standardization
MRR	Monthly Recurring Revenue
MRV	Monitoring, Reporting & Verification
PFC	PERFLUOROCARBON
RGGI	Regional Greenhouse Gas Initiative
RGGI COATS	RGGI CO_2-Allowance Tracing System
UNFCCC	United Nations Framework Convention on Climate Change
WCI	Western Climate Initiative

1 Introduction

Cost effective greenhouse gas (GHG) abatement is the core attribute of market-based mitigation policies like emissions trading, which are considered essential to reaching ever more ambitious emission reduction targets. Setting up and operating an emissions trading system (ETS) inherently involves a degree of both technical and administrative complexity. Policymakers and administrators need to navigate trade-offs between the procedures and requirements needed to ensure the environmentally sound operation of the system on the one hand, and the resulting administrative burden on the regulator and on covered entities on the other. For an ETS to be environmentally effective, a robust system for emissions monitoring, reporting and verification (MRV), as well as strong compliance and enforcement mechanisms are paramount. Similarly, fairness also requires that covered entities' circumstances are reflected appropriately, particularly where allowance allocation is concerned. At the same time, the real and perceived burden of an ETS can reduce cost effectiveness and also undermine support for the policy, particularly if the effort and costs of operation are considered disproportionate.

The question of how to keep ETS simple yet robust has therefore attracted significant interest among policymakers, experts and stakeholders. It is relevant to existing systems, which may consider options for ETS simplification as part of a review process, as was recently the case in Europe and currently is in New Zealand. In these jurisdictions, ETS reform processes may provide a welcome opportunity for streamlining procedures that have been found to be too burdensome or simply unnecessary in practice. Also, if simplification is not considered alongside other objectives in a review, the resulting regulatory changes might even add to system complexity.

Considering options for simplification is perhaps even more crucial for the next generation of ETS. Many of these will be implemented in emerging economies and may therefore face additional challenges in terms of institutional capacity and data availability, making the quest for simplicity where feasible all the more relevant. These emerging systems can benefit from the experience that has been accumulated over the past decade with ETS implementation. This should help them to consider streamlined approaches and procedures from the start, to the extent possible given the overarching objectives of system integrity and robustness.

Against this background, the present paper identifies general and transferable lessons for simplification in ETS design and operation. It highlights experiences and best practices from existing ETS around the world, based on a literature review and on a survey of policymakers and operational staff from ICAP member jurisdictions in Europe, North America and the Asia-Pacific.

Options for ETS simplification outlined in this paper cover a range of approaches that ease the administrative burden, ensure consistency across the system, and support participants in meeting their obligations. The paper argues that the structural design of an ETS, including its scope, point of regulation and allocation method, determines the kinds of complexity that can be expected during operation. Its main focus, however, is on measures to simplify ETS operation, as these may hold the greatest potential for simplification without entering into conflict with other objectives of the policy. The paper is structured as follows: Section one outlines the underlying objectives of ETS simplification, with particular regard to administrative burdens imposed by emissions trading. Simplification is shown to be a balancing act, where trade-offs with other ETS objectives can be expected and a degree of complexity is likely to be inevitable. Section two discusses how key choices in ETS policy design can lead to complexity in ETS operation. Section three identifies specific areas of ETS operation that hold potential for simplification and streamlining, and outlines approaches, experiences, and lessons from existing systems to date. Finally, section four provides a discussion of overarching simplification approaches and concludes.

2 Simplification objectives and trade-offs

2.1. Objectives of simplification

Simplification measures are interventions in policy design and operations that have the aim of reducing complexity, allowing for less costly or more accessible processes and procedures. Whether considered at the design phase or during operation, simplification measures generally have two main objectives – to reduce administrative costs and to increase user-friendliness - while maintaining the integrity of the system.

One of the main advantages of an ETS is that it is cost-effective – it can achieve a given level of abatement at lowest economic cost. In order for a robust ETS to function, regulators and covered entities must invest both time and money in specific tasks to fulfil their compliance obligations and to manage the system (the resulting costs are discussed in section 2.2). The cost effectiveness of the system as a whole, therefore, is influenced by the costs of establishing, operating and participating in it. Furthermore, rules and procedures may affect different participants unevenly, potentially distorting the market and placing a higher relative burden on some entities, such as small businesses. With this in mind, it is important for the regulator to identify who bears which costs, whether these can be considered proportionate, and what potential adjustments can feasibly be made.

Simplification can make participation easier, as well as increase transparency and user-friendliness. Complex rules and procedures, while often necessary for regulating complex sectors and installations, also greatly increase the information needs both on the side of the regulators and the covered entities, thereby adding to the real and perceived burden of the policy. A lack of accessible information can result in avoidable errors, increased requirements for checking and proofing, and potentially cases of non-compliance. Furthermore, if some participants do not understand how best to engage with the policy, then this can affect market functioning. Simplification approaches can help to ensure that participants are informed of their obligations and opportunities by providing clear and easy access to both market information and services. In sum, easy engagement, coupled with consistent and transparent rules and procedures, can also increase the transparency of the system and make the policy more acceptable to a broad range of stakeholders.

2.2. Administrative burden and transaction costs

Within this paper we define the overall administrative burden as all those costs to regulators and covered entities that come from establishing, operating, and participating in the ETS - excluding the cost of purchasing emissions allowances for covered entities. Administrative burden can be further considered in terms of implementation costs and operational costs. Implementation costs are associated with developing system elements, institutions and capacities. They may arise not only during the initial establishment, but also when the system design changes. Operational costs are the ongoing or periodic costs that result from management of and participation in the system.

2.2.1. Administrative burden of the regulator

The tasks of the regulator include designing and implementing the ETS, gathering, processing and checking information during operation, and undertaking the analysis and evaluation needed for improving the system over time. This includes activities both at policy and at operational or management level. At policy level, tasks include establishing the overall system design and legislative basis, undertaking stakeholder engagement and consultation, conducting data assessment and analysis, and determining the allocation rules. At operational level, this involves allowance allocation and the collection and processing of data required for this, enforcing compliance and other obligations, approving monitoring plans, checking verified emission reports, providing support and information to covered entities, establishing and operating (or overseeing) the registry, monitoring market activity, and the recognition and oversight over third-party verifiers.

2.2.2. Administrative transaction costs of covered entities

For covered entities, administrative transaction costs are all costs associated with fulfilling the legal obligations and complying with the rules and procedures of an ETS, excluding the cost of purchasing allowances.[1] This includes all activities and infrastructure needed for performing MRV in the company or installation, completing applications for allocation, gathering information, trading, and submitting allowances for compliance, as well as the costs of hiring legal and technical consultants.[2] Finally, almost all ETS established by now require a mandatory third party verification of data, reports and applications submitted to the regulating authorities. Therefore, the fees for hiring independent third-party verifiers have to be included in the transaction costs of the covered entities as well.[3]

Early studies of administrative transaction costs for German and Irish firms covered by the EU ETS in phases I&II estimate that MRV costs made up around 70% of such costs (Jaraitê et al. 2010, Heindl 2012), although the authors expected MRV costs to fall over time, as a result of learning-by-doing, as well as through reforms to the European MRV system (see Box 1).

[1] The administrative transaction costs together with the expenditure for purchasing emissions allowances then make up the total compliance cost for covered entities.

[2] It is worth nothing that most of the specific costs mentioned are not transaction costs associated specifically with an ETS, but the cost of MRV and basic documentation that would be required for monitoring and reporting of emissions in any policy context

[3] Oversight of independent third-party verifiers: Most systems foresee the use of independent experts to verify emission reports. While quality assurance is the main objective, third-party verifications also reduce the administrative burden for competent authorities regarding the assessment of annual emission reports and applications for free allocation. The cost to the regulator depends on how robust the recognition process (e.g. accreditation) and the overseeing process are. However, the costs of the verification itself still generally fall on covered entities, as the verifiers charge fees for their service. The verifiers also generally pay for their own accreditation and then factor the cost into their fees. Verification costs are therefore considered part of the administrative transaction costs of covered entities.

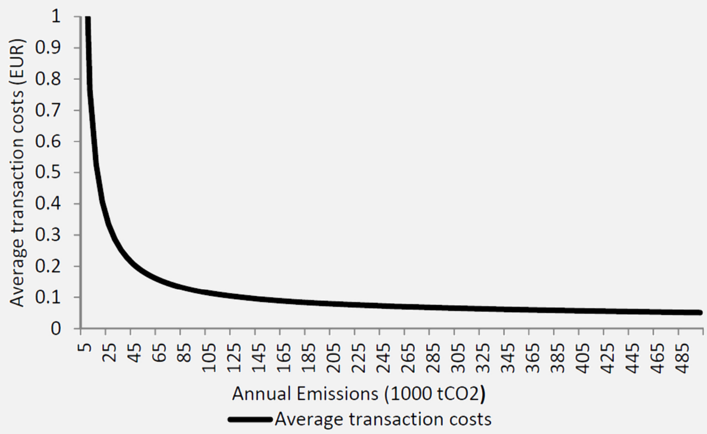
Box 1

Administrative transaction costs in the EU ETS – small and simple emitters

Two empirical studies from Heindl (2012, 2017) have investigated the impact of administrative transaction costs of monitoring, reporting and verification (MRV) on German firms regulated by the EU ETS in phase II between 2009 and 2012. The studies examined costs as they relate to the size (amount of annual emissions) and the type (industrial sector) of the covered entities. Two trends were highlighted:

Firstly, the average costs per tonne of CO_2e emitted were correlated with the size of the installation, with the smallest emitters facing the highest relative costs. The pattern is not linear; costs drop sharply at first and then more gradually. This indicates that there are both fixed costs associated with MRV (the main driver of the pattern), as well as marginal costs that larger emitters are better able to manage through economies of scale (see Figure 1).

Figure 1: Average transaction cost (€) per tCO2 emitted by EU ETS participants in Germany



Source: Heindl 2012

Secondly, entities in different sectors were found to face different levels of transaction costs. In particular, power utilities generally face lower costs than other sectors, as MRV procedures are highly standardized for utilities with relatively simple processes (e.g., monitoring based on the carbon content of fuel inputs). Companies with more complex and diverse industrial processes face more complex MRV procedures to ensure environmental integrity and accuracy of data.

As companies factor their administrative transaction costs into their investment decisions, this affects their relative cost of abatement, meaning that small companies and those with complex processes effectively face a higher carbon price per ton of CO_2e. Although overall costs related to MRV are not found to hamper the environmental effectiveness of the instrument, the studies from Heindl (2012, 2017) emphasize that it is still important to avoid excessive administrative burdens and strive for a level playing field for all regulated entities.

It should be noted that the EU ETS monitoring guidelines applicable in Phases I & II have been revised in Phase III, also with regard to "reduction of requirements" and "simplification for smaller installations". Extensive guidance was also issued to support implementation. Although comparable studies of Phase III costs are not available, the reforms have likely reduced relative costs for smaller emitters, thereby moderating the economies of scale.

2.3. A degree of complexity is inevitable

A well-functioning ETS requires trust on the part of regulators, covered entities and the broader public, which is rooted in confidence that the ETS has fair and robust rules and procedures supported by a sound institutional framework. This implies some level of administrative effort and cost, and participants are generally aware of the need to invest time, effort and money to ensure the system can reach its objectives. To ensure the environmental integrity of an ETS, it is essential that accurate and reliable emissions data are being reported and that a transparent and robust accounting system is in place. Similarly important are stringent security procedures for registry transactions and strong market oversight to protect against fraud and market manipulation. Furthermore, achieving specific policy objectives may in some cases require detailed and differentiated rule-setting. For example, highly complex and industry-specific rules for allocation may complicate the allocation process, yet may be needed to ensure fairness among covered entities and allow for adequate and proportionate protection from the risk of carbon leakage. Operating a robust system that can effectively meet a range of objectives therefore means that some complexity is necessary, and the need to retain trust in the system will generally set a guiding limit on how far simplification approaches can go.

2.4. Striking the right balance

On the other hand, there are instances where greater complexity, more data collection and more stringent security measures can aim to address risks or iniquities that at a closer look may be found to be minimal or non-existent. These may result in higher administrative cost, but not necessarily in a better outcome. In these cases, there is potential to simplify the system while still meeting the objectives of the policy. In practice, however, simplification will typically require trade-offs between different aspects. Such trade-offs may be, for example, between the administrative burden and accuracy of emissions data. Or they may be between transaction costs for covered entities and administrative costs for the regulator. Any approach to simplification should therefore acknowledge the relevant trade-offs, and base decisions on principles that will ensure the policy remains effective.

3 Major ETS design elements that determine complexity

The policy design of an ETS will influence the type and level of complexity in system operation, as well as possible options for simplification. Design decisions on scope, point of regulation, and the allocation method are particularly relevant in this regard.

3.1. Point of regulation

Setting the point of regulation upstream reduces the administrative burden of an ETS. This is because covering fossil fuels where they enter the economy also reduces the number of covered entities in a system. Furthermore, upstream entities are typically larger and may have relatively simple processes with a low number of fuel streams and emissions sources compared to downstream entities (PMR/ICAP, 2016).

New Zealand, for example, opted for upstream coverage in the energy and industrial sectors, with one objective being to limit the administrative burden of the NZ ETS. This greatly reduced the number of entities, although this simplification is largely offset by the inclusion of the forestry sector in the NZ ETS, which means many large and small forest entities are also covered, with complex sector-specific rules and accounting procedures.[4] California and Québec also decided to cover fossil fuels for transport and heating upstream, greatly reducing the number of covered entities in the transport sector and enabling upstream coverage of the building and small industry sectors..

However, the greater simplicity of upstream coverage must be weighed against the benefits of downstream regulation. The latter gives the regulation more visibility at the entity level and as managers do not just account for a carbon price, but must calculate their own emissions, it is often argued that it is more effective at incentivizing reductions (ICAP/PMR, 2016: 35). It also enables information to be collected on e.g. industrial processes, which can facilitate benchmarking approaches to free allocation. Downstream coverage may also provide opportunities for simplification by aligning policy with existing regulatory structures and reporting obligations, as in the case of California, Québec, and RGGI. Last but not least, upstream coverage may simply not be an option for some jurisdictions due to geographical or economic constraints. This is the case for Tokyo, where large power plants cannot be directly covered as they are located outside of the Tokyo metropolitan area.

3.2. ETS scope

Limiting the scope of an ETS to fewer sectors or gases can reduce complexity as it reduces the number and type of covered entities. However, a narrower scope also implies that fewer emissions will be capped by the system, meaning that other instruments may be required to incentivize reductions from these sources or gases. The same trade-off also applies to setting the inclusion threshold for participation, which will be covered in Section 4.

3.3. Method of allocation

Another design element with major implications for complexity – in terms of administrative costs at the get-go and during system operation – is the method of allocating allowances. At a general level, for the regulator, free allocation tends to be more onerous than allocating allowances exclusively through auctioning. This is because distributing allowances for free requires good-quality data to be available for basing allocation decisions on and also entails complexity in terms of developing and approving

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[4] Efforts to simplify forestry accounting have been undertaken as part of the recent NZ ETS review and reform process, with measures such as 'averaging' accounting for forestry participants to be introduced

allocation plans. Yet, free allocation in an ETS helps with meeting other important policy objectives, such as managing the transition into an ETS and reducing the risk of carbon leakage for covered sectors. Many systems therefore start with relatively high shares of free allocation and then look to moving towards more auctioning over time (ICAP & PMR, 2016).

When first establishing an ETS, free allocation by grandparenting is a typical approach, among other reasons due to its relative simplicity in implementation, as it mainly requires historical emissions data. However, as grandparenting has various limitations (e.g. reduced abatement incentives, limited leakage protection and disadvantages for “early movers”) most systems transition to more sophisticated free allocation methods over time. Benchmarking is a proven means of allocating free allowances in a transparent and non-distortive manner, which can better apply the polluter-pays-principle and reward efficiency (ICAP & PMR, 2016). Benchmarks have been employed in the EU ETS, California, Québec and other jurisdictions, often succeeding grandparenting as the preferred method of free allocation due to their ability to set a clear and targeted price incentive while reducing over-allocation and windfall profits. Options for simplifying free allocation approaches are further discussed in Section 4.5.

Auctioning on the other hand also has administrative costs for the regulator who needs to set up and oversee the auctions. In some systems like the EU ETS, auctions are held at commodity exchanges, limiting the role of the regulator to oversight and interfacing with the market place. In others – notably for California/Québec and RGGI – auctions are run through the Western Climate Initiative Incorporated (WCI Inc.) and RGGI Inc., the dedicated service organizations of the two systems, respectively. For the participants, the complexity of participating in an auction depends on the set-up and requirements. Especially for smaller entities, the costs of participating in an auction can become too high, requiring them to revert to an intermediary, who will require a fee for their services.

3.4. Additional design elements

As jurisdictions have taken different approaches to system design, in line with their economic profiles and policy objectives, their issues with complexity and experiences with simplification also differ. Beyond ETS scope, point of regulation, and the allocation method, there are further design elements that – depending on the specifics – may increase complexity in terms of policy design and operation. These include:

- If *offsets* are allowed, the registry may become more complex as it has to account for different types of units. Beyond this, the design and operation of a domestic offset system as in California’s Compliance Offset Program and Québec’s Offset Program involves significant administrative effort on the part of the regulator. Using standardized offset methodologies (such as those used for the UNFCCC Clean Development Mechanism) as well as restricting the scope and type of offsets allowed can potentially simplify an offset program. However, including a domestic offset program in an ETS is a significant administrative undertaking (PMR, 2015).

- Accounting for *indirect emissions* in an ETS requires additional provisions and guidelines for double counting, as well as procedures for ensuring that they are followed, particularly if these emissions (such as in the case of electricity imports) occur in another jurisdiction that may have its own carbon pricing instrument.

Table 1 provides an overview of the broad design elements of the systems whose implementation experience is covered in the paper.

Table 1: Overview of major design elements in the systems surveyed

	EU	California	Québec	RGGI	Tokyo	New Zealand
Point of Regulation	Downstream	Upstream and downstream	Upstream and downstream	Downstream	Downstream (incl. indirect emissions)	Upstream
Number of Covered Entities	>11,000	ca. 450	ca. 149	ca. 165	ca. 1300	206 mandatory plus 2,084 voluntary (forestry)
Sectoral coverage	Industry, Power, Aviation	Industry, power, (buildings and transport covered via upstream)	Industry, power, (buildings and transport covered via upstream)	Power	Industry, buildings	Industry, power, waste forestry, (building, transport and aviation covered via upstream)
Allocation Method	Free allocation (benchmarking) and auctioning	Free allocation (benchmarking) and auctioning	Free allocation (benchmarking) and auctioning	Auctioning	Free allocation (grandparenting)	Free allocation (benchmarking)

4 Simplification approaches – lessons from current practice

4.1. Thresholds for participation - when size matters

A fundamental approach to simplification in an ETS is deciding who within the covered sectors is obliged to participate, and under what conditions. In this decision, policymakers are faced with the trade-off between achieving comprehensive coverage and minimizing the administrative burden associated with entities' participation. There are several benefits to more comprehensive coverage: it provides ETS participants with a wider range of potentially cheaper abatement options, reduces competitiveness issues across the covered sectors, it promotes market functioning and liquidity, and may provide more certainty on the attainment of the jurisdiction's mitigation target (ICAP and PMR, 2016).

However, comprehensive coverage within a sector also comes with a potentially large number of smaller emitters. For each extra participant, there is some level of administrative and transaction costs, so the overall administrative burden rises disproportionately to the benefits of their inclusion. While each jurisdiction has a unique economic profile, it is logical to prioritize large emitters. In line with the Pareto Principle, generally a small proportion of entities are responsible for a large proportion of activity. The principle expresses in a nutshell the decreasing marginal benefits of including ever smaller emitters.

In managing this trade-off, it is common practice in most jurisdictions to apply threshold values that define what size of entity is obliged to participate in the system. There are a range of approaches to setting thresholds that have been applied, for example, based on emissions output, generation capacity or fuel distribution/use. A major consideration with setting a threshold is the effect that it may have on economic activity, as it may create competitive distortions, for example, by unfairly favoring entities just below the threshold. Setting a threshold may also provide incentives for 'bunching' whereby companies try to arrange their activities to stay below the threshold. In most jurisdictions, entities that fall below threshold are still subject to monitoring and reporting obligations,[5] and supporting policies are often put in place to manage the effects of the threshold and provide other abatement incentives.

4.1.1. Exclusion thresholds in practice

The decision of where to set thresholds is highly dependent on the point of regulation. Downstream regulation, as applied in Tokyo, RGGI and the EU ETS (see Table 1), can potentially cover a large number of small emitters, particularly in some industrial sectors. In Tokyo, for example, the threshold is set relatively high in order to focus on large emitters, while emitters below the threshold are subject to a range of monitoring and reporting obligations that encourage abatement activities. In RGGI, the threshold was set in line with well-established emissions reporting thresholds of the U.S. Environmental Protection Agency (EPA).

For aviation, the EU ETS has focused on ensuring equal treatment of operators on the same flight routes, with tailored provisions for participation at the downstream level. Where commercial airlines are competing, this is essential, even when the scope is currently limited to intra-European flights. For non-commercial aviation, competitiveness concerns are not as important, and so an exemption was

[5] Even without compliance obligations, monitoring and reporting activities still entail costs. Smaller emitters are also disproportionately affected, so just as with ETS compliance, thresholds may also be used to determine who faces reporting obligations and to what degree of accuracy. Further information on considerations for reporting thresholds can be found in Singh et al 2015 (p.44-46)

introduced in 2014 for non-commercial operators whose emissions within Europe are below 1000 tons per year.

New Zealand on the other hand combines upstream coverage with very low thresholds (de minimis - approximately 4000 tons CO_2e/year). The low threshold means that despite the upstream coverage, there are also a number of small emitters under the ETS, but this was balanced in the design phase with relatively simple MRV procedures. To ensure coverage of HFC and PFC gasses, a greenhouse gas import levy applies to vehicles and equipment that contain them, whereby entities below the threshold still face a carbon price. Some large downstream companies are equally given the chance to voluntarily opt-in to the ETS and account for their own emissions, rather than accepting the carbon price passed through from their fuel suppliers (ICAP and PMR, 2016: 34).

Other systems use a combination of both options: in California and Québec, downstream entities are only covered after they meet or exceed the 25,000 metric tCO_2e, while fuel distributors are covered upstream where fuels enter the distribution system, provided that the annual emissions from combustion of the supplied fuel exceeds 25,000 metric tCO_2e (California) or if they have distributed at least 200 liters of fuel in 2015 (Québec – see box 3). Entities covered downstream that are below the threshold (with annual emissions less than 25,000 but greater than 10,000 metric tCO_2e) are subject to reporting obligations, although reports are simplified and do not require verification unless they choose to voluntarily opt into the ETS (see section 4.1.2). Although it limits compliance options for entities below the threshold, this combined approach is designed to minimize threshold effects and administrative transaction costs for smaller entities while enabling coverage of most statewide or province-wide emissions.

Table 2: Participation thresholds across different jurisdictions

EU	>20 MW total rated thermal input or specific output (production capacity) thresholds for industrial processes; tailored provisions for aviation that ensure equal treatment of operators on flight routes
California	> 25,000 tCO_2e; Opt-in option below threshold; and all imported electricity is covered
Québec	Mandatory: >25,000 tCO_2e; Opt-in: >10,000 tCO_2e
RGGI	>25MW (generation capacity)
Tokyo	Large emitting facilities >1,500 kl crude oil equivalent
New Zealand	De Minimis low thresholds
Korea	Company >125,000 tCO_2e/year Facility >25,000 tCO_2e/year
Switzerland	>20 MWth installed capacity
China national ETS*	Energy consumption >10,000 tce/year (ca. >26,000 tCO_2)
Mexico pilot ETS*	>100,000 tCO_2/year

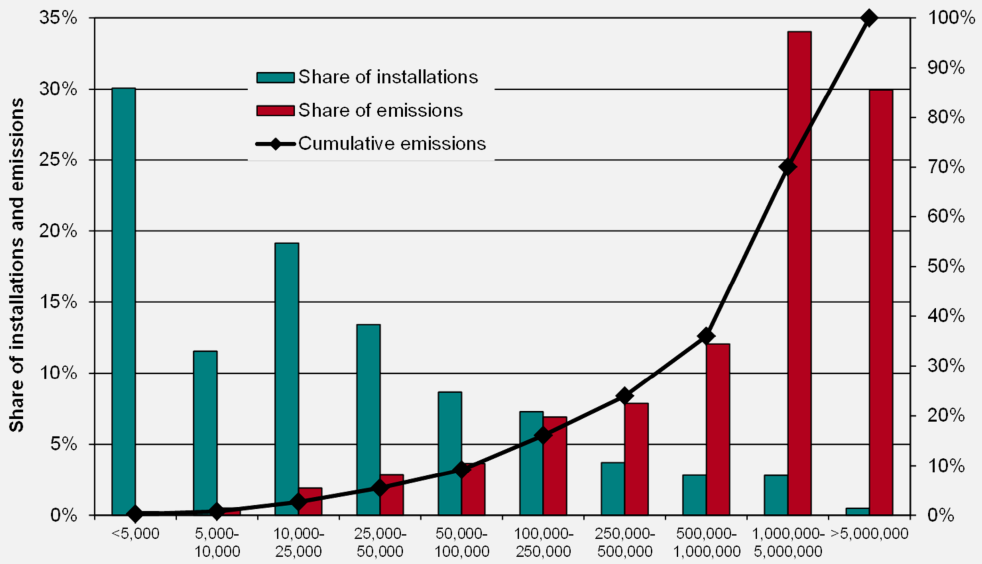
Notes: * Intended threshold for scheduled ETS

Box 2

Thresholds and small emitter opt-out provisions in the EU ETS

The EU ETS is designed to have a relatively comprehensive coverage across its covered sectors, so as to maximize the benefits of a large carbon market and ensure a level playing field for businesses. Participation for most of the covered activities is determined by sector specific capacity-based thresholds, like for example the total rated thermal input (exceeding 20 MW) or the production capacity (e.g., exceeding 75 tons per day for the manufacture of ceramic products). Small emitters (installations with low emissions) are in general obliged to participate if they exceed the capacity-based thresholds.

Figure 5: Share of EU ETS installations and emissions related to annual CO2e emitted



Source: Fallmann et al. (2015) from Umweltbundesamt, EUTL verified emissions s 2013

Recognizing that small emitters faced disproportionately higher administrative transaction costs, Article 27 of the EU ETS Directive (Directive 2003/87/EC) allows Member States to implement at national level an opt-out scheme for small emitters, defined with a threshold of less than 25,000 tons of CO_2e per year. This opt-out provision was applied from Phase III starting in 2013 (Fallmann et al., 2015). However, installations still have to be subject to measures that will achieve an equivalent contribution to emissions reductions. Furthermore, to ensure that they do not exceed the opt-out threshold, installations must also still monitor and report their emissions (albeit usually under simplified conditions). From 2021, an additional opt-out possibility will be in places for installations that exceed capacity-based thresholds but emit less than 2,500 tons of CO_2e per year. These, as well as reserve or backup units which do not operate more than 300 hours per year, can be excluded without equivalent measures.

Box 2. continued below

Box 2 (continued)

Thresholds and small emitter opt-out provisions in the EU ETS

In Phase III, the opt-out provision has only been used to a limited extent. According to national reports submitted in 2017, only eight countries (Germany, Spain, France, Croatia, Iceland, Italy, Slovenia and the United Kingdom) are making use of this option. Furthermore, the decision to opt-out was only taken by a small proportion of eligible companies in these states, most often for installations involving combustion activity and ceramics production. Several possible reasons for this have been suggested (European Commission, 2015, p. 135). For example, developing a new 'equivalent measures' regulation is one of the pre-requisites for Member States to access this option, and it poses a potentially higher administrative burden than simply applying the EU ETS regulation.

Furthermore, through participating in Phases I and II, many covered entities had already become used to the rules and procedures of the EU ETS, including the MRV compliance cycle and surrendering allowances. Changing to a different national measure with different administrative obligations may in itself be an administrative burden. More fundamentally, as opt-out entities are still obliged to monitor and report emissions, and because small emitters under the EU ETS enjoy less stringent MRV obligations (see section 0 on tiered approaches) in many cases the small reduction in administrative costs from opting-out would not outweigh the benefits of participating in the ETS.

4.1.2. Competitiveness concerns and opt-in

Although differentiated treatment of covered entities through targeted thresholds and other options is desirable to, for instance, avoid imposing an undue burden on smaller emitters, competitiveness concerns must also be considered as an inappropriate threshold can create competitive distortions within a sector.

Competitiveness concerns have arisen, for example, in sectors when emitters above the threshold are covered yet receive free allocation, but emitters below the threshold in the same sector indirectly pay a full carbon price on their fuels, through upstream coverage of fuel distribution, without any compensation.

In order to address competitiveness concerns some jurisdictions have introduced opt-in provisions, whereby additional sectors, activities or installations may join the system, either under the direction of the regulatory authority or decided voluntarily by the entities themselves.

The EU ETS introduced opt-in provisions[6] during the first and second phases, which are still valid in phase III (Ellerman et al. 2010).

This is also the case for California and Québec, where entities below the threshold can voluntarily opt into the system and thereby receive the same treatment and face the same obligations as other covered entities.

The use of low thresholds is another option to ensure a level playing field in a particular sector or industry such as in the case of Québec (see Box 3). This is mostly possible when the point of regulation is upstream.

Box 3

Québec- ensuring a level playing field for fuel distributors

In its second compliance period (2015-2017) Québec broadened the coverage of its program to include the transportation sector upstream, by covering fuel distributors. In 2015, the threshold used for fuel distributors was set identical to the one used for large industrial emitters. Fuel distributors (producing annual GHG emissions attributable to the use of fuels) that met or exceeded 25,000 tCO_2e were covered in the system. It became clear that some entities that were just below the threshold had the opportunity to gain market shares from larger distributors. Some entities were (at least in theory) also able to split their activities in order to remain below the threshold. This situation raised concerns about competitiveness distortions from the industry and potential avoidance of the ETS regulation.

In 2016, the threshold was reduced to 200 liters of fuel distributed (even if the combustion of fuels resulted in the emission of less than 25,000 tCO_2e). The decision aimed to preserve a level playing field for all distributers. The new threshold ensures that every entity introducing fuel into the system is subject to the cap-and-trade regulation.

[6] See Article 24: EU ETS Directive on Procedures for unilateral inclusion of additional activities and gases.

4.2. Simple by default – emissions factors and tiered approaches to monitoring

The MRV system plays a key role in ensuring the integrity and credibility of an ETS. MRV obligations in many cases make up a large proportion of the administrative burden of an ETS. In particular, accurately monitoring emissions can be technically complex and potentially expensive. A range of approaches have been taken to simplify monitoring methods and reduce obligations in proportion to the size and complexity of covered entities while aiming to ensure environmental integrity. This can reduce the administrative burden for covered entities and competent authorities while still following the principles of completeness, consistency, comparability, transparency and accuracy.

Methodologies for monitoring emissions generally fall under two approaches – calculation and measurement. In some cases, a combination of both approaches is applied. Emissions may be calculated from a covered entity's activity data (e.g. the quantity of fuel and material inputs and product outputs) multiplied with emissions factors representing their energy and carbon content and the efficiency of the conversion processes. In the other approach, equipment may be used to directly measure GHGs at the point of emission (continuous emission measurement systems - CEMS). More or less stringent methods under each approach will require different levels of data quality and reach different levels of accuracy. However, there is a general trade-off between accuracy and administrative burden, with very high accuracy often not feasible or too costly. It is therefore up to policymakers to determine what is acceptable and to provide guidance on appropriate methodologies.

4.2.1. Default emissions factors

One basic strategy is to provide covered entities with options for simplified MRV methodologies and then develop these over time to increase accuracy – from simple and conservative methodologies to more stringent and less conservative. Calculation-based methodologies can be further simplified through the use of conservative default emissions factors. Rather than obliging operators to determine the carbon content of their fuels and other inputs, default emissions factors may be set by the regulator based on industry averages or best practice.[7] To simplify calculation even further, fuel quantities can be determined solely from purchasing records such as fuel invoices. This is particularly applicable for standardized commercial fuels, materials and products, such as diesel.[8]

Default emissions factors are used for example in New Zealand to minimize administrative costs. Conservative default emissions factors are specified for most sectors and industries. However, entities that meet given eligibility criteria are permitted to establish their own more accurate unique emissions factors through site-specific measurement, sampling and testing. In some cases, the default emissions factor is deliberately set above average to encourage the use of unique individual emissions factors and improve the overall accuracy of monitoring over time.

[7] Default factors need to be updated regularly to reflect technological developments. This represents a further (relatively minor) administrative cost.

[8] For commercial standard fuels the measurement equipment of the supplier is under national metrological control in several jurisdictions.

4.2.2. Tiered approaches

Policymakers can also adopt a tiered system of MRV requirements with increasingly stringent methods based on, for example, the size of the facilities, the amount of annual emissions, the type and amount of fuels and materials used (source streams), the annual operation hours, and the measurement devices already in place (Singh et al, 2015: 53-55). This is the case in California and the EU ETS.

Cost effectiveness is an important concept built into the design of MRV regulations in both California and the EU ETS. The tiered approach distinguishes between different sizes of installation as well as different sizes of their individual source streams. One principle of the tiered approach is that the largest sources of emissions should use higher-tier monitoring and quantification methods that provide a greater degree of certainty, while less stringent methods can be applied to smaller emissions streams. This ensures that an unreasonable administrative burden is avoided where the benefits of greater efforts would only be minimal.

In California there is a four-tier system in place for stationary combustion facilities. Each tier dictates which methodology may be used for monitoring.[9] Lower tiers allow calculation based on default factors and readily available data from fuel purchase records. Middle tiers require the heat content, carbon content and quantity of fuels to be measured. The highest tier requires continuous CO_2 measurement using Continuous Emissions Monitoring Systems (CEMS). A minimum level of accuracy of ±5% is set for all measurements.[10] This level was determined with input from stakeholders after weighing up the costs and benefits of using a lower value. Together with the tier-system, it is intended to balance costs with accuracy and allow operators to conduct monitoring during normal operations without adding new equipment. Small emitters, who emit <25,000 tons CO_2e/year, and are therefore not directly covered by the California Program are subject to less stringent monitoring and reporting obligations and are not required to perform third-party verification unless they decide to opt into the ETS.

In the following, we describe the EU ETS approach in detail as an illustrative example. In the EU ETS, installations are able to design their monitoring plan by selecting from a range of methodologies.[11] The tiered system sets different requirements for data quality for each parameter used to determine emissions, whether calculation factors or direct measurements. As shown in Table 3, tiered requirements for data quality are determined by the level of uncertainty of each method (taking into account the use and condition of the instruments, and allowing for both random and systematic errors). Achieving low levels of uncertainty thereby requires more stringent (and therefore more costly) methods. For example, lower tiers may allow for the use of default values to determine emissions factors, while higher tiers require fuel sampling and laboratory analysis.

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[9] Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR) - title 17, California Code of Regulations, § 95100-95158

[10] According to MRR § 95102 - Definitions, "Accuracy" means *'the closeness of the agreement between the result of the measurement and the true value of the particular quantity (or a reference value determined empirically using internationally accepted and traceable calibration materials and standard methods), taking into account both random and systematic factors'*. This definition makes levels of 'accuracy' in California comparable to 'uncertainty' in the EU ETS MRV MRR guidelines, except that 'more accuracy' implies 'less uncertainty'.

[11] The 'monitoring plan' is a core element of the European MRV system established by EU ETS rules. It sets out a detailed, complete and transparent documentation concerning the monitoring methodology of a specific installation or operator.

Table 3: Tiered uncertainty requirements – example from the EU ETS

EU ETS tiered requirements for activity data used to calculate emissions – combustion fuels	
Tier number	Amount of fuel [tons - t or normal cubic meters - m^3] over the reporting period is determined with a maximum uncertainty of:
1	less than ± 7.5 %.
2	less than ± 5.0 %.
3	less than ± 2.5 %.
4	less than ± 1.5 %.

Following this principle, installations in the EU ETS are categorized by size and their emissions streams as either major, minor or de minimis. These categories then determine which tier must be applied (see Table 4). Furthermore, all covered entities are allowed to apply lower tiers if they can demonstrate through a cost-benefit analysis that greater accuracy is not technically feasible or would incur unreasonable costs.[12]

Table 4: Tier requirements in the EU ETS categorized by installation size and source stream

Source stream	Category A Annual emissions <50,000 tCO_2e	Category B Annual emissions 50,000-500,000 tCO_2e	Category C Annual emissions >500,000 tCO_2e
Major	Sector-specific	Highest tier	Highest tier
Major, but technically not feasible or unreasonable costs	Up to 2 tiers lower (minimum tier 1)	Up to 2 tiers lower (minimum tier 1)	Up to 1 tier lower (minimum tier 1)
Minor	Highest tier technically feasible and without unreasonable costs (minimum tier 1)		
De minimis	Conservative estimation, unless a defined tier is achievable without additional effort		

[12] The concept of 'unreasonable costs' is a general approach to limit the administrative costs of facility operators and was introduced as a way to improve the acceptance of the EU ETS MRV system. It can apply even to large emitters who may, for example, avoid the need to purchase additional equipment.

Box 4

Small emitters and the EU ETS tier system

In order to further reduce the administrative burden of the EU ETS, installations with low emissions (small emitters - <25,000 tCO_2e/year) enjoy special simplifications to the MRV system. Not only do they allow minimum tiers to be met for accuracy, but they also exempt small emitters from a range of MRV procedures. Under the EU ETS, small emitters:

- may apply tier 1 for activity data and emissions factors for all source streams;
- may submit a simplified monitoring plan based on a template, if the Member State provides such template;
- are exempt from submitting a risk analysis supplementing the monitoring plan;
- are exempt from conducting several aspects of the uncertainty assessment where activity data is based on purchase records;
- are exempt from reporting on monitoring improvements recommended by the verifier;
- face less stringent standards for laboratory analysis, and
- under further conditions the verifier is allowed to waive the site visit during the verification process.

According to a report from the European Commission (2017), in 2014, 72% of installations were in category A (<50,000 tCO_2e), 21% in category B (50,000-500,000 tCO_2e) and only 7% in category C (>500,000 tCO_2e). In 2015, over 5700 installations were reported as installations with low emissions (57% of the total excluding Italy, which was not part of the study). The report found that the large share of installations with low emissions (small emitters) and others in category A means that the tier-based system and other simplifications targeting small emitters are still particularly relevant.

4.2.3. Simple emitters

The success of the tiered systems in California and Europe, with special considerations for small emitters, has opened discussion on the potential to simplify MRV procedures for other types of activities and installations. One possibility is to expand monitoring simplifications to 'simple emitters', being installations with relatively simple processes. Many MRV obligations are aimed at ensuring comprehensive monitoring of complex installations. As a result, MRV procedures may be unnecessarily burdensome for simple emitters.

In California, there are some provisions in place to simplify monitoring for facilities with simple processes even if they have large source streams, such as power plants or industrial facilities using only natural gas. In some instances these facilities may use default emissions factors for pipeline natural gas and biofuels, which simplifies reporting and reduces costs. However, third-party verification is still required if emissions are greater than 25,000 tCO_2e/year or if they decide to opt-in.

In the EU ETS, although there are no specific provisions for 'simple emitters', a limited simplification of a facility's monitoring plan may be allowed at the discretion of the competent authority and based on a risk assessment carried out by the operator or the competent authority. According to guidance provided by the European Commission, this may be applied in particular for 'simple emitters' that:

- are small to medium size and have just natural gas as a source stream;
- use only commercial standard fuels without process emissions;
- use a calculation approach with invoices for activity data and default emissions factors;
- do not use direct measurement or emit non-CO_2 greenhouse gases.

Even where simplified methods may be applicable, such as the potential to use invoices and default emissions factors, facility managers may not be aware of these options. For this reason, guidance is often provided by the regulator to help simple emitters in choosing the most appropriate methodologies.

4.3. Dealing with emissions data – reporting made simpler

Good quality emissions data is fundamental to the proper functioning of an ETS. It is the basis for both compliance and allocation, while also giving governments the information needed to develop and adjust their broader climate policy trajectory. Emissions' reporting typically begins several years before compliance in order to establish historical data, and in many cases even emitters without compliance obligations are still required to report their emissions. Robust reporting systems need to ensure that reported emissions data are reliable, consistent and accurate, have high standards of transparency and confidentiality, and are at least sufficient to allow the necessary verification, compliance and enforcement.

Generating quality data requires administrative efforts from covered entities (completing the reports), as well as from regulators, who process, check and manage the data. Depending on the jurisdiction, covered entities are also often obliged to contract a third-party verifier. Approaches to simplifying the reporting and verification process can potentially reduce the administrative burden, while still maintaining data quality. As outlined below, different approaches and experiences show that there is potential for systems to avoid duplication and benefit from synergies with other reporting obligations. There are clear benefits from standardization, and potential for electronic reporting templates and online platforms to further simplify data collection and processing.

4.3.1. Synergies with existing accounting or reporting systems

The information that covered entities need to submit under an ETS does not always need to be newly generated. Often there are synergies to be found with other existing data gathering systems. The administrative burden can be significantly reduced by using readily available data and avoiding the duplication of efforts. An example is fuel invoices and purchase data, which often must be gathered and reported for tax purposes, can also be used to calculate GHG emissions. It is therefore worthwhile, though not always possible, to align MRV obligations with company process controls and accounting systems, as well as with reporting obligations for other regulations. However, this may limit the ETS design choices, and reduce the potential to adapt the design of the system over time.

RGGI closely aligned its system to match the data gathered by the US Environmental Protection Agency (EPA) Clean Air Markets Division. Under existing EPA regulations to curb air pollutants, electrical utilities are obliged to monitor and report a range of data using established protocols. In an agreement with the participating RGGI states, the EPA provides this data to state departments via the RGGI CO_2 Allowance Tracking System (RGGI COATS), where it is used to calculate compliance obligations for covered entities. This agreement removes the need for RGGI to implement separate MRV requirements, greatly reducing the administrative burden of the cap-and-trade system. However, the EPA data covers limited parameters and is only available for power utilities above the emissions threshold of 25,000 tCO_2. If RGGI were to consider changing the design of the system, for example by expanding the scope, new MRV requirements would need to be established that also align with the existing data.

4.3.2. Standardization

It is accepted good practice to standardize emissions reports, and all existing systems employ this to some degree. Standardized reporting formats may have different levels of sophistication, and include both paper forms and electronic templates. The initial administrative effort of regulators to establish standardized reporting systems with consistent and uniform definitions and categories ensures that emissions data is consistent over time, as well as across different staff members doing the reporting (PMR, 2013: 17). It also helps to guide reporters to submit all the necessary information, reducing the instance of mistakes and missing data. Likewise, standardization allows verifiers and regulators to more efficiently check monitoring plans and emissions reports, and cuts down on processing time. Another effect of standardization is that it facilitates learning over time. While the reporting process may be complicated when it is first done, as it is repeated each year both operators and regulators become accustomed to the standardized procedures.

Administrative efforts by regulators to provide support and guidance for reporting are also common practice and all jurisdictions surveyed found these efforts to be highly worthwhile. Support is typically given through guidance documents, help-desks, and targeted capacity building efforts.

Québec's ETS uses the standardized reporting protocols developed by the Western Climate Initiative (WCI) for combustion and key industrial processes. Reporting is done on an electronic template and submitted using a secured electronic delivery service. These simplifications ensure that complete data is reported in the correct units and reduces the risk of mistakes. However, although all the raw data is entered, the template does not automatically calculate emissions – the responsibility for calculations lies ultimately with the emitter. The ministry provides support and guidance on their website, including step-by-step guidance documents, and the reporting team is available to answer questions.

Several jurisdictions have gone one step further to employ dedicated electronic reporting systems that integrate standardized reporting into online platforms. Electronic reporting has several advantages with regard to user-friendliness and efficiency, with potentially greater ease of data-checking and management, higher levels of data completeness, and the ability to integrate data from monitoring plans, reports and allowance allocation (see Box 4 for examples). However, electronic systems entail large administrative costs both for their development and maintenance, and these costs need to be weighed up against their potential benefits. Online systems further require special measures to ensure that sensitive data is securely transmitted. Especially for jurisdictions with limited administrative resources, well-designed paper-based reporting systems or simple electronic templates may be sufficient, and continue to function well in many jurisdictions.

Box 5

Electronic reporting platforms in practice

A number of ETS jurisdictions have established dedicated information technology platforms for reporting emissions and other obligations. These are online tools for submitting emissions reports build on standardized reporting procedures, with different levels of data integration and automation. These include Germany's 'Formular Management System' (FMS) operated by the Deutsche Emissionshandelsstelle (DEHSt), the 'Emissions Trading Scheme Workflow Automation Project' (ETSWAP) system of the United Kingdom Environment Agency, the California Air Resource Board's electronic Greenhouse Gas Reporting Tool (Cal-eGGRT), and Québec's Inventaire québécois des émissions atmosphériques (IQEA) system. Online reporting tools are also used in the Republic of Korea, Australia and New Zealand.

The experience of California - Cal-eGGRT

In line with the different reporting requirements, different levels of complexity are built into the Cal-eGGRT system. Simplified reporting requirements are provided for data that can be easily measured and validated. However, reporting complexity increases with more complex facilities, whereby a range of underlying data is needed to allow for verification and quality assurance. For covered entities eligible for cost free allocation, additional production data must also be reported, so that allocation can be calculated from reported data. This further increases the complexity of reporting.

However, experience has shown that more complex requirements do not necessarily lead to more reporting errors. Problems can arise just as often with simple reporting tasks such as using the correct fuel units. One potential reason for this is that large and complex facilities typically have dedicated staff directly responsible for completing the reporting requirements. For smaller and simpler sources, reporting staff may be responsible for several tasks and may be less familiar with the reporting requirements.

To assist reporting staff, a number of validation checks have been added to the online tool which check for completeness or serve as warning for the user to review entered information which appears to be outside of expected data ranges. This function increases the user-friendliness of the tool and helps to minimize basic mistakes.

4.3.3. Quality, transparency and accountability through verification

Third party verification is the most robust and transparent method of assuring accuracy of emissions reports. Although it adds significant administrative costs to a MRV system, most jurisdictions require verification to meet agreed standards of transparency and data quality.[13]. Using standardized reporting formats enables verifiers to more efficiently validate the completeness and accuracy of reports. In return, many jurisdictions find that, over time, verifiers also improve the quality of data received in emissions reports, for example, as they find initial errors and give feedback to covered entities, which in turn saves regulators time and effort in checking reports.

[13] A discussion of other verification methods and the considerations for defining verification rules can be found in PMR 2019 (p.60 ff).

Jurisdictions that take a very rigorous approach to verification have also taken some steps to reduce the administrative burden. For example, verifiers in the EU may decide to waive site visits to installations that meet certain criteria, but only under strict conditions and with the approval of the competent authority. Clear guidance and templates can also help to ease the process. However, under a highly rigorous verification approach there are only limited opportunities for simplification. Some potential lies in applying international standards such as ISO 14064 and 14065 for verifiers. Under these standards, the verifier should conduct a risk analysis of a company's quality assurance and quality control systems. If the risks are deemed low, the verification may be less extensive.

In California, a rigorous approach is also taken, with third-party verification required for all entities with annual emissions greater than 25,000 tCO_2 (in line with participation in the cap-and-trade program). Of the approximately 800 entities with reporting obligations, around 500 are subject to third-party verification. There, the regulator also performs multiple quality assurance checks on emissions reports using an integrated data management system that checks for accuracy and completeness. At the other end of the scale, New Zealand has opted for a highly simplified system of verification. Quality assurance procedures for emissions reporting in the New Zealand ETS are based on the established system of self-certification with random auditing used in the income tax system.[14] Reporters make a formal assertion of the accuracy of the emissions reports and face stiff penalties if they are found by government audit to have falsified reports. This latter approach, however, is likely to remain the exception rather than the rule globally as it is intrinsically connected to the strong culture of regulatory compliance in New Zealand.

[14] This applies only if default emissions factors are used (most cases). For unique emission factors, verification by third parties is required.

4.4. Rules and exceptions– dealing with complexity in allocation

Free allocation is perhaps the best example of how detailed design specifications can lead to complex rules and procedures. Due to the strong distributional effects of free allocation, rules are necessarily developed closely with industry to ensure fair treatment across sectors, sub-sectors and individual entities, and to account for competitiveness concerns. The results are often highly differentiated rules, procedures and exceptions that accommodate for specificities in production processes, technologies and other special circumstances. The considerable tasks of establishing and updating methodologies, such as eligibility criteria and benchmarks, fall to the regulator, while completing and processing applications are a burden for both covered entities and regulators.

The main potential for simplification of free allocation would be to reduce the complexity of rules and procedures already in the development phase. This means striving for consistent rules with as few exceptions and special cases as possible. However, this generally implies a trade-off whereby covered entities and their representatives would need to accept a less differentiated allocation. At the same time, rules need to be carefully crafted and communicated to ensure fairness, especially for vulnerable industries, and reduce the potential for abuse of the system. Aside from simplifying legislation, there also exist some levers for dealing with necessarily complex free allocation procedures.

4.4.1. Integrating electronic systems for allocation

Allocation is a data intensive process. Several jurisdictions have incorporated allocation procedures into their electronic data systems, with different levels of automation. Both California and Québec use the data from their respective reporting databases to calculate free allocation. Since the verified reporting data is already available, the emitter does not need to submit extra information or an application. All the rules and criteria required to automatically calculate the free allocation are programmed into the electronic tools. Nonetheless all calculations are checked and counter-verified by regulator staff, and in some cases covered entities still need to submit personally signed forms to complete the process.

4.4.2. Establishing product benchmarks

When first establishing an ETS, free allocation by grandparenting is a typical approach, among other reasons due to its relative simplicity in implementation, as it mainly requires historical emissions data. However, as grandparenting has various limitations (e.g. reduced abatement incentives and leakage protection) most systems transition to more sophisticated free allocation methods over time. Benchmarking is a proven means of allocating free allowances in a transparent and non-distortive manner, which can better apply the polluter-pays-principle and reward efficiency (ICAP & PMR, 2016). Benchmarks have been employed in the EU ETS, California, Québec and other jurisdictions, often succeeding grandparenting as the preferred method of free allocation due to their ability to set a clear and targeted price incentive while reducing over-allocation and windfall profits.

Benchmarks can, however, be complex to establish, with disaggregated data requirements and associated implementation costs for the regulator related to development and updating. However, this can vary depending on the approach taken and the sectors (or subsectors) considered. Benchmarks developed for other purposes – or for an ETS in another jurisdiction – may also be adapted for the ETS if possible. Of the benchmarking approaches, product benchmarks are considered the most accurate and least burdensome to apply. This is because in addition to reported emissions they require only production data to calculate. Application of product benchmarks is particularly straightforward if facilities have only one product for which there is an established benchmark. However, particularly for industrial facilities generating several products, complexity increases with the need to apply multiple benchmarks.[15] If a specific product benchmark does not exist, then fallback approaches can be used (e.g., based on processes for heat production or fuel use), which can also increase complexity. Expanding the number of dedicated product benchmarks is therefore considered a practical step towards simplifying allocation procedures, although this entails implementation costs for the regulator and some facilities will still face a degree of complexity.

In California, product benchmarks may be revised or added through a formal public process to accommodate substantial changes to the makeup of an industrial sector or changes to the products made by an industrial sector. In 2017, product benchmarks were applied to over 99% of industrial allocation in California. In the EU ETS, around 52 product benchmarks have been developed for Phase III (covering around 75% of emissions), with fallback approaches (in the case that there is no specific benchmark) for heat, fuel and process emissions otherwise applied. Here, feedback from covered entities in the Netherlands indicates that the fallback approaches can be difficult to apply, particularly for small and medium sized facilities (Bank et al., 2015; Borkent et al., 2015). These facilities often face an additional administrative cost using heat benchmarks, as the measurement and reporting of heat flows are not usually standard practice. Expanding the use of product dedicated product benchmarks could potentially reduce complexity for these facilities, but may not be practical for all products and would entail a greater burden for the regulator.

[15] In the EU, benchmark allocation for heat in the power sector (e.g. combined heat and power plants) was applied in a straightforward approach in which a plant's heat production was simply multiplied by an assumed efficiency factor of 1/0.9 and the emission factor of natural gas.

4.5. Simple and secure registry operation

An ETS registry is an electronic database that records and monitors the transactions of allowances, thereby enabling trading and compliance. Security is the central principle of a registry. Both robust technical systems and transaction security procedures are needed to prevent registry fraud (PMR & FCFP, 2016). Registry data is also important for monitoring market activity. The importance of registry security was highlighted after several incidents of fraud and theft in the EU ETS in 2011. Considering the need for a secure system, there is limited potential for greatly simplifying a registry. However, approaches can be taken to increase user-friendliness, and in some cases, potentially reduce the administrative burden by streamlining the process of opening and managing an account for some users.

When streamlining the registry operations, even some small changes in procedure may require changes to legislation or electronic system updates, with considerable administrative efforts. One approach that does not necessarily require legislative changes is to streamline the amount and type of information required. Often more information than is required is asked for, and it is only after a period of operation that regulators may discover what information is essential for security, to support market functioning and to prevent market manipulation. Several jurisdictions conduct regular reviews in order to revise internal and external registry procedures and forms with the goal of identifying what information is really necessary.

Transaction security can be greatly increased with relatively simple procedures that do not require complex technological solutions. An example can be found in California and Québec, where a three-step procedure is required to complete transfers. Under the 'push-push-pull' model, a representative of the selling entity must 'propose' and a second representative must 'approve' a transfer, before it is then 'accepted' by a representative of the purchasing entity. In the EU ETS, the 'four eyes' principle is applied, whereby transactions must be approved by at least two people. Coupled with stringent requirements for the identification of account users with documentation, such procedures increase security and transparency while reducing unnecessary errors.

4.5.1. Proportionate security requirements

Generally, the same robust security measures currently apply to all registry users. However, security measures could be adapted proportionally to the profile of the user, in line with 'compartmentalised' security controls in a data management system (PMR, 2013: 18). One possibility would be to provide easy access to view registry information without being able to make transactions. An example can be found in Québec and California, where in addition to the high-security 'trading account', covered entities also maintain a 'compliance account' that permits only low risk transactions such as transfers and surrender, but does not allow trading. This can reduce the administrative burden on covered entities that are obliged to surrender allowances but do not actively trade.

4.5.2. Automatic compliance options

Security procedures such as those mentioned above ensure a robust system is in place for entities to engage in trade in allowances. However, feedback from EU ETS participants shows that some participants, particularly small and medium sized installations, effectively only access the registry twice per year – once to register their emissions and then again to surrender allowances (Bank et al., 2015).In this case, accessing the registry may be considered a disproportionate burden, particularly as it takes time to conduct security checks and re-learn the procedures. An automatic compliance option may be adopted that removes the need to access the trading registry, whereby data from emissions reports can be automatically registered, and the regulator can then facilitate the automatic surrender of the appropriate number of allowances, similar to a bank direct debit transaction. Québec employs a similar compliance process: once emissions reports are validated, the regulatory body creates a compliance obligation for the covered entity, which then must simply ensure that they have an equivalent number of eligible instruments in the compliance account at the time of the compliance event. Such an option may not only reduce the administrative burden for small and medium emitters, but may also minimize the chance of missing compliance deadlines with associated fees.

4.5.3. Harmonization of common registries

The experience of the EU ETS, RGGI and WCI systems shows that operating a common registry across multiple linked jurisdictions can create efficiencies but also introduce complexity. Dealing with this complexity during development can simplify operations during implementation. One example comes from the experience with the Compliance Instrument Tracking System Service (CITSS) registry system in California and its subsequent extension to Québec, Ontario (2017-2018) and Nova Scotia (since 2018, despite not being linked with California and Québec). Their experience shows that allowing for different actions based on differing regulations in multiple languages is challenging to the maintenance of a centralized registry, but these challenges can be largely addressed when designing the registry platform. Some key considerations at the design stage include the harmonization of relevant regulations and procedures, as well as a decision on which languages will be supported. At the technical level, the content management system of the registry platform needs to be compatible with multiple languages and texts. Finally, protocols should be incorporated that allow new jurisdictions to join the registry over time and enable them to operate as ‘standalone’ systems until the operational link is established.

4.6. Mitigating complexity - when simplification is not possible

Across many of the different elements of an ETS, the needs of a well-functioning system cannot be compromised, meaning that some complexity is inevitable. In these cases, there is a strong role for capacity building and the coordination of activities to make the administrative burden on all participants more manageable. Where there are complicated procedures in place, and when there are changes to the rules, it is important that all parties have good knowledge of the legislation and their respective requirements. Significant time can be saved when all responsible parties know their rights and obligations, are aware of the steps to be taken, and know who is responsible for each step. Therefore, most regulators undertake knowledge sharing and capacity building activities, both among their own staff and externally with operators and verifiers. Even with training, legislation documents can be difficult to understand, so most jurisdictions also provide step-by-step guidance documents for each stage of the compliance cycle, as well as help desks to answer questions. Experience shows that having workshops, trainings, guidance documents, templates, and a helpdesk for operators and verifiers can effectively help to avoid mistakes, thereby increasing data quality and compliance levels, which in the end enhances user-friendliness and makes the perception of administrative burden more bearable.

From the side of the regulator, at each stage of the compliance cycle there are procedural steps that need to be followed, with responsibility for each step sometimes taken by different agencies. Efforts to enhance communication between responsible parties can pay off with better coordination, less processing time, and generally lower stress levels. More broadly, it is important to identify which steps of the compliance cycle require the greatest processing time and effort, and to allocate enough time and resources to these in order to avoid bottlenecks.

4.6.1. Stakeholder consultation regarding simplification

Both during the initial design phase and when undertaking reforms of an ETS, stakeholder consultation can help to identify and develop simplification approaches. After all, it is the facility managers, industry representatives, verifiers and regulator operational staff that deal with the ETS on a day to day basis. Stakeholders can provide working knowledge of their current systems and practices, including what works well and what does not. They can also help to design ETS methodologies and procedures that are aligned with existing systems, thereby minimizing the potential administrative burden and enhancing user-friendliness. Stakeholder consultation is also an opportunity to build knowledge of rules and procedures, and can help to identify knowledge gaps and capacity needs. Furthermore, it can inform regulators about how covered entities perceive the administrative burden of the policy and whether particular procedures are considered worthwhile for them. Several jurisdictions have reported that they greatly value the insights gained from stakeholders regarding simplification, and have cooperated with them to identify areas for simplification and improve the user-friendliness of the ETS legal framework and tools. However, it is up to the regulator to find solutions that balance the different demands of stakeholders, and to ensure the overall effectiveness of the system in meeting its objectives.

5 Conclusion

This paper has highlighted several broad lessons on navigating the trade-off between system complexity and simplification in emissions trading. Limiting the administrative burden imposed by an ETS is a goal on which almost everyone – from regulators to covered entities – can agree. Yet at times this conflicts with other policy objectives, which then need to be traded off against one another. It is therefore worthwhile to draw on the experience from more than a decade of emissions trading globally and identify areas and options that allow for simplicity or simplification in ETS design and operation without prejudicing other key policy goals.

Considering simplicity as one objective among others already at the inception stage of a system can yield important benefits as key ETS design elements will determine the type and degree of complexity that will be faced during operation. Once legislation or information systems are in place making changes can require significant administrative effort. Important lessons can be learned in this regard from the experiences of existing systems. Key determinants of complexity in ETS design revolve around the choice of allocation method, point of regulation and inclusion thresholds, and a potential offset component of a system.

Looking across existing systems in search of best practices for keeping ETS simple yet robust, a few areas stand out. Still on the design side, in terms of inclusion thresholds, systems typically target large emitters and aim at easing the burden on smaller ones. In setting thresholds, a careful approach is required to prevent the risk of economic distortions. Despite this, issues may still arise in ETS operation that require more differentiated rules

Most of the opportunities for ETS simplification, however, lie in the realm of ETS operations. Particularly with regard to MRV, opting for 'simple yet conservative' approaches rather than more 'accurate yet also more complex' ones holds significant potential. This is relevant for instance where the use of default emissions factors comes in, but also applicable, for example, when determining free allocation procedures. Furthermore, methods may be initially designed to err on the conservative side, with the option to increase accuracy at a later point. For example, using conservative methods may give a higher-than-real measurement of emissions or a lower estimation of activity data for free allocation. Covered entities may then be given the option to apply more accurate (but more costly) methods, which potentially allow them to surrender fewer or receive more allowances. Their decision then depends on the cost-benefit-ratio of applying the more accurate method and is therefore also largely influenced by the allowance price of their respective ETS.

Another avenue to reduce the burden on smaller and simpler emitters while maintaining key policy objectives is to combine conservative methods with a proportionate approach, such as tiered requirements for accuracy in monitoring. Proportionate approaches are generally based on 'size' of a covered entity's emissions, but to a limited extent, have also been applied to simple emitters. Developing a comprehensive proportionate approach to simple emitters has potential to further simplify some existing MRV systems.

Another overarching approach is standardization. While standardized reporting formats greatly simplify the collection and processing of emissions data, standardization also more broadly facilitates the learning process for all participants over time. More sophisticated forms of standardization, such as integrated online reporting platforms, can further streamline a range of operations, even allowing for the automatic calculation of allocation entitlements. Yet, here it is important to balance the benefits of hightech measures with their implementation costs, considering that in practice, checking and authorization are still done manually.

Experience shows that, for many aspects of ETS, it may not be necessary to reinvent the wheel. In many cases, there will be synergies with existing data systems, procedures and obligations that can be leveraged to reduce implementation costs. International standards can also be adapted and tailored to ETS-specific contexts, such as with ISO standards for verifiers. With an expanding number of systems around the world designed to fit very different circumstances, there is also ever increasing potential for new systems to take inspiration from, adapt and where possible transfer elements of ETS infrastructure, institutions and protocols to their own domestic contexts.

Just as important as technical or procedural changes, however, are the various ‘soft’ approaches to simplification, such as providing capacity building, guidance documents and help desks, inter-agency communication and coordination, and stakeholder consultation. All of our survey respondents agree that these measures can greatly increase the efficiency of operations over time and should not be underestimated. There is value in conceiving of ETS operation as a continual learning-by-doing process - anything new seems more complex at first, but over time staff can learn and policy can be adapted. Keeping policy consistent, when possible, gives time for all participants to get used to the rules and procedures. Yet, in the practice of ETS, change is also normal. Legislation and regulatory design often start in a simple form and then evolve to become more complex, for example, after issues are discovered that require special rules, exceptions or clarifications. On the other hand, as systems mature, participants also often realize that things can be done more simply as the experience of operating a system yields lessons for simplification. In this regard, stakeholder engagement has been found to be highly valuable in simplifying and streamlining operations. In particular, it can identify areas of operational complexity and help to develop targeted simplification approaches. In the end, all participants are interested in creating a well-functioning, easy-to-use system that can successfully achieve its objectives with minimal administrative burden.

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