

Chapter 2

California, RGGI, Quebec: The Followers

2.1 The California Cap and Trade Scheme

2.1.1 Introduction

The California cap and trade system has been introduced by the Global Warming Solution Act of 2006 (also known as Assembly Bill 32—hereinafter AB32) that addresses climate change and energy in a coordinated way; to this effect, AB32 sets the target of cutting Californian GHG emissions to 1990 levels by 2020¹ and requires the California Air Resource Board (CARB) to develop and adopt the implementing regulations necessary to achieve this objective.² The two main regulations implementing the GHG abatement target envisaged by AB32 are the following ones: (1) subchapter 10, article 5, Title XXVII of the California Code of Regulations, *California Cap on GHG Emissions and Market-Based Compliance Mechanisms*, as amended in 2012, providing the rules for the establishment, functioning and administration of the ETS (the California ETS Regulation hereinafter); and (2) Regulation on the *Mandatory Reporting of GHG* (MRR), laying down the rules for monitoring and reporting the GHG emissions.

Indeed, the two Regulations adopted by CARB have concretely established the California cap and trade scheme, which has started to operate in 2013. The CARB Executive Officer is the main authority involved in the management of the

¹Such a target corresponds to 427 million tonnes of CO₂ equivalent by 2020 instead of the business as usual that would be 507 million tonnes of CO₂ equivalent.

²As it is well known, the Californian initiative is placed in a US Federal context, which is characterised by the absence of international commitments, since the USA has never ratified the KP, and therefore, it is not bound by its Annex B compulsory GHG emission reduction targets. However, this situation might change in the near future, if the US–China Joint Announcement on Climate Change delivered in Beijing in November 2014 will result in concrete legislative measures and actions at US Federal level. According to such an announcement: “*The United States intends to achieve an economy-wide target of reducing its emissions by 26–28 % below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28 %*”.

California ETS. Such a scheme is structured upon three compliance periods running until 2020. Overall, the California ETS is expected to cover 85 % of the country's GHG emissions and almost 600 facilities are subjected to it.

2.1.2 The California ETS: Main Scope, Purpose, Structure and Features

The scope of application of the California ETS is determined by subarticle 3 of the California ETS Regulation. Similarly to what happens in the other ETSs operating in other countries, this provision identifies the scope of the scheme with regard to both the GHG and the emitting activities covered. As far as the GHGs covered are concerned, these are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulphur hexafluoride (SF₆), hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), nitrogen trifluoride (NF₃) and other fluorinated greenhouse gases.

With regard to the types of activities covered, these vary according to the compliance period concerned. In fact, while the 1st compliance period was characterised by a narrower scope of application and encompassed only large industrial facilities and first deliverers of electricity,³ since the beginning of the 2nd compliance period in 2015, the scheme extended its scope including suppliers of gas and liquid fuels as well.⁴

In addition to the two criteria mentioned above (types of GHGs and types of activities covered), the ETS Regulation also sets a threshold requirement for any entity to be covered by the scheme. In fact, it is established that only entities with reported and verified annual emissions in any “data year”,⁵ which equal or exceed the threshold of 25,000 metric tons of CO₂ equivalent, are subject to the application of the cap and trade scheme.

³Please note that according to subarticle 2 of the ETS Regulation: “*First Deliverer of Electricity or “First Deliverer” means the owner or operator of an electricity generating facility in California or an electricity importer*”.

⁴In detail, the following sectors are covered since the starting of the California ETS (i.e. from the 1st compliance period): cement production; cogeneration; glass production; hydrogen production; iron and steel production; lime manufacturing; nitric acid production; petroleum and natural gas systems and petroleum refining; pulp and paper manufacturing; self-generation of electricity; or stationary combustion; first deliverers of electricity, namely electricity generating facilities located in California or electricity importers; carbon dioxide suppliers.

From 2015 onwards (since the starting of the 2nd compliance period), the following sectors will be added to the scope of the ETS: suppliers of Natural Gas: an entity that distributes or uses natural gas in California being a public utility gas corporation operating in California or a publicly owned natural gas utility operating in California; suppliers of distillate fuel oil; suppliers of LPG: the operator of a refinery that produces LPG in California or that fractionates natural gas liquids to produce LPG or a consignee of LPG into California.

⁵Please note that according to the ETS Regulation subarticle 2 the following definition applies to the term “data year”: “*data year means the calendar year in which emissions occurred*”.

The main purpose of the California ETS is to support the State in delivering its climate change policy and measures, particularly by achieving the target of reducing the GHG emissions to 1990 levels by 2020. In more concrete terms, this means lowering the GHG emissions by approximately 13 % by 2020 compared to 2013 levels (the starting date of the ETS) and by approximately 16 % compared to the *business as usual scenario*.

The California ETS is structured upon three progressive compliance periods: (1) 2013–2014, (2) 2015–2017 and (3) 2018–2020. Each year of any compliance period runs from 1 January to 31 December. For each year of the covered periods, a country-wide cap is set, representing the *GHG allowance budget*, i.e. the annual amount of GHG allowances available. In order to achieve the 2020 target, the initial cap will decrease in a linear manner by 2 % every year through 2015 and 3 % every year through 2020.⁶

The eligible emission units that may be used for complying with the surrendering obligation are called *compliance instruments*, while the *compliance obligation* represents the quantity of verified reported emissions or assigned emissions for which an entity must submit compliance instruments to CARB. With regard to the method of allocation of the allowances, it can be anticipated here that it is a mixed one, since some allowances are allocated for free upon determined benchmarks, while a remaining portion is allocated via auction or traded in the market (see below Sect. 2.1.5).

2.1.3 Duties of the Covered Entities and Competences of the California Air Resource Board (CARB) Executive Officer

Each covered entities shall register with CARB by submitting all the identification information and data required. The CARB Executive Officer will then open an account for the covered entity. Once such registration duty has been satisfied, the covered entity is first of all subject to the monitoring and reporting duty with regard to its annual GHG emissions. Secondly, and as a corollary to this duty, it must fulfil its compliance obligation, i.e. surrender an amount of compliance instruments corresponding to its reported and verified GHG emissions for each data/year of the compliance period in force.

⁶According to subarticle 6 of the California cap and trade regulation, the following caps apply: 1st Compliance period: 2013: 162.8; 2014: 159.7; 2nd Compliance period: 2015: 394.5; 2016: 382.4; 2017: 370.4; 3rd Compliance period: 2018: 358.3; 2019: 346.3; 2020: 334.2. Please note that while the initial cap only includes electricity and large industry (1st compliance period covered entities), the caps set for years 2015 onwards will encompass all the sectors covered by the California ETS.

As far as the reporting duty is concerned, each covered entity is subject to MRR and has a compliance obligation based on its total emissions. Entities covered by the cap and trade scheme are subject to a compliance obligation for every metric ton of CO₂, for which a positive emissions data verification statement is issued, rounded to the nearest whole ton. The emission reports are verified by third-party accredited entities (verifiers).⁷ Such reports are due on an annual basis according to the following timetable: stationary entities shall submit their GHG report to CARB by 10 April each year, while electric power entities shall do so by 1 June.

The fulfilment of the reporting obligation and the related issuance of the Positive Emissions Data Verification Statement from the verifiers is of utmost importance also with respect to the second main duty of the covered entity, i.e. the compliance obligation. In fact, the compliance obligation is exactly the quantity of verified reported emissions that the covered entity shall surrender to CARB by using the eligible compliance instruments (allowances).

With regard to these surrendering obligations, the following regime applies: there is an annual and a triennial compliance obligation and an annual and triennial-related surrender deadline. The annual compliance obligation for a covered entity equals 30 % of emissions with a compliance obligation reported from the previous data year that received a positive or qualified positive emissions data verification statement. The surrendering deadline for the annual compliance obligation is on 1 November of the year following that of reported emissions. The triennial compliance obligation for a covered entity is the sum of the reported GHG emissions during a compliance period minus the compliance instruments (allowances) already surrendered under the annual compliance obligation. The deadline to surrender these remaining compliance instruments is set at 1 November of the calendar year following the final year of the compliance period. As a consequence, in years 2015, 2018 and 2021, final years of the California ETS compliance periods, there is no annual compliance obligation for the preceding compliance period but only a triennial compliance obligation.⁸

Borrowing of compliance instruments is not allowed; therefore, in order to fulfil a compliance obligation, a compliance instrument must be issued from an

⁷In such a context, subarticle 2 of the cap and trade regulation, providing all the relevant definitions, specifies that: “*Positive Emissions Data Verification Statement*” means “*a verification statement issued by an impartial verification body attesting that the verification body can say with reasonable assurance that the covered emissions data in the submitted emissions data report is free of material misstatement and that the emissions data conforms to the requirements of MRR*”.

⁸Since the compliance periods are 2013–2014, 2015–2017 and 2018–2020, the triennial surrender will occur 1 November 2015, 2018 and 2021, respectively. More in detail, the following schedule applies with regard to the percentage of compliance obligations due: First compliance period: 1 November 2014 30 % of 2013 covered emissions and 1 November 2015 70 % of 2013 and 100 % of 2014 covered emissions. Second compliance period: 1 November 2016 30 % of 2015 covered emissions; 1 November 2017 30 % of 2016 covered emissions; 1 November 2018 70 % of 2015 and 2016 and 100 % of 2017 covered emissions. Third compliance period: 1 November 2019 30 % of 2018 covered emissions; 1 November 2020 30 % of 2019 covered emissions; 1 November 2021 70 % of 2018 and 2019 and 100 % of 2020 covered emissions.

allowance budget year within or before the year for which an annual compliance obligation is calculated or the last year of a compliance period for which a triennial compliance obligation is calculated. Each covered entity fulfils its compliance obligation by transferring the due amount of eligible compliance instruments from its holding account to its compliance account.

Finally, as it has already been pointed out above, it should be recalled that the CARB Executive Officer is the California ETS competent authority. As a consequence, it receives the covered entities applications for registration in the scheme, administers the ETS registry (CITSS), issues the compliance instruments and receives the compliance instruments surrendered by the covered entities under the compliance obligation.

2.1.4 Sanctions Against Non-compliant Entities

In case, the covered entity or the opt-in entity does not satisfy its compliance obligation and does not surrender the applicable amount of eligible compliance instruments in due time, a case of *untimely surrender* occurs and a sanction is associated to this violation. The sanction is calculated according to the *excess emissions*, i.e. the difference between the compliance obligation and the compliance instruments timely surrendered by the entity concerned (if any), and is equal to four times the entity's excess emissions (i.e. four allowances must be surrendered for each metric tonne not covered in due time). The untimely surrender obligation is due within five days of the first auction conducted by CARB following the applicable surrender date. In case the covered entity or opt-in entity fails to comply with the untimely surrender obligation, separate penalties apply according to the California's Health and Safety Code and other relevant laws.

2.1.5 The Allocation Regime of the California Allowances

2.1.5.1 Nature and Validity of the Compliance Instruments

Each compliance instrument can be used to fulfil a compliance obligation equivalent to one metric ton of CO₂ equivalent; therefore, it represents the right to emit up to one metric ton of CO₂ equivalent. Compliance instruments are issued by the Executive Officer of CARB. They are tradable and transferable.

More in detail, according to subarticle 4 of the ETS Regulation, the following ones are eligible to satisfy the covered or opt-in entity's compliance obligation: (1) California GHG Emission Allowances, issued by the CARB Executive Officer. The Executive Officer shall assign each California GHG allowance a unique serial number that indicates the annual allowance budget from which the allowance originates. In addition, the Executive Officer shall place these allowances into a

holding account under its control; (2) offset credits issued by CARB Executive Officer, who shall issue and register such CARB offset credits pursuant to the requirements of subarticles 13 and 14 of the ETS Regulation which will be analysed further on. The possibility to surrender CARB offset credits is subject to quantitative limitations.

2.1.5.2 The Regime for Offset Credits Under the California ETS

An offset credit is equivalent to a GHG reduction or GHG removal enhancement of one metric ton of CO₂ equivalent. As explained in the paragraph above, these credits are considered eligible compliance instruments and they shall be issued by the Executive Officer as a consequence of an offset generating project duly registered and listed within CARB.

Subarticle 13 of the ETS Regulation provides the regime applicable to offset projects and credits, as it is analysed more in detail below. Firstly, offset credits shall be issued only if generated by offset projects implemented according to an Approved Compliance Offset Protocol. Such Protocols shall be approved by CARB and shall satisfy the following requirements: determine the extent to which GHG emission reductions and GHG removal enhancements are achieved by the offset project type; establish data collection and monitoring procedures; establish a project baseline; ensure GHG emission reductions and GHG removal enhancements are permanent; establish the length of the crediting period; and establish the eligibility and additionality of projects using standard criteria, and quantify GHG reductions and GHG removal enhancements using standardised baseline assumptions, emission factors, and monitoring methods. So far, CARB has approved 5 Protocols on the following sectors: forestry; livestock; ozone depleting substances; urban forests and mine methane capture.

Secondly, offset projects generating offset credits must create GHG reductions or removals that are additional to business as usual, real, quantifiable, permanent, verifiable and enforceable. Therefore, the project proponent must monitor and report the GHG emission removals/reductions of its offset project. Such report will be verified by an independent accredited verifier.

Thirdly, a geographical requirement applies since the offset project must have a geographical boundary within the USA or its territories, Canada or Mexico.

Finally, once the conditions set above are fulfilled, the offset project has received a Positive Offset Verification Statement from the verifiers, the offset project operator has been registered with CARB and its related offset project has been listed by CARB, the Executive Officer will issue the offset credits generated by the project concerned. The CARB offset credit will have a unique serial number and may be transferred, traded or immediately surrendered for compliance with the California ETS. As a rule, offset credits can be used to fulfil the compliance obligation under the California ETS within a limited amount, namely to meet up to 8 % of the covered or opt-in entity total compliance obligation.

2.1.5.3 The Special Regime of Direct Allocation of the Allowances for Industry Assistance (Carbon Leakage), for Electrical Distribution Utilities and Natural Gas Distributors

In principle, the California allowances will be distributed to the covered or opt-in entities by means of auctioning. Notably, such allocation method is the most transparent and economic efficient one. Furthermore, it creates a certain shortage of allowances availability in the market, thus acting as a driver for the incumbent operators to improve their environmental performance through the adoption of green technology.

However, the auctioning method of allocation is subject to a few exceptions, providing a direct allocation free of charge for some sectors covered by the ETS. In fact, similarly to the other ETSs in force in other countries, the California ETS foresees a direct allocation for industrial sectors subject to risk of carbon leakage, electrical distribution utilities and natural gas distributors.

The direct allocation regime applicable to these sectors and the requirements and criteria to be fulfilled are spelled out in subarticle 9 of the California ETS Regulation. For industrial sectors subject to a carbon leakage risk, i.e. industries facing higher compliance costs (*emission intensive*) and suffering from higher competition from out-state production (*trade exposed*), which are therefore prone to a de-localisation of their production in foreign countries adopting laxer climate change policies and standards, free allocation is provided for purposes of industry assistance.

The sectors that are eligible for industrial assistance are listed in Table 8-1 of the ETS Regulation, while the relevant activities and products are listed in Table 9-1. Each eligible sector is further classified according to the level of carbon leakage risk faced, ranging from “*high*” to “*medium*” to “*low*” and consequently associated with an *industry assistance* factor, declining over the three compliance periods.⁹ For instance, while for sectors under a high risk of carbon leakage the industry assistance factor remains at 100 % throughout the three compliance periods, for the ones facing medium risk it lowers to 75 % in the second and 50 % in the third compliance period. On the contrary, for sectors facing a low risk of carbon leakage, the industry assistance factor immediately declines to 50 % in the second compliance period and reaches only 30 % in the third one.

The precise amount of allowances allocated free of charge to these sectors is calculated for each year of the compliance periods by the Executive Officer by means of two alternative methodologies, according to the type of sector and activity concerned. In particular, if an entity belongs to a sector eligible for free allocation under Table 8-1 and carries out an activity listed in Table 9-1, the amount of allowances is

⁹The following sectors are subject to a high risk of carbon leakage: oil and gas extraction, paper mills, chemical, glass and cement manufacturing, iron and steel mills. Sectors under medium risk include petroleum refineries and food, gypsum product, mineral wool and steel shape manufacturing. Finally, sectors with low risk are pharmaceutical, medicine, aircraft manufacturing and support activities for all transportation.

calculated by means of a product-output-based allocation calculation methodology. Conversely, if an entity belongs to a sector eligible for free allocation under Table 8-1 and carries out an activity not listed in Table 9-1, the amount of allowances is calculated upon an energy-based allocation calculation methodology. Section 95891 (b) and (c) provide a detailed formula for each of the two calculation methodologies. In brief, it may be said that both formulas are based on benchmarks. Notably, the benchmarks are based on the most efficient performance of the sectors concerned and reward the operators who come closer to the benchmark performance.

The second special regime, foreseeing direct allocation, is reserved to “*Electrical Distribution Utilities*”. These are entities that own and/or operate an electrical distribution system but do not generate electricity. The amount of allowances the Executive Officer shall allocate to this sector is 97.7 million metric ton multiplied by the cap adjustment factors specified in Table 9-2 multiplied by the allocation factors, expressed in percentage, set for each utility until 2020 in Table 9-3 of the ETS Regulation. Such amount is determined for each year of the compliance periods. These utilities may satisfy their remaining compliance obligation by buying the compliance instruments they need. However, a purchase limit for electrical distribution utilities is set at 40 % of the allowances offered for auction. The *ratio* of making these utilities benefiting from direct allocation is protecting retail ratepayers that would otherwise have to face the price of compliance costs. In fact, the allowances directly allocated are issued in a *limited use* account of their holder and a *monetisation requirement* is set by section 95892 (c)–(d) of the ETS Regulation.

2.1.5.4 The Regime for Auctioning of the Allowances

The regime for auction and sale of the allowances is set in subarticle 10 of the ETS Regulation that prescribes the timing, requirements, format and price minimum.

Firstly, with regard to the actors of the auctions, the Executive Officer may act as the Administrator of the auctions or appoint an entity serving as Administrator. At least 60 days prior to each auction, the Auction Administrator shall publish all the relevant information on the auction. Entities wishing to participate to the auction shall be registered within CARB with the status of covered entity. In addition, they shall fill in and submit the auction participant application providing all their information and relevant data. Moreover, they need to provide a bid guarantee at least 12 days prior to the auction.¹⁰

Secondly, with regard to the timing, a first auction was held on 14 November 2012, but from 2013 onwards auctions shall be conducted on the twelfth business day of the second month of each calendar quarter (quarterly auctions). Prior the

¹⁰The bid guarantee must be cash or in the form of an irrevocable letter of credit issued by a financial institution with a US banking license or a bond issued by a financial institution with a US banking license. The amount of the bid guarantee must be greater than or equal to the maximum value of the bids to be submitted.

auction, allowances due to be auctioned will be placed in the Auction Holding Account of the CITSS. An auction may include allowances from the current and previous budget years that remained unsold at previous auctions. Auctioning of allowances from future budget years is allowed as well, but allowances from future vintages will be auctioned separately from the current and previous ones.

Thirdly, with regard to the auction Bidding Format, the provision states the auction will consist of a single round, sealed bids submitted in whole US dollars and whole cents. A reserve price schedule is also set for each auction with the result that no allowances will be sold at bids lower than the auction reserve price. The auction reserve price for vintage 2013 allowances auctioned in 2012 was \$10 per allowance. For Advance Auctions conducted in 2012, the Reserve Price was \$10 per allowance for vintage 2015 allowances. From 2012, and each year thereafter, the Auction Administrator will announce the auction reserve price for auctions to be conducted the following calendar year on the first day in December that is a business day in California, calculated on the basis of the auction reserve price for the previous calendar year increased annually by 5 % plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers. Prior to the opening of the auction window on the day of the auction, the Auction Administrator shall announce the auction reserve price.

An auction purchase limit representing the maximum number of allowances offered at each quarterly auction that can be purchased by any entity or group of entities will apply to auctions conducted from 1 January 2012 through 31 December 2014. For the Advance Auction of future vintage allowances the purchase limit is 25 % of the allowances offered for auction, while for the auction of current vintage allowances it will be 15 % of the allowances offered for auction. Bearing in mind the special regime of direct allocation analysed above, it shall be recalled that the purchase limit for electrical distribution utilities will be 40 % of the allowances offered for auction. The purchase limit for all other auction participants is 4 % of the allowances offered for auction.

Finally, with regard to the conclusion of the auction and the notification of its results, the Executive Officer will review the conduct of the auction by the Auction Administrator and then certify whether the auction met the requirements described above. Afterwards, she will direct the Financial Services Administrator to notify each winning bidder of the auction settlement price, the number of allowances purchased, the total purchase cost, and the deadline and method for submitting payment. As previously clarified, borrowing of allowances is not allowed, while banking is allowed with some limitations in the California cap and trade system. In fact, a holding limit quantity, restricting the maximum number of allowances that an entity may bank at any time, is set and is based on a multiple of the entity's annual allowance budget.

Finally, it shall be reported that according to section 95870 of the ETS Regulation an *Allowance Price Containment Reserve* is created. Such reserve is established as a strategic means to contain costs and protect the ETS from excess price fluctuation. As a result, the Executive Officer shall transfer allowances to the

Allowance Price Containment Reserve, as follows: (1) 1 % of the allowances from budget years 2013–2014, (2) 4 % of the allowances from budget years 2015–2017 and (3) 7 % of the allowances from budget years 2018–2020.

2.1.6 The California Instruments Tracking System (CITSS)

Alike the other existing ETSSs, the Californian one relies on a registry to track all the issuances and subsequent transactions of the allowances. Indeed, the Compliance Instrument Tracking System Service (CITSS) is the country's tracking system devised to provide accounts for market participants for holding and retiring compliance instruments and to conduct transactions of compliance instruments with other registered account holders, ensuring transparency and reliability.

In brief, the CITSS is used to register entities participating in the California cap and trade programme, issue allowances and compliance offsets, track the ownership of compliance instruments, enable and record compliance instrument transfers, facilitate emissions compliance and support market oversight. According to sub-article 5 of the California ETS Regulation, the Executive Officer shall serve as CITSS Administrator at national level: each entity participating in the California ETS, fulfilling the requirements to be qualified as *covered entity* must register with CARB. The registration process has two steps: (1) application for a CITSS user ID and (2) once the applicant has been granted the CITSS user ID, application for an account. Moreover, any entity must designate a primary account representative and at least one and up to four alternate account representatives.

2.1.7 Carbon Pricing

Exchange-based trading of CCAs started in September 2011 with the introduction of derivatives contracts on the ICE and the Green Exchange. An overall amount of 3.927 million CCAs were exchanged, mostly through ICE's OTC platform. The total value of the CCA market in 2011 was estimated to be around US\$63 million. In the same year, the estimated amount of offset credits issued by CARB was even higher: 7.375 million tons of US domestic offsets, corresponding to US\$67.7 million value. A series of contracts have emerged on the market, according to the different expiration dates of the allowances and/or the different kind of assets and emissions curbing projects they refer to.

Figure 2.1 below shows the inter-temporal evolution of the price of these different allowances. As the figure shows, while the 2013–14 vintage¹¹ prices were

¹¹The term “vintage year” refers to the first calendar year for which the allowance may be used for compliance.

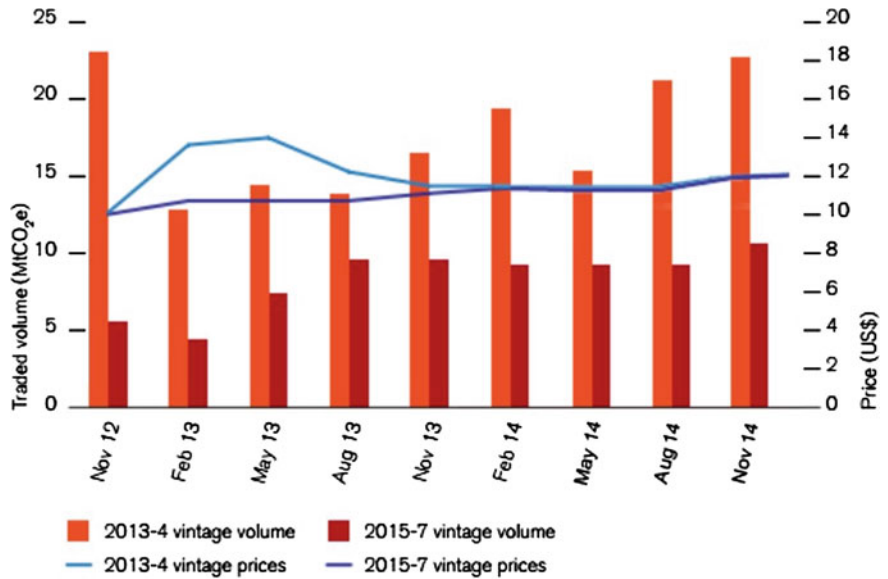


Fig. 2.1 Price of allowances auctioned and traded volumes in the primary market in California cap-and-trade programme. *Source* Author’s own elaboration from World Bank (2014), updated on the basis of California Environmental Protection Agency data (<http://www.ecofys.com/files/files/world-bank-ecofys-2014-state-trends-carbon-pricing.pdf>)

initially rather volatile, from November 2013 onwards the prices of all kinds of allowances stabilised around US\$12.

As already stressed above, differently from the EU ETS, the Californian ETS has set a minimum price level for its allowances. In fact, the reserve emissions allowance unit price has been set at US\$10/unit in 2012, increasing 5 % per year plus inflation rate to be specified. As a consequence, the price floor has been set to US\$10.71 in 2012, US\$11.34 in 2014 and US\$12.10 in 2015 (CARB 2015). As it emerges from Fig. 2.1 and column 5 of Table 2.1 below, the prices of Californian allowances basically moved along the price floor over these years.

2.1.8 Auction Revenues and Incentives to Environment-Friendly Technologies

Differently from the EU ETS, which has spurred a vast and growing literature on its impact on environment-friendly innovations and technological improvements, such data are so far generally unavailable for other ETSs outside the European Union. Therefore, it is impossible to perform a similar study for those systems. This applies to both US systems analysed in the present Report (namely, California cap and trade and RGGI).

Table 2.1 Compliance cost assessment

Auctions	CCAs 2013 sold	Future CCAs sold	CCAs 2013 selling price	Future CCAs selling price	Purchasing CCAs costs
Auction 1	23126110	5576000	10.09	10	289102449.9
Auction 2	12924822	4440000	13.62	10.71	223588475.6
Auction 3	14522048	7515000	14	10.71	283794322
Auction 4	13865422	9560000	12.22	11.1	275551456.8
Auction 5	16614526	9560000	11.48	11.1	296850758.5
	CCAs 2014 sold	Future CCAs sold	CCAs 2014 selling price	Future CCAs selling price	Purchasing CCAs costs
Auction 6	19538695	9260000	11.48	11.38	329683018.6
Auction 7	16947080	4036000	11.5	11.34	240659660
Auction 8	22473043	6470000	11.5	11.34	331809794.5
Joint Auction 1	23070987	10787000	12.1	11.86	407092762.7
	CCAs 2015 sold	Future CCAs sold	CCAs 2015 selling price	Future CCAs selling price	Purchasing CCAs costs
Joint Auction 2	73610528	10431500	12.21	12.1	1025005697
Joint Auction 3	76931627	9812000	12.29	12.1	1064214896
Joint Auction 4	73429360	10431500	12.52	12.3	1047643037

Source Authors' own elaboration based on California Environmental Protection Agency data (http://www.arb.ca.gov/cc/capandtrade/auction/auction_archive.htm)

While this lack of data prevents a robust econometric analysis on this issue for non-EU countries, it is still possible to make some considerations on the incentives to adopting new technologies and production systems deriving from the non-EU ETS through the use of the auction revenues.

In fact, the expected auction revenues reported by the California's Department of Finance in its 2012–2013 budget were approximately equal to US\$1 billion. Half of this amount was used to cover the State's costs related to GHG mitigation activities, while the other half were invested in clean and efficient energy, low-carbon transportation, natural resource protection and sustainable infrastructure development. Differently from other ETS schemes that have experienced high volatility in the auction revenues (cf. the case of the RGGI described in the next section), the Californian ETS raised a rather stable amount of revenues during the first eight auctions (those concerning California alone). More precisely, revenues were always above US\$200 millions, ranging between US\$223.5 billions and US\$331.8 billions (see Fig. 2.2). Results turned out to be remarkably different once California linked with Quebec. During the first four joint (California and Quebec) auctions, revenues increased significantly rising above US\$400 millions in the first joint auction held in November 2014 and stabilising at more than US\$1,000 millions in the following three joint auctions (see Fig. 2.2). The observed increase in the auction revenues is

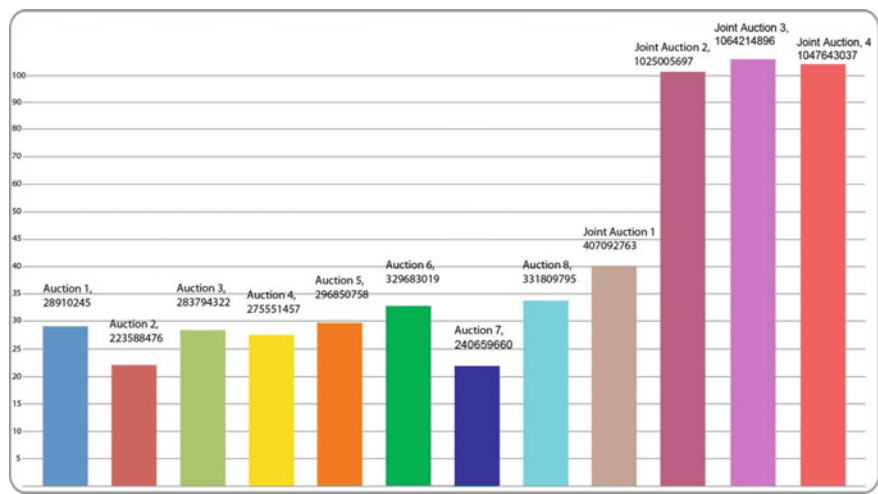


Fig. 2.2 Auctions revenues deriving from past auctions. *Source* Authors’ own elaboration based on California Environmental Protection Agency data (http://www.arb.ca.gov/cc/capandtrade/auction/auction_archive.htm)

likely to reflect the initial enthusiasm of the operators for the larger market size deriving from the linking of the Californian and Quebec ETSs. Since auction revenues are destined to alternative sources and energy efficiency projects, their stabilisation around such high levels may play a crucial role in spurring investments in alternative technologies and it can reduce the uncertainty that often prevents firms from investing in new and less polluting (but initially more costly) technologies that need a few years to become profitable.

2.1.9 Compliance Cost Assessment

During the first three auctions, Californian compliant entities have incurred a total cost of around 800 millions \$. This result has been computed considering the amount of CCAs bought in 2013–2014–2015 and the different average clearing price for each kind of allowance (see Table 2.1). In such a context, it shall be noted that the CCAs 2013 auction price has been growing steadily and significantly (about 40 %) over the rather limited time span of the first three auctions. From Auction 4 (in August 2013), however, the current CCAs selling prices declined stabilising around 11.5\$ (see column 4 of Table 2.1), with a slight increase (up to the Auction 4 levels) in the two joint California–Quebec auctions. On the contrary, the future CCAs selling price has increased slowly but steadily (see column 5 of

Table 2.2 Facilities' emissions during the period 2008–2013 (data in CO₂-e metric tons/year)

Source category ^a	2008	2009	2010	2011	2012	2013
California facilities						
Cement plants	8,745,004	5,930,929	5,625,902	6,221,403	7,054,289	7,382,978
In-state electricity generation ^b	64,329,165	60,788,291	56,139,488	45,203,967	56,008,282	54,208,347
Other combustion sources ^c	10,522,295	9,226,370	9,077,145	9,819,263	11,257,856	11,276,608
Refinery and hydrogen plants	36,724,823	34,393,790	34,754,066	34,212,970	33,755,850	33,860,983
Oil and gas production	11,349,054	11,237,758	10,972,797	14,591,066	15,214,740	16,498,686
Total facilities	131,670,341	121,577,137	116,569,398	110,048,669	123,291,017	123,227,603

2011 data includes additional process emissions not required to be reported in 2008–2010. Process emissions are produced by chemical/physical reactions rather than combustion

^aFacilities are categorised in identical source categories across all years, which may cause shifts in emissions between categories compared for previously posted 2008–2010 data

^bCategory includes cogeneration power plants. Out-of-state electricity generation sources were excluded from the 2008–2010 historic data to maintain consistency with the current version of MRR, which does not require reporting by out-of-state electricity generators

^cOther combustion sources represent facilities with primarily combustion emissions, although they may also include relatively small amounts of “process” emissions, which are typically GHG emissions resulting from chemical reactions (versus fuel combustion or fugitive emissions)

Source California Air Resources Board (2015)

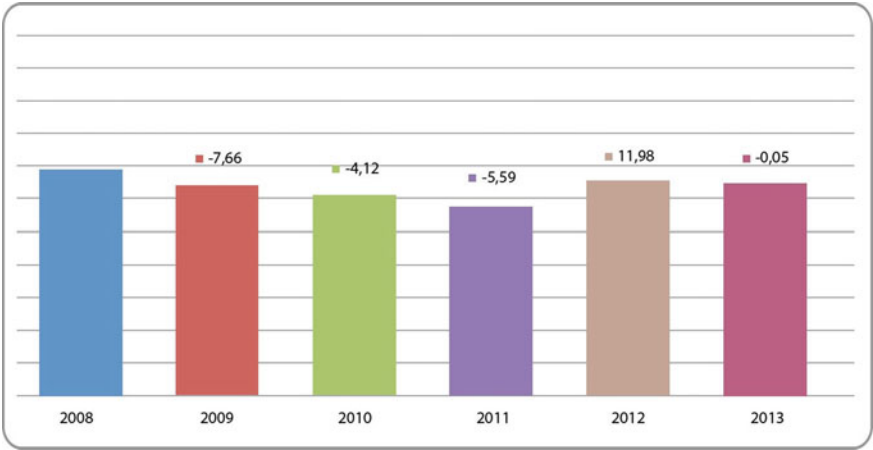


Fig. 2.3 Californian CO₂ equivalent annual emissions trend during the period 2008–2013. *Source* Authors’ own elaboration on the basis of California Air Resource Board (2015). *Legend* Numbers reported in the figure refer to annual rate changes as compared to previous year

Table 2.1), basically eliminating the increasing gap between the current and future prices that had emerged in the first three auctions.

2.1.10 Environmental Performance: Preliminary Evaluation

CARB (2015) has recently updated its environmental performance report extending the observation period up to 2013. The report allows to better evaluate the potential environmental effectiveness of the Californian ETS, although it is important to bear in mind that a possible correlation between ETS application and CO₂ reduction obviously gives no indication on the direction of causality. On the basis of data currently at disposal, it seems reasonable to argue that the Californian climate change mitigating policy has produced a positive effect during the 2008–2011 period, in terms of a continuous reduction of the yearly total CO₂ equivalent emissions (cf. Table 2.2 and Fig. 2.3 below). CARB underlines that the observed decrease in the electricity generation emissions during the 2008–2011 period reflects lower Californian electricity emissions due to increased nuclear energy and renewable energies (hydro, solar, wind) production, as well as a decrease in energy consumption and a slight increase in electricity imports.

In 2012, emissions started increasing again (by about 12 % as compared to the previous year) going back to the 2009 levels, and in 2013 they levelled-off around 123 millions tons. The emissions recovery in 2012–2013 is likely to reflect the economic recovery experienced in those years, so that the scale effect deriving from

the Californian economic growth¹² more than counterbalanced the technological effect induced by increasing allowance prices.

2.2 The Regional Greenhouse Gas Initiative (RGGI)

2.2.1 Introduction

The RGGI is a *CO₂ Budget Trading Program*¹³ established as a result of a Memorandum of Understanding signed in 2005 by a group of 10 US States wishing to establish a cap and trade programme covering the power sector. It started in 2009 and, although quite limited in scope, represents the first cap and trade experience in the USA. After the withdrawal of New Jersey in 2011, it currently applies to 9 US States (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont). The RGGI is regulated by a framework legislation represented by the Model Rule adopted by all the participating States. Such legislation provides the basic principles, procedures and rules for the establishment, functioning and implementation of the RGGI. The Model Rules provide guidance to participating States for the ETS implementation. In fact, each of them is required to implement the Model Rule's prescriptions within its jurisdictions by means of own statutory and/or regulatory tools. The original Model Rule, released in 2006 as a result of the 2005 Memorandum of Understanding between the Parties involved in the RGGI, was amended in February 2013, in order to review and strengthen the ETS.

The RGGI sets an overall multi-state-wide cap on the CO₂ allowances to be apportioned among the participating States, which then allocate them to the covered installations. Currently, it covers 163 facilities distributed in the territory of the participating States. The peculiarity of the RGGI is that it is composed of 9 individual *budget trading programmes* implemented by the participating States in the framework of the Model Rules adopted by all of them. Therefore, consistency with the Model Rules ensures uniformity of the ETSs' rules, targets, procedures, standards and applicability throughout the entire RGGI territory. This section focuses on the Model Rules contents as amended in February 2013, by analysing the framework rules and mechanisms for the functioning of the RGGI that provide the compulsory basis for the regional budget programmes.¹⁴

¹²In 2012 and 2013, the Californian GDP grew by 3.5 and 3.6 %, respectively (JP Morgan Chase & Co. 2014).

¹³The definition of “*CO₂ Budget Trading Program*” is provided in section XX-1.2 of the Model Rule, stating that it is: “*A multi-state CO₂ air pollution control and emissions reduction program established pursuant to this Part and corresponding regulations in other states as a means of reducing emissions of CO₂ from CO₂ budget sources*”.

¹⁴As already mentioned above with regard to the California cap and trade programme, the RGGI cap and trade scheme could be affected, in the medium–long term, by the (announced) new US

2.2.2 The RGGI: Main Scope, Purpose, Structure and Features

Compared to other existing ETs, the RGGI is characterised by a narrower scope of applicability, with regard to both sectors and GHG coverage. In fact, RGGI is very sector-specific since it only applies to fossil fuel-fired power plants with a name-plate capacity equal or greater than 25 MW burning more than 50 % fossil fuels located in the USA. These facilities represent the regulated sources and are named *CO₂ budget units* or *CO₂ budget sources* (if comprising one or more units, like fossil fuel-fired stationary boilers, combustion turbines or combined cycle systems). The only GHG covered by RGGI is CO₂.

As to the RGGI's purpose, this is initially to stabilise (in the period 2009–2014) and then reduce CO₂ emissions from the CO₂ budget sources (i.e. the power plants falling under its scope) in an economic efficient manner. More in detail, it sets the target of progressively reducing the CO₂ emissions of a linear factor of 2.5 % each year, starting from 2015, with the aim to achieve a 10 % CO₂ emission reductions compared to 2009 levels by 2018. To this end, it imposes to the covered facilities the duty to apply for a CO₂ budget permit, perform monitoring and reporting of their CO₂ emissions and, at the end of each compliance period (named *control period*), surrender an amount of allowances corresponding to their emission as duly monitored, reported and verified by an independent auditor.

The scheme is structured in three years of control periods, commencing on 1 January and ending on 31 December each, divided as follows: 1st control period: 2009–2011, 2nd control period: 2012–2014 and 3rd control period: 2015–2017. The surrendering duty shall be fulfilled at the end of each of the control periods and offset allowances may be used for compliance purposes, albeit with some restrictions.

2.2.3 Duties of the Covered Operators and Competences of the Regulatory Agency

The duties of the operators subject to the RGGI are spelled out in XX-2, 3, 4 and 8 of the Model Rule. These may be summarised by reference to the following requirements which shall be fulfilled in chronological order: (1) authorisation requirements with regard to the account representative; (2) permit requirements; (3) monitoring, reporting and compliance certification requirements; (4) record-keeping requirements; and (5) CO₂ surrendering requirements.

(Footnote 14 continued)

approach towards climate change policies and measures, as contained in the November 2014 US–China Joint Declaration.

The first requirement regards the authorisation requirements concerning the account representatives. In general terms, it should be noted that the *condicio sine qua non* for a covered entity to perform its activity is to apply for a CO₂ budget permit. However, in order to be eligible for such permit, a CO₂ budget source authorised account representative (AAR) shall be appointed for each of the budget sources covered by the RGGI. The AAR shall be selected upon agreement between the operator and the owner/s of the CO₂ budget source and shall be legally responsible for representing, binding and acting on behalf of the CO₂ budget source. An alternate account representative may be also appointed. The formal appointment of the AAR is made by submitting to the Regulatory Agency, i.e. the Environmental Protection Agency (EPA), an *account certificate of representation* providing all the details to identify the CO₂ budget source, its operator/s and the AAR. No CO₂ permit can be issued and no allowance trading can be made until an account certificate of representation is received by EPA.

Once the AAR has been designated, the second requirement to be fulfilled pertains to the CO₂ budget permit, since none of the covered activities may be operated without such permit. The AAR is responsible for filing the permit application to EPA, 12 months before the CO₂ budget source commences its activities. The permit shall include a CO₂ emissions monitoring plan.

The third (and core) requirement of the covered installations pertains to the monitoring, reporting and compliance certification duties. Indeed, the monitoring and reporting activities are of utmost importance since they shall be used by EPA to determine the budget source's compliance with the CO₂ surrendering requirements. Monitoring of the CO₂ emissions must be performed according to section XX-8 of the Model Rule, as well as according to sections 40–part 75 of the Code of Federal Regulations (CFR). The AAR shall submit to EPA quarterly monitoring reports covering each calendar quarter, supported by a compliance certification ensuring that all emissions have been correctly and fully monitored.¹⁵ Furthermore, Model Rule section XX-4.1 prescribes that for each control period (i.e. every three years), by 1 March following the control period concerned, the AAR shall submit to EPA a compliance certification report.¹⁶ The implementation of the duties described so far are integrated by a record-keeping requirement, which provides that the owners and

¹⁵The Model Rule, section XX-8-5(3) with regard to the compliance certification states: “*The CO₂ authorized account representative shall submit to the REGULATORY AGENCY or its agent a compliance certification in support of each quarterly report based on reasonable inquiry of those persons with primary responsibility for ensuring that all of the unit’s emissions are correctly and fully monitored. The certification shall state that: (i) The monitoring data submitted were recorded in accordance with the applicable requirements of this Subpart and 40 CFR part 75, including the quality assurance procedures and specifications (....)*”.

¹⁶The compliance certification report must have the following content: identification of the source and each CO₂ budget unit at the source; the serial numbers of the CO₂ allowances that are to be deducted from the source's compliance account for the control period, including the ones of any offset allowance used to this end; a compliance certification where the AAR shall certify, “*whether the source and each CO₂ budget unit at the source for which the compliance certification is submitted was operated during the calendar years covered by the report in compliance with the*

operators of the CO₂ budget source and each CO₂ budget unit must keep on site at the source a series of specific documents for a period of 10 years from the date the document is created.¹⁷

Finally, the CO₂ surrendering requirements must be fulfilled: to this end, the owners/operators of a CO₂ budget source must hold in the source's compliance account CO₂ allowances available for compliance deductions under Model Rule section XX-6.5 in an amount not less than the total CO₂ emissions for the control period. In other terms, at the end of each control period the covered entities' operators shall surrender to EPA a number of CO₂ allowances corresponding to the CO₂ emissions generated by their facilities throughout the control period concerned.

The general compliance procedure is spelled out by section XX-6.5 of the Model Rule and is described hereinafter. Preliminarily, with regard to the CO₂ allowance deadline, it should be mentioned that the allowances due for compliance purposes shall be subject to *recordation*,¹⁸ i.e. transfer within the facility's compliance account, on 1 March occurring after the end of the control period. This duty is implemented by the AAR in the broader context of the submission of the compliance certification report.

The CO₂ allowances are held in the CO₂ budget source's compliance account or are transferred into the compliance account by a CO₂ allowance transfer correctly submitted for recordation under section XX-7.1 of the Model Rule by the CO₂ allowance transfer deadline for that control period. In brief, it may be said here that the deduction is made by the Regulatory Agency that will deduct the amount of allowances available in the CO₂ budget source compliance account to cover its related control period emissions until such amount equals the number of tons of total CO₂ emissions for the control period.

The AAR may request in the compliance certification report that specific CO₂ allowances, identified by their serial number, shall be deducted first. In the absence of any such request the Regulatory Agency will conduct a default compliance deduction taking CO₂ offset allowances first and CO₂ allowances other than offset ones secondly.¹⁹ In both cases, for offset and non-offset allowances, a chronological order will apply, i.e. CO₂ offset/non-offset allowances from earlier allocation years

(Footnote 16 continued)

requirements of the CO₂ Budget Trading Program"; whether all CO₂ emissions from the units at the source were monitored or accounted and reported in the quarterly monitoring reports.

¹⁷The documents subject to the record-keeping requirement are the following: the account certificate of representation for the AAR; all emissions monitoring information; copies of all reports, compliance certifications and other submissions and all records made or required under the CO₂ Budget Trading Program; copies of all documents used to complete a CO₂ budget permit application and any other submission to demonstrate compliance with the requirements of the CO₂ Budget Trading Program.

¹⁸According to Model Rule section XX-1.2, "*recordation*" is the movement of CO₂ allowances by the Regulatory Agency or its agent from one COATS account to another for purposes of allocation, transfer or deduction for compliance.

¹⁹"Non-offset" allowances are RGGI allowances not generated by offset project, differently from "offset" allowances, which are project-based.

shall be deducted before those from later allocation years. Moreover, in the event that some, but not all, CO₂ offset/non-offset allowances from a particular allocation year are to be deducted, these shall be deducted by serial number, with lower serial number allowances deducted before higher serial number allowances. In case there are insufficient allowances to complete the deductions, a deduction for excess emissions will apply, as it is analysed in the following paragraph dealing with the sanctions.

As it emerges from all the above, the duties to be implemented by the AAR/operator described so far are mirrored by a series of competences belonging to EPA. In fact, EPA is competent for issuing the CO₂ permits, receiving the monitoring reports, making possible inspections and conduct audits as well as reviewing the reporting certifications, and, finally, issuing the sanctions envisaged by the Model Rule in case of excess emissions.

2.2.4 Sanctions Against Non-compliant Operators

In case the CO₂ budget source operator contravenes the obligation to hold, at the end of each control period, a number of allowances equal to the facility's CO₂ emissions monitored and reported in the period concerned, a violation of the Model Rule and of the implementing regulatory and statutory rules of the participating RGGI State occurs. Each ton of CO₂ emission not covered by any eligible allowance (offset and non-offset) represents an excess emission and makes the operator liable to a penalty issued by the competent State.

However, the Model Rule determines a general sanction in section XX-6.5, by stating that the Regulatory Agency or its agent will deduct from the CO₂ budget source's compliance account a number of CO₂ allowances, from allocation years that occur after the control period in which the source has excess emissions, which equal three times the number of the source's excess emissions. In the event that a source has insufficient CO₂ allowances to cover three times the number of the source's excess emissions, the source shall be required to immediately transfer sufficient allowances into its compliance account. No CO₂ offset allowances may be deducted to account for the source's excess emissions. Such a sanction shall not affect the liability of the owners and operators found in breach for any other fine, penalty, or assessment, nor their obligation to comply with any other remedy, for the same violation, as ordered under the applicable State law.

2.2.5 The Allocation Regime of the RGGI Allowances

2.2.5.1 Nature and Validity of the Allowances

Each allowance represents the limited authorisation issued by the Regulatory Agency to emit one ton of CO₂. Allowances may be transferred and traded

according to the rules on recordation that will be analysed in greater detail in the COATS paragraph. The types of allowances eligible for compliance purposes are RGGI allowances and offset allowances. Each allowance has a unique serial number useful to identify it, its year of allocation and to track its movements occurred by means of the recordation activities.

2.2.5.2 The Regime for Offset Allowances Under the RGGI

As it has been already mentioned, the CO₂ budget sources may fulfil their compliance duty deducting both allowances and, with some constraints, offset allowances. Offset allowances are awarded²⁰ by the Regulatory Agency to sponsors of CO₂ emissions offset projects reducing or avoiding such emissions or generating carbon sequestration. CO₂ offset allowances represent CO₂ equivalent emission reductions.

The regime applicable to offset projects and to offset allowances is spelled out in Model Rule section XX-10, which sets a series of eligibility requirements and other conditions to be fulfilled.

Firstly, only certain project types may be eligible to generate offset allowances that may be used within the RGGI.²¹

Secondly, a geographical limitation applies, since the offset project must be located in one of the 9 participating States or, alternatively, in any State or United States jurisdiction with which a cooperating Regulatory Agency has entered into a Memorandum of Understanding.

Thirdly, a *project sponsor*, responsible for all the activities and duties related to the offset project, must be appointed.

Fourthly, the CO₂ emission reductions generated by the offset project must be real, additional, verifiable, enforceable and permanent. To this end, the offset project must not have been required pursuant to any local, State or federal law, regulation or legal order, and it must generate CO₂ emission reductions that would not occur in the absence of the offset project. Moreover, an offset project audit must be provided, in order to verify the project-based CO₂ emission reductions. In such a context, the project sponsors must provide, in writing, an access agreement to the Regulatory Agency granting its access to the physical location of the offset project to inspect it for compliance purposes. Additionally, as it is further explained below,

²⁰Award is the determination by the Regulatory Agency of the number of CO₂ offset allowances to be recorded in the general account of a project sponsor pursuant to Model Rule section XX-10.7. Award is a type of allocation.

²¹The project types eligible to generate offset allowances are the following ones: landfill methane capture and destruction; reduction in emissions of sulphur hexafluoride (SF₆); sequestration of carbon due to reforestation, improved forest management or avoided conversion; reduction or avoidance of CO₂ emissions from natural gas, oil or propane end-use combustion due to end-use energy efficiency; and avoided methane emissions from agricultural manure management operations.

a verification of the CO₂ emissions avoided or sequestered by the project must be performed by third-party independent verifiers.

Finally, projects including an electricity generation component or receiving funds or incentives through the *consumer benefit or strategic energy purpose allocation* regulated by Model Rule subdivision XX-5.3(b) are not eligible as offset projects under the RGGI.

Offset projects have a crediting period of 10 years that may be renewed by the Regulatory Agency upon application of the project sponsor. A detailed procedure is envisaged by Model Rule XX-10-4 for the offset project application.

As already pointed out above, offset allowances may be used for compliance purposes with some limitations. In fact, the number of CO₂ offset allowances that are available to be deducted in order to comply with the CO₂ requirements for a control period may not exceed 3.3 % of the CO₂ budget sources CO₂ emissions for that control period. In principle, the possibility given to operators to comply with their targets also by means of offset allowances aims at giving them a certain degree of flexibility in meeting their obligations, providing a higher range of choices with regard to the means of compliance, while at the same time ensuring the achievement of CO₂ emission reductions through project-based activities.

2.2.5.3 The Regime for Auctioning of the Allowances

CO₂ allowances are issued by each RGGI participating State's Regulatory Agency in an amount determined by each of their applicable statute/regulation, within the total RGGI cap. Each of the participating State's legislation also prescribes the modalities for taking part to the regional auctions of the allowances that are held quarterly. Allocation rules may vary from State to State, but a general non-negotiable rule is set by Model Rule section XX-5.3, requiring that a minimum of 25 % of each participating State's CO₂ allowance budget shall be allocated to the *consumer benefit or strategic energy purpose set-aside account*. This is a general account established by the Consumer Benefit or Strategic Energy Purpose Fund Administrator from which allowances will be sold or distributed in order to provide funds to encourage and foster the following fields: promotion of energy efficiency measures, direct mitigation of electricity ratepayer impacts attributable to the implementation of the RGGI, promotion of renewable or non-carbon-emitting energy technologies, stimulation or reward of investment in the development of innovative carbon emissions abatement technologies with significant carbon reduction potential, and/or the administration of the participating States' CO₂ Budget Trading Program.

Beside this general allocation rule, another general allocation mandatory provision is set by Model Rule with regard to Cost Containment Reserve (CCR) allocation. CO₂ CCR allowances are offered for sale at an auction by the Regulatory Agency for the purpose of containing the cost of CO₂ allowances. They

are separate from (and additional to) CO₂ allowances allocated from the participating States' "base" budget. A CCR trigger price, representing the minimum price at which CO₂ CCR allowances are offered for sale by the Regulatory Agency or its agent at an auction, is set at US\$4.00 per CO₂ allowance in calendar year 2014, US\$6.00 in calendar year 2015, US\$8.00 in calendar year 2016, and US\$10.00 in calendar year 2017. In each calendar year thereafter, the CCR trigger price shall be 1.025 multiplied by the CCR trigger price from the previous calendar year, rounded to the nearest whole cent.

The general rules applicable to the auctioning of allowances are laid down in Model Rule subpart XX-9. Additional elements, regarding for instance the time and location of the auction or the registration deadlines, may be specified by the Regulatory Agency in the auction notice of each auction, following the general requirements that represent the minimum standards to be included in the auction notice.

Banking of allowances is envisaged, since Model Rule section XX-6.6 provides that: *"Each CO₂ allowance that is held in a compliance account or a general account will remain in such account unless and until the CO₂ allowance is deducted or transferred"*.

2.2.6 The RGGI CO₂ Allowance Tracking System (COATS)

The establishment of an electronic system to register the allowances issued and to track their transfers is a necessary feature common to all existing ETSs around the world. Indeed, it enables the authority in charge to administer the ETS, to keep record and trace all the issuance and movements (*recordations*) of the allowances in a reliable and accountable manner.

The RGGI CO₂ Allowance Tracking System is called COATS and is managed by the Regulatory Agency. As already pointed out above, a prerequisite for any operator to be eligible for a RGGI permit is to be registered with an account within COATS. Compliance accounts and general accounts, the former ones used for CO₂ requirements compliance purposes, the latter ones used for holding and transferring allowances, may be opened following the procedure of application to the Regulatory Agency already analysed above.

2.2.7 Carbon Pricing

As explained above, participating States receive their share of allowances from the overall cap. Each State sells 75 % of emission allowances through auctions. The remaining 25 % of allowances will be used for a public benefit purpose, such as promoting renewable energy and energy efficiency, or mitigating possible increases in consumer energy prices.

Tables 2.3 and 2.4 below describe the allowances allocation by States after the first and the second control periods, respectively.

As the last row of Table 2.3 shows, during the first control period the unsold allowances retired were almost one-fifth of the CO₂ allowances offered at auctions. The overall performance of the auctions, however, changed remarkably over time. More precisely, as described in Fig. 2.4, the first eight auctions of the RGGI ETS were characterised by a substantial equilibrium between current allowances offered and sold. On the contrary, from the 9th to the 18th auction (except the 11th) the RGGI system has experienced an oversupply of current allowances compared to the real demand. In the period 2012–2013, the supply of allowances was estimated to be about 140 millions above the cap established for the period 2009–2013 (cf. RGGI 2014). This situation adversely affected the auction revenues, which tended to decrease and, in any case, turned out to be lower on average in the period September 2010–March 2013 than those deriving from the first 8 auctions (see Fig. 2.5). To manage the overallocation problem, in February 2013 the regulation authority adjusted the cap by adopting the so-called new model rule.²² As a result, the following auctions (from the 19th onwards) showed again an equilibrium and a rise in the corresponding revenues. The alternation of equilibrium and disequilibrium periods, together with the high volatility of the auction revenues over the observed period, is likely to reflect rapid changes in the facilities' activity production as well as in their expectations on their future need of this instrument for production and/or speculative reasons. This seems to confirm the volatility of the ETS markets already observed in other geographical areas (i.e. the EU ETS examined in Chapter 1 above) and for other kinds of pollutants (e.g. in the US SO₂ ETS market).²³

The oversupply observed in many auctions adversely affected the allowance unit average price, which followed a decreasing trend during these years. Differently from the EU ETS, but in line with the Californian ETS, RGGI sets a floor price in the allowance auctions, which is currently around US\$2/t CO₂ indexed to inflation.

In general, it can be claimed that the existence of a price floor in the auctions turned out to be effective because it prevented allowance prices from collapsing despite the overall surplus of allowances, so that the latter were generally traded at roughly the price floor during the overallocation period.

From September 2010 onwards, in fact, prices tracked the US\$1.86 floor price (US\$1.86 in 2010 and US\$1.89 in 2011). The share of secondary market exchange-based transactions collapsed from 85 % in 2009 to 6 % in 2011 (see Fig. 2.6), most of which were on a bilateral spot basis (World Bank 2012).

²²The current surplus of allowances is expected to be depleted over the remainder of the decade as a consequence of the proposed interim adjustments for banked CO₂ allowances (see http://www.rggi.org/docs/PressReleases/PR011314_AuctionNotice for further details on the proposed intervention).

²³With regard to the US SO₂ ETS market see Ellerman and Joskov (2008).

Table 2.3 Allowance allocation by States after first RGGI control period

State	CO ₂ allowance budget	Offered at auction	Sold at auction	Sold at fixed price	Transferred from State set-aside accounts	Early reduction allowances (ERAs)	Offered but unsold at auction	Remaining set-aside allowances	Set-aside allowances retired ^c	Unsold allowances retired ^d
Connecticut	32,085,108	29,549,635	22,953,057	221,278	601,834	198,231	–	1,390,355	322,006	6,596,578
Delaware ^a	22,679,361	12,958,576	9,952,619	–	6,098,153	3,128	–	–	3,622,632	3,005,957
Maine	17,846,706	14,971,146	11,797,376	–	2,518,615	–	3,173,770	353,773	3,172	–
Maryland	112,511,949	95,225,672	74,943,417	–	–	217,703	487,284	6,381,500	10,904,777	19,794,971
Massachusetts	79,980,612	78,855,612	62,024,346	–	–	18,276	–	1,125,000	–	16,831,266
New HAMPSHIRE	25,861,380	18,360,928	14,479,101	–	7,500,000	1,064,718	3,881,827	–	452	–
New Jersey	68,678,190	61,375,032	46,266,477	5,655,178	982,173	113,469	–	–	665,807	15,108,555
New York	192,932,415	182,338,053	143,536,651	–	4,499,999	806,883	–	769,253	5,325,110	38,801,402
Rhode Island	7,977,717	7,974,349	6,270,050	–	–	–	–	–	3,368	1,704,299
Vermont	3,677,490	3,665,232	2,877,123	–	–	–	–	6,265	5,993	788,109
Total	564,230,928	505,274,235	395,100,217	5,876,456	22,200,774	2,422,408	7,542,881	10,026,146	20,853,317	102,631,137

^aIn Delaware, the percentage of CO₂ allowances allocated to auction shall increase by 8 % per year from 2009–2014, such that 100 % of CO₂ allowances shall be auctioned in 2014

^b2,422,408 early reduction allowances (ERAs) were awarded for the first control period

^cFor New York, the set-aside allowances retired column also includes New York's Behind-the-Meter Adjustments for 2009, 2010 and 2011

^dFor Connecticut, the unsold allowances retired column also includes CO₂ allowances that are intended to be retired

Source RGGI (2013) (<http://www.rggi.org>)

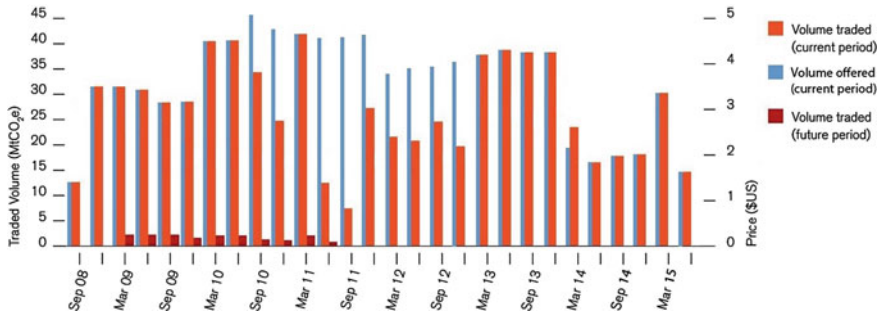


Fig. 2.4 Allowances offered and sold in auctions run during the period September 2008–June 2015. *Source* Authors' own elaboration from World Bank (2014) updated on the basis of Regional Greenhouse Gas Initiative data (<http://www.ecofys.com/files/files/world-bank-ecofys-2014-state-trends-carbon-pricing.pdf>)

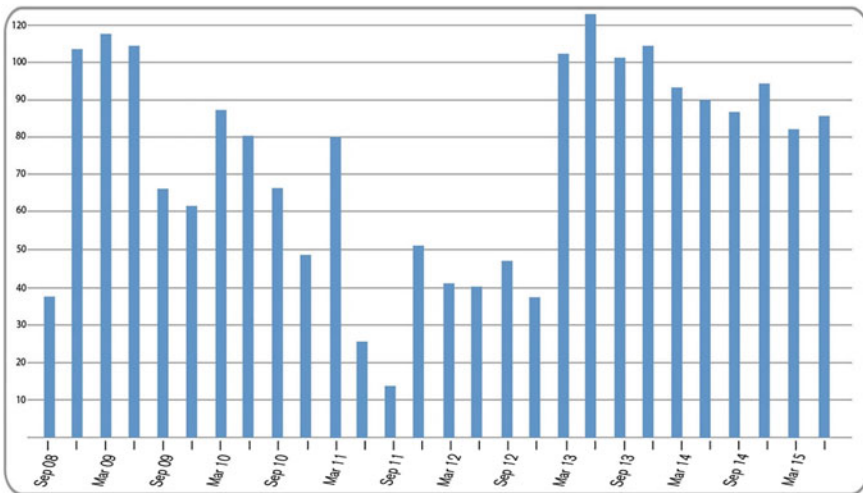


Fig. 2.5 Auction revenues in the period September 2008–June 2015. *Source* Authors' own elaboration based on Regional Greenhouse Gas Initiative data

The average daily volume of RGGI futures contracts listed on the Chicago Futures Exchange (CCFE) declined by a factor of 100 over the same period, from an average daily volume of 2.7 Mt CO₂ equivalent in 2009 to 0.28 Mt CO₂ equivalent in 2011.

After the regulatory intervention in 2013, however, average yearly prices recovered and kept growing reaching the peak level of 4.72 in 2014 (see Fig. 2.6). Market volumes also increased again after reaching their lowest level in 2012, although they remained far from the boom levels initially experienced in 2009.

Table 2.4 Allowance allocation by States after second RGGI control period

State	CO ₂ allowance budget	First control period Interim adjustment ⁱ	CO ₂ allowance adjusted budget	Offered at auction	Sold at auction ^{i,g}	Sold cost containment reserve (CCR) allowances ^j
Connecticut	27,281,967	531,969	26,749,998	26,181,640	22,091,336	323,731
Delaware ^a	19,184,261	375,603	18,808,658	14,869,032	12,720,378	228,829
Maine	15,175,054	295,567	14,879,487	12,448,488	10,410,958	180,069
Maryland ^{b,e}	95,368,910	1,863,361	93,505,549	87,951,051	74,104,427	1,135,217
Massachusetts	67,807,514	1,324,595	66,482,919	66,085,825	55,524,192	806,984
New Hampshire ^c	21,989,931	428,302	21,561,629	17,060,240	14,269,514	260,935
New York ^d	163,850,432	3,195,240	160,655,192	151,138,024	126,818,004	1,946,639
Rhode Island	7,603,453	132,122	7,471,331	7,421,068	6,363,649	80,491
Vermont	3,106,970	60,905	3,046,065	3,015,605	2,528,167	37,105
Total ^{i,g}	421,368,492	8,207,664	413,160,828	386,170,973	324,830,625	5,000,000
State	Sold at fixed price	Offered but unsold at auction ^h	Transferred from State set-aside accounts	Remaining set-aside allowances ^f	Set-aside allowances retired ^{b,d}	Unsold allowances retired ^e
Connecticut	0	4,090,304	211,545	0	356,813	0
Delaware ^a	N/A	2,148,654	1,524,538	0	2,415,088	0
Maine	N/A	2,037,530	2,094,433	336,566	0	0
Maryland ^{b,e}	1,600,000	13,846,624	0	1,600,000	2,354,498	0
Massachusetts	N/A	10,561,633	0	0	397,094	0
New Hampshire ^c	N/A	2,007,922	4,500,000	0	1,389	782,804

(continued)

Table 2.4 (continued)

State	Sold at fixed price	Offered but unsold at auction ^b	Transferred from State set-aside accounts	Remaining set-aside allowances ^f	Set-aside allowances retired ^{b,d}	Unsold allowances retired ^e
New York ^d	N/A	24,320,020	4,500,000	1,082,934	3,934,234	0
Rhode Island	N/A	0	0	22,850	27,413	1,057,419
Vermont	N/A	0	0	24,913	20	487,438
Total ^{f,g}	1,600,000	59,012,687	12,830,516	3,067,263	9,486,549	2,327,661

^aIn Delaware, the percentage of CO₂ allowances allocated to auction shall increase by 8 % per year from 2009–2014, such that 100 % of CO₂ allowances shall be auctioned in 2014

^bFor Maryland, the set-aside allowances retired column also includes CO₂ allowances that will be retired in accordance with deadlines in Maryland regulations
^cFor New Hampshire, the unsold allowances retired column includes 260,935 CO₂ allowances that were converted into 2014 Cost Containment Reserve (CCR) allowances plus 521,869 CO₂ allowances that were converted into 2015 CCR allowances

^dFor New York, the set-aside allowances Retired column also includes New York's Behind-the-Meter Adjustment for 2012 and 2013

^eMaryland distributed 154,302 allowance allocation year 2013 CO₂ allowances after 17 March 2014. These CO₂ allowances were not included in the Second Control Period Interim Budget Adjustment. Additional information available at <http://www.rggi.org/design>

^fIn addition to the figures above, New Jersey sold 1,058,403 allowance allocation year 2012 CO₂ allowances, 879,132 allowance allocation year 2013 CO₂ allowances, and 279,758 allowance allocation year 2014 CO₂ allowances. There are no other New Jersey allowance allocation year 2012, 2013, or 2014 CO₂ allowances in circulation

^gIn 2011, the nine States, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont, sold 2,807,952 allowance allocation year 2014 CO₂ allowances. 17,980,017 allowance allocation year 2014 CO₂ allowances were sold in Auction 23 and 18,062,384 allowance allocation year 2014 CO₂ allowances were sold in Auction 24 and 17,998,687 allowance allocation year 2014 CO₂ allowances were sold in Auction 25 and 18,198,685 allowance allocation year 2014 CO₂ allowances were sold in Auction 26

^hStates do not intend to reoffer CO₂ allowances in the offered but unsold at auction column. New Hampshire may convert some of these CO₂ allowances to Cost Containment Reserve allowances

ⁱOn 13 January 2014, the States announced the First Control Period Interim Adjustment for Banked Allowances (FCPIABA). The adjustment was applied to the 2014 CO₂ allowance budget. Additional information available at <http://www.rggi.org/design/overview/cap>

^jA total of 5 million 2014 Cost Containment Reserve (CCR) allowances were distributed in Auction 23. More information available at http://www.rggi.org/market/co2_auctions/results and at <http://www.rqai.org/design>

Source RGGI (2015)

http://www.rggi.org/docs/CO2AuctionsTrackingOffsets/Allocation/SCP_Allowance-Allocation.pdf



Fig. 2.6 Market volumes and prices on the RGGI during the 2008–2011 period. *Source* Authors' own elaboration from World Bank (2014) updated on the basis of Regional Greenhouse Gas Initiative data

2.2.8 Auction Revenues and Incentives to Environment-Friendly Technologies

In the case of RGGI, revenues from allowances, almost all of which are auctioned, go to State governments. Since their beginning in September 2008, RGGI auctions have raised about US\$2.1 billion revenues (see https://www.rggi.org/market/co2_auctions/results).

Most auction revenues have been invested by State governments in local renewable energy or energy efficiency projects, while roughly 1/5 of the revenues have been used for State deficit reduction, in accordance with the double-dividend purpose often underlying the adoption of ETS and other market-based environmental policy instruments (e.g. carbon tax).

More precisely, auction revenues have been allocated across all RGGI States as follows (see World Bank 2012):

- 48 % to energy efficiency programmes promoting new installations and retrofits in residential and commercial facilities (e.g. insulation)²⁴;
- 14 % to direct electricity bill assistance;
- 7 % to support renewable power generation;
- 11 % to various other environment-related programmes and outreach activities; and
- 20 % to States' general budgets.

It is important to emphasise that RGGI-funded energy efficiency investments have led to remarkable consumer gains, with an estimated net economic impact of about US\$1.6 billion and the creation of 16,000 new jobs (Hibbard et al. 2011). Such energy efficiency investments together with those in renewable energy sources, however, have also reduced the demand for RGGI allowances. This denotes the possible existence of a conflict between the use of ETS and that of energy efficiency/renewable energy policies that have been raised also within the context of the EU 20/20/2020 legislative package and is the object of current debate in the literature. In other words, improvements in energy efficiency/renewable energy policies may have a partial “crowding-out” effect on the ETS, reducing the demand (and thus also the price) of the allowances and thus weakening the role of the instrument itself.

Moreover, given the high volatility observed in the RGGI auction revenues and pointed out above, the actual money volume destined by State governments to renewable energy and energy efficiency projects might remarkably fluctuate over time if they are to rely on ETS revenues alone, thus possibly generating uncertainty on the support provided through the ETS to such alternative and innovative projects. For this reason, it seems advisable that additional and/or alternative government interventions take place to support renewables and energy efficiency beyond the ETS.

2.2.9 Compliance Cost Assessment

Entities who operate in RGGI system paid a total amount cost of about US \$1,133,521,353 billions to purchase allowances in the auctions during the 2008–2013 period. The average unit allowance price observed in this period has generally shown high volatility. In the first 4 auctions the average clearing price was around US\$3.30. In auctions 5 to 7, the average clearing price was about US\$2.10. From the 8th to the 18th auction, allowances were sold at an average price of about US \$1.90 before increasing to US\$3 in the following two auctions (see Fig. 2.7). Afterwards, prices kept growing rapidly, reaching the record evaluation of US\$5.5

²⁴This measure is estimated to have generated electricity bill savings of US\$1.3 billion for residential, commercial and industrial consumers across the participating States. Savings in non-electric energy supply (natural gas, heating oil) amount to an additional US\$174 million.

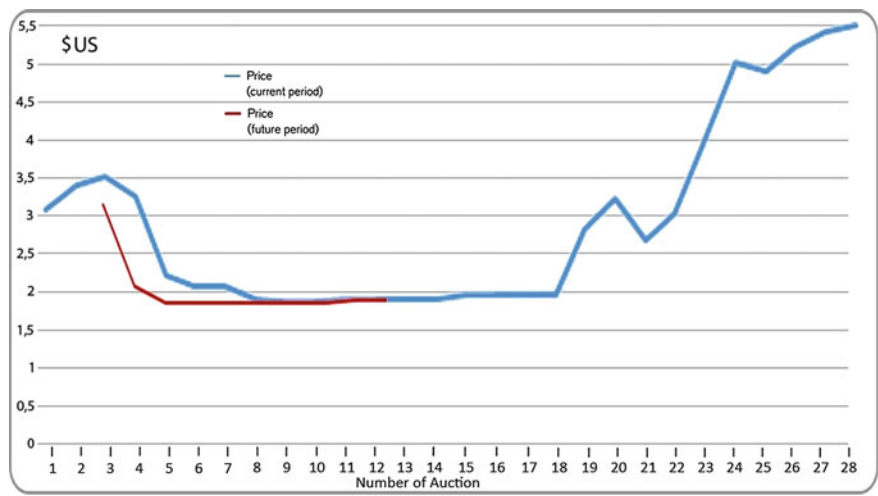


Fig. 2.7 Auction prices fixed during the September 2008–June 2015 period. *Source* Authors’ own elaboration based on Regional Greenhouse Gas Initiative data

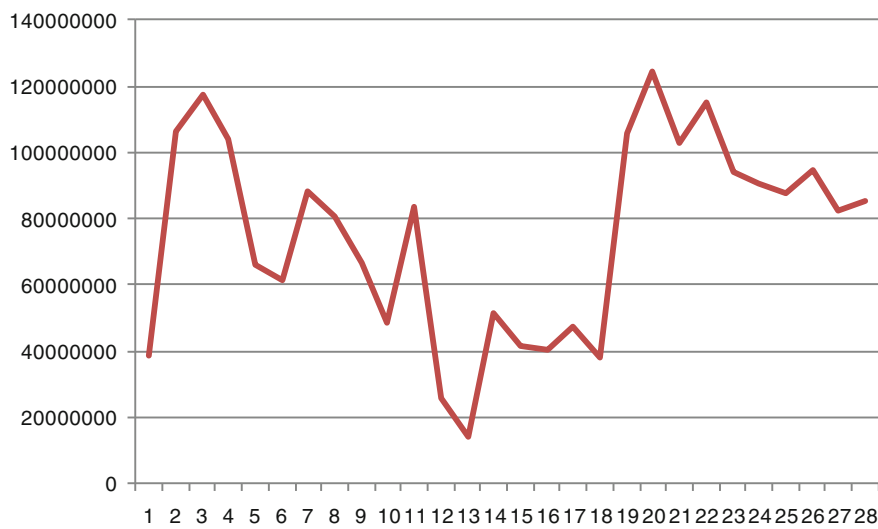


Fig. 2.8 Purchasing costs paid by compliant entities in auctions run in the period September 2008–June 2015. *Source* Authors’ own elaboration based on Regional Greenhouse Gas Initiative data. *Legend* Horizontal axis = progressive auction number, vertical axis = purchasing costs

at the last auction. This trend, which is strictly linked to the oversupply of allowances from the 9th to the 18th auction, implied also a volatility in the overall entities costs sustained by the entities to purchase the needed allowances and thus comply with the ETS requirements (see Fig. 2.8).

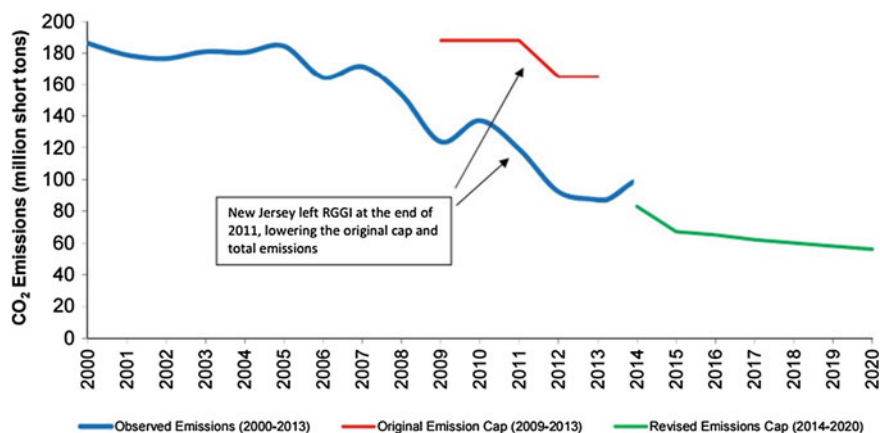


Fig. 2.9 Emissions trend in the RGGI States during the period 2000–2015. *Source* Authors' own elaboration from Congressional Research Service (2015), updated on the basis of Regional Greenhouse Initiative data

2.2.10 Environmental Performance: Preliminary Evaluation

During the first compliance period (2009–2011), emissions across the 10 participating States remained relatively stable, declining by only 2.7 million stCO₂ equivalents, from 123.7 million to 121 million stCO₂ equivalent.²⁵ This level is 36 % below the annual cap of 188 million stCO₂ equivalent. As Fig. 2.9 suggests, most emission reductions occurred before the RGGI actually entered into action. The World Bank estimates that the main reasons underlying the observed emission reduction were as follows: (i) lower electricity demand due to the development of energy efficiency measures and weather conditions; (ii) fuel switching from coal and petroleum to gas triggered by lower relative natural gas prices; and (iii) increasing power generation from non-emitting sources such as nuclear and renewable energy.

In the absence of sufficiently large data set at disposal, it is hard to disentangle the role played by the RGGI scheme among the many factors influencing the emissions trend. However, one cannot exclude that emissions started falling before the RGGI was implemented partly because some firms might have shifted to new technologies and alternative energy sources in advance, when the RGGI was announced, to gain an early mover advantage on the allowance market.

While the system was safely below the original emission cap in the period 2009–13, more emission reduction efforts will be needed to satisfy the revised emissions cap set for the period 2014–2020. The latter, however, seems in line with the overall

²⁵In 2011, overall emissions were 33 % below the programme cap (RGGI 2012).

downward trend followed by RGGI emissions from 2007 onwards; therefore, it represents a feasible target for the future.

2.3 The Quebec Cap and Trade System

2.3.1 Introduction

The Quebec cap and trade system was formally established in 2011, when the Government of Quebec adopted the *Regulation Respecting a Cap and Trade System for GHG Emission Allowances* (the GHG Regulation hereinafter). However, this legal act represents the final step of a legislative process started in 2009, when the Province of Quebec adopted the first amendment of the *Environment Quality Act* granting the Government the power to establish a cap and trade system and officially endorsed by Decree its GHG emission reduction target of 20 % compared to 1990 levels, to be reached by 2020.²⁶

The cap and trade system started operating in 2013 and is structured upon three compliance periods: 1st: 2013–2014, 2nd: 2015–2017 and 3rd: 2018–2020. Each year of the compliance periods runs from 1 January to 31 December. The scheme initially covered almost 80 % of Quebec’s GHG emissions; from 2015 onwards, such percentage was increased up to 85 %. The GHG reductions target remaining unchanged, the GHG Regulation has been amended more than once to allow a harmonised linking with the California cap and trade programme from 2014, thus achieving an outstanding example of fully fledged linking.

This section analyses the Quebec cap and trade system main features and functioning from a legal and economic point of view, with the aim to provide the background information for the analysis of the Quebec–California linking performed below in this book.

2.3.2 The Quebec Cap and Trade: Main Scope, Purpose, Structure and Features

The scope of application of the Quebec ETS is determined by the Environment Quality Act (section 46.1), listing the GHG covered, and the GHG Regulation (sections 2, 3, and Appendix A), providing the definitions of “emitter/s” and GHG and identifying the targeted sectors of activity.

²⁶See Decree 1187–2009 in Quebec Official Gazette Part 2, number 49 of 9 December 2009.

More in detail, the GHG covered are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), per fluorocarbons (PFCs), sulphur hexafluoride (SF₆) or any other gas determined by regulation of the Government.

The types of activities covered by the scheme have changed over time, according to the applicable compliance period. In fact, while during the 1st compliance period (2013–2014) only industrial installations and electricity operators were covered, from the 2nd period (2015 onwards) fossil fuels distributors are also included.²⁷

Similarly to what happens in all the other ETSs analysed above, a threshold requirement also applies to the emitters' subject to the Quebec cap and trade system. In fact, according to section 2 of the GHG Regulation, installations must have reported an annual amount of GHG emissions equal to or greater than 25.000 metric tonnes CO₂ eq in order to be covered by the scheme.

The Government, by means of an Order, sets a Cap on the emission units that may be granted by the Ministry for each year of the compliance periods. The Cap shall progressively decrease, from 2015 onwards, according to the 2020 GHG reduction target.²⁸ With regard to the obligations and main functioning rules, the Quebec system is very similar to the other ones previously analysed, since it requires operators subject to the scheme to carry out an annual mandatory monitoring and reporting of GHG emissions, and, for each compliance period, to surrender eligible allowances corresponding to their verified emissions.

The main authority responsible for managing the ETS is the Ministry for Sustainable Development, Environment and Climate Change of Quebec (the Ministry hereinafter), supported by the Auction Administrator and the Financial Services Administrator in the auctioning phase.

2.3.3 Duties of the Covered Operators and Competences of the Ministry for the Environment of Quebec

The entities subject to the Quebec cap and trade system shall firstly register in the Quebec cap and trade system. To do so, they shall register in the Compliance Instrument Tracking System Service (CITSS) in due time. The registration application must be submitted to the Quebec Ministry of the Environment (the Ministry),

²⁷Appendix A of the GHG Regulation lists the sectors included in the cap and trade scheme: mining, quarrying and oil and natural gas extraction; electric power generation, transmission and distribution; natural gas distribution; steam and air-conditioning production for industrial purposes; manufacturing; and pipeline transportation of natural gas.

²⁸The following Caps are spelled out in Order 1185–2012: for the year 2013, 23.20 million emission units; for the year 2014, 23.20 million emission units; for the year 2015, 65.30 million emission units; for the year 2016, 63.19 million emission units; for the year 2017, 61.08 million emission units; for the year 2018, 58.96 million emission units; for the year 2019, 56.85 million emission units; and for the year 2020, 54.74 million emission units.

according to the format and providing the information spelled out in section 7 of the Regulation. If the application is correct and fulfils all the information required, the Ministry opens an entry into the CITSS and provides the emitter with a dedicated account to hold, trade and record the allowances.²⁹

Once this registration duty has been complied with, the emitter shall ensure an annual monitoring and reporting of its GHG emissions, according to the rules spelled out in the GHG Regulation. In fact, a common feature of all the existing ETSs worldwide requires transparency and reliability of reported data; therefore, emission reports are subject to third-party impartial verification. In the case of Quebec, this activity is performed by verifiers accredited under the ISO 14065 certification,³⁰ who provide an objective assessment of the report according to ISO 14064-3 standards.

The MRV activities are “preliminary” mandatory activities necessary to fulfil the compliance obligation.³¹ As specified below, specific sanctions may be applied to non-compliant operators.

The authority empowered to manage and implement the system is the Quebec Ministry for the Environment which is competent to receive and assess the emitters’ applications to CITSS, open the account, release the allowances and apply the sanctions for non-compliance with the duty to surrender the due amount of allowances.

2.3.4 *Sanctions Against Non-compliant Operators*

The enforceability of the system is ensured, *inter alia*, by the Ministry’s power to issue sanctions, which should act as deterrents against non-compliant operators.

To this respect, section 22 of the Regulation states that the failure by an emitter to surrender the due amount of GHG emissions on the expiry of the compliance deadline leads to two different, cumulative sanctions: (a) the suspension of its general account; and (b) the application of an administrative sanction equal to 3 emission units for each missing emission allowance needed to complete the coverage. When the emitter’s accounts do not contain enough emission allowances required for the application of the administrative sanction, the Ministry notifies the emitter, who must surrender them within 30 days from the failure to provide

²⁹For further details, see sections 8–18 of the GHG Regulation.

³⁰The Standard Council of Canada and the American National Standard Institute are accrediting bodies.

³¹section 21 of the GHG Regulation states that: “On 1st November following expiry of a compliance period or, if that day is not a business day, on the first following business day, every emitter must have at least as many emission allowances in its compliance account as its verified emissions for every covered establishment during the compliance period or, where applicable, during the years following the last compliance period for which emissions coverage was required”.

coverage. If the failure to comply comes from an emitter eligible for the allocation free of charge of emission units, the Ministry removes a quantity equivalent to the emission allowances from the quantity that would normally have been allocated to the emitter without charge for the following compliance period.

Besides these sanctions, sections 71-ss of the Regulation provide specific pecuniary sanctions in case of violation of the compliance obligation and in case, among others, of violation of the rules related to the process of opening the account within CITSS, the trading process and the participation to the auctions.³²

2.3.5 The Allocation Regime of the Quebec Allowances

2.3.5.1 Nature and Validity of the Allowances

Each unit issued by Ministry under the Quebec ETS represents a ton of CO₂ eq and allows its holder to emit a corresponding amount of GHG. Emission allowances are issued in electronic form and are identified in a way that allows them to be differentiated, in particular by type and by vintage. section 20 and 37 of the GHG Regulation specify that the eligible emission allowances are the following ones: emission units, offset credits, early reduction credits and any other emission allowance determined by a Regulation of the Government. Moreover, the GHG Regulation also determines that no borrowing of allowances is allowed.

2.3.5.2 The Regime for Offset Allowances Under the Quebec Cap and Trade

The Quebec cap and trade system, pursuant to section 20 of the Regulation, allows incumbent operators to use offset credits to fulfil their compliance obligation. Offset credits, expressed in tons of CO₂ eq, are issued by the Ministry in electronic format. They represent a quantity of GHG emissions never emitted or permanently and irreversibly removed from the atmosphere by an offset project voluntarily implemented by an individual, organisation or business, above and beyond usual practices (i.e. additional to business as usual). Eligibility requirements and strict rules apply to offset projects, regulated by the 3 applicable Protocols currently in force, covering the following areas: CH₄ destruction at covered manure storage facilities, CH₄ destruction at landfill sites, destruction of ozone depleting substances contained in insulating foams that have been removed from refrigerators and freezers.³³

³²For the amount of the monetary sanctions, see sections 71–73 of the Cap and Trade Regulation.

³³More details on the Protocols sector coverage, participation requirements and procedural rules can be found at <http://www.mddelcc.gouv.qc.ca/changements/carbone/documentation-en.htm#regulations>.

Section 20 of the GHG Regulation allows just a limited borrowing of offset credits, which may be used only if issued in the first year following the year of expiry of the compliance period. At the same time, the same provision determines a quantitative limitation of offset credits that the emitter may use to cover its obligations. In fact, they cannot exceed 8 % of its total GHG emissions to be covered for the compliance period. Further rules are provided in sections 70.1–70.21 of the Regulation, in particular with regard to MRV of offset credits and registration requirements for the participants.

2.3.5.3 The Special Regime for Carbon Leakage

The Quebec cap and trade shares several similarities with all the other ETSs analysed so far. Among these, it should be mentioned the provision of a special regime to protect “trade exposed” industry sectors in order to avoid the carbon leakage phenomenon.

We already defined above the concept of “carbon leakage” and specified the ratio behind the beneficial regime applicable to sectors that would, otherwise, be particularly vulnerable to foreign competition and face high production costs to comply with their national ETS. In fact, lacking a “more favourable” treatment, these sectors would be likely to offshore their production in countries with laxer climate change/environmental rules. In order to avoid such a risk, following the choice already made by most of the other ETSs, also the Quebec’s regime foresees the free allocation of a certain amount GHG units to these sectors. The activities under a “carbon leakage” risk, i.e. eligible to free emission allowances, are listed in Appendix C, Part I—Table A of the GHG Regulation,³⁴ while Appendix C, Part II (A–D), determines the methods for calculation of the GHG allowances that may be allocated free of charge.

The total number of allowances that may be distributed free of charge during one year is determined by a Ministerial Notice and, obviously, may not exceed the annual Caps determined by Law. Starting from 2015 (2nd compliance period), the number of units allocated for free will drop by about 1 to 2 % a year, in order to meet the 2020 target, while at the same time progressively encouraging installations belonging to carbon leakage sectors to enhance their efforts to curb their GHG emissions. Finally, it should be underlined that despite the favourable conditions granted to these sectors, they are not exempted neither from MRV of their allowances, nor from holding a sufficient amount of units in their account (corresponding to their verified emissions) at the end of each compliance year.

³⁴ Provided they meet the requirements spelled out in Appendix C, Parts I and II of the Regulation these are: aluminium; lime; cement; chemical and petrochemical industry; metallurgy; mining and pelletising; pulp and paper; petroleum refining; glass containers, electrodes, gypsum products; and some agro-food establishments.

2.3.5.4 The Regime for Auctioning of the Allowances

Except the carbon leakage sectors described above, as a rule emission allowances are distributed via auctioning in the Quebec cap and trade. The auctioning rules are set in section 45-ss of the GHG Regulation. Here, it is specified, *inter alia*, that the Ministry is responsible to auction emission units in a specific place or online, at most 4 times per year.

Every emitter or participant registered in the CITSS, except an emitter or a participant whose accounts have been suspended or revoked for a reason other than a failure to surrender the GHG emissions of a covered establishment, may take part in an auction. For this purpose, the emitter or participant must, at least 30 days before the date of the auction, register with the Ministry as a bidder, by submitting the information and documents required in section 46 of the Regulation, and, most importantly, submit a financial guarantee to the Ministry, at least 12 days before the date of the auction.³⁵

2.3.6 The Quebec Compliance Instrument Tracking System Service (CITSS)

According to section 7 of the GHG Regulation, every emitter subject to the Quebec cap and trade system must register by providing the Ministry with the information and documents listed therein. When an application for registration meets the requirements of sections 7-13 of the GHG Regulation, the Ministry opens, in the electronic system: (1) for each emitter or participant, a general account in which the emission allowances that may be traded are recorded; and (2) for each emitter, a compliance account in which the emission allowances used to cover the GHG emissions of its covered establishments at the end of a compliance period must be recorded.

The CITSS is a computerised GHG emission allowance tracking system that serves as the official register of the Ministry in support of the implementation of the cap and trade system. Issuance, trading, use and cancellation of GHG allowances are all tracked in a transparent and secure way within the CITSS. Finally, recalling what has been already explained above with regard to the registration procedure regulated by sections 7-ss of the GHG Regulation, it should be further pointed out that, since the Quebec and California CITSSs are linked under the central administration of WCI Inc., registration of covered entities is mutually recognised in both countries. However, emitters owning installations covered by the respective cap and trade schemes in both jurisdictions will have to open a CITSS account in both of them.

³⁵The financial guarantee requirements to be met are spelled out in section 48 of the Regulation.

Table 2.5 Volumes and prices of Quebec emission allowances at auctions

Auctions	QEA 2013 sold	Future QEA sold	QEA 2013 selling price	Future QEA selling price	Purchasing QEA costs
Auction 1	1,025,000	1,708,000	10.75	10.75	29379750
	QEA 2014 sold	Future QEA sold	QEA 2014 selling price	Future QEA selling price	Purchasing QEA costs
Auction 2	1,035,000	285,000	11.39	11.39	26424800
Auction 3	1,049,111	1,302,000	11.39	11.39	26779154.3
Auction 4	694,000	1,455,000	11.39	11.39	24477110
Joint Auction 1	23,070,987	10,787,000	13.68	13.41	460264772.2
	QEA 2015 sold	Future QEA sold	QEA 2015 selling price	Future QEA selling price	Purchasing QEA costs
Joint Auction 2	73,610,528	10,431,500	15.14	15.01	1271040209
Joint Auction 3	76,931,627	9,812,000	15.01	14.78	1299765081
Joint Auction 4	73,429,360	10,431,500	16.39	16.1	1371454360
Joint Auction 5	75,113,008	10,431,500	17.00	16.89	1453109171

2.3.7 Carbon Pricing

A price floor of 10.75 CAD \$ (Canadian Dollars) has been applied from 2013 (beginning of the Quebec ETS) and is scheduled to increase at a rate of 5 % plus inflation every year until 2020. Since the linkage with the Californian ETS and the first joint auction in November 2014, the annual price floor was set at CAD \$12.08 for Quebec and US\$12.10 for California (CDC Climate et al. 2015). In the joint auctions, the price floor is equal to the highest of the two based on the exchange rate at the time of the auction. For example, during the joint auction held in February 2015, the highest price floor turned out to be that of California so that the price for Quebec was set at CAD \$15.01. Therefore, price floors may vary according to the fluctuations in the exchange rate between US\$ and CAD \$ and depending on whose price floor is the highest between Quebec and California (CDC Climate et al. 2015).

Table 2.5 reports volumes and prices of the Quebec emission allowances (QEA) sold at the auctions (first separately and then jointly with California), as well as the overall corresponding purchasing costs sustained by the operators (equal to the product of current and future allowances sold times their corresponding price).

As Table 2.5 shows, the selling price of Quebec emission allowances (expressed in Canadian Dollars) experienced a substantial rise ever since the beginning of joint auctions. As to the volume of the emission allowances, the amount sold at the joint auctions turned out to be much higher than that sold from California and Quebec

separately before their linking. This can be easily verified by comparing the amount sold at the 2015 joint auctions (always above 70 million allowances, see Joint Auctions 2–5 in Table 2.5) with the overall allowances sold at the last separate auctions (which sum up at around 23 million allowances).³⁶

2.3.7.1 Auction Revenues and Incentives to Environment-Friendly Technologies

Auction proceeds go to the Quebec Green Fund, in order to finance the 2013–2020 Climate Change Action Plan (CCAP) initiatives. Environmental measures and initiatives supported by the Green Fund in order to create a greener economy include innovation and the development of knowledge and technology, awareness-raising, land-use planning and development of and participation to related national/international GHG reduction initiatives.

An estimated budget of CAD \$3.3 billion is expected to be used for such measures in the period 2013–2020 (Gouvernement du Quebec 2012).³⁷ The largest share of this budget should derive from auction revenues raised by the ETS. In mid-December 2015, the overall amount of proceeds paid to the Green Fund from the joint auctions held so far was equal to CAD \$864,881,669.79 (Gouvernement du Quebec 2015).³⁸

Box 2.1 The (former) Australian ETS: a quick glance

As mentioned above, in the Preface, beside the three selected ETSs (California, RGGI and Quebec) that have been analysed in a detailed way in this chapter, there are also other relevant ETSs experiences around the world. A special mention is deserved by the (former) Australian regime, which, despite having been now repealed, represents nonetheless an interesting example of an ETS, from which some lessons can be learned.

The Australian ETS, namely the Carbon Pricing Mechanism (CPM), was operative from 2012 to 2014. More precisely, it was established in November 2011 by virtue of the Clean Energy Act and started to operate in July 2012; quite soon, however, following a change in the political majority after the Australian 2013 general elections, the scheme was firstly suspended and then repealed in July 2014 by the Clean Energy Legislation (Carbon Tax Repeal) Act 2014.

At a closer look, the Australian scheme, on the one side, similarly to the other ETSs examined above, was conceived as a market-based tool to be

³⁶The overall amount sold before linking can be computed summing up allowances separately sold at Auction 8 in California (see Table 2.1) with those sold at Auction 4 in Quebec (see Table 2.5).

³⁷http://www.mdelcc.gouv.qc.ca/changements/plan_action/pacc2020-en.pdf.

³⁸<http://www.mdelcc.gouv.qc.ca/changements/carbone/revenus-en.htm>.

integrated by other national mitigation actions and measures with the view to curb Australian GHG emissions by 5 % compared to the 2000 levels by 2020. However, on the other side, when compared to the other existing ETSs, the CPM was a quite peculiar case, specifically with regard to its structure. In fact, it foresaw a two-stage structure, consisting of a first phase (2012–2015), in which a carbon pricing mechanism (a carbon tax) was introduced, and a second phase (2015–2018), in which the real ETS should have come into play. Unfortunately, as already anticipated above, the Australian ETS was suspended and then repealed, before the beginning of phase two. Therefore, in reality, the proper cap and trade regime never really started to operate in Australia.

Despite its short duration and substantially unsuccessful outcome, the experience of the Australian ETS is particularly relevant, insofar as it is a good example of the difficulties that some countries may encounter in establishing their national Emission Trading Schemes. A major difficulty in this sense can be represented by the widespread opposition that may sometimes emerge against a carbon tax or a cap and trade scheme, due to the fears of a decrease in international competitiveness for the firms subject to such regime, as compared to other competitors operating at international level on the same product market, which are not subject to similar obligations and related costs. This was, in fact, the main reason that influenced the decision of the new Australian Government to suspend and repeal the CPM, following the 2013 general elections.

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