CARBON MARKET

ANALYSIS OF INTERNATIONAL EXPERIENCES





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CNI PRESENTATION

In recent decades, climate change has emerged as one of the main challenges for governments, companies, investors and society at large. More recently, growing concerns about greenhouse gas (GHG) emissions have begun to reshape the business environment.

Carbon pricing has been increasingly discussed and implemented globally as part of the countries' GHG reduction strategies. Dozens of pricing systems have already been adopted, in the form of taxation of emissions or trading of quotas via the carbon market.

For Brazil, the industrial sector considers that the regulated carbon market is the instrument that will provide greater flexibility to manage the country's emissions, in addition to being strategic to accelerate the transition towards a low-carbon economy and enhance the competitiveness of the sector.

The implementation of a regulated carbon market depends on an adequate organizational structure and governance for its operation. In this sense, it is essential to know and evaluate the lessons learned in the initiatives that have been launched in the world.

This study presents international projects on carbon-market governance systems that have been successful and, therefore, it will be useful for the design of such a mechanism in Brazil. With this, the Brazilian National Confederation of Industry (CNI) hopes to contribute to the necessary debate about this topic.

Enjoy your reading!

Robson Braga de Andrade

President of the Brazilian National Confederation of Industry (CNI)





1 INTRODUCTION



Globally, carbon pricing instruments have been increasingly discussed and implemented as part of countries' greenhouse gas (GHG) mitigation strategies. According to data from the World Bank, carbon pricing initiatives cover around 21.5% of the global GHG emissions, with 64 projects implemented or currently under study. Trading prices range between US\$1 and US\$137/tCO₂, with more than 51% of the GHG emissions covered by carbon pricing systems having an average price of US\$10/tCO₂e.

In Brazil, the subject has been formally studied by the federal government since October 2011, when the government expressed interest in joining the Partnership for Market Readiness (PMR), a World Bank program. In September 2014, the entry into the PMR was approved, through the development of a Partnership for the Preparation of Market Instruments (PMR Brasil), implemented by the Ministry of Economy and the World Bank. Between 2016 and 2020, the PMR had as its main objective to provide the Brazilian government with information about the convenience of adopting carbon pricing instruments as part of GHG mitigation policies in the country

The market has shown interest in the PMR Brazil, as it concluded the design of the methodological and technical bases necessary for the implementation of an emissions trading system. The structure proposed within the scope of the PMR Brazil project will be the centerpiece for defining the model to be adopted by the country in the future. Therefore, it is important that the parties involved in the process, both from the public and private sectors, be aware of the different global governance systems, the way they are organized and how the Brazilian model can come to be inspired by what is common to all analyzed structures. The essential normative parameters of any climate policy are defined in the National Policy on Climate Change (PNMC), established by Law number 12187/2009, which provides for monitoring, inspection and control actions and financing lines for mitigation projects. In addition to the PNMC, subnational regulatory standards can also provide parameters to be considered by a national system. For example, the São Paulo State Policy on Climate Change (PEMC), established by Law No. 13.798/2009, was prepared before the PNMC itself and provides for the creation of plans and programs that contribute to the mitigation of state GHG emissions. Finally, the experience gained by RenovaBio (Law number 13576/2017 and Decree number 9308/2018), the first Brazilian decarbonization policy to institute a market mechanism, launches a model that may also inspire aspects of a market system that is already being implemented in the country.

In addition to the national and subnational regulatory components, it is essential to know and evaluate the lessons from the initiatives that have been adopted around the world. Currently, dozens of market systems have already been established for the trading of carbon quotas or for the taxation of GHG emissions. The first carbon trading system implemented in Europe, the European Union Emissions Trading System (EU-ETS), for example, was created 15 years ago and is in its fourth phase. Relevant initiatives have already emerged in some countries on the American continent, such as Mexico and Chile. In Asia, different countries have made real progress on the pricing agenda. Therefore, there is a great variety of experiences whose lessons can contribute to the design of a Brazilian policy.

Therefore, the present work aims to map the following systems, which were adopted in five international jurisdictions, identifying challenges found and how they were met:

1) European Union (EU-ETS), the world's first carbon market;

2) Mexico (SCE – Carbon Trading System), a market launched in 2020, which allows for an understanding of the regional context and that of developing countries;

3) Canada/California (WCI – Western Climate Initiative), mature markets, with an important cross-jurisdictional component; and

4 and 5) Japan (Tokyo-CaT – Cap and Trade) and South Korea (KETS – Korean Emissions Trading Scheme), pioneer markets, which illustrate the Asian context t.

Chapter 2 presents the main methodological definitions adopted in this study, with special attention to the mapping of the flow of functions that characterize a carbon-market governance system.

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In Chapter 3, the aforementioned international jurisdictions are discussed, through two components: first, a characterization of their implementation history and the general architecture of the systems and, then, the detailing of the respective governance structures. In this second part, the mapping will consist of a methodical assessment of the format of the initial regulation (origin in the Executive Branch versus in the Legislative Branch), regulatory procedures, implementation and duration phases, regulatory agents and their functions, specific committees and mandates. Furthermore, when available in the literature, the internal structure of regulatory agents, possible interfaces with the private sector and forms of interface with unregulated sectors will be identified.

Chapter 4 presents a description of the common elements found in the five jurisdictions.

Finally, the last chapter concludes the document with the presentation of some guiding principles, mapped through the systematization of the international experience, which may support a future design of a carbon- market governance system in Brazil.



2 GOVERNANCE – DEFINITION AND MAPPING



This chapter presents the definition of the term "governance" that guided the procedure used to map the roles and responsibilities within the framework of the carbon market structures.

The theme of governance has been present in public debate since 1992, when the World Bank first defined the term, which has been used in two contexts. The first one is the space of corporations, in which the way they relate to their different audiences and carry out their work becomes increasingly relevant. The second context is that of political science, which deals with the exercise of power at subnational, national and international scales. In this work, we adopted a definition of governance applicable to the national and international political scales.

Governance is how public institutions gain and exercise power, with respect to procedures and the institutional format¹. To delimit its conceptual space, it is necessary to distinguish governance from what, in English, is called "policy", which consists of the written rules themselves. Governance should not be confused with the legal framework that provides the formal bases for operating.

> The issue of governmental procedures and practices in achieving its goals gains relevance, including aspects such as the institutional format of the decision-making process, the public-private coordination in the formulation of policies, or even greater or lesser opening for the participation of interested sectors or different spheres of power (WORLD BANK, 1992).

^{1 &}quot;[T]he manner in which public officials and institutions acquire and exercise the authority to shape public policy and provide public goods and services" (WORLD BANK, 1992

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Based on this understanding, it is possible to define a general structure of the carbon markets that allows the systematic and concrete assessment of the different functions that must be performed for the operationalization of these markets, as well as the organizations or entities that perform such functions. The structure of markets is divided into three major steps, as shown in Figure 1.



FIGURE 1 – Governance of carbon trading markets – three stages and 18 functions

The main concepts related to each of the steps of the carbon-market governance process are presented below:

Planning – To be effective, carbon trading systems need to be transparent and predictable. For this, it is necessary to establish planning mechanisms (functions) that clearly determine the parameters of the system. First, you need to define the long-term horizon, in the form of mitigation objectives (percentage reduction compared to a baseline). Then, the scope of action must be delimited, in terms of which GHGs and sectors will be regulated. Next, it is necessary to establish medium to long-term goals, according to the compliance periods defined for the program. It is also necessary to determine the rules for allocation of permits, possibly differentiated by sectors, and possible limits for the use of offsets. Furthermore, there needs to be a mechanism that allows for modification of the rules if necessary. And, finally, a set of rules must be established for the possible interconnection with other markets and for a possible admission of other programs in the form of offset.

MRV – Once the parameters have been defined, it is necessary to quantify the emission reductions made by the regulated entities. This quantification is done through monitoring, reporting and verification (MRV) methodologies, whose protocols can be based on periodic emissions inventories or on simplified forms of measuring emission reductions. In both cases, MRV procedures are of fundamental importance to ensure the quality of the information and transactions. Commonly, measurement and reporting are carried out by the interested party itself. For this, in certain cases, it is necessary to appoint a technical body to plan and implement the MRV processes. In some markets, regulated entities are required to submit monitoring and/or mitigation plans to the regulatory entity, for approval. Once this is done, the regulated entities shall submit detailed reports on their emissions or emission reductions. These reports are usually verified by qualified and independent entities (outside the government structure), and it is important that the regulator validates the verification entities in advance, based on authorization, licensing or accreditation procedures, and that it provides a list of rules detailing the obligations of the verification entities. In addition, the regulator normally oversees both regulated entities and verifiers ("verification entities"). Next, it is necessary to create an offset system for the bonds (credits or permits) obtained in programs/external markets that may be used for offsets. Finally, there must be a control system that discourages any errors or fraud in the different stages of the MRV process.

Market – A central aspect of carbon trading systems is the creation of new bond markets, which allow the purchase and sale of assets related to the right to emit a certain amount of GHG. Assets can be of two types: permits (or licenses or quotas) or emission credits, both of which confer the right to emit. Credits are based on a past environmental gain,

which has already been effectively realized and accounted for. Emission permits, on the other hand, do not reflect an already incorporated environmental gain. Instead, they are based on a determined emission limit, according to an estimated baseline for the future.

For the permit or credit market to function, the regulator must first grant and book the bonds. The granting is based on targets of emissions (permits) or emission reductions that have been reached and certified (credits). Bookkeeping – systematic entry of bonds into accounting records – can be done by a private bookkeeper (like in the case of RenovaBio) or by the regulator itself, usually in an electronic record. In the case of permits, the next step is the allocation, which can follow three paths: 1) allocation according to explicit criteria of historical emissions (e.g., each company receives permits equivalent to 98% of the emissions of the three previous years), 2) allocation by discretionary decision; or auction-based allocation (the highest bid gets the permits). In the case of auctions, it is necessary to create a market structure to make the transactions viable. In the case of interconnected markets, auctions can be held individually or jointly. Once the bonds are registered and allocated, they can be traded on the primary market (in the case of credits or permits that have not been auctioned) or secondary market (permits purchased at an auction). In general, the regulator institutes a regulatory system for the securities market, which must be cross-jurisdictional if the markets are interconnected. Furthermore, it is common to have price control mechanisms to avoid very high fluctuations in values. Finally, the regulator needs to disclose data about the program so that participants can learn and plan their future actions.

2.1 GOVERNANCE – FUNCTIONS AND AGENTS

Based on the previous structural model, it was possible to identify the agents responsible for 18 central functions of the carbon trading markets. Table 1 below presents a summary of the main results in the five jurisdictions studied, with one or more agents being appointed for each function. For example, in the case of the European carbon market (second column from the left), the table shows, in the "Planning" section, the agents responsible for the governance of each of the six functions that make up the stage. In this case, the institutional process is exactly the same for the six functions and requires the participation of the Executive and Legislative Branches and National Governments. Likewise, the table presents the agents responsible for the governance of the functions of the functions corresponding to the MRV stage. For example, the last column on the right shows that, in WCI, it is up to the participating jurisdictions

to independently determine the governance organization of most functions, and the private entity created to operationalize the market – WCI, Inc - would only be responsible for checking the compliance.

The table presents, whenever possible, the details of the agencies or sub-agencies responsible for each function. A more detailed discussion about the distribution of functions and performing agents in each jurisdiction is presented in the next section.

	Japan				
	European Union	Japan	South Korea	Mexico	California/ Canada
Functions	EU-ETS	Tokyo-CaT	KETS	SCE Mexico	WCI
	Planning				
Cap (long term)	PE -> PL -> GN	PE	PE (inter-ministerial)	PE -> PL	Jurisdictions10
Scope	PE -> PL -> GN	PE (undersecretariat)	PE (task-force> MMA)4	PE (MMA)	Jurisdictions
Periodic goals	PE -> PL -> GN	PE (undersecretariat)	PE (task force -> MMA)	PE (MMA)	Jurisdictions
Free permits	PE -> PL -> GN	-	PE (task-force -> MMA)	Undefined	Jurisdictions
Changes of courses	PE -> PL -> GN	PE or PE -> PL2	PE (MF, MMA)	(MMA, INECC), SC (C3, CC)7	Jurisdictions
Interconnections/ offsets	PE -> PL -> GN	PE	PE (task-force -> MMA)	Undefined	PE -> PL
		MF	٧V		
Monitoring/ Mitigation Plan	GN (competent authority)	PE (undersecretariat)	riat) - PE (mma)		Jurisdictions
Accreditation verifier	Accreditation entity	PE (undersecretariat)	PE (MMA)	PE (PROFEPA) -> EMA8	Jurisdictions
Report verification	SP (verifier)	SP (verifier)	Verifier	SP (verifier)	Jurisdictions
External bonds	PE (Central Registry)	PE (undersecretariat)	PE (MMA)	PE (MMA)	Jurisdictions
Report audit / verification	Accreditation entity	_	_	PE (MMA)	-
Compliance verification	GN (competent authority)	PE (undersecretariat)	PE (certification committee)⁵	Undefined	SP (WCI, Inc.) ¹¹

TABLE 1 – Agents responsible for the governance structure of five carbon markets

	Japan				
	European Union	Japan	South Korea	Mexico	California/ Canada
Functions	EU-ETS	Tokyo-CaT	KETS	SCE Mexico	WCI
		Planr	ning		
Allocation/ granting of permits	GN -> PE	PE (undersecretariat)	PE (MMA)	PE (MMA)	SP (WCI, Inc.)
Bookkeeping	PE (Central Registry)	PE (registration system)	PE (GIR)6	SMDE9	SP (WCI, Inc.)
Auction/ marketplace	SP (EEX)	-	KRX (stock exchange)	BVM	SP (WCI, Inc.)
Regulation	ESMA, GN (fin. auth.)1	PE	KRX (stock exchange)	Undefined	SP (WCI, Inc.) -> PE
Control of prices	PE (Registration Central)	PE	PE (task force -> MMA) -> SP (financial institutions)	Undefined	PE
Publication of data	PE (EUTL)	PE (registration system)	KRX (stock exchange)	Undefined	-

PE = Executive Branch; PL = Legislative Branch; GN = National Governments; SP = private sector; EEX = European Energy Exchange, headquartered in Leipzig, Germany; EUTL = European Union Transaction Log, system that records EU-ETS public data; KRX = Korea Exchange; MMA = Ministry of Environment; MF = Ministry of Finance.

¹ ESMA = European Financial Markets Authority, independent regulatory body based in Paris. In addition to it, national financial authorities regulate the market. ² Changes to technical parameters are implemented by the Executive Branch. Structural changes must be approved by the Legislative Branch. ³ Group composed of different ministries, which defines long-term goals. ⁴ *Task force* set up at the Ministry of the Environment to design allocation plans. ³ The certification committee is within the Ministry of the Environment. ⁶ South Korea GHG Inventory and Research Center. ⁷ INECC = National Institute of Ecology and Climate Change, scientific and research body of the MMA; SC = civil society; C3 = high-level advisory board composed of 13 experts; CC = advisory committee of the emissions trading program composed of representatives from businesses, government, universities and associations. ⁸ PROFEPA = Federal Attorney General for the Environment, an MMA agency; EMA = Mexican Accreditation Entity. ⁹ Emission rights monitoring system. ¹⁰ Each jurisdiction that joins the program follows a specific institutional path. ¹¹ WCI, Inc. is the private non-profit entity founded by the participating jurisdictions of the program to manage the system.

Note: arrows to the right indicate the chronological order of the institutional process.



3 GOVERNANCE SYSTEMS



3.1 EUROPEAN CARBON MARKET – EU-ETS

3.1.1 GLOSSARY

Executive Branch: European Commission. It is made up of Commissioners from the 27 member countries, and one of them is the President of the Commission. Carbon market matters are dealt with in the Climate Action Directorate, Sub-Directorate of Carbon Markets².

Legislative Branch: European Parliament. The European legislation is implemented by member countries. The Commission and Parliament have the role of creating harmonized standards and guidelines to regulate the implementation of the law. Next, it is up to each country to institute systems to put the laws into use.

National Governments: governments of the 27 member countries, Liechtenstein and Norway. Carbon market matters are handled by competent authorities appointed by governments.

3.1.2 SUMMARY

The European Carbon Trading Program (EU-ETS) is an international structure coordinated by the European Union (EU) and its design follows a decentralized governance model (Figure 2). In it, the presence of checks and balances imposes a strong process of political negotiation on decision-making. For example, the decisions concerning the planning of the program, which are relevant in the long and medium term, need to be jointly reached by three groups: the executive branch, the legislative branch and the member countries. The submission of initial proposals

is a function of the Executive Branch. Therefore, the implementation of the European carbon market is seen as an achievement by the Executive Branch, which played a strong entrepreneurial role in building synergies among member countries and among stakeholders and in the subsequent approval of the law that founded the market, in 2003. The little centralized format of the EU-ETS is a consequence of the political structure of the European Union, in which the 27 member countries have broad representation in the Executive and Legislative Branches and a high degree of autonomy to implement EU laws. At the same time, the EU-ETS has a reasonable degree of participation of the private sector, both in the operationalization of the marketplace, where securities are traded, and in the verification of emission reports. This participation contributes to providing transparency and legitimacy to the system before the economic agents.





Source: prepared in house. Note: in certain cases, the accreditation entities are part of the government.

3.1.3 CHARACTERIZATION AND HISTORY

The European carbon trading program started operating in 2005. The first program of its kind in the world, the EU-ETS was instituted by an Act of the European Parliament of October 2003³. It currently regulates approximately 40% of the emissions of the 27 member countries, in addition to Liechtenstein and Norway, and it is formally associated with

²⁴

Switzerland's carbon trading program (since 2019). The regulation of the EU-ETS focuses on the energy production, industry and aviation sectors. The goal of the regulated sectors is a 60% reduction by 2030 compared to 1990. Sectors not regulated by the program also have mitigation targets. A 2013 law – the Common Effort Regulation⁴ – assigned sectors not regulated by the EU-ETS – agriculture, buildings, land transport, among others – the goal of reducing emissions by 30% by 2030, compared to 2005. The regulation sets individual targets for member countries, which are responsible for promoting mitigation.

Leadership of the Executive Branch

The institutional process for approving policies in the European Union is known as the "comitology procedure." In this model, after the law is approved (by Parliament) and the format for its implementation is designed (by the Executive Branch), a series of consultations are held with member countries to refine the implementation format. Once this is done, the Executive Branch publishes the definitive guidelines and the member countries implement them.

The emergence of the carbon market took place along the conventional institutional path, in which the Executive Branch plays a leading role. In the early 2000s, some EU member countries were developing individual initiatives to respond to decarbonization demands arising from the 1998 Kyoto Protocol – among them, there were the United Kingdom and Denmark. At that time, mitigation strategies based on carbon taxation had little political feasibility. With this, the European Commission (Executive Branch) acted assertively (Skjærseth and Wettestad, 2010) in the path that offered the least resistance – the design of an emission quota trading program. After extensive discussions with member countries, beginning in the late 1990s, the Executive Branch sent a bill to Parliament with the aim of unifying a European proposal. In 2003, after obtaining support from Germany, which initially was against the program, the European Parliament approved a regulatory mechanism that set limits on the volume of emissions.

Phases

The program was divided into four compliance phases, each lasting longer than the previous one, which reflects the system's maturation process:

Phase 1: 2005-2007 (pilot, 3 years); Phase 2: 2008-2012 (5 years); Phase 3: 2013-2020 (8 years); and Phase 4: 2021-2030 (10 years). The first phase was a pilot stage that constituted the learning period. In it, each country defined its own emission limit (the global limit was equal to the sum of the individual limits) and could allocate the permits in any way it preferred. The rule to be respected was that the national limits had to be aligned with the Kyoto Protocol's objectives. In this first phase, practically all permits were distributed free of charge by member countries and companies received permits in proportion to the base level of past emissions ("grandfathering")⁵.

The pilot phase was subject to many challenges, largely due to the pioneering nature of the program. In those early years, the Executive Branch once again played an important role. In Europe's heavily decentralized system, legislative changes tend to be slow. Therefore, the Executive Branch needed to act in the formation of a common vision around the need for the constant evolution of the system. One of the problems identified in the first two phases was the volatility of prices, which dropped sharply after the 2008 crisis. One reason for the instability was the distribution of permits free of charge2⁶. Thus, after a long journey, the law was revised in 2009 and, from phase 3 onwards, the distribution of permits began to be based mostly on auctions.

The functions and agents responsible for the governance system of the EU-ETS are described below, and more details on the evolution of the program over its 15 years of existence are presented.

3.1.4 FUNCTIONS AND RESPONSIBILITIES

A) Planning

1. Definition of the emission cap (long term)

Responsibility: Executive Branch -> Legislative Branch -> National Governments

Long-term goals are defined by the standard political process. In it, the Executive Branch proposes, the Legislative Branch evaluates (in an environmental committee) and approves, and the member countries ratify. In 2020, the goals for 2030 and 2050 were under discussion. The goal for 2030 was established in 2014 by the Executive Branch (Table 2), but it was modified by the Legislative Branch in October 2020, which increased it from 40% to 60%%⁷. The target for 2050 is still in the process of public consultations, led by the Executive Branch⁸.

⁵ Climate policy info hub (2020)

⁶ But there were other reasons. For example, what became known as the hot air problem, in which countries that were initially supposed to undertake mitigation efforts, due to the post-2008 economic crisis and relatively high emission limits, instead of demanding carbon bonds, started to offer bonds. This bond surplus was one of the factors that drove prices to virtually zero

⁷ Schultz (2020); Simon (2020)

⁸ European Commission (2020)

Period	Base year	Goal	Approved in
2020	1990	-20%	2007
2030	1990	-60%	2020

TABLE 2 – The European Union's long-term climate targets

Source: European Commission, 2020a.

2. Scope definition – regulated sectors

Responsibility: Executive Branch -> Legislative Branch -> National Governments

As with the long-term goals, the inclusion of new sectors also goes through the standard institutional path of the European Union. There have been discussions for the inclusion of new sectors in the EU-ETS since the beginning of the program. The first sector to be formally incorporated was aviation, including all flights passing through the European Union. Aviation was incorporated into the program in legislation approved in 2008 and the goals became effective in phase 3, starting in 2012. In industry, the following sectors were also included in phase 3: aluminum, petrochemicals and other chemicals. Furthermore, since 2005, the inclusion of land transport has been under discussion, until now without any conclusion ⁹.

3. Definition of the periodic emission target

Responsibility: Executive Branch -> Legislative Branch -> National Governments

Medium-term goals also follow the standard institutional path. Initially, in phases 1 and 2 (2005-2012), the limits were determined nationally in allocation plans. The program's goal was obtained later, by the sum of the national goals. The allocation plans also defined, in accordance with the internal rules of each member country, how the permits would be distributed among sectors and within each sector. Thus, each country followed its own governance system for the definition and allocation of targets. However, the national allocation plans were very complex and not very transparent, creating uncertainty and risk in the market.

In phase 2, the Executive Branch moved towards standardizing the format of the plans, reducing complexity and increasing transparency. Later, in 2009, the European Parliament approved a legislative reform that transferred to the European sphere, as of phase 3, both the definition of the global limit and the rules to be followed for the allocation of permits. As a result, countries still define their goals, but they do so in accordance with fully harmonized standards. In addition, nationally defined targets must be approved by the Executive Branch¹⁰.

9 AFRIAT *et al.* (2015)

¹⁰ European Commission (2015)

In phase 2, the program's goal was a reduction of 6% compared to 2005. In phase 3, which ended in 2020, the target constituted an additional 15% reduction compared to 2005. In phase 4, which ends in 2030, the goal is an additional 22% reduction compared to 2005, totaling a 43% reduction throughout the program ¹¹. These targets are specific to the EU-ETS ¹², and they must not be confused with the global targets presented in Table 2. The base year is 2005 as it is the starting year of the program.

4. Allocation of free permits

Responsibility: Executive Branch -> Legislative Branch -> National Governments

This function concerns editing the list of sectors and subsectors subject to carbon leakage. The protection of industry sectors exposed to external competition is part of the EU-ETS framework. The objective is to compensate for the loss of competitiveness that regulation imposes on sectors that compete with countries without a similar regulatory structure. Protection reduces the chance of carbon leakage as it allows sensitive sectors to continue producing domestically, without being subject to major losses in competitiveness.

The institutional path of protection of sensitive sectors follows the standard of the European Union ¹³. To put the protection into practice, a list of sectors subject to carbon leakage is defined and rules are established for a greater allocation of free-of-charge permits to these sectors (reaching 100% in most cases). The list is revised every five years. Thus, companies that receive free-of-charge permits have a relative subsidy in comparison with companies in other sectors.

5. Changes in course - changes to the rules

Responsibility: Executive Branch -> Legislative Branch -> National Governments

Changes to the rules follow the standard institutional procedure, requiring legislative approval.

Problem: depressed carbon prices

An important set of changes concerns price regulation. Starting in the beginning of 2009, there was sharp drop in prices, which only recovered in mid-2018 (Figure 3)).

¹¹ European Commission (2020a)

¹² Emissions-EUETS (2019)

¹³ European Commission (2019)

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FIGURE 3 - Carbon-market prices (tCO₂e) in the EU-ETS

Source: EMBER, [2020].

One explanation for the long period of depressed prices is the drop in economic activity resulting from the 2008 crisis, added to the excess of free-of-charge permits granted in phases 1 and 2. These two factors led the market to understand that, in the long term, the emission cap would not be restrictive, leading to a drop in the demand for permits. This understanding is confirmed in the analysis of Figure 4, which shows that, since 2008, the emission limit determined by the EU-ETS (red line) has always been above the verified emissions (purple line), largely due to the drop in emissions after 2008.



FIGURE 4 - Verified emissions, projected emissions and EU-ETS emission targets

²⁰¹⁸ in an estimate base an preliminary data

Solutions - market stability reserve and other measures

Since mid-2018, prices have not become depressed again, and even the crisis arising from the covid-19 pandemic had only a temporary effect on their decline. What is the explanation for this shift from the preceding long period of depressed prices? There are two possible clues. The first one is the market stability reserve. In practice, this reserve manages the shortage of permits, ensuring an intertemporal reallocation of permits without affecting the emission cap established for each period. This leads to less volatility, as it promotes adjustments between supply and demand in the short term.

Since 2009, there has been a long process of evaluating the program to overcome the problem of price depression (JEVNAKER; WETTESTAD, 2017). This process led to a redesign proposal that began to be discussed in 2012 and was approved by the Legislative Branch in 2015. As a result of this change, in January 2019, the market stability reserve was implemented (ERCST, 2019). This automatic mechanism means that, when the number of circulating permits exceeds a certain cap, a fixed number of permits is removed from the auction calendar. Likewise, when the number of permits is below a given level, a fixed number of permits is added to the auction calendar (ERCST, 2019).

The second clue is the definition of the parameters of phase 4 of the program, starting in 2021. In the new period, the rate of decrease in the volume of granted permits (donated + auctioned) was increased by 2.2 percentage points per year¹⁴. In addition, the volume of permits granted free of charge was maintained at the level of phase 3, 43% of the emission limit ¹⁵. Both measures reinforced expectations that the shortage of permits would increase, increasing demand for permits and prompting prices to recover.

6. Interconnections, offsets

Responsibility: Executive Branch -> Legislative Branch -> National Governments

The interconnections are negotiated by the Executive Branch through a committee set up jointly with the jurisdiction that is the target of the interconnection. After evaluating all the parameters and defining the terms of interconnection and the necessary adjustments, the Executive Branch signs an interconnection agreement that must be ratified by the Legislative Branch and may be vetoed by the National Governments. In the past, EU-ETS already completed interconnection processes with Norway, Liechtenstein and Iceland.

Rules relating to offsetting with credits external to the EU-ETS are defined periodically, together with definitions of scope and emission limits.

¹⁴ European Commission (2020a)

¹⁵ European Commission (2020b)

B) MRV

Until the second phase, MRV procedures in EU-ETS were not harmonized. A harmonized regulation was only established in 2012, at the beginning of phase 3. Since then, the protocol has been the same for all countries, but the operationalization of the MRV mechanisms continues to be the responsibility of the competent authorities in each country. Competent authorities are defined by member countries (Figure 5).





Source: Institut Delors, 2018.

As a general rule, the competent authority is the equivalent of the Ministry of the Environment or the Environmental Agency, but there are different cases, such as in France, where the regulatory agent is an EU-ETS management cell located in what is equivalent to the National Agency for Civil Aviation. In Germany and the Netherlands there is a specific body created for the EU-ETS, and in Italy there is a national committee created to manage the EU-ETS and the Kyoto Protocol (EUROPEAN COMMISSION, 2020d)¹⁶.

MRV Phases

1. Approval of the monitoring plan

Responsibility: National Government (competent authority)

The submission of a monitoring plan is the first step in the MRV routine. The plan is submitted annually to the competent authority, which, in addition to analyzing and approving it, has the role of inspecting its implementation. In the plan, the regulated entities establish how to monitor emissions, describe the facilities and define monitoring responsibilities, the list of GHG sources, the monitoring methodology, measurement systems and data management¹⁷. The regulator offers a unified standard document (template) for the implementation of the plan¹⁸; this is reviewed and approved by the competent authority and the regulated entities start to do the monitoring as provided for in the plan.

18 European Commission (2020e)

¹⁶ European Commission (2020c)

¹⁷ European Commission (2020d)

2. Verifier accreditation

Responsibility: independent entity or National Government (accreditation entity)

Verifier companies have the role of analyzing the emission reports submitted by the regulated companies. These companies are validated by accreditation entities defined by the member countries ¹⁹. Accreditors can be part of the government, as in the case of Ireland (Irish National Accreditation Board), or independent entities supervised by the government, as in the case of Italy (*Ente Italiano di Accreditamento*, ACCREDIA) and France (*Comité Français d'Accréditation*, Cofrac). These entities follow a set of harmonized rules for granting and maintaining the accreditation²⁰.

3. Report verification

Responsibility: private sector (accredited verification company)

Independent third-party verification is an essential part of the MRV process. Verifier companies carry out the procedural and risk analysis and deliver a report to the competent authority with their conclusions. If the verifier finds non-conformities, it must report them to the competent authority.

4. External bonds

Responsibility: Executive Branch (Central Registry)²¹

Credits from outside the EU-ETS are accepted up to a limit of 50% of the obligations and are converted into units accepted under the program by the Central Registry. Clean Development Mechanism (CDM) credits granted before the end of 2012 were accepted until December 31, 2015²². Credits for post-2012 projects from countries classified by the United Nations as least developed (least *developed countries*), as well as credits for "joint implementation" (joint *mechanism*), were accepted until the end of 2020, provided they did not involve:

- Nuclear energy;
- Afforestation and reforestation; or
- Destruction of industrial gases²³.

From 2019, Switzerland's carbon trading program merged with the European one, so Swiss emission permits are also accepted. Swiss and EU-ETS permits are automatically interchangeable.

¹⁹ EA (2019)

²⁰ Emissions-EUETS (2019b)

²¹ Eur-Lex (2019).

²² European Commission (2015b)

²³ For example, the secondary catalytic destruction of N2O in nitric acid plants, the burning of HFC-23 and the burning of CH4.

As of 2021, all international credits, except Swiss ones, are no longer accepted ²⁴.

5. Reporting and Verification Audit

Responsibility: National Government (competent authority) and accreditation entity

The competent authority is responsible for inspecting the measurements and reports and the verification report/statement. The accreditation entity is responsible for inspecting the processes of the verifier company.

6. Compliance check (emissions offset with permits)

Responsibility: National Government (competent authority)

Once the emissions are reported, the competent authority checks inventories/reports and calculates the number of permits/credits necessary to offset the emissions. The regulated entity must then present the corresponding permits or credits. In the event of non-compliance, the fine is EUR 100/tCO₂ and the emission must be offset in the following year.

C) Permits market management

1. Allocation and granting of permits

Responsibility: National Government -> Executive Branch

Emission permits are generated by member countries and are tradable within the EU-ETS, i.e., each country's permit is valid in all others. Each emission permit (EU Emission Allowance – USA) corresponds to the heating potential of one ton of carbon dioxide equivalent (tCO₂e). Currently, granted permits can follow three paths: 1) free-of-charge allocation, restricted to 43% of permits; 2) auction sale; and 3) market stability reserve.

In the case of free-of-charge allocation, a benchmarking rule defines the volume of permits each company will receive. The benchmarking is calculated for 52 products and is based on the average emission of the most efficient 10% of the industrial plants that produce each of these products. As a result, 10% of the plants will receive enough permits to cover their past emissions and 90% of the plants will need to purchase additional permits or invest in mitigation.

Based on these benchmarks, each country determines the number of permits to be allocated to each plant in its territory. The numbers for all countries are then added and corrected to fit the global limit. Once this is done, the permits are issued.

2. Bookkeeping of permits

Responsibility: Executive Branch (Central Registry)

The bookkeeping of permits is done in a Central Registry hosted and managed by the Executive Branch, created in 2009 and implemented in 2012. Before, each country had its registration. This is an electronic permit accounting system, which records:

- Accounts of member countries, companies and individuals;
- Transactions (granting, free distribution, sale, exclusion etc.);
- The offsets (CERs certified emission reductions, of the CDM, and ERUs emission reduction units, for joint implementation between industrialized countries. Both are named AAUs assigned units -, which are types of credits generated under the Kyoto Protocol, therefore managed outside the scope of the EU-ETS);
- National allocation plans, recording the permits distributed free of charge to each plant or member country;
- Verified emissions from each plant and air operator;
- Emission data for each regulated plant and the permits used to offset them; and
- The rules of the Common Effort Regulation for each country.

From the user's point of view, the functioning of the registry is similar to that of a bank. To open an account, there is a verification process designed to make fraud more difficult. Permit owners can transfer permits using the system's secure interface.

3. Auction and sale of permits

Responsibility: private sector (European Energy Exchange, EEX)

Permit auctions (primary market) take place on the European Energy Exchange, headquartered in Leipzig (Germany), and are regulated by a specific law of 2010.²⁵. Each country can opt for an independent platform, but only the UK had made that choice²⁶. EEX emerged in 2002, just before the law that led to the foundation of the EU-ETS. Until 2012, auctions still received only a small part of the volume of permits and were managed by member countries. In 2012, they were fully transferred to the EEX.

The other permit trading operations also take place at the EEX, with the support of the Central Registry.

²⁵ Eur-Lex (2010).

²⁶ European Commission (2020b).
4. Regulation of the secondary market

Responsibility: European Financial Markets Authority and national regulators of financial markets

The sale of permits in the primary market is carried out through a checking account hosted at the program's Central Registry. Any entity can open an account, even if it is not regulated. Transactions on the secondary market can be made directly and do not require a broker²⁷.

As of January 2018, all transactions involving emission permits started to be treated as financial instruments, being subject to the set of financial regulations of the European Union. Previously, only derivative contracts of permits (which account for the majority of the volume of transactions) were subject to regulation of the financial system ²⁸. Now the spot market is also there.

In practice, this means that market operators who trade emission permits will have to undergo further verification. In addition, part of the data generated in the Central Registry will be made available for access by entities that regulate the financial market, such as the European Securities and Markets Authority (ESMA), the Agency for the Cooperation of Energy Regulators (ACER) and the national financial agencies, such as the German Federal Financial Supervisory Authority²⁹.

5. Price control

Responsibility: Executive Branch (Central Registry)

It is up to the Executive Branch to control the permits and price adjustment operations, increasing or decreasing the offer of permits when necessary. After permits are granted and registered, and before they are auctioned, the Executive Branch transfers the number of permits provided for by law to the market stability reserve. They are then used when there are price fluctuations, in order to exceed the levels prescribed by law.

6. Publication of market data

Responsibility: Executive Branch (EU Transaction Log, EUTL)

A portion of the registry data is made publicly available through a public interface, the EU Transaction Log (EUTL) platform, which also verifies the legality of all transactions made in the Central Registry. Transactions must comply with the EU-ETS legal regulations. The EUTL also checks the inputs and outputs of permits in the EU-ETS, as an example

²⁷ Climate policy info hub (2020).

²⁸ European Commission (2020f).

²⁹ Reed Smith (2019).

of inputs via CDM or outputs in joint implementation projects. All exchanges with other programs go through a log maintained by the United Nations called International Transactions Log (ITL)).

3.2 JAPAN CARBON MARKET – TOKYO-CAT

3.2.1 GLOSSARY

Executive Branch: Tokyo Metropolitan Government.

Legislative Branch: Tokyo Metropolitan Legislative Assembly.

3.2.2 SUMMARY

The Tokyo Carbon Trading Program (Tokyo-CaT) is a sub-national structure that encompasses the entire Metropolitan Region of Tokyo. The program adopts a strongly centralized governance model (Figure 6). The management is done almost entirely by the Executive Branch's Bureau of Environment, since the verification of emission inventories is done by the private sector. Inside the Bureau of Environment, there is a Division of Climate Change and Energy and, within this, there is a section dedicated to the emissions trading system. One of the reasons for this centralization is the Executive Branch's vast experience in environmental regulation. The Tokyo Metropolitan Region, Japan's largest subnational government, is a leading jurisdiction in the climate agenda vis-à-vis the National Government³⁰. Even before having placed the focus on combating climate change, from 2002 onwards, Tokyo's Bureau of Environment had already achieved great success in dealing with urban environmental problems – from reducing vehicle emissions to controlling industrial pollution. Thus, the experience built up in monitoring emissions through a mandatory reporting program was crucial to its success. Another reason for centralization in the government is the reduced size of the emission credit market, as the system was designed to limit the role of the financial sector. Thus, the government estimates that, in the first phase of the program, only 10% of the mitigation obligations were offset with credits acquired in the market³¹. Transactions take place bilaterally (there is no marketplace) and there is no instantaneous monitoring of prices. As a result, there is no institution for regulating the market.

³⁰ ICAP (2015).

³¹ Brundage-Moore (2019).



FIGURE 6 – Organizations responsible for the governance of the Tokyo Metropolitan Region's carbon trading market

3.2.3 CHARACTERIZATION AND HISTORY

Tokyo-CaT was launched in 2010. It was the third carbon emission control program in the world and the first to implement cutting edge regulation on energy consumption: from large commercial and residential buildings to factories that, together, emit around 20% of the region's GHG ³². The program was instituted through a revision of the Tokyo Metropolitan Government's Environmental Security Act of June 2008³³. Tokyo-CaT currently regulates the CO₂ emissions of approximately 1,200 large buildings and industrial plants, as well as garbage, sewage and water treatment and distribution plants.

Tokyo-Cat's bases date back to the year 2000. Two programs launched that year set the course for the climate strategy for the following decades. The first one was the CO₂ Emissions Reduction Program, which required large factories and buildings to make an inventory of and report their emissions and establish mitigation plans. This program was incorporated by Tokyo-CaT and constituted a crucial source of learning about the emissions

32 IEATA (2015).

³³ Green Local Government Portal (2020).

structure and about the challenges of monitoring emissions. The second one was the Green Buildings Program, which measured the environmental performance of buildings and assigned efficiency ratings. The objective was to encourage the increase in energy efficiency in buildings. This program gave Tokyo's environmental managers experience in the best ways to spur technological change.

The experience gained in regulating energy consumption and energy efficiency defined the Tokyo decarbonization model ³⁴. In December 2006, the government announced a long-term development plan as part of its bid to host the 2016 Olympic Games. The goal was to reduce emissions by 25% in 2020 compared to 2000³⁵. This objective became the basis of a climate change strategy, published in 2007, which proposed a mitigation program geared to large companies. In the 12 months that followed, the Bureau of Environment carried out studies, deliberated and held a lot of consultations with the aim of submitting, to the Legislature, a bill to regulate the program. The leadership role then played by the government, in partnership with several stakeholders, was essential to build a consensus about the program (RUDOLPH; KAWAKATSU, 2012). The law was passed in 2008 and provided for a program aimed at mitigating emissions based on energy efficiency.

Phases

Tokyo-CaT is organized into five-year plans and is currently in its third phase of compliance:

Phase 1: 2010-2014 (5 years); Phase 2: 2015-2019 (5 years); and Phase 3: 2020-2024 (5 years).

The program operates based on emission caps stipulated for each regulated entity. When an entity exceeds the mitigation objective, the surplus emission reduction generates a credit that can be traded bilaterally. Credits can also be saved for subsequent years (banking). The allocation of emission caps is done specifically for each regulated entity, according to an emission baseline from three previous years.

Initially, reduction targets are broken down by sector. For example: in phase 3, commercial buildings are expected to reduce emissions by 27% from the baseline of the previous two to three years (excluding non-typical years); commercial buildings with intensive use of heating to reach a 25% reduction; and industrial plants also 25%. Then, the target of the sector is distributed among the regulated entities in proportion to the baseline of each

³⁴ IEATA (2015).

³⁵ Green Local Government Portal (2020).

one. With that, it is possible to obtain the target per plant for the five-year period, which is then broken down into annual targets.

The functions and agents responsible for the Tokyo-CaT governance system are described below, along with more details on the evolution of the program over its ten years of existence.

3.2.4 FUNCTIONS AND RESPONSIBILITIES

A) Planning

1. Definition of the emission cap (long term) Responsibility: Executive Branch

The Executive Branch has a mandate to set long-term goals. The Tokyo Metropolitan Government has announced three targets that are relevant to the climate policy. In 2006, the goal of reducing emissions by 25% in 2020 compared to 2000 was announced. In 2019, the Tokyo Zero Emission plan was launched, in which the goal became a 30% reduction in 2030 compared to 2000 and net carbon neutrality in 2050 ³⁶. Both plans were defined by the Executive Branch based on the legislation passed in 2008.

2. Scope Definition - Regulated Sectors

Person Responsibility: Executive Branch -> Legislative Branch

Since the beginning of the program, there was only change in the scope, which was implemented by the Executive Branch. Since 2016, industrial plants that meet all regulatory criteria, but which have more than 50% of shares owned by small or medium-sized companies, are exempt from regulation. This, however, had no visible effect on the number of installations, which had hovered around 1,200 since the start of the program.

If it is necessary to make a structural change in the program, it will probably need to be approved by the Legislative Branch, as its founding regulations are reasonably specific in relation to the group of regulated companies.

36 Tokyo Metropolitan Government (2019).

3. Definition of five-year emission targets

Responsibility: Executive Branch (Environment Secretariat, Climate Change Division, Planning Section)

The five-year goals are set by the Executive Branch in order to meet the long-term goals. The Bureau of Environment's Climate Change Division has a section dedicated exclusively to planning, that is, the definition of five-year goals ³⁷. Thus, for phase 1, the government set the global target of 6% reduction from the baseline. In phase 2, the planned overall reduction was 17%. In phase 3, which ends in 2024, the stipulated reduction is 27%.

4. Changes in course - changes to the rules

Responsibility: Executive Branch (Secretariat for the Environment, Climate Change Division) / Executive Branch -> Legislative Branch

Marginal changes are defined by the Executive Branch. Structural changes, if necessary, may require legislative approval.

Tokyo-CaT is a program with stable rules. Marginal changes only happen every five years and there have been no structural changes since the beginning of the program. For example, the number of regulated installations has remained stable between 1,200 and 1,400 since the start of the program, indicating that there have been no structural changes. The changes that take place every five years are of a technical nature and aim to correct procedural failures. For example, between the first and second phases, the emission factor increased from 0.382 tCO₂e/1,000 kWh to 0.489 tCO₂e/1,000 kWh, a change defined by the Executive Branch. On the other hand, more important changes, such as an eventual expansion of the scope of the program to incorporate smaller industries, would probably need to go through the Legislative Branch, as they would go against the legal mandate established in the legislation that gave rise to the program.

5. Interconnections, offsets

Responsibility: Executive Branch

The Tokyo Metropolitan Government signed an interconnection agreement with the Saitama Prefecture in 2010, when Saitama's carbon trading program was still in the drafting stage. As a result, the program that was designed was practically identical to the Tokyo-CaT, with minor differences. The interconnection became operational in 2011³⁸.

³⁷ Tokyo Metropolitan Government (2020).

³⁸ Santikarn *et al.* (2018).

The programs accepted for offset purposes were determined by the Executive Branch and have not changed since their inception.

B) MRV

The Tokyo-CaT regulatory process includes five components: reporting, verification, submission of mitigation plan, emission reduction or offsetting via trade, and verification. The industrial plants and commercial buildings regulated by the program must submit and validate annual reports on the emission of CO_2 , CH_4 , N_2O , SF_6 , HFCs, PFCs and NF_3 gases. If the inclusion criterion is met for three consecutive years, the emission reduction becomes mandatory. However, only CO_2 emissions from energy consumption have mandatory mitigation criteria (including at industrial plants). In this case, it is mandatory to submit a mitigation plan to an accredited external agent and have the emissions verified by that agent³⁹.

The emission baseline calculation is done in two ways. In the first one, the average emission of CO₂ resulting from the energy consumption of the last three years is calculated. the so-called "grandfathering". In the second form of calculation, what counts is the area of buildings or factories, which is multiplied by a specific emission factor for each economic activity, in order to obtain the baseline. The first method is only applied to companies that have demonstrated a prior mitigation effort ⁴⁰.

1. Monitoring and mitigation plan approval

Responsibility: Executive Branch (Secretariat for the Environment, Climate Change Division)

The Climate Change Division of the Bureau of Environment evaluates and approves the monitoring and mitigation plans. Regulated companies must first appoint a qualified energy management team to advise them on energy efficiency measures. The team, which can be outsourced, must undergo training offered by the government, and it is legally responsible for submitting a plan with the technical specifications of the monitoring and mitigation strategy, with emission reduction targets for the next period.

³⁹ Tokyo Metropolitan Government (2015).

⁴⁰ Tokyo Metropolitan Government (2015a).

2. Verifier accreditation

Responsibility: Executive Branch (Secretariat for the Environment, Climate Change Division)

The Executive Branch does all the accreditation. The regulator imposes, as a condition for a company to be accredited as a verifier, the experience of working with at least ten cases, within the past three years, including energy efficiency diagnostic work; ISO 14001 audit; audit, verification or activation of CDM or verification of some Japanese inventory program. Eligible companies then undergo an inspection and are accredited.

3. Report Verification

Responsibility: Verifier

Verifier companies must follow the parameters established by the Executive Branch⁴¹ to carry out the analysis of the reports.

4. External bonds

Responsibility: Executive Branch (Secretariat for the Environment, Climate Change Division)

Regulated entities can request the conversion of external credits to the Tokyo-CaT. For this, they must ensure that the projects have been verified by a third party, according to the MRV rules of Tokyo-CaT, and they must submit a request for conversion to the competent authority. The following credits are accepted: emission reduction credits from unregulated industries (small and medium enterprises), Japan's renewable energy adoption program, and credits from outside Tokyo's Metropolitan Area. In addition, Tokyo-CaT is linked to Saitama Prefecture's trade program, so credits are interchangeable between the two programs, subject to certain conditions.

5. Compliance check (excess emissions offset with credits)

Responsibility: Executive Branch (Environment Secretariat, Climate Change Division)

The Climate Change Division is responsible for accounting for the credits that may be needed to offset the emissions that each regulated company produced above the cap. For offsetting, regulated entities can use credits granted by Tokyo-CaT or credits from offset verified and validated for use in Tokyo-CaT.

⁴¹ Tokyo Metropolitan Government (2020a).

C) Credit market management

Tokyo's carbon market is quite peculiar compared to others around the world. One of its peculiarities is the less relevant role given to the trading of emission credits, which is based almost exclusively on bilateral exchanges, outside the stock exchange. The Tokyo system was designed to limit the role of the financial sector. The main strategy in this regard was to produce emission credits based on reductions in excess emission from past periods. Thus, only companies that have already demonstrated a substantial effort, exceeding their own mitigation target, are entitled to sell credits. In addition, there is no marketplace organized to host transactions (securities exchange). As a result, the price of credits is not monitored in real time and is only known through periodic surveys organized by the government ⁴².

1. Granting of credits

Responsibility: Executive Branch (Secretariat for the Environment, Climate Change Division)

The Executive Branch grants credits on demand to companies, which must annually submit their emission inventories. In parallel, if they have exceeded the mitigation target of the previous year, they can request the granting of the corresponding excess emission credits, which are digitally booked and are registered in the registration system. Credits can be saved for the future (banking), but cannot be borrowed from the future (borrowing). They can also be sold at any time in free transactions, which occurs, for example, in Tokyo. The government distributes credits only when companies emit less gases than their mitigation targets. These credits are free of cost, as companies have already made an effort to exceed the target. Companies can then sell them to any party interested in bilateral transactions.

2. Credit bookkeeping

Responsibility: Executive Branch (registration system)

The electronic system records credits granted, credit transactions and credits from other programs submitted to offset mitigation obligations (offsets). All market participants must open accounts in the system⁴³.

⁴² Arimura e Abe (2020).

⁴³ Tokyo Metropolitan Government (2015).

3. Regulation of the secondary market Responsibility: Executive Branch

The program provides for the actions to be taken by the Executive Branch (without specifying the agency) in the event of misconduct in market operations with emission credits:

- Conduct hearings with suspected participants;
- Inform other relevant market participants about the suspicion and advise them, if necessary; and
- If misconduct is verified, impose the penalties stipulated in the market foundation law.

4. Price Control

Responsibility: Executive Branch

The Executive Branch can take different measures to reduce price fluctuations, including generating credits from public buildings and placing them on the market, or raising the cap on offset credits from outside Tokyo. However, due to the low liquidity of the market and the lack of knowledge about the prices in real time, these measures have not been taken⁴⁴.

5. Publication of market data

Responsibility: Executive Branch (registration system)

The following data are publicly accessible:

- Account owner name;
- Emissions in the base year, annual emission cap and annual emission volume reported; and
- Volumes of credits from offset granted and traded monthly.

3.3 SOUTH KOREA CARBON MARKET – KETS

3.3.1 GLOSSARY

Executive Branch: Government of the Republic of Korea. Several bodies are active in the program: the prime minister's office; the inter-ministerial task force on carbon trading; the Ministry of Environment; and the Ministry of Strategy and Finance.

Legislative Branch: National Assembly.

⁴⁴ ICAP (2020c).

3.3.2 SUMMARY

South Korea's emissions trading scheme (KETS) is a national structure with vertically decentralized governance, that is, within the Executive Branch (Figure 7). It played a central leadership role in the creation and implementation of the carbon trading program. After ensuring that the foundations of the system were inscribed in law, the Executive Branch designed a governance structure aimed at giving legitimacy to the program through the sharing of responsibilities between the Ministry of Environment and the Ministry of Finance. It is a successful experience in a country where the industrial sector is highly dynamic. In just five years, the program was able to take advantage of many of the lessons learned from other experiences - notably, the European market – to obtain positive results. KETS regulates around 70% of the country's emissions and has a permit market with an exceptionally stable price history and an upward trend, despite the still low liquidity. The system involves different ministries and bodies within the Executive Branch, ensuring that there is a dialogue between representatives of divergent interests.



FIGURE 7 - Organizations responsible for the governance of the Korean carbon trading market

Source: prepared in house.

Notes: GIR is the English acronym for "South Korea's GHG Inventory and Research Center". The independent verifier can be from the private sector or the public sector.

3.3.3 CHARACTERIZATION AND HISTORY

The KETS was launched in 2015, at the initiative and under the leadership of the Executive Branch. It was the second mandatory national-scale program in Asia and is the second largest active carbon trading program in the world after the EU-ETS. Since its launch, it has been recognized as extremely ambitious, for regulating more than two-thirds of the emissions of a heavily industrialized country with extensive use of coal as an energy source. The program faced important challenges before launch and in its early years. The main difficulty was political, as part of the production sector ⁴⁵ had reservations about the initiative. The consequence was the postponement of the launch and the emergence of disputes, within the government, between the Ministry of Environment and other ministries more aligned with the production sector.

The government used two strategies to guarantee the creation and continuity of the program in the long term. The first one was to establish a solid legal basis. In 2010, the Legislative Branch passed a law⁴⁶ that opened up the possibility of creating a carbon trading program. In 2012, another law ⁴⁷ was specifically passed to regulate the implementation of the program, determining that the government should formulate five-year plans for its execution. By turning the program into law, the government reduced the likelihood of setbacks. The second strategy was to create a decentralized system of governance, in which different actors from inside and outside the government took on responsibilities. This format may have slowed down the decision-making process, but it gave the program greater legitimacy⁴⁸.

Phases

Before launching the first compliance phase of the program, the government instituted in 2012 a mandatory emissions reporting system for large industries and companies. This system was intended to allow the acquisition of knowledge about the measurement of emissions and about the ideal format for regulating an emissions market. To operationalize the reporting system, the Ministry of Environment created a new organization – the South Korea GHG Inventory and Research Center (GIR). In 2015, the GIR became part of the KETS governance system.

- 45 Hyun; Oh (2016).
- 46 Grantham Institute (2020).
- 47 Grantham Institute (2020a).

⁴⁸ Hyun; Oh (2016).

The KETS is organized into the following compliance phases:

Phase 1: 2015-2017 (3 years); Phase 2: 2018-2020 (3 years); and Phase 3: 2021-2025 (5 years).

In the first phase, the explicit purpose was to learn about and provide training in the program. In that initial period, there was no intention of realizing actual gains in terms of mitigation. The permits were allocated completely free of charge and an auction system only started operating in the second phase. In addition, the purpose of the first phase was also to establish and structure the MRV system.

3.3.4 FUNCTIONS AND RESPONSIBILITIES

A) Planning

1. Definition of the emission cap (long term) Responsibility: Executive branch (interministerial group)

An inter-ministerial group was set up to define long-term goals ⁴⁹ (, 2018). The first one of these was defined in the Copenhagen Accord, in 2009, for a 30% reduction in 2020 compared to the baseline scenario. In Korea, the baseline is not defined by the volume of emissions in a specific year, but by a projection of emissions made for the future in a "business as usual" scenario. The current target (NDC) for 2030 is a 37% reduction from the baseline. The KETS founding law establishes that the Executive Branch is responsible for defining the long-term goals.

2. Scope definition – regulated sectors

Responsibility: Executive Branch (Task Force --> Ministry of the Environment)

A task-force *was* set up within the Ministry of Environment to be the main authority responsible for the KETS. In this condition, the task force proposes, in periodic allocation plans, the list of sectors and gases to be regulated by the program. Subsequently, the plans must be approved by the Ministry of the Environment before becoming binding.

The KETS regulates the emission of all Kyoto gases – CO_2 , CH_4 , N_2O , PFCs, HFCs, SF⁵⁰ – in the power generation, industry, buildings, transport, aviation and waste sectors. To be regulated, companies belonging to the above sectors must have total emissions, considering all installations, equal to or greater than 125,000 tCO₂e/year for three years in a row⁵¹.

51 EDF (2016).

⁵⁰ ICAP (2020).

If the company does not meet the criteria, but one or more of its plants does, this (these) will be regulated. For this, individual industries must have emissions equal to or greater than 25,000 tCO₂e/year for three consecutive years.

3. Definition of emission targets

Responsibility: Executive Branch (Task Force --> Ministry of Environment)

The Task Force proposes the global cap on permits for each program period. The cap is proposed in an allocation plan that must be approved by the Ministry of Environment

During the first phase, the overall permits cap increased from 540 MtCO₂ and in 2015 to 567 MtCO₂ and in 2017. In phase 2, it remained constant at 548 MtCO₂e. In phase 3, the cap for the five years will be 1,777 MtCO₂e, which corresponds to approximately 355 MtCO₂e per year. The substantial drop in the cap in phase 3 stems, in part, from the existence of a volume of unused permits in phases 1 and 2capcapcap.

4. Allocation of free permits

Responsibility: Executive Branch (Task force --> Ministry of Environment)

The task force proposes rules that define which sectors will benefit from 100% free emissions. The cap is proposed in an allocation plan approved by the Ministry of Environment. For the second phase of the program, three criteria defined which sectors would benefit:

- Additional production cost (due to regulation) > 5% + international trade intensity⁵² > 10%; or
- Additional production cost (due to regulation) > 30%; or
- International trade intensity > 30%.

5. Changes in course - changes to the rules

Responsibility: Executive Branch (Ministry of Finance and Ministry of the Environment)

The Executive Branch can change the program's rules through the five-year pilot plans proposed by the Ministry of Strategy and Finance and approved by the head of the Executive Branch, and through the allocation plans approved by the Ministry of Environment.

6. Interconnections, offsets

Responsibility: Executive Branch (Task Force --> Ministry of the Environment)

The KETS has not yet implemented interconnections with other programs.

The types of external bonds and projects allowed for offsetting are defined by the regulatory authority and approved by the Ministry of Environment.

^{52 (}Value of exports + value of imports) / (total value of domestic sales + value of exports).

B) MRV

1. Verifier accreditation

Responsibility: Executive Branch (Ministry of the Environment)

The accreditation of verifier entities is done by the Ministry of Environment. In general, verifiers are also accredited to verify CDM projects⁵³. Verifiers must have international certifications such as ISO 14065: 2013 or IAF MD 6: 2014.

2. Report Verification Responsibility: Verifier

The verification entities can be government agencies, associations or private companies. The reports submitted annually by the regulated entities must be verified by third-party verifiers in March.

3. External bonds

Responsibility: Executive Branch (Ministry of the Environment)

The Ministry of Environment is the competent authority for converting foreign bonds. All of them must be converted into Korean Credit Units (KCUs) for use in the KETS, and no more than 10% of the permits used can come from offsets and no more than 5% from international projects⁵⁴.

The following projects are eligible for conversion: Korean domestic projects certified by the Korean offset program, CDM projects implemented outside the jurisdiction of the KETS by Korean companies regulated by the KETS and domestic CDM projects certified to international standards.

4. Compliance check (emissions offset with permits)

Responsibility: Executive Branch (Ministry of the Environment and Certification Committee)

A specific committee of the Ministry of Environment verifies and validates the emission reports. If irregularities are found, the report must be redone. If there are uncompensated emissions, there is the imposition of an administrative fine that cannot exceed three times the value of a ton of CO_2 e on the market in the corresponding year, in addition to the obligation to offset the emissions. In addition, the fine cannot exceed W100,000 (~US\$91)/tCO₂e⁵⁵.

- 54 ADB Asian Development Bank (2018).
- 55 ADB (2018).

⁵³ ADB – Asian Development Bank (2018).

C) Permits market management

1. Allocation and granting of permits

Responsibility: Executive Branch (Ministry of the Environment)

The permits are allocated by the Ministry of Environment, based on the limits defined for each period in the allocation plans. These limits are broken down for the different sectors of the economy. In the first phase of the program, all sectors, except clinker (cement base) manufacturing, aviation and refineries, received permits based on emissions for the 2011-2013 period, and 100% of the permits were allocated free of charge. For the other sectors, a benchmark procedure was used, in which the average of emissions of the most efficient companies was adopted. In the second phase, 50% of companies received permits based on benchmarking and 97% of them were allocated free of charge. For the third phase, 70% of companies are expected to receive permits based on benchmarking and no more than 90% of them should be allocated free of charge.

2. Bookkeeping of permits

Responsibility: Executive Branch (Registration System – GIR)

The GIR is responsible for three KETS-related registration systems: the national emissions inventory system, the national emissions trading system, and the offset registry. Emission permits are registered in the second system.

3. Auction and sale of permits

Responsibility: Private Sector (South Korea Stock Exchange – KRX)

Since the first phase, KRX was defined as the marketplace for the auction and trading of emission permits in the KETS secondary market. The exchange is responsible for registering entities authorized to operate in the market, publishing prices in real time, managing the transactions, resolving disputes and investigating abnormal situations that may indicate fraud⁵⁶.

The secondary market for permits did not develop much in the first phase, with only 2.3% of permits traded⁵⁷. One of the reasons for the low liquidity was the fact that it was not possible for the financial agents to broker the transactions.

Despite the low liquidity, the price of permits showed an exceptionally stable pattern of growth. As shown in Figure 8, the carbon price in the KETS was more stable than in the EU-ETS and was less impacted by the crisis caused by the covid-19 pandemic.

⁵⁷ EDF (2016).

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FIGURE 8 - Carbon market prices (tCO₂e) in South Korea (KETS) and in the European Union (EU-ETS)

Source: ICAP, 2020b.

4. Secondary market regulation

Responsibility: Private Sector (South Korea Stock Exchange – KRX)

KRX is tasked with identifying abnormal situations in the market that may indicate fraud⁵⁸. The applicable penalties are imposed by the Ministry of Environment.

5. Price control

Responsibility: PE (Task Force --> Ministry of Environment) --> private sector (financial institutions)

The competent authority (task force) is responsible for adopting price control measures, which must be approved by the allocation committee of the Ministry of Environment. By the end of 2018, price control mechanisms had been activated four times, always with success.

The government manages a market reserve composed of permits retained according to a fixed rule. Despite this, price control actions are largely discretionary, subject to decisions by the competent authority. Possible measures include the use of the permits that make up the reserve, but also changes in the maximum compensation percentage via offsets, changes in the percentage of permits that can be saved for future periods and the determination of retention percentages for permits⁵⁹.

In the first phase, the ministry activated the price stabilization mechanism to contain an excessive rise in prices, providing additional permits. As of the second phase, the ministry allowed three financial institutions to open accounts in the registration system and act as brokers: the Development Bank, the Export and Import Bank and the Industrial Bank of South Korea ⁶⁰. These institutions have the role of increasing market liquidity through the sale of additional permits whenever the competent authority deems it necessary.

Other mechanisms that contribute to the stabilization of market prices are the possibilities of using permits in future periods (*banking*) and of borrowing future permits (*borrowing*). In addition, the program allows offsets from domestic and international projects.

6. Publishing data

Responsibility: Private Sector (South Korea Stock Exchange, KRX)

KRX is responsible for publishing key liquidity and transaction data relating to the carbon market.

3.4 MEXICAN CARBON MARKET – SCE MEXICO

3.4.1 GLOSSARY

Executive Branch: Federal Government. On the climate agenda, it acts through the Presidency of the Republic, the Ministry of the Environment (Secretariat for the Environment and Natural Resources, SEMARNAT) and the National Institute of Ecology and Climate Change (INECC), a scientific and educational body linked to SEMARNAT.

Legislative Branch: National Congress (bicameral), composed of the Senate and House of Representatives.

⁵⁹ Vivideconomics (2020).

⁶⁰ ADB – Asian Development Bank (2018).

3.4.2 SUMMARY

Mexico has an institutional arrangement in which there is the coexistence of a carbon tax, created in 2013, and the carbon trading system launched in 2020. It was possible to advance on these two fronts because the Executive Branch exercised strong leadership over the last 25 years. In the creation of the carbon trading system, this leadership was complemented by the co-leadership of the Legislative Branch in specific cases. The Emissions Trading System (SCE Mexico) follows a decentralized governance model, with an important participation of the private sector and civil society (Figure 9). The program was born with parts of the governance structure ready. This was due to the formulation of a detailed learning system, consisting of four stages: 1) the implementation of the national mandatory inventory system, in force since 2015, which began to build the methodological bases for the MRV; 2) the exercise (simulation) of carbon markets, a pioneering initiative led by the company MEXICO2 and the Mexican stock exchange (BVM), aimed at training companies to operate in a carbon market (2017-2019); 3) the pilot period of the carbon market (2020-2021), in which fundamental rules are being tested and participation is mandatory; and 4) a transition phase for the definitive operation of the system (2022). Due to the knowledge that was gradually gained, SCE Mexico is being launched with a reasonably well-structured governance platform.





3.4.3 CHARACTERIZATION AND HISTORY

Mexico is widely recognized as a leading country on the climate agenda⁶¹. Its "national climate change system" was created in 2012 by the Climate Change Law. It stipulated the creation of a mandatory GHG reporting program. Then, in 2013, in the context of a tax reform, the government implemented the first carbon tax in the Americas levied on a national scale and the first one in a developing country. The rate was set at \$3/tCO₂e and is levied on fuels. It is estimated that the tax was responsible for the deduction of 1.8 million tCO₂/year ⁶². Then, in 2015, the mandatory reporting program was launched and it went into operation through the digital platform of the National Emissions Registry – RENE ⁶³. Since then, all entities that emit more than 25,000 tCO₂e/year are required to report emissions and possible reductions, considering CO₂, CH₄, N₂O, SF₆, PFCs, HCFCs and NF₃ gases. Every three years, companies are required to submit a verification report prepared by an accredited verifier company.

In parallel with the implementation of RENE, the government worked to institute a carbon trading system. To this end, in 2014, it launched a carbon market simulation platform managed by the company MEXICO₂⁶⁴). The first phase of the simulation happened in 2017, with the purpose of developing the skills necessary for companies to operate in the context of a carbon market. Then, in July 2018, it was necessary to make an amendment to the National Climate-Change Law to institute the carbon trading program⁶⁵. In this reform, it was determined that the program would start with a 36-month trial period and that the Ministry of Environment (SEMARNAT) would design and manage the program).

Shared leadership of the Executive and Legislative Branches

The legislative reform that instituted the carbon trading program originated in a proposal presented by a group of representatives of the Committee on Climate Change of the House of Representatives, in December 2017 ⁶⁶. Therefore, the Legislative Branch played an important role in leading the process. However, this initiative located in time took place in the context of Mexico's broad international leadership in the climate agenda, which dates back 25 years⁶⁷ and which results from a strong commitment by the Executive Branch. Thus, at the same time that the proposed revision of the law was presented to the House of Representatives, the President of the Republic announced that the design of the carbon

⁶¹ Grantham Institute (2018).

⁶² IETA (2018).

⁶³ SEMARNAT (2017).

⁶⁴ MÉXICO2 (2016).

⁶⁵ Câmara dos Deputados do México (2018).

⁶⁶ Câmara dos Deputados do México (2017).

⁶⁷ Grantham Institute (2018).

trading program would be launched by the Ministry of Environment (SEMARNAT) in July 2018⁶⁸. There was, therefore, a clear synchronization between the branches.

Learning in four stages

The first stage of learning in the implementation of a carbon trading system was the mandatory reporting system for GHG emissions, in place since 2015. For a system of this type to operate, it is necessary to implement an MRV protocol, which constitutes essential learning for the operationalization of an emissions trading system.

The second phase of learning is the carbon market simulation exercise, which ran from 2017 to June 2018. The exercise was conceived in partnership with the Ministry of Environment and implemented by MEXICO₂, a voluntary carbon trading platform that belongs to the Mexican stock exchange – BVM⁶⁹. More than half of the companies listed on the Mexican stock exchange intended to participate in the simulation⁷⁰, which may have generated important learning from a corporate point of view.

The third phase is the pilot period of the carbon trading system, lasting two years and starting in 2020. At this stage, the objective is to put the system into operation and make the necessary operational adjustments. In it, some of the functions relating to the emission permits market are being implemented, such as the auction system that is still being designed.

Finally, the fourth and final phase of the learning process is the transition to the definitive system, which will take place in 2022. During this phase, the Ministry of the Environment must publish the final rules for the program, which will start in 2023.

Participation of the Civil Society

The Mexican governance system gives civil society a more important role compared to other systems. This participation takes place through a council and a committee. The Climate Change Council, known by the acronym C3, is composed of a group of 13 experts outside the government who offer technical and scientific opinions that are relevant to the carbon market⁷¹. The Consultation Committee is made up of representatives from different government agencies, business associations, civil entities and universities⁷², s and aims to provide technical support in the direction and planning of the program.

⁶⁸ IETA (2018).

⁶⁹ Altamirano & Martínez (2017).

⁷⁰ IMEI (2018).

⁷¹ López, M. J. et al. (2017).

⁷² SEMARNAT (2019).

3.4.4 FUNCTIONS AND RESPONSIBILITIES

A) Planning

1. Definition of the emission cap (long term) Responsibility Executive Branch --> Legislative Branch

The conversion of the long-term goals into law was proposed by the Executive Branch and approved by the Legislative Branch. For 2020, the intention was to generate a 30% reduction from the baseline, with the condition of international support in different forms. The targets for 2030 and 2050 were defined with the participation of INECC and are for a reduction of 22% and 50%, respectively⁷³.

2. Scope definition – regulated sectors

Responsibility: Executive Branch (Ministry of the Environment)

The Ministry of Environment is responsible for defining the scope of regulation. During the pilot period, emissions of CO₂ from stationary sources of installations with emissions above 100,000 tCO₂e/year from the industry and energy sectors will be regulated. The industries include: automotive, cement and lime, chemicals, food and beverages, glass, steel, metallurgy, mining, petrochemicals, pulp and paper and other sectors that produce emissions from stationary sources⁷⁴.

3. Definition of the periodic emission target

Responsibility: Executive Branch (Ministry of the Environment)

The Executive Branch is responsible for determining the total permits to be distributed each year⁷⁵. For the pilot period, the limits are 271.3 MtCO in 2020 and 273.1 MtCO in 2021. In addition to these caps, additional permits will be granted to fill the following reserves cap⁷⁶:

- Auction reserve: 5% of global limit;
- Reserve for new entrants and for production increases: 10% of the global limit; and
- General reserve: 5% of the global limit.

4. Allocation of free permits Responsibility: indefinite

⁷³ ICAP (2020).

⁷⁴ SEMARNAT (2019a).

⁷⁵ Mijares Angoitia Cortes y Fuentes (2019).

⁷⁶ SEMARNAT (2019b).

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5. Changes in course - changes to the rules

Responsibility: Executive Branch (SERMANAT, INECC) + Civil Society (Climate Change Council and Consultation Committee)

During the learning period, there will be annual reviews of the pilot led by the Executive Branch and validated by INECC, the Climate Change Council and the Consultation Committee.

6. Interconnections, offsets

Responsibility: undefined

In the governance structure, there is no assignment of one or more entities as responsible for the interconnection process and for the offsetting rules.

In spite of that, since the beginning of the design of the program, there was a strong intention to make an interconnection with California. The reason for this interest is the important economic and social nexus that exists between the two markets. With this, the model of the Mexican market was designed with the Californian model in mind and the interconnection process took place between California and Quebec.

B) MRV

The MRV process of the National Registry of Emissions (RENE) has been in existence since 2015. A specific MRV protocol for the carbon trading program is being developed based on the existing MRV, whose governance structure is presented below.

1. Approval of the monitoring plan

Responsibility: Executive Branch (Ministry of the Environment)

The submission of monitoring plans is mandatory, but there is no penalty for those who do not do so⁷⁷.

2. Verifier accreditation

Responsibility: Executive Branch (Federal Environmental Attorney – PROFEPA) --> private sector (*Entidad Mexicana de Acreditación* – EMA)

The EMA accredits RENE's inventory verification entities and PROFEPA supervises and grants the accreditations. For the accreditation, EMA follows the ISO 14065:2013 standard⁷⁸.

3. Report verification

Responsibility: private sector (accredited verification companies)

Accredited verification companies issue an evaluation report on the annual emission reports of the regulated entities. In October 2020, there were 14 companies accredited for verification⁷⁹.

4. Crediting of foreign securities

Responsibility: Executive Branch (Ministry of the Environment)

Domestic credits generated outside SCE Mexico can be validated for use in the program up to a limit of 10% of total obligations ⁸⁰. Projects that have been verified through protocols accepted by the Ministry of Environment and registered in the National Emissions Registry (RENE) will be approved. Examples of projects that will be accepted: forests, agriculture and waste management.

5. Report audit

Responsibility: Executive Branch (Ministry of the Environment)

The reports are delivered through Annual Operating Bills (COAs), which are standardized documents for submitting the report ⁸¹.

6. Compliance check (emissions offset with permits)

Responsibility: Executive Branch (Ministry of the Environment)

In the pilot phase, the program does not provide for immediate monetary sanctions for regulated entities that do not offset their emissions. However, non-compliant companies will lose the possibility of making use of the emission permits in the following period. In addition, once the pilot is completed, non-compliant companies will receive two fewer permits for each permit not submitted during that period⁸².

To offset the emissions reported each year, the regulated entities will have at their disposal a series of flexibility mechanisms:

- Use of permits in subsequent periods (banking); and
- Use of credits obtained from approved projects offsets).

⁷⁹ PROFEPA (2019).

⁸⁰ SEMARNAT (2019).

⁸¹ PROFEPA (2019).

⁸² ICAP (2020).

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C) Management of the permits market

1. Allocation and granting of permits

Responsibility: Executive Branch (Ministry of the Environment)

The Executive Branch will allocate permits to each regulated entity using the emission caps defined for each sector, based on emissions inventoried through RENE in the last year in which the company exceeded 100,000 tCO₂. Each permit will give the right to emit 1 tCO₂ecap.

2. Bookkeeping of permits

Responsibility: emission rights monitoring system

All permits will be recorded in an electronic system (Sistema de Seguimiento de los Derechos de Emisión) which will also record the permit transactions ⁸³. This system is to be developed by SEMARNAT, but it is not yet clear how this will be done or what the system will be like.

3. Auction/sale of permits Responsibility: undefined

Permits will be distributed free of charge in the first year of the pilot period and may be auctioned from the second year onwards. The sale of these permits in the secondary market will be done by BVM.

4. Regulation of the secondary market Responsibility: undefined

The permits market will be regulated in a way that is very similar to what is done in the United States, where the bonds are not considered securities, so they are leniently regulated. As a result, transactions will not be within the jurisdiction of the securities regulator in Mexico, because, in general, the financial system is largely inspired by the U.S. model.

5. Price Control Responsibility: Undefined

7. Publication of market data Responsibility: undefined

83 Gallego (2019).

3.5 NORTH AMERICAN CARBON MARKET – WESTERN CLIMATE INITIATIVE

3.5.1 GLOSSARY

Executive Branch: in California, the agency responsible for the program is the state environmental agency (California Air Resources Board – CARB). In Quebec, it is the State Secretariat for the Environment (*Ministère de l'Environnement et de la Lutte contre les Changements Climatiques*).

Legislative Branch: in California, there is a bicameral legislature. In Quebec, a unicameral legislature.

3.5.2 SUMMARY

The Western Climate Initiative (WCI) is a decentralized regional carbon market management framework based on strong collaboration across jurisdictions and partnerships with the private sector (Figure 10). Its main feature is the interconnection among subnational jurisdictions from different countries. The jurisdictions may voluntarily join the WCI, provided that this is approved by the WCI members. However, the domestic functioning in Quebec and California is mandatory. The founding of the program and its implementation resulted from the leadership exercised by US state governments since 2006. This is a unique model, which brings together subnational entities from the United States and Canada. This format poses a challenge, since subnational entities do not have the autonomy to enter into international negotiations or treaties. As a result, they are not able to promote a cross-jurisdictional association of legal value, as the entry of subnational entities into this market is done on a voluntary basis. The way around the problem was to create a nonprofit private domain entity, registered in the US state of Delaware, to legalize the association between international subnational jurisdictions. That entity is WCI, Inc., registered in 2011 and which carries out much of the program's operation in the three current jurisdictions that make it up. WCI, Inc. manages almost all functions relating to the permit and carbon credit market in these three jurisdictions, including a role in the oversight of the market. In addition, WCI, Inc. provides technical expertise to members and actively participates in the development of the necessary guidelines for harmonization of the programs. On the other hand, the MRV processes are managed by the environmental agencies of the respective jurisdictions.

In the case of the WCl's jurisdiction, the focus is on the interconnection between jurisdictions. The scope of work was defined to remain within a total of five jurisdictions. Figure 10,

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below, emphasizes the nexus between the jurisdictions, which takes place via the Executive Branch with the support of authorization from the Legislative Branch. The figure also shows that the private entity (WCI, Inc.) operates across jurisdictions.





Source: prepared in house.

3.5.3 CHARACTERIZATION AND HISTORY

The Western Climate Initiative (WCI) began to be conceived in 2003, when the governors of California and other states came together to design common strategies for the climate agenda. The formal project of a regional carbon trading market was signed in 2007, at the initiative of the American states of Arizona, California, New Mexico, Oregon and Washington. Since then, a total of eight American states and four Canadian provinces have joined the initiative at different times, but most of them have ended up leaving due to internal political challenges.

Today, only California and the Canadian provinces of Quebec and Nova Scotia remain. California and Quebec implemented their carbon trading programs individually in 2012 and completed the interconnection in 2014. The Nova Scotia Province program started in 2019 and is not yet interconnected with other jurisdictions⁸⁴.

Interconnection

From the beginning, the objective of the WCI was to bring together several subnational jurisdictions in the same program, in order to obtain economies of scale. However, the more jurisdictions, the greater the challenge of harmonizing rules and interconnecting. With that in mind, the initial design of the program contained three steps. In the first stage, WCI members jointly produced a proposal for the design of programs to be considered in each of the jurisdictions⁸⁵. In the second stage, each jurisdiction used this design proposal to build its own legal framework and implement a carbon trading system independently, without interconnection with other jurisdictions. Thus, despite the fact that each legal framework was produced according to different legal systems and, consequently, through rules that did not necessarily converge, the fact that they were based on a single base proposal made the systems potentially interlinkable. Thus, in the third stage, it was possible for the partners to resort to the formal interconnection of their programs.

The three-stage model was based on the premise that the policy decisions that would need to be made in planning and implementing the program would have been hampered if the interconnection had been a prerequisite.

Interconnection Measures

When it was time to do the interconnection, three categories of rules to be adopted were defined:

- Rules that would need to be identical across interconnected jurisdictions, such as those relating to unified auctions or the transfer of permits between jurisdictions;
- II) Rules that should produce similar results but do not need to be identical, such as those relating to MRV, that ensure that emissions accounted for in each jurisdiction refer to the same unit of measurement (tCO₂e); and
- III) Rules that could be completely different in the interconnected jurisdictions, such as those relating to acceptable offsets.

Based on this classification, representatives of WCI's member governments produced a rule-alignment agreement that served as the basis for the interconnection process⁸⁶. The agreement was approved at the executive level of each jurisdiction.

Phases

The program started with a two-year learning phase, followed by three-year periods:

Phase 1: 2013-2014 (2 years); Phase 2: 2015-2017 (3 years); Phase 3: 2018-2020 (3 years); Phase 4: 2021-2023 (3 years); Phase 5: 2024-2026 (t3 years); and Phase 6: 2027-2029 (3 years).

3.5.4 FUNCTIONS AND RESPONSIBILITIES

A) Planning

1. Definition of the emission cap (long term) Responsibility Executive Branch --> Legislative Branch

In California, the government issued a decree (Executive Order S-03-05) in 2005, with long-term goals, notably the target of reaching the 1990 emissions level by 2020, with a 40% reduction in 2030 and 80% in 2050. The following year, the Legislative Branch passed a law (AB 32) that endorsed these objectives and determined that the state environmental agency (California Air Resources Board – CARB) would be the entity in charge of implementing it.

In Quebec, the Legislative Branch granted the Executive Branch the authority to establish the objectives and rules aimed at creating a carbon trading system (PL 42 of 2009). Based on this mandate, the goals were defined by Executive Decree 1187-2009 ⁸⁷, which is equivalent to a law. Thus, the goal was set to reduce emissions by 20% in 2020 compared to 1990, 37.5% in 2030 and from 80% to 95% in 2050.

2. Scope Definition - Regulated Sectors Responsibility: Jurisdictions

At WCI, the scopes of the programs are defined independently in each jurisdiction. In California, the Legislative Branch defined in a very specific way the format that the program should adopt, while in Quebec, the Executive Branch was given the task of defining the scope of the program.

3. Definition of periodic emission target (medium term) Responsibility: jurisdictions

Each jurisdiction sets its goals independently. In California, the Legislative Branch determined the number of permits granted in each period, while in Quebec this definition was left to the Executive Branch.

4. Allocation of Free Permits

Responsibility: Jurisdictions

In California, the legislation used international trade exposure and emissions intensity data to define lists of sectors at high, medium and low risk of carbon leakage ⁸⁸. Sectors most at risk of leakage receive more free permits. In the first phase of the program, all permits were distributed 100% free of charge.

In Quebec, the legislation defined a list of ten sectors that benefit from free licenses and defined the rules for calculating the percentage of free licenses attributed to each entity ⁸⁹.

5. Changes of course - changes to rules

Responsibility: jurisdictions

In California, changes to the rules have been made by the Legislative Branch, while in Quebec the Executive Branch has greater freedom to determine changes in direction.

6. Interconnection

Responsibility: Executive Branch -> Legislative Branch

At first, WCI member governments prepared a general proposal for the design of the program, which was formatted to facilitate the interconnection. This proposal was discussed, modified and approved following the institutional rites of each jurisdiction.

B) MRV

The California and Quebec MRV systems needed to be harmonized for interconnecting the programs. It was up to Quebec to adapt its reporting system to California's strictest rules, reducing the annual emissions cap that makes reporting mandatory to 10,000 tCO e, increasing the number of regulated sectors and harmonizing protocols ⁹⁰.

⁸⁸ Emissions-EUETS (2012).

⁸⁹ Governo do Quebec (2018).

⁹⁰ Governo do Quebec (2018).

In both jurisdictions, the management of the MRV is performed exclusively on order of the Executive Branch.

1. Monitoring Plan Approval Responsibility: Jurisdictions

In the case of California, the reporting of emissions is carried out both at the state level – the California Air Resources Board ⁹¹ – and at the federal level – the Environmental Protection Agency (EPA)⁹². Annual reporting at the federal level requires the submission of a monitoring plan. However, the carbon market uses inventory data submitted annually to the state level that do not require a monitoring plan.

In the case of Quebec, reporting is done at the state level and it is not necessary to submit a monitoring plan ⁹³.

2. Verifier Accreditation

Responsibility: Jurisdictions

In California, verifiers are accredited by the state environmental agency (CARB). In Quebec, verifiers are accredited by the Canadian Standards Council – CCN ⁹⁴, a public accreditation body.

3. Report Verification

Responsibility: Jurisdictions

In both California and Quebec, regulated entities must submit information about annual verifications conducted by accredited verifiers.

4. External bonds

Responsibility: jurisdictions

Each jurisdiction is responsible for validating the credits generated in programs accepted for offsetting, and validation rules are harmonized across jurisdictions. All projects in the following categories are eligible: in California, US forestry projects such as urban forestry, animal husbandry, ozone layer, capture of methane in mining, and rice cultivation; in Quebec, destruction of methane in animal husbandry, gas capture in landfills, substances harmful to the ozone layer, collection of cooling gases, and capture and destruction of methane in mining.

⁹¹ CARB (2018).

⁹² EPA (--).

⁹³ Governo do Quebec (2015).

⁹⁴ BNQ (--).

5. Compliance Check (Emissions Offset with Permits) Responsibility: Private Sector (WCI, Inc.)

Compliance is automatically verified by the Compliance Instrument Tracking System Service (CITSS), a tool developed by WCI, Inc. to manage the WCI's permit market. CITSS records emission data and offsets inventoried emissions against bonds held by regulated entities.

C) Permits market management

In general terms, the market is entirely managed by WCI, Inc., which is controlled by the jurisdictions that are part of the WCI, receiving from them the mandate to manage the program.

1. Allocation and Granting of Permits

Responsibility: Jurisdictions

Each jurisdiction uses its own procedures for allocating and granting permits. In California, the legislation establishes the allocation rules, which are automatically calculated following pre-defined formulas, based on benchmarks.

In Quebec, the allocation is defined by the Executive Branch, according to a benchmarking procedure based on increasingly strict efficiency standards ⁹⁵.

2. Bookkeeping of permits

Responsibility: Private Sector (WCI, Inc.)

CITTS is a completely digital system for bookkeeping the bonds, including permits and other credits for offsetting emissions.

3. Auction/sale of permits

Responsibility: Private sector (WCI, Inc.)

Auctions are conducted electronically on a dedicated platform managed by WCI, Inc., and payments can be made in Canadian or US Dollars.

4. Regulation of the secondary market

Responsibility: Private Sector (WCI, Inc.) --> Executive Branch

WCI, Inc. provides the market monitoring and irregularity search service, both in auctions and in transactions carried out via CITSS ⁹⁶. The irregularities found are communicated to the Executive Branch, which has the power to adopt punitive measures.

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95 CIGI (2019).
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5. Price Control Responsibility: Executive Branch

In both California and Quebec, the carbon market regulator has the power to retain permits in a market reserve for use in containing price fluctuations. The floors and ceilings set for prices are coordinated across the jurisdictions, but each one acts independently to control prices.



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4 COMMON ELEMENTS



This chapter presents a summary of the lessons learned from the cases of the five international jurisdictions. The objective is to point out common elements that can be useful for reflection on the governance of a carbon market in Brazil. The chapter is organized around the following elements: leadership of the Executive Branch, decentralization, creation of new structures, organization of offsetting systems, interface with the private sector, and forms of interaction with unregulated sectors.

Prerequisites for long-lasting carbon markets

Leadership by the Executive Branch

In the five jurisdictions studied, the leadership in the process of creating and developing carbon trading markets was concentrated in the Executive Branch. Respecting the particularities of different contexts and scales, the Executive Branch acted as a catalyst for the process, engaging other actors, politicians and representatives of the private sector, when necessary. It was found that the success in the implementation of long-lasting programs was associated with three elements: 1) governments with a strong capacity for coordinating efforts, going beyond the public sector and favoring an open dialogue with the private sector; 2) political will to advance the climate agenda as a State theme and not as a government issue, with consistency over the years; and 3) experience of the government with a mandatory emissions reporting system (Figure 11).



FIGURE 11 - Prerequisites and steps for the implementation of sustainable carbon trading systems

Source: prepared in house. Grade: SCC = carbon trading system.

For example, in the European Union in the early 2000s, the Executive Branch, presided over by Romano Prodi between 1999 and 2004, was a government with a strong capacity for coordination. He was responsible for implementing the common currency (Euro) and getting ten new countries to join the block (2004). This government was instrumental in combining the continent's multiple forces around a climate agenda. The coordination effort had its first major success in 2003, when the founding law of the EU-ETS was passed. After that, a continuous process of harmonization was necessary, over the next ten years, in order for the foundations of the program to be improved and in order for these improvements to be made into law.

What can be concluded from the cases evaluated is that the Legislative Branch played a fundamental role in enabling the carbon markets to gain firm and stable bases, but the Legislative Branch was not the institution that led the process. In certain cases, the Legislative Branch started to take a leading role over time, as in the European Union, where, in October 2020, the European Parliament approved a more severe decarbonization target for 2030 (of 60%) than the target advocated by the European Commission (55%). Despite this specific example, the general rule is strong leadership exercised by the Executive Branch.

Decentralization

The five jurisdictions studied have governance models that are essentially different; therefore, with different degrees of decentralization (Figure 12). As a general rule, programs that are born with the challenge of integrating jurisdictions from different countries, such as the EU-ETS and the WCI, show a greater degree of decentralization. In the case of the European Union, this stems from the format of institutions in the European
bloc, in which the National Governments of the 27 member countries participate in the decision-making process. In this case, both the definition of the rules and the execution of the program are decentralized.

At WCI, however, there is no supranational jurisdiction capable of coordinating the actions of subnational entities (governments, provinces) from different countries, in this case, the United States and Canada. Thus, the legal framework is independently defined by the jurisdictions. However, although each jurisdiction establishes its rules independently, this is done in a coordinated manner with the other jurisdictions, in order to facilitate the interconnection process. Therefore, at the program planning and design stage, the model is one of decentralized governance with constant exchanges between jurisdictions. On the other hand, in the execution stage, the program is totally centralized in a single private entity, specifically constituted to manage it.



FIGURE 12 – Degree of decentralization and creation of new bodies in carbon markets

Note: the degree of decentralization is equal to the number of bodies that make up the governance system, as listed in Table 1, divided by 18, which is the number of functions mapped in the governance systems. In the case of the European Union, each of the 27 National Governments was included as an organ within the governance system. Source: prepared in house.

At the other end, there is the Tokyo carbon trading program, which was born with an essentially local design, that is, without the ambition to interconnect with jurisdictions in other countries. In this case, there is no structural reason that makes decentralized governance necessary. Consequently, the governance is strongly centralized in the Bureau of Environment, which already had a well-developed structure to deal with different aspects of environmental regulation. As this strong structure already existed, there was no need to create others.

Creation of new structures

The need to create structures for the operationalization of a carbon market is an important factor in the initial design of programs. In a scenario where the State is large and subject to increasing budgetary constraints, creating agencies or bodies with fixed staff and budget allocation becomes increasingly challenging. At the same time, it is hardly feasible to imagine that a complex system of carbon trading on a national scale will not require the creation of some new structures.

One way to quantify the demand for new structures is to list the new bodies created in each jurisdiction. This exercise allows for a simple, straightforward view of the problem. However, it is necessary to be aware of the simplification that can happen by treating all structures in the same way. For example, creating an advisory committee that meets sporadically is different from creating a national agency specifically aimed at regulating the trading system.

The number of new structures created ranged from zero in Japan to one in the WCI, two in Mexico, three in South Korea and more than three in the European Union.

Organization of clearing systems

All assessed jurisdictions accept credits from external projects to offset emissions produced. External credits can be used up to a certain limit of the total obligations of regulated entities. This limit is 4% in California, 8% in Quebec, 10% in South Korea and Mexico, 50% in the European Union and 100% in Tokyo. In addition, external credits must meet two other criteria: they must originate from projects of accepted types and must have been inventoried using accepted methodologies, that is, adherent to the MRV pre-approved in each program.

The list of acceptable projects for each jurisdiction is presented below. In general, there is a preference for domestic projects, although, in certain cases, international credits are accepted. For measuring methodological compatibility (fungibility), there are two models. The first one, adopted in the European Union, is the automatic compatibility of credits generated in specific external programs, such as the CDM. In it, the operating cost of the offsetting system is much lower. The second model is the verification and validation of compatibility. In that case, the competent authority can request verification by a third party and then do, on its own, the validation and conversion of extra-jurisdictional claims to jurisdictional claims, as in the case of Tokyo, or it may contract a company with the proper credentials specifically for validation, verification and conversion, as in the case of California.

External project categories accepted for compensation

European Union, EU-ETS

- CERs Certified Emission Reductions, from the CDM;
- ERUs Emission Reduction Units, of the Joint Implementation Mechanism;
- CDM projects carried out until 2012 or from 2013 onwards in countries classified as less developed;
- Projects that do not involve nuclear energy, afforestation or reforestation, or destruction of industrial gases; and
- Switzerland emission permits.

Japan, Tokyo-CaT

- Reduction of emissions from small and medium-sized companies;
- Japan's Renewable Energy Adoption Program; and
- Japanese credits from outside the Tokyo Metropolitan Area.

South Korea, KETS

- Domestic projects certified by the Korean offsets program;
- CDM projects implemented outside the KETS jurisdiction by Korean companies regulated by the KETS; and
- Domestic CDM projects certified with international standards.

Mexico, SCE Mexico

- Forests;
- Agriculture;
- Waste Management; and
- Domestic projects verified with protocols produced by the Ministry of the Environment (SEMARNAT) and registered in the National Emission Registration System (RENE).

California, WCI

- US Forests;
- Urban forests;
- Animal husbandry;
- Ozone layer;
- Capture of methane in mining; and
- Rice cultivation.

Quebec, WCI

- Destruction of methane in animal husbandry;
- Capture of landfill gas;
- Certain substances harmful to the ozone layer;
- Cooling gas collection; and
- Capture and destruction of methane in mining.

Interface with the private sector

All programs studied have one or more private entities in their governance structure. The most frequent function assigned to a private entity is the verification of reports, which is carried out in whole or in part by the private sector in the five jurisdictions. The second most frequent role is that of a permit trading platform, which is performed by stock exchanges in the European Union and South Korea, by a private company in the WCI, and potentially will also be performed by the stock exchange in Mexico.

Other functions assumed in specific cases by the private sector are the bookkeeping of credits from external programs (offsets), the accreditation of verifiers and the implementation of sub-mandated price control actions and supervision of the regulatory authority. In addition to these specific functions, a private institution was created at WCI to manage the carbon trading system in its entirety.

Forms of interaction with unregulated sectors

Unregulated sectors are generally covered via participation in the offset market. For example, in Tokyo, only large companies are regulated by Tokyo-CaT and small and medium companies can sell their emission reductions in the offset market. This generates an incentive for mitigation at other levels and allows the regulated sectors to meet their goals more efficiently. The limitation of this type of strategy is that the participation of unregulated sectors is often limited to a maximum percentage of the obligations. In three of the programs studied, this percentage is 10% or less.

In the case of the European Union, there is specific legislation – the Common Effort Regulation – that establishes mitigation targets for sectors not regulated by the EU-ETS. This means that, in parallel to the carbon market, which encompasses a certain set of regulated entities, there is another system, acting outside the market, and which regulates the emissions of other entities. Despite being based on a command-and-control model, this second legislation establishes some forms of flexibility that can allow unregulated sectors to achieve their mitigation goals more efficiently. In addition, the legislation provides a form of penalty for member countries that fail to meet their targets.



5 CONCLUSION



The systematization of the international experience in the studied carbon-market jurisdictions points to some guiding principles. A point of attention is related to the interface of the trade program with the private sector, in particular the regulated entities, which are of fundamental importance from the planning stage to the implementation of projects. Inserting this representation into the governance structure through the legal text is the best model, as it facilitates the transfer of technical knowledge and information.

As a general rule in most jurisdictions studied, in relation to the participation of extra-governmental entities, the Executive Branch holds periodic consultations with business and other entities in order to promote alignment and give legitimacy to their actions, but unilaterally. In Mexico, the participation of civil society representatives, including representatives of the business community, is enshrined in the law. This ensures that regulated entities will have the opportunity to engage in dialogue with the regulator and provide it with technical analyses.

Another highlight is the monitoring, reporting and verification system. It is essential that a mandatory MRV framework on a national scale be implemented before the market starts operating, and that this framework be compatible with the resources available in the country for implementation of the MRV. All jurisdictions studied instituted a mandatory MRV system on a national scale before starting the carbon market.

In this regard, the case of Mexico is also interesting, as the country has seen a decline in its ability to adequately analyze emission reports, which creates difficulties for the development of the MRV infrastructure in the Ministry of the Environment. Due to a threshold of 25,000 tCO₂ for mandatory reporting, the volume of emissions of entities required to report is now around 1,000 tCO₂, far above the ministry's capacity. As a result, despite having instituted an MRV system in advance, this infrastructure remains below the level necessary to manage reports from across the country. Had additional reporting criteria been inserted, this problem would have been minimized.

In addition to the MRV, the Permit Registration System is an essential infrastructure for the operation of the market. This requires an advanced technological framework, with security measures and at the same time transparency. In the international experience, the operationalization of the registration of permits can be the responsibility of both the public administration and private entities.

In the evaluations carried out, it was found that the regulatory agency (or the competent authority) is always inserted in the public structure, but it is not always the environmental agency. In some cases, other bodies of the public structure were chosen to lead the permit trading system, as in France. To identify the ideal public entity to act as a regulator, it is necessary to take into account what the functions of the regulatory body will be and what capacities are required of it, as well as, in the legal aspect, which bodies of the State structure have the vocation to take on this task.

If Brazil opts for a private entity that has the role of an implementing agency, it is important that its performance be adequately limited to administrative functions and that a regulatory apparatus be created to allow the supervision of the work of the private entity. For example, in the case of the Brazilian electricity system, this supervision is the responsibility of the National Electric System Operator (ONS), the National Electric Energy Agency (ANEEL) and the Ministry of Mines and Energy (MME).

In WCI's carbon market, WCI, Inc. – the private implementing body – is treated by the California regulator as a service provider. Thus, WCI, Inc.'s attributions are exclusively focused on the operationalization of the market, whether in its technological aspect (the registration of permits) or in its commercial aspect (management of the permit trading platform). WCI, Inc. is not responsible for any task relating to the regulation of different aspects of the carbon market, except in the event that the regulator should request, through a contract, studies or technical analyses.

In summary, the international experiences of the jurisdictions described here, if well studied and evaluated, will be of great relevance to discussions about a Brazilian carbon market model that takes into account not only the country's specificities, but also the lessons learned from mature and well-structured carbon markets.



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REFERENCES

ADB - ASIAN DEVELOPMENT BANK. **The Korea Emissions Trading Scheme:** Challenges and Emerging Opportunities. Mandaluyong City: ADB, 2018. Available at: https://www.adb.org/sites/default/files/publication/469821/korea-emissions-trading-scheme.pdf. Accessed on: 15 June 2021.

AFRIAT, Marion *et al.* Extending the EU ETS to the road transport sector. *In*: INSTITUTE FOR CLIMATE ECONOMICS – I4CE. **Exploring the EU ETS beyond 2020**. Paris: I4CE, 2015. Available at: https://www.i4ce.org/wp-core/wp-content/uploads/2016/06/rapport-I4CEchapitre-4.pdf. Accessed on: 15 June 2021.

ALTAMIRANO, J.-C.; MARTÍNEZ, J. **Mexico's 3 big steps towards comprehensive carbon pricing**. [*S. l.*]: World Resources Institute, 2017. Available at: https://www.wri.org/insights/ mexicos-3-big-steps-towards-comprehensive-carbon-pricing. Accessed on: 15 June 2021.

ARIMURA, T. H.; ABE, T. The impact of the Tokyo emissions trading scheme on office buildings: what factor contributed to the emission reduction? **Environmental Economics and Policy Studies**, [*S. l.*], v. 23, n. 1, p. 1-17, 2020.

AVERCHENKOVA, Alina; GUZMÁN, Sandra. **Mexico's general law on climate change**: successes and challenges. Policy brief. [*S. l.*]: Grantham Institute, 2018. Available at: https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/11/Policy_brief_ Mexico%E2%80%99s-General-Law-on-Climate-Change-Successes-and-challenges_8pp_ AverchenkovaGuzman-2.pdf. Accessed on: 15 June 2021.

BNQ – BUREAU DE NORMALIZATION DU QUÉBEC. **Vérification de déclarations d'émissions de gaz à effet de serre (GES)**. [*S. l.*]: BNQ, [2021]. Available at: https://www.bnq.qc.ca/fr/ autres-services/verification-declarations-emissions-ges.html. Accessed on: 15 June 2021.

BRUNDAGE-MOORE, Asha. **The Tokyo emissions trading scheme:** lessons from a pioneering jurisdiction. New York: Guarini Center, 2019. Available at: https://guarinicenter.org/wp-content/uploads/2019/07/Tokyos-Emission-Trading-Program-_Issue-Brief-July-19.pdf. Accessed on: 15 June 2021.

CÂMARA DOS DEPUTADOS DO MÉXICO ("Mexico's Lower House"). Ley general de cambio climático. **Diario Oficial de la Federación**, Ciudad de México, 2018. Available at: http://www.diputados.gob.mx/LeyesBiblio/pdf/LGCC_130718.pdf. Accessed on: 15 June 2021.

CÂMARA DOS DEPUTADOS DO MÉXICO ("Mexico's Lower House"). **Proyecto de decreto que reforma, adiciona y deroga diversas disposiciones de la Ley General de Cambio Climático**. **Diario Oficial de la Federación**, Ciudad de México, 2017. Available at: http:// sil.gobernacion.gob.mx/Archivos/Documentos/2017/12/asun_3642476_20171207_1512 747479.pdf. Accessed on: 15 June 2021.

CARB – CALIFORNIA AIR RESOURCES BOARD. **Mandatory Greenhouse Gas Reporting Regulation:** 2018 Regulation. Sacramento: CARB, 2018. Available at: https://ww2.arb. ca.gov/mrr-regulation. Accessed on: 15 June 2021.

CARB – CALIFORNIA AIR RESOURCES BOARD. **Agreement on the harmonization and integration of cap-and-trade programs for reducing greenhouse gas emissions**. Sacramento: CARB, 2017. Available at: https://ww2.arb.ca.gov/sites/default/files/classic/cc/ capandtrade/linkage/2017_linkage_agreement_ca-qc-on.pdf. Accessed on: 15 June 2021.

CIGI – CENTER FOR INTERNATIONAL GOVERNANCE INNOVATION. **A guide to emissions trading under the western climate initiative**. [*S. l.*]: CIGI, 2019. Available at: https://www. cigionline.org/publications/guide-emissions-trading-under-western-climate-initiative. Accessed on: 15 June 2021.

CLIMATE POLICY INFO HUB. **The EU emissions trading system**: an introduction. [*S. l.*]: Climate Policy Info Hub, [2020]. Available at: https://climatepolicyinfohub.eu/eu-emissions-trading-system-introduction. Accessed on: 15 June 2021.

CNI – CONFEDERAÇÃO NACIONAL DA INDÚSTRIA (Brazilian National Confederation of Industry). **A precificação de carbono e os impactos na competitividade da cadeia de valor da indústria**. Brasília, DF: CNI, 2020. Available at: http://www.portaldaindustria.com. br/publicacoes/2020/10/precificacao-de-carbono-e-os-impactos-na-competitividade-dacadeia-de-valor-da-industria/. Accessed on: 15 June 2021.

EA – EUROPEAN ACCREDITATION. **Overview of the system for accreditation in the EU as part of National Quality Infrastructure**. Geneva: EA, 12 nov. 2019. Available at: https://www.wto.org/english/tratop_e/tbt_e/01_b_p1b_eu_accreditation.pdf. Accessed on: 15 June 2021.

EDF – ENVIRONMENTAL DEFENSE ACTION FUND. **Republic of Korea**: an emissions trading case study. Washington, D. C.: EDF, 2016. Available at: https://www.edf.org/sites/default/files/korean_case_study.pdf. Accessed on: 28 set. 2021.

EMA – ENTIDAD MEXICANA DE ACREDITACIÓN. **Organismos de certificación para verificar la emisión de GEI**. [*S. l.*]: EMA, [2018]. Available at: https://www.gob.mx/cms/uploads/ attachment/ file/264937/3-_Acreditaci_n OC-VV-GEI.pdf. Accessed on: 15 June 2021.

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EMBER. **Carbon price viewer**. [*S. l.*]: EMBER, [2020]. Available at: https://ember-climate. org/data/carbon-price-viewer/. Accessed on: 15 June 2021.

EMISSIONS-EUETS. **Commission decision determining a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage**. [*S. l.*]: Emissions-EUETS, 2019a. Available at: https://www.emissions-euets.com/commission-decision-no-20102eu-of-24-december-2009-determining-a-list-of-sectors-and-subsectors-which-are-deemed-to-be-exposed-to-a-significant-risk-of-carbon-leakage. Accessed on: 15 June 2021.

EMISSIONS-EUETS. **EU ETS accreditation and verification regulation**. [*S. l.*]: Emissions-EUETS, 2019b. Available at: https://www.emissions-euets.com/verification-andaccreditation-regulation. Accessed on: 15 June 2021.

EMISSIONS-EUETS. **California carbon leakage list**. [*S. l.*]: Emissions-EUETS, 2012. Available at: https://www.emissions-euets.com/httpwwwemissions-euetscomcomponentconten tarticle909-california-cap-and-trade296-california-carbon-leakage-list. Accessed on: 15 June 2021.

EPA – ENVIRONMENTAL PROTECTION AGENCY. **Greenhouse Gas Reporting Program (GHGRP)**. Available at: https://www.epa.gov/ghgreporting. Washington, D. C.: EPA, [2021]. Accessed on: 15 June 2021.

EUROPEAN PARLIAMENT. Directive 2003/87/EC of the European Parliament and of the Council, of 13 October 2003. **Official Journal of the European Union**, Brussels, L 275/32, 25 out. 2003. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32003L0087. Accessed on: 15 June 2021.

EUROPEAN PARLIAMENT. Commission Regulation (EU) n° 1031/2010, of 12 November 2010. **Official Journal of the European Union**, Brussels, L 302/1, 18 nov. 2010. Available at: https://eur-lex.europa.eu/eli/reg/2010/1031/2019-01-05. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **EU ETS handbook.** Brussels: European Comission, 2015a. Available at: https://ec.europa.eu/clima/sites/clima/files/docs/ets_handbook_en.pdf. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Updated information on exchange and international credit use in the EU ETS**. 2015b. Available at: https://ec.europa.eu/clima/news/articles/ news_2015050402_en. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Effort sharing 2021-2030**: targets and flexibilities. Brussels: European Commission, 2018. Available at: https://ec.europa.eu/clima/policies/effort/ regulation_en. Accessed on: 15 June 2021. EUROPEAN COMMISSION. **Directorate general climate action:** organizational chart. Brussels: European Commission, 2019a. Available at: https://ec.europa.eu/info/sites/ default/files/organisation_charts/organisation-chart-dg-clima_en.pdf. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Adoption of the delegated decision on the carbon leakage list for 2021-2030**. Brussels: European Commission, 2019b. Available at: https://ec.europa. eu/clima/news/adoption-delegated-decision-carbon-leakage-list-2021-2030_en. Accessed on: 15 June 2021.

EUROPEAN COMISSION. **Union registry**: explanatory memorandum. Brussels: European Commission, 2019c. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/ HTML/?uri=PI_COM:C(2019)1841&from=EN. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **2050 long-term strategy**. Brussels: European Commission, 2020a. Available at: https://ec.europa.eu/clima/policies/strategies/2050_en. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **EU Emissions Trading System (EU ETS)**. Brussels: European Commission, 2020b. Available at: https://ec.europa.eu/clima/policies/ets_en. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Auctioning**. Brussels: European Commission, 2020c. Available at: https://ec.europa.eu/clima/policies/ets/auctioning_en. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Contact information for national Competent Authorities responsible for the implementation of the inclusion of aviation into EU Emissions Trading System**. Brussels: European Commission, 2020d. Available at: https://ec.europa. eu/clima/sites/clima/files/transport/aviation/docs/ca_contacts_en.pdf. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Annual emissions monitoring plan**. Brussels: European Commission, 2020e. Available at: https://ec.europa.eu/clima/sites/clima/files/ets/monitoring/docs/t1_mp_installations_en.xls. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Use of international credits**. Brussels: European Commission, 2020f. Available at: https://ec.europa.eu/clima/policies/ets/credits_en. Accessed on: 15 June 2021.

EUROPEAN COMMISSION. **Ensuring the integrity of the European carbon market**. Brussels: European Commission, 2020g. Available at: https://ec.europa.eu/clima/policies/ ets/oversight_en. Accessed on: 15 June 2021. GALLEGO, Erik. **Bases preliminares del programa de prueba del sistema de comercio de emisiones**. [*S. l.*]: Greenberg Traurig Law, 2019. Available at: https://www.gtlaw.com/en/insights/2019/12/bases-preliminares-del-programa-de-prueba-del-sistema-de-comercio-de-emisiones. Accessed on: 15 June 2021.

GOVERNO DO QUEBEC. Décret 1187-2009, 18 novembre. **Gazette Officielle du Québec**, v. 141, n. 49, p. 5871, 9 dez. 2009. Available at: http://www2.publicationsduquebec.gouv. qc.ca/dynamicSearch/telecharge.php?type=1&file=52751.pdf. Accessed on: 15 June 2021.

GOVERNO DO QUEBEC. **Québec cap-and-trade system for greenhouse gas emission permits (C&T):** Technical overview. [*S. l.*]: Gouvernement du Québec, 2018. Available at: http://www.environnement.gouv.qc.ca/changements/carbone/documents-spede/ technical-overview.pdf. Accessed on: 15 June 2021.

QUEBEC GOVERNMENT. **Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere**. [*S. l.*]: Gouvernement du Québec, 2015. Available at: http://legisquebec.gouv.qc.ca/en/ShowDoc/cr/Q-2,%20r.%2015. Accessed on: 15 June 2021.

TOKYO METROPOLITAN GOVERNMENT. **Tokyo cap and trade program for large facilities**. Tokyo: Tokyo Metropolitan Government, 2015. Available at: https://www.kankyo.metro. tokyo.lg.jp/en/climate/cap_and_trade/index.files/TokyoCaT_detailed_documents.pdf. Accessed on: 15 June 2021.

TOKYO METROPOLITAN GOVERNMENT. **Zero emission Tokyo strategy**. Tokyo: Tokyo Metropolitan Government, 2019. Available at: https://www.kankyo.metro.tokyo.lg.jp/en/about_us/zero_emission_tokyo/strategy.files/Full-ver.ZE-strategy0311.pdf. Accessed on: 15 June 2021.

TOKYO METROPOLITAN GOVERNMENT. **Bureau of Environment**: Organization. Tokyo: Tokyo Metropolitan Government, 2020a. Available at: https://www.kankyo.metro.tokyo. lg.jp/en/about_us/organization. html. Accessed on: 15 June 2021.

TOKYO METROPOLITAN GOVERNMENT. **Report verification guides**. Tokyo: Tokyo Metropolitan Government, 2020b. Available at: https://www.kankyo.metro.tokyo.lg.jp/ climate/large_scale/rules/cat9740.html. Accessed on: 15 June 2021.

GRANTHAM INSTITUTE. **Climate change laws of the world:** framework act on low carbon green growth, regulated by Enforcement Decree of the Framework Act on Low Carbon Green Growth. [*S. l.*]: Grantham Institute, 2020a. Available at: https://www.climate-laws. org/geographies/south-korea/laws/framework-act-on-low-carbon-green-growth-regulated-by-enforcement-decree-of-the-framework-act-on-low-carbon-green-growth. Accessed on: 15 June 2021.

GRANTHAM INSTITUTE. **Climate change laws of the world**: act on the allocation and trading of greenhouse gas emissions rights, regulated by Enforcement Decree of Allocation and Trading of Greenhouse Gas Emissions Rights Act. [*S. l.*]: Grantham Institute, 2020b. Available at: https://www.climate-laws.org/geographies/south-korea/laws/act-on-the-allocation-and-trading-of-greenhouse-gas-emissions-rights-regulated-by-enforcement-decree-of-allocation-and-trading-of-greenhouse-gas-emissions-rights-act. Accessed on: 15 June 2021.

GREEN LOCAL GOVERNMENT PORTAL. **Tokyo Metropolis**. [*S. l.*]: ISEP, 2020. Available at: http://www.climate-lg.jp/en/local_gov/archives/metropolitan_tokyo.html. Accessed on: 15 June 2021.

HANDKE, Alexander. **ETS governance - case studie**: EU ETS / Germany. Bonn: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2019. Presented at ETS Academy of Mexico City, 23–25 July 2019.

HEDLEY, Adam. **A new registry regulation**: are you ready for Phase IV of the EU ETS? [*S. l.*]: Reed Smith, 2019. Available at: https://www.reedsmith.com/en/perspectives/2019/10/anew-registry-regulation-are-you-ready-for-phase-iv-of-the-eu-ets. Accessed on: 16 June 2021.

HYUN, J.; OH, H. **Korea's emission trading system**: an attempt of non–Annex I party countries to reduce GHG emissions voluntarily. [*S. l.*]: Partnership for Market Readiness, 2015. Available at: https://www.thepmr.org/system/files/documents/KETS_HyunOh1. pdf. Accessed on: 03 February 2019.

ICAP – INTERNATIONAL CARBON ACTION PARTNERSHIP. **Korea emissions trading scheme**. [*S. l.*]: ICAP, 2020a. Available at: https://icapcarbonaction.com/en/?option=com_ etsmap&task=export&format=pdf&layout=list&systems%5B%5D=47. Accessed on: 16 June 2021.

ICAP – INTERNATIONAL CARBON ACTION PARTNERSHIP. **Permit price explorer**. [*S. l.*]: ICAP, 2020b. Available at: https://icapcarbonaction.com/en/ets-prices. Accessed on: 16 June 2021.

ICAP – INTERNATIONAL CARBON ACTION PARTNERSHIP. **Mexico.** [*S. l.*]: ICAP, 2020c. Available at: https://icapcarbonaction.com/en/?option=com_ etsmap&task=export&format=pdf&layout=list&systems[]=59. Accessed on: 16 June 2021.

ICAP – INTERNATIONAL CARBON ACTION PARTNERSHIP. **Japan - Tokyo cap-and-trade program**. [*S. l.*]: ICAP, 2020d. Available at: https://icapcarbonaction.com/en/?option=com_ etsmap&task=export&format=pdf&layout=list&systems%5B%5D=51. Accessed on: 16 June 2021. ICAP – INTERNATIONAL CARBON ACTION PARTNERSHIP. **Emissions trading world- wide**. Status Report 2015. [*S. l.*]: ICAP, 2015. Available at: https://icapcarbonaction.com/images/ StatusReport2015/ICAP_Report_2015_02_10_online_version.pdf. Accessed on: 16 June 2021.

IETA – INTERNATIONAL EMISSION TRADING ASSOCIATION. **Mexico**: a market-based climate policy case study. Toronto: IETA, 2018. Available at: https://www.ieta.org/resources/ Resources/Case_Studies_Worlds_Carbon_Markets/2018/Mexico-Case-Study-Jan2018. pdf. Accessed on: 16 June 2021.

IETA – INTERNATIONAL EMISSION TRADING ASSOCIATION. **Tokyo**: an emissions trading case study. Brussels: IETA, 2015. Available at: https://www.ieta.org/resources/Resources/Case_Studies_Worlds_Carbon_Markets/2015/tokyo_case_study_may2015.pdf. Accessed on: 16 June 2021.

IMEI – ASOCIACIÓN MEXICANA DEL EDIFICIO INTELIGENTE Y SUSTENTABLE. **Mercado de carbono en México**. Ciudad de México: IMEI, 2018. Available at: https://imei.org. mx/2018/02/21/mercado-de-carbono-en-mexico/. Accessed on: 16 June 2021.

INSTITUT DELORS. **Background information on the EU ETS**. [*S. l.*]: Institut Delors, 2018. Available at: https://institutdelors.eu/wp-content/uploads/2018/01/eu_ets_appendix_a. pdf. Accessed on: 16 June 2021.

JEVNAKER, T.; WETTESTAD, J. Ratcheting up carbon trade: The politics of reforming EU emissions trading. **Global Environmental Politics**, [*S. l.*], v. 17, n. 2, p. 105-124, 2017.

LÓPEZ, M. J. *et al.* **Investigación de casos exitosos en financiamiento climático en la región Latinoamericana**. [*S. l.*]: PNUD, 2017. Available at: https://www.gcfreadinessprogramme. org/sites/default/files/Investigaci%C3%B3n%20de%20casos%20exitosos%20en%20 financiamiento%20clim%C3%A1tico%20en%20la%20regi%C3%B3n%20Latinoamericana. pdf. Accessed on: 16 June 2021.

MARCU, Andrei *et al.* **2019 state of the EU ETS report**. [*S. l.*]: ERCST, Wegener Center, ICIS, I4CE and Ecoact, 2020. Available at: https://www.i4ce.org/wp-core/wp-content/ uploads/2019/05/2019-State-of-the-EU-ETS-Report.pdf. Accessed on: 16 June 2021.

MÉXICO₂ – PLATAFORMA MEXICANA DE CARBONO. **Nosotros**. Ciudad de México: MÉXICO₂, 2016. Available at: http://www.mexico2.com.mx/nosotros.php. Accessed on: 16 June 2021.

MIJARES ANGOITIA CORTES Y FUENTES. **Puesta en marcha del Programa de Prueba del Sistema de Comercio de Emisiones para 2020 y publicación de Topes de Emisiones**. Ciudad de México: Mijares Angoitia Cortes y Fuentes, 2019. Available at: https://www. macf.com.mx/wp-content/uploads/2019/12/emisiones-2020_espanol-LR-1.pdf. Accessed on: 16 June 2021. PROFEPA – PROCURADURÍA FEDERAL DE PROTECCIÓN AL AMBIENTE. **Organismos de certificación de emisiones de gases de efecto invernadero**. Ciudad de México: Gobierno de México, 2019. Available at: https://www.gob.mx/profepa/acciones-y-programas/ organismos-de-tercera-parte. Accessed on: 16 June 2021.

RUDOLPH, S.; KAWAKATSU, T. **Tokyo's greenhouse gas emissions trading scheme**: a model for sustainable megacity carbon markets? [*S. l.*]: Researchgate, 2012. Available at: https:// www.researchgate.net/publication/254428576_Tokyo's_Greenhouse_Gas_Emissions_ Trading_Scheme_A_Model_for_Sustainable_Megacity_Carbon_Markets. Accessed on: 16 June 2021.

SANTIKARN, Marissa *et al.* **A guide to linking emissions trading systems**. [*S. l.*]: Researchgate, 2018. Available at: https://www.researchgate.net/publication/335928926_A_ Guide_to_Linking_Emissions_Trading_Systems. Accessed on: 16 June 2021.

SCHULTZ, Florence. **EU lawmakers up the ante, vote for 60% climate target for 2030**. [*S. l.*]: Euractiv, 2020. Available at: https://www.euractiv.com/section/climate-environment/ news/eu-lawmakers-up-the-ante-vote-for-60-climate-target-for-2030/. Accessed on: 16 June 2021.

SEMARNAT – SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES. **Programa de prueba del sistema de comercio de emisiones en México**. Ciudad de México: SEMARNAT, 2019a. Available at: https://www.gob.mx/cms/uploads/attachment/file/505746/Brochure_SCE-ESP.pdf. Accessed on: 16 June 2021.

SEMARNAT – SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES. **Programa de prueba del sistema de comercio de emisiones**. Ciudad de México: Gobierno de México, 2019b. Available at: https://www.gob.mx/semarnat/acciones-y-programas/programa-de-prueba-del-sistema-de-comercio-de-emisiones-179414. Accessed on: 16 June 2021.

SEMARNAT – SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES. **Aviso para el programa de prueba del sistema de comercio de emisiones**. Ciudad de México: SEMARNAT, 2019c. Available at: https://www.gob.mx/cms/uploads/attachment/file/513701/ Aviso_Asignacion_Sectorial.pdf. Accessed on: 16 June 2021.

SEMARNAT – SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES. **Registro nacional de emisiones (RENE) para el reporte de emisiones de compuestos y gases de efecto invernadero**. 2021. Available at: https://iki-alliance.mx/wp-content/uploads/ RENE-Gu%C3%ADa-de-Usuario-RENE-1.pdf. Accessed on: 16 June 2021.

SEMARNAT – SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES. **Registro nacional de emisiones**. Ciudad de México: SEMARNAT, 2017. Available at: https://www.

gob.mx/cms/uploads/attachment/file/264936/1-_RENE_AA_10.10.2017.pdf. Accessed on: 16 June 2021.

SKJÆRSETH, J. B.; WETTESTAD, J. Making the EU emissions trading system: the European commission as an entrepreneurial epistemic leader. **Global Environmental Change**, [*S. l.*], v. 20, n. 2, p. 314-321, 2010.

VIVIDECONOMICS. **Market stability measures**. London: Vivideconomics, 2020. Available at: https://ec.europa.eu/clima/sites/clima/files/ets/reform/docs/study_market_stability_measures_en.pdf. Accessed on: 16 June 2021.

WCI – WESTERN CLIMATE INITIATIVE. **WCI, Inc. contracts with an independent, third party contractor for market monitoring analysis to assist the Participating Jurisdictions in their oversight of the carbon market**. [*S. l.*]: WCI, [2021]. Available at: https://wci-inc. org/services/market-monitoring. Accessed on: 16 June 2021.

WCI – WESTERN CLIMATE INITIATIVE. **Design for the WCI Regional Program**. [*S. l.*]: WCI, 2010. Available at: http://westernclimateinitiative.org/dmdocuments/Design_for_the_ WCI_Regional_Program.282.pdf. Accessed on: 16 June 2021.

WCI – WESTERN CLIMATE INITIATIVE. **Design Recommendations for the WCI Regional Cap-and-Trade Program**. [*S. l.*]: WCI, 2009. Available at: https://www.environnement. gouv.qc.ca/changements/carbone/documents-WCI/modele-recommande-WCI-en.pdf. Accessed on: 16 June 2021.

WORLD BANK. Governance and development. Washington, D. C.: World Bank, 1992.

YOO, Jong. **Introduction to Korea emissions trading scheme; Korean offsetting program**. [*S. l.*]: ICAO, 2018. Available at: https://www.icao.int/Meetings/carbonmarkets/ Documents/04_Session2_Yoo_KETS.pdf. Accessed on: 16 June 2021. **CNI** *Robson Braga de Andrade* President

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