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California's Cap-and-Trade Program

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1. Climate change policy outline

California has implemented a wide range of programs that leverage advanced markets, such as the Renewables Portfolio Standard, the Low Carbon Fuel Standard, and zero-emission vehicle (ZEV) regulations. Among them is the Cap-and-Trade Program.

The decision to introduce the program came under the Global Warming Solutions Act of 2006 (AB-32),¹ which stipulates measures against global warming through 2020. AB-32 aims to reduce California's emissions to 1990 levels by 2020 and positions the program as a key policy tool to achieve this target. The program was launched in 2013. A wide range of business operators, including large emitters such as power generators, and fuel suppliers, are subject to the program.

In July 2017, the California Legislature passed a law (AB-398²) to revise the Cap-and-Trade program and implement it beyond 2020 until 2030. AB-398 delegated authority to the California Air Resources Board (CARB) to determine specific implementation methodologies and regulations, including the establishment of price ceilings. CARB considered them in 2018 and decided on them in December 2018.

In parallel with this, the Independent Emissions Market Advisory Committee (IEMAC),³ established under AB-398, analyzed issues regarding the program. Their investigation revealed a significant surplus of emission allowances, which was potentially impeding the emission reduction efforts of regulated entities.

Based on this, CARB considered an initiative to monitor surplus emission allowances from 2020, in addition to the specific implementation methods and rules of AB-398 decided on in 2018.

¹ AB-32 Air pollution: greenhouse gases: California Global Warming Solutions Act of 2006.

https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32

² AB-398 California Global Warming Solutions Act of 2006: market-based compliance mechanisms: fire prevention fees: sales and use tax manufacturing exemption.

https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398

³ Independent Emissions Market Advisory Committee (IEMAC)

<https://calepa.ca.gov/independent-emissions-market-advisory-committee/>

2. Emissions trading program design

2.1. Overview of the program

California's Cap-and-Trade Program annually lowers the regulatory cap on emissions to reduce greenhouse gas emissions in the state. The Cap-and-Trade program is an important part of measures to achieve the state's GHG emissions reduction target,⁴ covering about 75% of California's GHG emissions.

The Californian Cap-and-Trade Program features cooperation with a foreign local government cap-and-trade system. While negotiations on the formulation of rules for the international transfer of emission credits based on the Paris Agreement are still underway, California has been cooperating with the Canadian province of Quebec about emission credit trading since 2014.

Figure 1 shows the trends of auction settlement and reserve prices under the Cap-and-Trade Program. Prior to mid-2021, auction settlement prices consistently approximated reserve prices. For instance, in the second quarter of 2021, the auction settlement price was \$17.84/t-CO₂e, nearly equivalent to the reserve price at \$17.71/t-CO₂e. One of the reasons why settlement prices were close to reserve prices is that the emission allowance supply apparently far exceeded demand as (1) allowances for paid allocation and (2) allowances for financing demand-side initiatives for the electrical utility sector is sold simultaneously in each auction. On the other hand, the auction settlement price continued to increase from the third quarter of 2021 and reached \$38.73/t-CO₂e, far above the reserve price of \$22.21/t-CO₂e in the fourth quarter of 2023. There was a view that the increase in the auction settlement price reflected the anticipation of growing demand for emission allowances in the future. It is noteworthy that this price escalation occurred in the absence of specific policy interventions, such as the enhancement of emission reduction targets or revisions to the program structure.

⁴ California has developed a comprehensive plan known as the Scoping Plan to achieve its GHG emissions reduction target. The 2017 Scoping Plan estimated the GHG emission reduction for each policy measure from 2021 to 2030. The estimate indicates that various policy measures are expected to reduce emissions by a total of 622 million tons CO₂ equivalent. The Cap-and-Trade Program is estimated to account for the largest share, at 236 million t-CO₂e, or 38% of the total reduction.

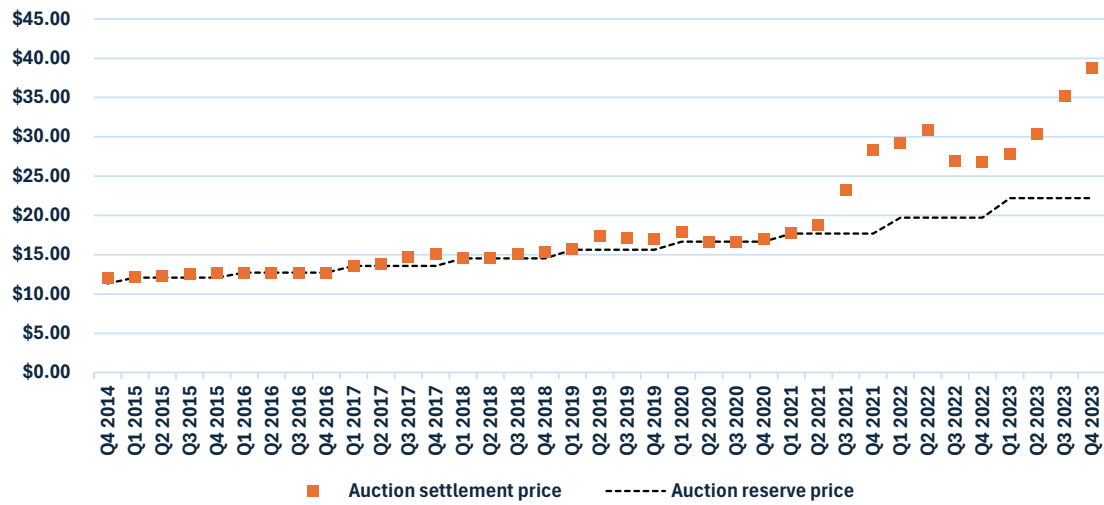


Figure 1 Auction settlement and reserve price trends

Source: CARB

An interesting aspect of California's climate change policy framework is its mechanism for redistributing the governmental costs associated with climate change policy measures, including the Cap-and-Trade Program, to business entities. In September 2009, CARB adopted the Cost of Implementation Fee Regulation⁵ to pass costs for climate change policy measures operations, including the Cap-and-Trade Program under AB-32 on to the private sector. Under this regulation, about 250 business operators, including natural gas suppliers, gas pipeline operators, transport fuel manufacturers and importers, cement manufacturers, and electrical utilities, shouldered Cap-and-Trade Program operation costs according to CO₂ emissions and other factors.

2.2. Allocation method (Auctions and free)

California's Cap-and-Trade Program combines free allocations to the industrial sector, those to the electrical utility sector through auctions to finance energy efficiency improvement, and allocations to the industrial and electrical utility sectors through auctions. Figure 2 shows the allocation plan through 2030.

⁵ Cost of Implementation Fee Regulation
<https://ww2.arb.ca.gov/our-work/programs/ab-32-cost-implementation-fee-regulation>

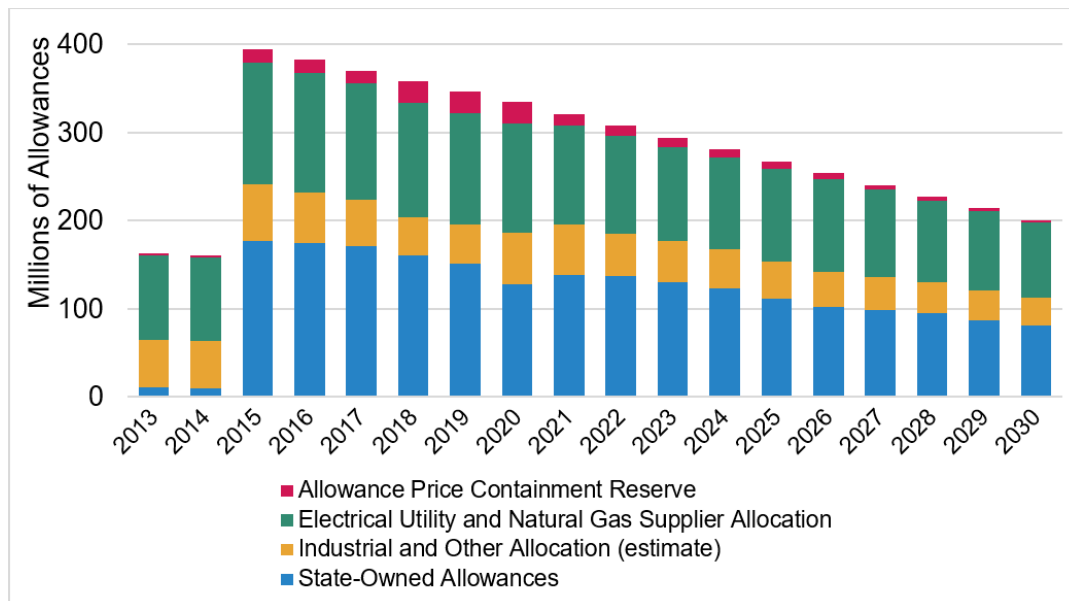


Figure 2 Emission allowance allocation plan through 2030

Source: CARB

In the industrial sector, there are 85 product-specific benchmarks for 34 emission-intensive industries, including crude oil extraction, natural gas extraction, mining, pulp, industrial gas production, fertilizers, ceramics, cement, iron and steel, and oil refinery. The benchmarks are based on the average data for the top 10% in each industry from 2008 to 2010. Free emission allocations are determined after these benchmarks are adjusted by the carbon leakage risk factor and the cap adjustment factor consistent with the 2030 emission reduction target (for the "Industrial and Other Allocation (estimate)" in the above figure). The free allocations are determined in advance before the compliance period (about three years). If there are changes in production during the period, a mechanism may be applied to adjust allocations in the final year. For industries not subject to benchmarks, free allocations are made using a uniform emission factor.

In order to mitigate the impact of the Cap-and-Trade Program on consumers, emission allowances based on customers' carbon reduction compliance costs shouldered by electrical utilities are allocated free of charge to the electrical utility sector and sold on the market by auction to implement equivalent emission reduction measures such as thermal insulation of houses and the introduction of renewable energy (Electrical Utility and Natural Gas Supplier Allocation in the above figure). Allowances for the free allocation are calculated by adding up electricity sales supplied through coal and natural gas power generation, excluding sales supplied to the industrial sector subject to the Cap-and-Trade Program that are covered by allowances for the auctions. Electrical utilities are required to use profits from allowance auctions to implement measures such as subsidies for energy-saving products for customers,

insulation retrofit, and renewable energy introduction and report their results converted into CO₂ equivalent to CARB in line with guidance.⁶

Auctions ("Electrical Utility and Natural Gas Supplier Allocation" and "State-Owned Allowance" in the above figure) are allocated quarterly (in February, May, August, and November) for both the industrial and electrical utility sectors. Auctions for the free allocation of allowances to the electrical utility sector coincide with the quarterly auctions. Based on AB-398, the maximum prices (Allowance Price Containment Reserve prices) and the minimum price (Auction Reserve price) are set for auctions.

Under the ceiling price mechanism that was introduced in 2020, when bid prices reach a certain level, an additional auction for business operators is conducted. Additional allowances supplied for the additional auction are partly reserved in advance in the Allowance Price Containment Reserve account managed by CARB. When setting the ceiling prices, CARB considers the following points and publishes the prices annually:⁷

- The need to avoid negative consequences for households, businesses, and the economy of the state
- Potential leakage
- Latest auction prices
- Social costs of GHG emissions
- Costs to meet the state's emission reduction target

There are three maximum prices: two fixed prices (Tier 1 and Tier 2) and a price ceiling. For 2024, Tier 1 is set at \$56.20/t-CO₂, Tier 2 at \$72.21/t-CO₂, and the price ceiling at \$88.22/t-CO₂. Business operators that fail to secure allowances required for compliance may obtain the necessary allowances by participating in a third-quarter auction conducted by CARB before the November compliance deadline. For auctions regarding the ceiling price mechanism, emission allowances are reserved for each price level. If emission allowances reserved for the Tier 1 are exhausted, those for the Tier 2 may become available, and then those for the price ceiling.

The floor price has been set since the commencement of the Cap-and-Trade Program. If bid prices fall below the floor level, the relevant auction may be unsuccessful. For 2024, the floor price is set at \$22.21/t-CO₂. It is adjusted in line with the annual inflation rate.

2.3. Availability of offset credits

The Cap-and-Trade Program allows CARB-approved offset credits to be used for emission reduction compliance measures. Offset credits are limited to Californian or U.S. domestic projects for

⁶ Guidance on Electrical Distribution Utilities and Natural Gas Suppliers Use and Reporting of Allocated Allowance Auction Proceeds

https://ww2.arb.ca.gov/sites/default/files/cap-and-trade/guidance/edu_ngs_allowance_value_guidance.pdf

⁷ Cost Containment Information

<https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cost-containment-information>

the following categories:

- Forests
- Agriculture/livestock
- Ozone-depleting substances
- Methane recovery in mining
- Limit on available offset credits

There is a cap on offset credits that can be used for emission reduction compliance measures, standing at 4% for 2021-2025 and 6% for 2026-2030. During the 2018-2020 compliance period, approximately 7% of the emission allowances used for compliance came from offset credits (an offset credit cap was 8%).

2.4. MRV

California's Mandatory GHG Reporting Program is used for the measurement, reporting, and verification (MRV) of GHG emissions and removals. The program was launched in 2007 and covers manufacturers, fuel and natural gas suppliers, and electricity suppliers that have facilities with emissions of 10,000 t-CO₂e or more. It covers 80% of California's emissions. Third-party verification is mandatory for facilities with 25,000 t-CO₂e or more in emissions that are subject to the Cap-and-Trade Program. CARB has developed a program that refers to ISO 14065 and other standards (for accreditation of greenhouse gas validation and verification bodies) and certifies verification organizations.

Business operators subject to the Cap-and-Trade Program are required to calculate their emissions from January to December each year, present third party-verified emissions reports to CARB by August 12 of the following year, and surrender the necessary emission allowances by November 1. In the first and second years of the three-year compliance period, however, they are required to submit emission allowances for at least 50% of actual emissions. After the end of the period, they may submit allowances for their accumulated emissions to complete their compliance measures.

2.5. Relations with other policies

Auction revenues are managed as the Greenhouse Gas Reduction Fund (GGRF) established by the state government. They are used for the following purposes that directly or indirectly contribute to the reduction of GHG emissions in the state:

- Improvement of the state's economy, environment, and public health
- Improvement of air quality
- Mitigation of the effects of climate change in the state
- Support for impoverished communities and families in the state

In California, how to use auction revenues is decided through an annual state budget (spending plan) that is approved by the state legislature and signed into law by the governor. A notable feature of the GGRF allocation strategy is its strong emphasis on social equity. Regulatory mandates stipulate that a minimum of 35% of the proceeds must be directed toward supporting low-income communities and individuals particularly vulnerable to the impacts of climate change. In practice, the actual allocation has significantly exceeded this minimum requirement, with over 73% of proceeds being channeled to these priority populations.

3. Implications for GX ETS

The implications of the Californian Cap-and-Trade Program for GX-ETS, include measures to operate the system sustainably. While how to design an ETS system including emission allowance allocation methods and price fluctuation countermeasures is important, measures to sustainably operate the system are significant for designing the system. Such measures are (1) financing, (2) MRV operation, and (3) consideration to households.

Regarding financing, California collects costs from energy-intensive industries for operating climate change measures including the Cap-and-Trade Program. Japan should consider collecting funds from business operators subject to the GX ETS for a budget of the GX Promotion Organization as the GX ETS operator to secure the sustainability of the system.⁸

Next is the operation of the MRV. Six years before the Cap-and-Trade Program went into operation, California introduced a GHG reporting system that requires third-party verification. It also used data collected through the reporting system for designing the Cap-and-Trade Program, giving consideration to reducing MRV burdens on business operators. In Japan, business operators report energy consumption and GHG emissions under the Act on the Rational Use of Energy and the Act on Promotion of Global Warming Countermeasures. The reporting systems under the two acts require no third-party verification,⁹ unlike the Californian GHG reporting system. At least the third-party verification may be inevitable for the GX ETS MRV. Although the reporting systems under the two acts have different organizational boundaries with the GX ETS MRV, it has been suggested that a GHG emission calculation method under the Act on Promotion of Global Warming Countermeasures be utilized for the GX ETS. Therefore, a mechanism should be developed to take advantage of an electronic reporting system for the existing reporting systems to reduce MRV burdens on business

⁸ If operating funds are to be raised separately, targets to be achieved under the GX ETS should be clarified along with the timing for its abolition.

⁹ Even in cases where no third-party verification is required, there are mechanisms to verify the quality and validity of data. For example, a mechanism to secure the quality and validity of data under the Act on the Rational Use of Energy and the Act on Promotion of Global Warming Countermeasures includes verification with an online system called the Energy Efficiency and Global Warming Countermeasures online reporting System, or EEGS, and checks by Regional Bureaus of Economy, Trade and Industry. Similarly, the U.S. Environmental Protection Agency's Greenhouse Gas Reporting Program (GHGRP) requires no third-party verification, depending on checks by the system and relevant divisions for securing the quality and validity of data.

operators for the GX ETS.

Finally, consideration should be given to households. California's Cap-and-Trade Program requires at least 35% of auction proceeds to be spent on low-income and other communities and populations vulnerable to climate change damage. Furthermore, the electrical utility sector uses proceeds from the sale of emission allowances allocated free of charge at auctions to introduce energy-saving products and renewable energy for households and renovate their thermal insulation. In Japan, while specific measures require further examination, it is evident that the GX-ETS should incorporate mechanisms to alleviate potential financial burdens on households. Such burden reduction measures is crucial for enhancing the social acceptability of the GX-ETS, thereby facilitating its smooth implementation and long-term sustainability.

In this way, the design of the GX ETS should be discussed along with financing, social acceptability, and other matters to sustainably operate the GX ETS.

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<https://ww2.arb.ca.gov/>

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https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf

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