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Emissions Trading System by Eastern States of the United States (RGGI)

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1. Overview of climate change policies

The Regional Greenhouse Gas Initiative (RGGI) is a regional emissions trading system in which 12 eastern states in the United States are participating. As of 2023, the United States had not introduced emissions trading at the federal government level, so it is limited to regional systems such as the RGGI and the California Cap and Trade.

Each of the participating states has set their own emissions reduction targets. Among these, the RGGI aims to set an emission cap for the participating states concerning the CO₂ emissions of the power plants located inside the participating states and gradually lower it to advance emissions reduction in the region overall. Furthermore, a vital characteristic of the RGGI is its primary use of auctions, with the proceeds being actively invested in low-carbon initiatives within the participating states.

2. System design of emissions trading

2.1. An overall of the system

In December 2005, the seven northeastern states of Delaware, Connecticut, Maine, New Hampshire, New Jersey, New York, and Vermont agreed to implement an emissions trading system in the eastern states from 2009 and signed a memorandum concerning its basic framework. Subsequently, New Jersey withdrew, but Massachusetts, Rhode Island, and Maryland began to participate. At the time of the system's start in 2009, nine states were participating, but some states withdrew or participated again due to policy changes accompanying changes in state governors.

The participating states establish specific implementation rules based on the Model Rule released in August 2006. While each state's laws govern the regulations' enforcement, RGGI Inc. was established to monitor market trends, manage the emissions registry, implement auctions, and provide technical support to the participating states.

Following the first program review from 2010 to 2012, authorities reviewed the Model Rule established in 2006. They conducted a second program review from 2015 to 2017; a third review is underway. During these reviews, stakeholders, including state governments, research institutes, and participating companies,

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convene to discuss and implement revisions to the Model Rule.

Figure 1 shows the trends in emissions from the facilities covered by the RGGI, the emissions cap, and the scheduled auction amount from 2005, before the start of the system, to 2022. Due to the new participation and withdrawal of states, emissions increased and decreased.

Authorities set the emissions cap based on past actual emissions. However, emissions notably decreased from 2005 to 2009, resulting in a significant divergence from the actual emissions once the system began. Consequently, they set a scheduled auction amount that would not exceed the emissions cap. Nevertheless, as Figure 3 illustrates, the actual contracted amount in the auctions from 2010 to 2012 fell below this limit.

Concerning the increase in banking due to this excess supply, in the 2012 system revision, the banked portion of the emission rights possessed by state governments and companies was taken into consideration (the adjustment for banked allowances), and the emissions cap was corrected with a downward adjustment several times from 2014 onward. This adjustment is shown in Figure 1 as the emissions cap under the system (the yellow line) and the post-correction emissions cap (the orange line).

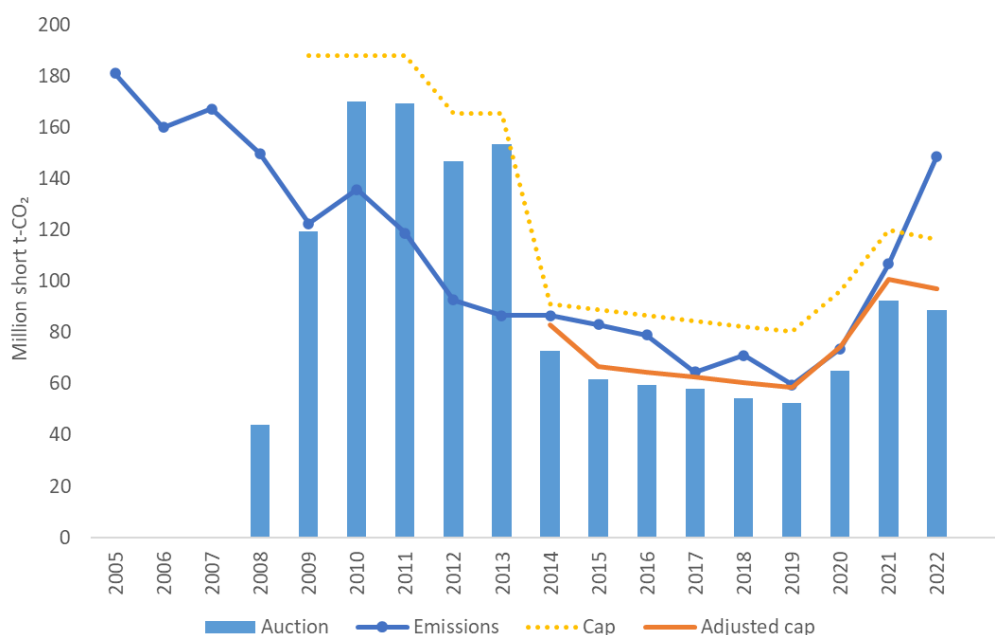


Figure 1: Trends in the emissions from facilities covered by the RGGI, the emissions cap, and the scheduled auction

Source: RGGI COATS (RGGI CO₂ Allowance Tracking System)

Note 1: The participating states in the RGGI vary over time (as detailed in the Overview of the RGGI System). Since 2022, Pennsylvania has participated, reporting emissions from facilities within the state covered by the system. However, a lawsuit has prevented the implementation of emission rights auctions and any adjustment of the emissions cap in Pennsylvania.

Note 2: In the RGGI, the emissions are all measured in short tons (one t-CO₂ × 0.907 = one short t-CO₂).

2.2. Allocation

As shown in Figure 2, more than 90% of the RGGI consists of sold allocations using auctions, and it is necessary for companies possessing facilities covered by the system to purchase emission rights in the same amount as the emissions. As shown in Figure 3, the auctions are held every quarter, and companies and financial institutions with facilities covered by the system participate. In a recent auction implemented in June 2023, 60% of the bidders were companies possessing facilities covered by the system, and the remaining 40% were financial institutions.²

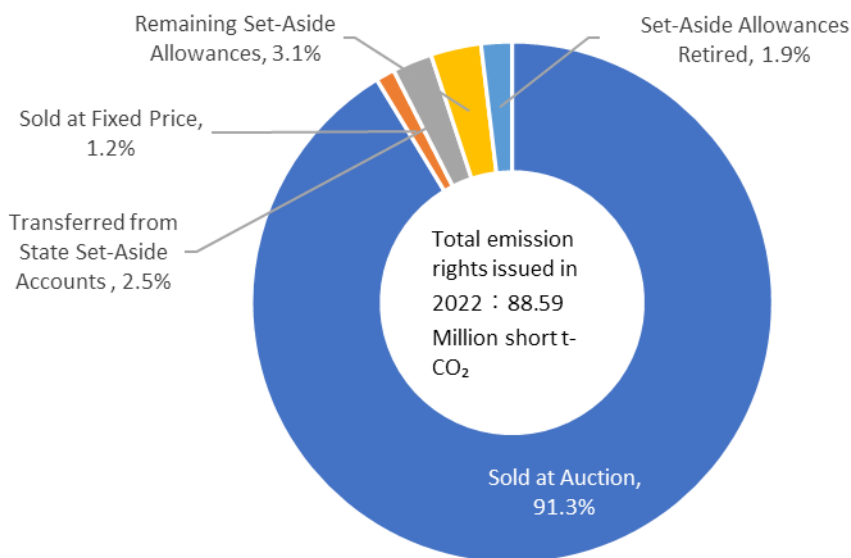


Figure 2: Method of allocation to facilities participating in the RGGI in 2022

Source: RGGI

Note: This excludes the issuance of emission rights from Pennsylvania, which is currently being disputed in the courts

RGGI has set an auction reserve price in its auctions since its inception. Additionally, they introduced the cost containment reserve (CCR) in 2014 and the emissions containment reserve (ECR) in 2021

The CCR releases additional emission rights to the market to curb the trading price in the case that, at the time of the bidding, the market price of the emission rights rises above a predetermined price (refer to the detailed explanation below and the table at the end of this document titled Overview of

² RGGI (2023) MARKET MONITOR REPORT FOR AUCTION 60 https://www.RGGI.org/sites/default/files/Uploads/Auction-Materials/60/Auction_60_Market_Monitor_Report.pdf

the RGGI). Annually, RGGI retains 10% of the regional emissions cap as the CCR, supplying it to the market for funding. However, if the market uses this 10% reserve, RGGI will not release additional emission rights, even if the contracted price at subsequent auctions exceeds the CCR trigger price.

On the other hand, the ECR curbs the amount supplied to the market if the price goes below a predetermined level. Retention in the ECR is a maximum of 10% of the emissions cap of the states that have introduced the RGGI (excluding Maine and New Hampshire), and emission rights are transferred to the ECR and cancelled if the price goes below the trigger price.

Note that the CCR and the ECR do not set a price cap on the auction price; they are quantitative measures that release to the market/absorb additional emission rights, and in some cases, the contracted price will go above/below those levels.

Authorities introduced these measures to stabilize the system and prevent the market's emission rights price from reaching unexpectedly high or low levels compared to emissions reduction costs. They determined the price and quantity for triggering these measures by considering emissions trends, model analyses of electricity prices, emissions, macroeconomic factors, consumer impacts, and stakeholder discussions.

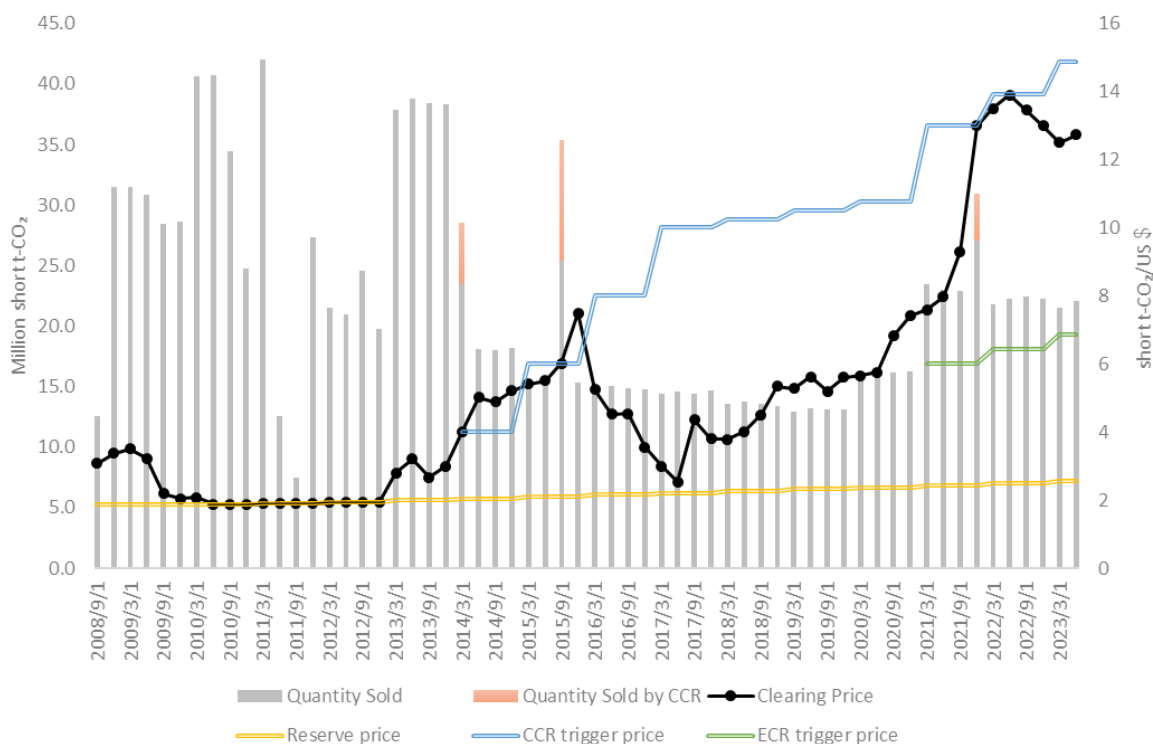


Figure 3: Trends in the contracted amount in auctions, contracted price, and reserve price.

Source: RGGI

2.3. Offset credits

In the RGGI, using the following offset credits is allowed with 3.3% of the cumulative emissions of the compliance period of three years as the cap.

- Projects allowed under the Model Rule of the RGGI: landfill methane capture, SF₆ reduction projects, afforestation projects, energy conservation in buildings, livestock methane capture.
- Early action offset credits: There is a system for issuing credits to emissions reduction projects carried out before the regulations start, but credits have not been issued.

As of July 2023, there is only one offset credit project registered in RGGI COATS (RGGI CO₂ Allowance Tracking System), which is the registry of the RGGI, and 53,506 short t-CO₂ were issued from 2017 to 2020.

2.4. MRV

Under the RGGI, it is mandatory to utilize the air pollutant emissions (CO₂, NO_x, SO₂) reporting system implemented by the Environmental Protection Agency (EPA) based on federal regulations³ to report to the RGGI the CO₂ emissions within the emissions reported in that system concerning power plant operating companies. Under these federal regulations, installing the measuring devices necessary to ascertain the emissions of CO₂, etc. in power plants is mandatory, and the results are reported⁴ to the EPA each quarter. Furthermore, it is necessary to receive confirmation from an EPA-accredited institution that the measuring devices have been installed and are operating correctly and then apply to the EPA to be accredited. For this reason, emissions based on federal regulations are utilized in the RGGI as emissions using measurement devices and methods that have received the accreditation of the EPA.

Power plant operating companies must surrender emission rights in the same amount as the cumulative emissions of three years in the RGGI. However, they do not surrender the emission rights in the same amount as the cumulative emissions after three years have ended; it is necessary to surrender 50% of the emission rights in the first year and the second year, and after the end of the third year, the final year, to surrender the remaining 200% of the emission rights in order to reach the same amount as the cumulative emissions.

2.5. Relation with other policies

The RGGI is emissions trading based on auctions, and it utilizes the revenue from the auctions to invest in energy conservation. In 2021, US\$374 million was invested in the participating states, with 51% invested in energy efficiency enhancement, 13% in funding to lower electricity prices, 13% in promotion of electrification, and 11% in reducing greenhouse gas emissions. According to an estimate⁵

³ U.S. EPA regulations at 40 CFR Part 75 Continuous Emission Monitoring.

⁴ Clean Air Markets Program Data <https://campd.epa.gov/>

⁵ RGGI (2023) The Investment of RGGI Proceeds in 2021

by the RGGI, in 2021, it contributed to an annual emissions reduction of 230,000 short t-CO₂ and saved US\$94 million on energy bills.

3. implications for GX ETS

The RGGI is a regional emissions trading system by the northeastern states of the United States that is based on auctions and covers power plants only.

The GX ETS, which will start an emission rights auction covering the electricity sector in FY2033, finds the system design of RGGI a useful reference. RGGI aims to stabilize prices and signal emissions reduction to companies by setting an auction reserve price and establishing a cap and reserve price with quantitative market measures through the CCR and ECR. These strategies offer valuable precedents filled with insights for the design of the GX ETS.

On the other hand, the initial emissions cap set when the system started significantly diverged from actual emissions, leading to adjustments that consider banking in subsequent system revisions. The operational aspects of the system offer many hints, particularly regarding adjustments to align the system with actual emissions and external conditions after its start.

<References and literature>

The Regional Greenhouse Gas Initiative <https://www.RGGI.org/>

US EPA Part 75 Policy and Technical Resources [https://www.epa.gov/power-sector/part-75-policy#:~:text=40%20CFR%20Part%2075%20requires,emission%20monitoring%20systems%20\(CEMS\).](https://www.epa.gov/power-sector/part-75-policy#:~:text=40%20CFR%20Part%2075%20requires,emission%20monitoring%20systems%20(CEMS).)

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Overview of the RGGI

Overview	System started year	2009
	Period of system	Set every three years from 2009 onward.
	Targets and objectives	<p>In 2017, a target of reducing the total amount of emissions in the facilities covered by the regulations located in the states participating in the RGGI by 30% compared to 2020 was agreed.</p> <ul style="list-style-type: none"> - First compliance period (2009 to 2011) <ul style="list-style-type: none"> ➤ 188,076,976 short t-CO₂ (the total amount every year) - Second compliance period (2012 to 2014) <ul style="list-style-type: none"> ➤ 2012 to 2013: 165,184,246 short t-CO₂ (the total amount every year) ➤ 2014: 82,792,336 short t-CO₂ - Third compliance period (2015 to 2017) <ul style="list-style-type: none"> ➤ 2015: 66,833,592 short t-CO₂ ➤ 2016: 64,615,467 short t-CO₂ ➤ 2017: 62,452,795 short t-CO₂ - Fourth compliance period (2018 to 2020) <ul style="list-style-type: none"> ➤ 2018: 60,344,190 short t-CO₂ ➤ 2019: 58,288,301 short t-CO₂ ➤ 2020: 74,283,807 short t-CO₂ - Fifth compliance period (2021 to 2023) <ul style="list-style-type: none"> ➤ 2021: 100,677,454 short t-CO₂ ➤ 2022: 97,022,454 short t-CO₂ ➤ 2023: 93,367,454 short t-CO₂
Background	<ul style="list-style-type: none"> - In December 2005, seven northeastern states of the United States, Delaware, Connecticut, Maine, New Hampshire, New Jersey, New York, and Vermont, agreed to implement an emissions trading system to reduce emissions of greenhouse gases from 2009 and signed a memorandum presenting its basic framework (subsequently, New Jersey withdrew while on the other hand Massachusetts, Rhode Island, and Maryland began to participate). - New Jersey began to participate in the RGGI in 2020 and Virginia in 2021, and as a result, 11 states are currently participating in the RGGI. Furthermore, it has been reported that Pennsylvania is also 	

		<p>considering participating in the RGGI. On the other hand, there is a possibility that the composition of the participating states will change going forward. For example, the governor of Virginia has expressed an intention to withdraw from the RGGI.</p>
	Penal provisions	<ul style="list-style-type: none"> - The regulatory authority deducts an emission quota equivalent to three times the shortfall from the compliance accounts of operators who have failed to comply. - If the emission quotas possessed by facilities covered by the regulations are less than the necessary amount, they must promptly transfer the emission quota shortfall to their compliance account. - The regulatory authority of each state is allowed to establish fines, etc., concerning facilities covered by the regulations that have failed to comply.
Target	Unit	Operator
	Main requirements for eligibility	<ul style="list-style-type: none"> - Only the electricity sector (12 states, 318 facilities, 967 units) - Power plants with a capacity of 25MW or greater satisfy the following conditions. (*Equivalent to approximately 85,000 tons in the case of assuming an operating rate of 80% and using the average intensity of all power sources in the United States) <ul style="list-style-type: none"> ➤ In the case of power plants that commenced operating on or before December 31, 2004, in which 50% or more of the annual heat input is fossil fuels. ➤ In the case of power plants, which commenced operating on or after January 1, 2005, power plants in which 5% or more of the annual heat input is fossil fuels.
	Covered gas	CO ₂
	Coverage	<p>Actual emissions in 2022: 148.58 million short t-CO₂</p> <p>Amounts allocated in 2022: 97 million short t-CO₂</p> <ul style="list-style-type: none"> - 2009 to 2011: ten states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont) - 2012 to 2019: nine states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, Vermont) - 2020: ten states (Connecticut, Delaware, Maine, Maryland,

		<p>Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont)</p> <ul style="list-style-type: none"> - 2021 onward: 11 states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Virginia) - 2022 onward: 12 states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Virginia, Pennsylvania)
Allocation method	Allocation method	<ul style="list-style-type: none"> - Free allocation: the participating states are allowed to implement both the free and sold (bidding) distribution methods, but currently, all participating states are implementing sold allocation only. - Bidding system: bidding is implemented every quarter. An auction reserve price is set, which was US\$1.86 in 2008 and US\$2 in 2014 and has been raised 2.5% yearly since then. As of 2023, it is US\$2.56.
Flexibility measures	Banking and borrowing	<ul style="list-style-type: none"> - Carryover is allowed in the case that a surplus emission quota has occurred. Borrowing is not allowed.
	Utilization of other credits	<ul style="list-style-type: none"> - Use is allowed within the scope of 3.3% of the emissions of the compliance period. <ul style="list-style-type: none"> ➤ Projects allowed by the Model Rule: landfill gas, SF₆ reduction projects, afforestation projects, energy conservation in buildings, livestock methane capture. ➤ Early action offset credits: a system for issuing credits to emissions reduction projects carried out before the start of the regulations (actually zero).
	Countermeasures against rapid rises in the price (quantitative measures)	<p>[Price cap and market release]</p> <ul style="list-style-type: none"> - Additional emission rights are released to the market from the cost containment reserve (CCR) in order to curb the trading price in the case that, at the time of the bidding, the market price of the emission rights rises above a predetermined base price. Ten percent of the emissions cap every year for the region overall is retained as the CCR. - Base price: 2014: US\$4, 2015: US\$6, 2016: US\$8, 2017: US\$10, 2018 onward: rose 2.5% each year, from 2021 onward: raised 7% every year from US\$13.

		<p>[Reserve price and release retention]</p> <ul style="list-style-type: none"> - If the price goes below a predetermined level, the emission quota is retained in the emission contamination reserve (ECR), the amount supplied to the market is restricted, and the retained portion is canceled. Retention in the ECR is a maximum of 10% of the emissions cap of the states that have introduced the RGGI (excluding Maine and New Hampshire).
Market	Price	The auction contracted price of the RGGI's CO ₂ allowance in the second quarter of 2022 was US\$13
	Trading volume	The trading volume on exchanges was 151 million short t-CO ₂ (fourth quarter of 2022)
	Trading format and exchange	Operators, financial institutions, etc., covered by the regulations participate in the trading. Emissions are traded on the commodity exchange ICE, and exchange trading is implemented outside auctions.