

EMISSIONS TRADING SCHEMES STAFF BACKGROUND PAPER

The objective of this document is to provide background information on Emissions Trading Schemes and other government interventions that reduce emissions of greenhouse gases.

This background paper is issued by the staff of the International Public Sector Accounting Standards Board® (IPSASB®) to provide information on Emissions Trading Schemes (ETSs) and other government interventions that reduce emissions of greenhouse gases. It describes different types of government interventions and their economic impacts.

This publication is not a pronouncement of the IPSASB and does not represent the views of IPSASB members. Its objective is to provide background information on ETSs and thereby support the IPSASB's potential future development of approaches for accounting for entities' involvement in ETSs. The IPSASB decided to make this document available publicly as an interim resource for IPSASB stakeholders, including national standard setters and users and preparers of general purpose financial reports, for their consideration of accounting for ETSs. It is based on initial background research and discussion. As its current project is deactivated the IPSASB is not seeking comments on this paper.

Background

Public sector entities may be either administrators of an ETS or participants in an ETS. The IPSASB has a project on accounting for ETS involvement, primarily from the perspective of administrators. The International Accounting Standards Board (IASB) has a research project, Pollutant Pricing Mechanisms (PPM), which considers accounting by ETS participants. IPSASB has deactivated its ETS project because the IASB's project is currently in its research pipeline, rather than on its active research agenda. The IPSASB does not think it appropriate to develop accounting approaches for administrators in isolation from the development of approaches for participants.

IPSASB's discussions have indicated the importance of understanding the economic impacts of an ETS and contrasting them with the economic impacts of other government interventions designed to reduce emissions, particularly environmental taxes such as carbon taxes. This paper's description of governments' policy objectives for an ETS, the alternative interventions that governments could use to achieve the same objectives and their economic impacts is expected to provide a good foundation for the development of accounting options on ETS involvement in the future.

Public Policy Objectives for an Emissions Trading Scheme

1. A government's primary public policy objective for an ETS is to reduce greenhouse gas (GHG) emissions. That objective is likely to be in the context of international agreements and local pressure to address environmental damage, global warming, and environmental hazards. Sharing the costs of emissions, while achieving an economically efficient solution that maximizes benefits and minimizes the intervention's costs, are further aims.

Primary Policy Objective—To Reduce Emissions

2. An ETS controls or “caps” emissions and, over time, aims to reduce them. “Emissions” are gases emitted into the atmosphere. An ETS is effective when the volume of target pollutants released into the atmosphere each year stops rising, and subsequently, declines.
3. The goal of an ETS is not to completely eliminate emissions, because some level of emissions may be both necessary and desirable. For example, one target gas for an ETS is carbon dioxide, which is a GHG. Carbon dioxide is naturally emitted into the atmosphere by almost all life forms. However, the unnaturally high volume of carbon dioxide presently in the earth's atmosphere causes global warming. Human activities that emit carbon dioxide include burning coal to produce electricity and burning petrol in combustion engines to drive machinery, cars, and airplanes. An administrator's target for carbon dioxide will be to reduce emissions to more sustainable levels, rather than attempt to eliminate them entirely.

Secondary Concern—Share the Costs of Emissions

4. In addition to an ETS's primary policy objective, a government may also use an ETS to redistribute or share the cost of emissions. Governments incur costs due to emissions. These include costs related to:
 - (a) Healthcare for illnesses caused by emissions;
 - (b) New infrastructure to ensure a sufficient water supply for communities and businesses;
 - (c) Increased emergency responses to environmental consequences, such as forest fires and more frequent and powerful storms caused by global warming;
 - (d) New and improved infrastructure for flood prevention, to address the increased risk of flooding due to global warming; and
 - (e) Increased border control activities related to population movement due to, for example, droughts affecting neighboring countries.

Government Interventions that Work Best—Maximize Benefits and Minimize Costs

5. When a government develops its policy to address emissions, its intervention approach is likely to take into account a complex set of considerations, including the political context for an intervention. Two reasons for developing and implementing an ETS are that a government wants to:
 - (a) Avoid negative impacts (as far as is possible) on business activity and the economy. For example, the ETS should not result in significant additional costs that make businesses less competitive and/or drive businesses to leave that jurisdiction and relocate to a lower-cost

jurisdiction. Government also aims to avoid interventions that reduce employment, have inflationary consequences, add to the costs of individuals and households, and/or otherwise have negative implications for the economy.

- (b) Achieve emission reductions in an economically efficient way. An ETS allows participants to trade Emission Allowances (EAs),¹ which may mean that the overall costs of emission reductions for ETS participants are less than the costs of other types of government intervention. An ETS therefore provides economic incentives to find efficient, future-oriented solutions to emissions.

International Pressure and International Agreements

6. A government's policy on emissions intervention may be related to an international treaty or similar international agreements. International agreements can influence a government's choice of intervention, because they may either partially restrict choices or influence the choice of a particular option. For example, where a government can access an international ETS that is already working effectively, there are likely to be practical and political benefits to joining that ETS.

Overview of Types of Government Intervention

7. After adopting a policy objective to reduce emissions, a government chooses one or more interventions to achieve that objective. This paper identifies four broad types of intervention:
 - (a) Regulation;
 - (b) Funding;
 - (c) Taxation; and
 - (d) ETSs.
8. The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets. It provides national governments with choices, also called "flexibility." (Appendix A provides a link to more detail on the Kyoto Protocol.) An excerpt from a Parliament of Australia document describes the different interventions that a government may use, under the Kyoto Protocol, to meet its emission reduction target:

"The Parties to the Kyoto Protocol can meet their obligations either by reducing their greenhouse gas emissions or increasing their removals sinks or both. Removals sinks are limited to direct human-induced land-use change and forestry activities (afforestation, reforestation, and deforestation since 1990).

The Kyoto Protocol does not specify the mechanisms by which Parties to the Protocol must meet their emissions target, thus providing an Annex I country, such as Australia, reasonable amount of discretion as to the policies and measures it implements domestically to meet its target. Domestic abatement action should be the primary means by which Annex I countries such as Australia meets their emissions target. Parties are also provided with an indicative list of policies and measures that they may wish to consider. These include

¹ Emission allowances are also called "units" or "permits."

promoting sustainable agriculture, promoting the renewable energy, removing market assistance for environmentally damaging economic activities, confronting the issue of transport sector emissions, and so forth.”

9. The Kyoto Protocol also sets out three “flexibility mechanisms” that Annex I Parties such as Australia may use as a supplementary means of meeting its target. These potentially help Annex I Parties cut the cost of meeting their emissions targets:
 - (a) The Clean Development Mechanism—this mechanism allows Australia to implement projects that reduce emissions in developing countries (non-Annex I Parties to the Protocol), or absorb carbon through afforestation or reforestation activities, in return for certified emission reductions that Australia can use towards meeting its own target.
 - (b) The Joint Implementation Mechanism—this mechanism allows Australia to implement an emission-reducing project or a project that enhances removals by sinks in the territory of another Annex I Party and count the resulting emission reduction units towards meeting its own target.
 - (c) Emissions Trading.
10. Intervention choices are not restricted to those that the Kyoto Protocol makes available to national governments. Sub-national governments and individual companies may take their own initiatives, using emission reduction mechanisms such as carbon pricing, to reduce emissions.
11. Table 1 provides an overview of the four categories of intervention identified above, classifying them as either market or non-market interventions. Market interventions require a market for some aspect of the mechanism to operate as intended. By contrast, non-market mechanisms do not require a market to operate.
12. Paragraphs 13-20 discuss general points applicable to all four categories. Paragraphs 21-56 consider each category of intervention in more detail.

Combinations of Intervention and Availability of Choice

13. Governments often use a combination of different interventions to reduce emissions. For example, a government may choose to use a command and control approach that requires coal-burning power plants to be shut down progressively over a specified period, while also introducing an ETS that impacts a broader group of entities. The Australian, South African, Swiss, and United States governments have used a mixture of interventions to achieve their emission reduction goals.
14. Governments can also allow affected entities some choice over the type of intervention that applies to them. For example, the Swiss federal government has, broadly speaking, allowed emitters a choice between paying a carbon tax and participating in an ETS. In practice, even where this choice exists, participants are still likely to be required to surrender EAs for some percentage of their emissions.

Table 1: Types of Emission Reduction Interventions

Market Intervention		Non-Market Interventions		
Pollutant Pricing Mechanisms				
<i>Emission Trading Scheme</i>		<i>Taxation</i>	<i>Funding</i>	<i>Regulation²</i>
<i>Over-the-Counter Market</i>	<i>Organized Market</i>			
EAs exchanged between nations (states) as occurs with the European Union (EU) ETS.	<ul style="list-style-type: none"> Primary market: e.g., auctions on exchange platforms such as the EU ETS's platform between states/EU and participants. Secondary market: between participants/states where all types of allowances (whether initially allocated for free or auctioned) are tradable. 	<p>Mandatory tax that applies, for example, to actual emissions. Increases the cost of emissions. Encourages entities to reduce & innovate. Includes environmental taxes, such as carbon taxes.</p>	<p>Funding provided for emission reductions, as subsidies or payments for projects, etc. E.g. Results-based financing where funds (or EAs) are provided in exchange for projects that reduce emissions.</p>	<p>Regulations to reduce pollution, such as requiring the use of filters in polluting industries. Regulation through legislation, irrespective of level of emissions.</p>
<p><i>Applies to both types of market mechanism:</i></p> <ul style="list-style-type: none"> The regulator/administrator sets a limit (cap) on the total level of covered GHG emissions; EAs must be submitted to cover actual emissions; and Unused EAs are tradable; setting a price on GHGs, which acts as an economic incentive to reduce GHGs, including an incentive to innovate. 				

² Regulation is also called "command and control."

Many Different Interventions

15. There are a number of different interventions to reduce the amount of GHGs in the atmosphere, by either reducing emissions or absorbing GHGs. The list below is not exhaustive:
 - (a) *Reduce emissions:*
 - Replace GHG-producing technology with sustainable technology (e.g., solar- or wind-powered generators to replace coal-burning generators);
 - Develop public transport systems to reduce the use of cars;
 - Tax cars (taxes on their purchase, fuel, driver license renewals);
 - Improve building designs to reduce energy needs (insulation, etc.);
 - Impose new taxes on fossil fuels either at entry into the country, at point of sale or when burned.
 - (b) *Absorb GHGs (through “carbon sinks,” i.e., forests, etc.):*
 - Provide communities with low-interest funding to plant trees;
 - Provide tradable EAs in exchange for projects to plant trees; and
 - Impose penalties on those that destroy forests (e.g., obligations to surrender EAs or imposition of government fines).

Complexity to Address Specific Situations

16. The examples of government interventions, to which Appendix A provides links, illustrate both complexity and evolution. Governments consider their specific situation when developing and customizing interventions. Factors that a government is likely to consider include the:
 - (a) Application of international agreements;
 - (b) Scope to cooperate with other governments on emissions reduction;
 - (c) Pattern of emissions in the region, including identification of the main sources of emissions;
 - (d) Scope to change emissions behavior;
 - (e) Impact on consumers and their ability to cope with consequential price changes, if any, for different goods and services; and
 - (f) Impact on the economy, including GDP and the competitiveness of exports.
17. An intervention can be applied in a variety of different ways, without changing its fundamental principles. For example, individual ETSs differ with respect to their start date, length of compliance period, and the ability of participants to carry EAs forward to future periods.

Changing Interventions—Learning from Experience and Responding to New Developments

18. Before choosing a particular intervention (or mixture of interventions), a government will evaluate the specific situation that it needs to address. This evaluation may be informed by a public consultation.

19. After an intervention has been in operation for a period, a government will often carry out some form of post-implementation review, and then make adjustments or more fundamental changes. A government may change interventions for technical, economic, political, or legal reasons, including:
- (a) Assessments of the effectiveness of a particular intervention, which could indicate a need to introduce further interventions or adjust the parameters of the first intervention;
 - (b) Scope to extend an intervention to a wider group of industries;
 - (c) Negative impacts on the economy and/or cost of living;
 - (d) Economic downturns that impact the market for EAs with the result that EA issuance, and/or the useful life of an EA changes;
 - (e) A change of government. For example, where a new government supports interventions that reward businesses for positive actions (rather than impose costs on emitters) or a hiatus, while the new government consults on a new set of possible interventions; and
 - (f) A legal challenge succeeds in halting or delaying the intervention, with the consequence that the government develops alternatives that are less vulnerable to future legal challenges.

Other Perspectives on Interventions—Statistical Categories

20. The statistical accounting community has categorized different types of government intervention, including different types of permits, licenses, quotas, and allowances. Appendix B provides details.

Intervention—Regulation

21. Regulations that take a “command-and-control” approach directly address pollution, without using a market mechanism. For example, governments can pass legislation that requires coal-powered electricity generators to install filters to reduce the amount of pollutants emitted, set limits on emissions, and impose fines to enforce the limits. “Command” is the presentation of quality standards/targets by a government authority that must be complied with. “Control” signifies the negative sanctions that may result from non-compliance e.g., prosecution.³ Although not a market-based intervention, the value of shares in a company and its ability to raise finance may be negatively impacted if government requirements are viewed as imposing significant costs or creating a risk that the company could have to shut-down or reduce the scale of some or all of its operations.

Command-and-Control Example—Regulations under the Clean Air Act (USA)

22. In accordance with the Clean Air Act, the United States’ Environmental Protection Agency (EPA) has taken the following command-and-control-style actions:
- (a) Required industrial sources to install controls or change production processes in order to reduce emissions. The EPA publishes regulations that cover a range of industrial categories, including chemical plants, incinerators, dry cleaners, and manufacturers of wood furniture. The regulations do not generally prescribe a specific control technology, but set a performance level based on a technology or other practices already used by lower-emitting sources in an industry. Companies must meet the emission levels required in the regulations.

³ McManus, P. (2009), *Environmental Regulation*; (Amsterdam: Elsevier, 2009)

- (b) Established limits on emissions from vehicles, which affect domestically manufactured and imported vehicles, and fuel restrictions requiring, for example, the use of very low sulphur gasoline.
- (c) A ban on lead in gasoline, implemented in 1996, which followed earlier requirements to limit lead levels in gasoline.
- (d) Requirements to:
 - Use reformulated gasoline in vehicles.
 - Install vapor recovery nozzles at gas stations. (These reduce the release of gasoline vapor into the air.)
 - Carry out regular car maintenance through mandated inspection and maintenance programs.
 - Equip passenger vehicles with on-board emission diagnostics.

Economic Impact for Government

23. Regulation is a relatively low cost instrument for government. The government incurs initial development and management costs and ongoing costs for monitoring and enforcement. Command-and-control interventions may generate revenue. For example, under the United States' Clean Air Act, entities that emit pollutants are required to purchase permits before they can operate their facilities. Cash flows from permits contribute to financing the monitoring and enforcement of the scheme. Fines and other penalties also generate positive cash flows.

Economic Impact for Emitting Entities

24. Command-and-control intervention is likely to involve one-off unavoidable and potentially large costs for entities that emit pollutants. Facilities may need to be moth-balled because they no longer meet emissions requirements and the cost of conversion is uneconomic. Emission reduction is likely to require new investment, with the alternative being higher production costs and a loss of competitiveness or a reduction in profit. There will also be on-going compliance costs in providing information to regulators. As noted above, emitting entities may be required to purchase permits in order to continue to operate.
25. Research shows that costs depend on an emitters' specific situation. For example, producers that are new entrants to the energy sector may already use efficient, sustainable technology and may not need to change their method of operating. In contrast, an energy producer that relies on old, inefficient, non-sustainable, and high-polluting technology (for example, coal-burning power plants) may incur high costs to change its method of operating.

Intervention—Funding

26. Government funding can subsidize projects and other initiatives that aim to reduce emissions. Results-based financing, takes a variety of forms. In some cases, contributors of finance receive carbon credits or EAs. Subsidies or project financing may be used to support energy conservation, the sustainable management of forests, and the enhancement of forest carbon stocks.

27. South Africa and Switzerland are two national governments that use results-based projects to achieve emission reductions and earn tradable EAs.

Projects that Generate EAs, International—UNFCCC’s Clean Development Mechanisms

28. The United Nations Framework Convention on Climate Change’s (UNFCCC) “Clean Development Mechanism” (CDM) is sometimes described as an offset program. This program allows countries to receive EAs in exchange for projects that reduce emissions. The CDM, defined in Article 12 of the Kyoto Protocol, allows a country with an emission-reduction or emission-limitation commitment to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets. The mechanism is the first global, environmental investment and credit scheme of its kind, providing a standardized emissions offset instrument, CERs.

Projects that do not Generate EAs—Australian Example

29. Results-based financing may also result in tradable units that are not EAs, but have similarities with EAs. For example, Australia’s Federal Government has financed emissions-reduction projects, where financing is through reverse auctions. Successful bidders receive “Australian Carbon Credit Units” (ACCUs).⁴ Unlike EAs, ACCUs are not allowances to emit GHGs. Successful bidders “earn” ACCUs by carrying out their project and achieving the targeted GHG reduction. Although ACCUs can be traded, their value ultimately depends on a pre-determined repurchase price set by the government. Their value is fixed through the auction process, when the government makes a contractual commitment to redeem the ACCUs at a set price, provided the project has been completed.

Economic Impact for Government

30. As for other interventions, the government incurs initial development and management costs and ongoing costs for monitoring and enforcement.
31. If a project-financing approach is used, as in the Australian example, with government paying the full cost of the emission-reduction projects, costs to the government are likely to be high compared to other interventions. If the financing approach used is that of subsidized loans for projects, then costs to government are those of interest foregone and there is also credit risk. Funding from other governments or international organizations, as in the South African case, results in a lower economic impact on the government.

Economic Impact for Emitting Entities

32. This type of intervention appears to have the lowest costs for emitting entities since engagement in such projects is usually discretionary, and the project is financed by government funding in the form of a grant or concessionary loan.

Intervention—Taxation

33. Taxation imposes a direct cost on emissions and, therefore, a disincentive to emit. For example, carbon taxes place a price on carbon, using a metric (e.g., price per metric ton of CO₂ or equivalent

⁴ IETA (2015) Australia: An Emissions Trading Case Study, as of May 2015.

[tCO₂e]). A carbon tax guarantees the carbon price in the economic system and, if the price is high enough, will provide an incentive for entities to reduce their emissions to reduce the tax burden

34. Although the mechanism of carbon taxes involves taxation, emission reductions are expected to result because of economic incentives. Businesses are expected to find ways to reduce emissions so that they can compete more effectively, where competition is on price. If businesses simply pass on additional costs to customers, customers are expected to reduce consumption. In both cases, lower emissions are expected to result. However, this cannot be guaranteed. Factors such as the price elasticity of demand could mean, for example, that carbon taxes increase costs without changing behavior sufficiently to either reduce emissions or slow their rate of increase.
35. Governments that have used (or plan to use) carbon taxes as a primary emissions reduction intervention include:
 - (a) Canadian provinces of Alberta, British Columbia, and Manitoba;
 - (b) South Africa; and
 - (c) Switzerland.
36. Links to descriptions of the South African and Swiss governments' interventions are provided in Appendix A. When introducing a carbon tax, governments are likely to consider whether it should be "revenue-neutral," in terms of the overall government finances. For example, the Swiss and British Columbian governments' carbon taxes both aim to be revenue-neutral, and use cash flows from emissions to reduce costs for the community in other areas.

Economic Impact for Government

37. As for other interventions, the government incurs costs to develop and manage the intervention.
38. A carbon tax provides positive cash flows for government. (Although, as noted in paragraph 40, the government may have a policy of applying those cash flows to reduce costs for the community in other areas.) These are dependent on the level of emissions. Cash flows rise as emissions increase. However, an emission tax can also be designed with a threshold, so that no tax applies until emissions reach that threshold.

Economic Impact for Emitting Entities

39. Emitting entities incur costs (the tax) as they emit. Costs increase directly proportional to emissions, subject to thresholds. In practice, taxes may be applied either to actual emissions or "emission surrogates," such as the fuel used by a polluting entity or even fuel imports or production, without specifying the eventual user of the fuel.

Intervention—ETSs

40. An ETS is a market-based mechanism to control pollution by providing economic incentives for reductions in emissions. ETSs provide emitting entities with flexibility to reduce their emissions in a cost-effective manner, while stimulating technological innovation and avoiding negative economic impacts. The main focus of ETSs has been GHGs.

41. In 2015 there were 17 active ETSs worldwide, with 14 further ETSs planned⁵. The active ETSs were in:
- (a) Canada (Quebec, which is part of the Western Climate Initiative).
 - (b) China (Beijing, Guangdong, Hubei, Chongqing, Shanghai, Shenzhen, and Tianjin).
 - (c) European Union (EU) (28 Member States and three European Economic Area (EEA) European Free Trade Association (EFTA) countries).
 - (d) Japan (Saitama and Tokyo).
 - (e) Kazakhstan.
 - (f) New Zealand.
 - (g) South Korea.
 - (h) Switzerland.
 - (i) United States of America (California, which is part of the Western Climate Initiative, and Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont, which are in the Regional Greenhouse Gas Initiative).
42. There are two main types of ETS; cap-and-trade schemes and baseline-and-credit schemes. These are described below.
43. Schemes can also be divided into statutory or non-statutory schemes. Statutory schemes are government imposed and require the mandatory participation of entities that emit GHGs. Non-statutory schemes are voluntary in nature.

Cap-and-Trade Schemes

44. The most common type of ETS is described as a cap-and-trade ETS. The administrator (usually a government) sets a legal limit or “cap” on the amount of pollutant that may be emitted. The overall cap is divided into EAs. For example, the EU ETS trades primarily in European Union Allowances (EUAs), the Californian scheme in California Carbon Allowances (CCAs), while the New Zealand ETS trades in New Zealand Units (NZUs).
45. The EAs are either allocated or sold to ETS participants, providing them with rights to emit a specific volume of the specified pollutant. Participants are required to hold sufficient EAs to cover their emissions. An EA is described as “offsetting” a unit of emissions. The total number of EAs issued in an ETS region cannot exceed the overall cap. Firms that exceed their allowed volume (or tonnage) of emissions must buy EAs from those who have remained below their allowed volume (or tonnage) either from within the region or, where external EAs are accepted by the administrator, from outside the region. In effect, the buyer is paying a charge for emissions, while the seller is being rewarded for having reduced emissions. Thus, in theory, those who can reduce emissions most efficiently will do so, achieving pollution reduction at the lowest cost to the economy and society.

⁵ ICAP (2015) *Emissions Trading Worldwide International Carbon Action Partnership (ICAP) Status Report 2015*, February 2015

Baseline-and-Credit Schemes

46. In a baseline-and-credit scheme, the administrator allocates the cap in the form of baselines. The baseline provides an entity with a right to emit up to a specified level. The baselines are assigned to a specific emitting source and, unlike allowances in cap-and-trade schemes, cannot be traded. The trading mechanism is introduced at the end of the reference period, when the administrator issues tradable credits to entities that have emitted below their baseline. Conversely, the administrator requires entities that have emitted above their baseline to provide credits. This mechanism imparts scarcity to the credits and gives rise to a market.
47. The Government of New South Wales implemented a baseline-and-credit scheme. However, the scheme was closed in 2012, after the Australian Federal Government began to implement an ETS and required companies to purchase EAs to cover their emissions. Presently, based on available information, it appears that there are no active baseline-and-credit ETSs. However the term “baseline-and-credit scheme” can be used with a general meaning, as explained below.

Concept of “Baseline-and-Credit Schemes” versus an ETS

48. The term “baseline-and-credit scheme” can also be applied to schemes that are not ETSs. For example, any scheme where a baseline is defined and some sort of credit is received for a reduction below the baseline can be treated as falling within the general category “baseline-and-credit scheme”. But the credit could, for example, be a simple right to receive funds from the government, rather than a tradable right to emit that can be used to cover an entity’s emissions. Schemes that do not involve the trading of emission rights do not fall within the ETS group of interventions.

Trading of EAs

49. EAs can be traded directly or through financial instruments that are later exchanged for units. Some regional ETSs allow the use of EAs from outside the region. For example, participants in the EU–ETS can use emissions unit types defined under the Kyoto Protocol, although this is subject to quantitative and qualitative limits. Kyoto Units can be traded between national governments. EUAs can be traded within the EU ETS group of 31 nations.

ETS Design, Issuance of EAs, and Emergence of Obligations to Surrender EAs

50. As previously noted, design of an ETS is likely to take into account many different factors, including factors specific to the particular jurisdiction. ETSs differ, for example, with respect to their:
 - (a) Start date, length of compliance period, and the ability of participants to carry EAs forward to future periods;
 - (b) Industries or installations covered by the ETS (e.g., power generation, transport, etc.);
 - (c) Geographic application (e.g., national, regional, or local);
 - (d) Target or cap on emissions (e.g., emissions set at 20% below 1990 levels);
 - (e) Type of penalty for non-compliance; and
 - (f) Mandatory or voluntary nature of the ETS.

51. Participants in ETSs can obtain EAs in different ways. For example, EAs may be:
 - (a) Transferred to ETS participants at no cost, for a nominal fee, or at a subsidized charge;
 - (b) Sold either to participants only or to the general public using different sale mechanisms including auctions; or
 - (c) Provided to entities in exchange for projects that reduce emissions or otherwise reduce the amount of pollutants in the environment (e.g., a project that has developed and implemented emission reduction technology or a reforestation project that removes GHGs from the environment).
52. ETS participants' obligations to submit EAs to the administrator may also have different drivers. Normally the driver is emissions. However, at least one ETS, the New Zealand ETS, requires entities that cut down forests to submit EAs, if certain conditions are met. In this case, the target entities may start with zero EA holdings (i.e., the administrator does not provide them with EAs at the start of the compliance period) and then develop an obligation to submit EAs, because of deforestation.

Economic Impacts for Government

53. An ETS can fulfil its role without having a major economic impact on the government as ETS administrator. There are costs to set up an ETS and costs to administer the ETS, which includes emission monitoring costs. Because of the electronic and intangible nature of the EA instrument, administrative costs should not be high. Furthermore, the majority of ETS activity—the issuance of EAs to participants, their holding of EAs and their eventual return to the administrator, and monitoring of participants' emission activity—does not involve significant costs.
54. An ETS appears capable of achieving its policy objectives without generating any positive cash flows for the government. However an ETS can be used to generate cash flows. Charging ETS participants for EAs (or auctioning EAs) can generate cash flows that:
 - (a) Cover the costs of the ETS;
 - (b) Cover the costs of emissions (for example, health care costs); or
 - (c) Contribute to funds for the general budget.
55. An ETS administrator may decide to auction EAs to receive information on EA market prices, rather than to generate cash flows.

Economic Impacts for Emitting Entities

56. From the participants' perspective, an ETS imposes costs proportional to an entity's emissions. If EAs are initially provided free then an ETS participant will only incur costs once it exceeds the emissions limit set by its allocation of EAs. Until that point it has "opportunity costs" when it emits, because an alternative use for its EAs is to sell them on the market. If EAs are issued for a charge then there are immediate costs, which can be defrayed if an entity sells some EAs on the assumption that it can reduce emissions below the amount covered by the transferred EAs.

Economic Impacts of Different Interventions—Overview and Further Discussion

57. For all four interventions, the government (as regulator or ETS administrator) incurs costs to develop and manage the intervention, as follows:
- (a) One-off, initial costs to develop and implement; and
 - (b) On-going costs to administer, which will usually involve a monitoring and enforcement aspect.
58. However other economic impacts for a government and for emitting entities vary. Tables 2 and 3 provide an overview of the economic impact of the four broad types of interventions.

Table 2: Economic Impacts for Government as Administrator/Regulator

Intervention	Outwards cash flows	Inwards cash flows	Resources, rights and obligations	Other features
Regulation	Costs to administer	Cash flows from fees (e.g. permits) and penalties for non-compliance	Rights to charge, fine, and enforce	
Funding	Costs to administer; funds for projects; and subsidies	None	Right to project work (service performance) by those funded	
Taxation	Costs to administer	Cash flows from taxation	Right to enforce.	Applies a price to emissions—tax per unit of emissions
ETS	Costs to administer	Cash flows from EA transfer fees and sales ETS participants may also be able to trade EAs	Rights to EAs initially (resource) and as emissions occur Obligation to make EAs available and to enforce	EAs tradable on primary market (auctions), secondary markets, over-the-counter transactions

Table 3: Economic Impacts for Entities as Emitters/ ETS Participants

Intervention	Outwards cash flows	Inwards cash flows	Resources, rights and obligations	Other features
Regulation	Payments for permits, upgrades, etc.	None	None	Licenses to operate and/or proven history of compliance could be a resource
Funding	Cash spent on the project Cash provided to encourage change	Receive grant or payment for projects	Earn right to funding from projects and/or earn EAs Obligation to carry out project	May be possible to trade rights to receive payment for partially completed projects
Taxation	Tax payments	None	Obligated to pay taxes	Internalize externalities (price for emissions) Tax losses may be tradable on secondary market ⁶
ETS	Any fees to receive/cost to purchase EAs, costs to change operations	Cash flows from EA sales	EAs that provide rights to emit Obligated to surrender EAs or pay fines	Internalize externalities (price for emissions) Applies a price to emissions—transfer fee then market value due to supply/demand

Economic Impacts—Government

59. As indicated above, a government may generate positive cash flows from an ETS, carbon tax, or emission reduction regulations. However, generally a government’s policy approach focuses on emissions reduction rather than revenue generation. This is usually evident from the way that prices are set or cash flows, once received, are applied by a government. For example,
- (a) Fees received for operating licenses are likely to be set at a level that covers the inspection and administration costs of the licensing arrangement, with no overall financial benefit to the government.

⁶ The extent to which tax losses are tradable worldwide is unclear, but appears fairly limited. There is a scheme to trade certain types of tax credits in the United States of America, where the concept of transferability within the tax system applies. By contrast, the Canadian tax system only allows transfer of tax credits in exceptional and limited situations. (For example, a young adult can transfer unused tuition tax credits, but only to immediate family.) The only secondary market for tax losses in Canada involves buying/selling businesses or subsidiaries with a history of accumulated business losses, which can then be used to absorb income in the acquirer’s tax return.

- (b) Fees received when EAs are initially transferred to ETS participants may be very low or zero, with financial penalties acting as a disincentive to exceeding emission levels.
- (c) Cash flows received from both ETSs and carbon taxes may be kept in a separate and ring-fenced fund and dedicated to:
 - (i) Other emission reduction initiatives such as cheaper public transport or the creation of clean energy solutions; or
 - (ii) Reduced costs for taxpayers in other areas of government activity, such as lower health insurance costs; or
 - (iii) Investments in infrastructure to cope with the impact of global warming, for example, forest fire prevention measures or improvements in flood protection.

Discussion and Comparison of Economic Impacts—Participants

- 60. Emitting pollutants can be made costly by applying:
 - (a) A tax on emissions, so that the amount of taxes paid increases directly proportional to emissions. There might be a threshold below which there is no tax for emitting entities or a scale that increases as emissions rise above a lower limit;
 - (b) Aggregate restrictions on the volume of emissions, so that where, overall, the participants exceed the set limit, the cost of additional emissions increases because of the scarcity of EAs; and/or
 - (c) Fines or other penalties for exceeding a set limit.
- 61. Interventions may lead to risks to the viability of emitting entities. Pressure to reduce emissions can require new investment, with the alternative being higher production costs and a loss of competitiveness or a reduction in profit.
- 62. Funding from government, whether in the form of subsidies or results-based financing can help emitting entities to develop or implement technological changes that reduce emissions at minimal cost (government grant approach) or with financing below market rates (low interest loan approach).
- 63. From the participants' perspective both carbon taxes and ETS impose costs (or potentially impose costs) related to an entity's emissions. In the case of carbon taxes, the relationship is simple; the more an entity emits, the more taxes it pays. For an ETS, the situation is more complex.
- 64. If EAs are initially provided at no charge, an ETS participant will only incur costs if it exceeds the emissions limit set by its allocation of free EAs. If EAs are issued for a charge, the ETS partially resembles a carbon tax. However, costs can still be reduced by emitting below the total covered by the EAs, so that surplus EAs can be sold. Depending on the sale price of surplus EAs, an entity may be able to recoup some or all of its original EA transfer costs. Therefore, an ETS could have a potential up-side for participants, because an entity may be able to sell any surplus EAs and thereby earn revenue from its ETS participation. A carbon tax is purely another cost, which the participant must cover.

Participants' Scope to Control or Influence the Economic Impact of an ETS

65. The economic impact for an ETS participant depends on various factors. Some of the factors are within the participant's control or influence:
- (a) The costs incurred for initial receipt of EAs depends on whether the administrator decides to charge a price and/or auction EAs. The participant may decide, if EAs are auctioned, to purchase fewer EAs, on the basis that there is scope to reduce emissions below the level that the government has set.
 - (b) Whether a participant incurs further costs to purchase additional EAs during the compliance period depends on whether it keeps its emissions below the limit set by the original EAs received.
 - (c) The participant manages costs to change operations (e.g., new technology) and thereby reduce emissions.
 - (d) The participant also chooses whether to trade EAs, which could result in gains (losses) from trading activities.

Comparison between ETSs and Tax on Emissions

Is an ETS a different category of government intervention or similar, in substance to carbon taxes?

66. Some argue that an ETS is a type of tax on emissions, for example, a particular type of carbon tax. This question is important for ETS accounting. If these two interventions are, in substance, the same, then they should be accounted for in the same way. However, there appear to be some obvious differences. For example, an ETS:
- (a) Allows trading of EAs, while taxes generally cannot be traded;
 - (b) Primarily involves the exchange of EAs rather than cash, while taxes involve cash in/outflows;
 - (c) Establishes a limit (the cap) on emissions, for each participant and for all participants in the scheme; thus, creating scarcity. Conversely, taxes allow emitting entities to emit without any upper limit, with higher emissions leading to higher costs (revenue from the government administrator's perspective) through taxation.
67. While these are important differences for participants, it is not clear that they represent significant differences for ETS administrators.

How do these two interventions differ and how are they similar?

68. From the administrator's perspective, both an ETS and a carbon tax have the same primary objective of reducing emissions, by making emitting costly to participants. They have the potential to generate positive cash flows. However, because EAs are commonly transferred to participants at no-cost or for a nominal fee, a government can be expected to generate lower cash flows from an ETS compared to a tax on emissions.
69. An ETS is different from a carbon tax because the major driver for behavioral change is the cap on emissions. An ETS can work effectively even where the administrator provides EAs at no cost, so that no cash flows are received by the ETS administrator. The cap creates scarcity where previously

emitting entities could treat the environment as a free, unlimited good. Once scarcity has been established, the laws of supply and demand set the market price for EAs. EAs are the main mechanism for imposing costs on emissions and, indirectly, internalize the externality (i.e., pollution and its negative consequences). In contrast, a carbon tax is effective through the extra costs that it imposes on emissions (or emissions-related activity).

Who Bears the Cost and Internalizes the Externality?

70. Environmental taxes and ETSs both aim to make entities internalize the pollution externality.⁷ All of society incurs costs from pollution, but emitting entities may treat their ability to pollute (or the environment into which they emit) as a free good. Similarly, customers of the services and products produced by emitting entities also disregard the externality unless an intervention requires them to take account of the cost of pollution.
71. Pollution taxes and ETSs are likely to force both the producer of emissions and those that purchase products and services of that producer to internalize the cost of pollution. For example, a coal-powered electricity generator may be able to charge a higher price for the energy that it produces in order to recover some or all of a carbon tax on its emissions. But there may be scope for customers to change to another, cheaper energy producer, a producer that is not affected by the carbon tax because it uses clean energy sources such as wind or solar power. Similarly, the energy company may be able to change its operations to cleaner sources of energy and thereby keep its costs down. These changed behaviors reflect the internalization of the externality. The carbon tax makes customers and producers consider the price of carbon emissions when making decisions about purchase and production respectively.

⁷ An externality is a factor whose costs (or benefits) are not reflected in the market price of goods and services. Carbon pricing and an ETS both aim to price emissions so that their price reflects the fact that emissions impose costs on society. These pollutant pricing mechanisms are expected to also impact market prices for goods and services that involve emissions so that those prices also reflect the cost of emissions for society.

Emission Reduction Interventions—Case Studies

A1. This section provides links to case studies that illustrate types of emission reduction interventions.

International interventions:

The [Kyoto Protocol](#) has implications for all national developments, as does the [Paris Agreement 2015](#)

The [EU-ETS](#), which is the largest and the longest-running ETS, involves 31 countries (the 28 EU member states, Iceland, Lichtenstein and Norway)

[North America's Western Alliance Initiative ETS](#) (California and Quebec)

National and sub-national interventions:

[Australia's](#) results-based financing

[Brazil's](#) use of incentives to protect forests and reduce deforestation

Canada—Provinces of [Alberta](#) and [Quebec](#)

[China's ETSs](#)

[New Zealand's ETS](#)

[South Africa's carbon tax](#)

[Switzerland's carbon tax and ETS](#)

[United States of America—Clean Air Act](#)—example of command-and-control intervention—and the [Regional Greenhouse Gas Initiative](#) (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont)

GFSM 2014 and Rights over Natural Resource Usage

- B1. Appendix A of the Government Finance Statistics Manual (GFSM) 2014 discusses the classification of ways in which a government can issue rights to use a natural resource (permits, licenses, or allowance). A government's choices when creating licenses and permits for natural resources are:
- (a) Allow use of the natural resource to extinction (i.e., open-ended right to use);
 - (b) Allow use for an extended period with little or no intervention; or
 - (c) Extend or withhold continued use of the right (to use the resource) from one year to another (i.e., a resource lease).
- B2. Government control over a resource can happen:
- (a) Without payment to the affected entities (or payment by the entity);
 - (b) With payments that constitute:
 - (i) A tax;
 - (ii) A rental (lease) payment;
 - (iii) Purchase of an asset that is then included in the GFS equivalent to an entity's statement of financial position.
- B3. Each of these options have different classification and reporting consequences for GFS.
- B4. A government may issue licenses or permits to use natural resources that are either:
- (a) Claimed by the government on behalf of the community; or
 - (b) Privately owned.
- B5. GFSM 2014 discusses application of the principles to governments' issuance of permits or licenses for a range of different natural resources, including the radio spectrum, land, timber, fish, water, and mineral and energy resources.

Relevance to Emission Allowances

- B6. EAs are similar to rights to use the atmosphere. Arguably, they are better described as rights to use a government-created resource. A government creates the total capacity for emissions (i.e., the cap or overall limit available for emissions) and makes that resource valuable by restricting entities' ability to operate without having the resource. There are financial consequences for an entity that does not hold sufficient EAs to cover their emissions. Although this resource (the total capacity for emissions) has similarities to a "natural resource," it is a government creation, a "man-made resource" that is not physical. It depends for its existence on legislation, and is a type of socially constructed, intangible phenomenon. The government issues rights to use a fraction of the resource. Those rights are EAs, and each EA provides a certain capacity to emit, which is a fraction of the total resource, i.e., the total capacity to emit, set by the overall cap on emissions.

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