

CAP-AND-INVEST FOR MARYLAND

ISSUE BRIEF 2: PROGRAM REVIEWS, AUTOMATIC ADJUSTMENTS, & PRICE CERTAINTY

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Climate Law &
Policy Project

Climate Law & Policy Project

Climate Law & Policy Project is a 501(c)(3) non-profit organization. CLPP's mission is to help formulate and advocate environmentally, socially, and scientifically sound policies to reduce emissions and protect communities around the world from the impacts of climate change.

CLPP operates like a think tank – seeking practical and politically viable strategies – while simultaneously advocating for strong responses to avert the increasingly urgent problem of climate change.

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Introduction

Maryland's Department of the Environment (MDE) has discussed the possibility of developing an economy-wide cap-and-invest program for the state. This paper explores the issues involved in **program reviews**, **automatic adjustments**, and **price certainty mechanisms**.

Maryland has some of the most ambitious greenhouse gas (GHG) reduction targets in the country. By law, it must reduce emissions 60% from 2006 levels by 2031 and achieve net-zero emissions by 2045.

In December 2023, MDE released [Maryland's Climate Pollution Reduction Plan](#) (CPRP) laying out a strategy to achieve the state's near-term goal and place the state on a path to achieve its 2045 goal. The CPRP includes an economy-wide cap-and-invest program, both to close a 3.5 million metric ton emissions gap remaining after MDE's other policy recommendations are implemented and to raise the roughly \$1 billion per year in new revenue the CPRP estimates is needed to fund several of these sectoral policy programs. (Alternative mechanisms, such as a carbon fee, are also included as potential revenue-raising options.) There is little detail in the CPRP about how cap-and-invest might be designed to best serve Maryland's needs.

In December 2024, the [annual report](#) from the Maryland Commission on Climate Change (MCCC) included a recommendation that the General Assembly authorize a study to evaluate the design of a cap-and-invest program. The MCCC's 2025 [recommendations](#) include a similar directive to the Moore Administration.

Not all stakeholders may be familiar with cap-and-invest and how it works. **Put simply, a cap-and-invest approach establishes a declining cap on emissions levels, requires polluters to acquire and retire emission allowances, and invests the proceeds of**

allowance sales (which can be substantial) in achieving a rapid, effective, and equitable transition to a decarbonized economy.

CLPP previously produced a [primer](#) that offered an overview of cap-and-invest, briefly described how it is being implemented in other jurisdictions, and identified some key design elements that must be considered to ensure cap-and-invest supports and complements other facets of Maryland's climate efforts.

This issue brief is part of a [series](#) taking deeper dives into those design elements. Each brief will focus on one element (or set of elements), review how other jurisdictions address it, and discuss the issues at play as Maryland considers its own cap-and-invest program.

This brief focuses on **periodic program reviews & automatic adjustment mechanisms** — in other words, how to structure a cap-and-invest system so it can adapt in both the near term and the longer term to changing circumstances — all while still providing **price certainty**.

For reasons discussed in this paper, Maryland should probably conduct periodic comprehensive program reviews, while also making minor regulatory adjustments as needed. Maryland should adopt a minimum allowance price. For automatic adjustments, Maryland should either adopt an emissions containment reserve and a cost containment reserve or adopt a continuous allowance supply budget that correlates allowance availability and price/demand levels.

What Has to Be Decided Regarding Program Reviews, Automatic Adjustment Mechanisms, and Price Certainty Mechanisms?

A jurisdiction cannot take a “set it and forget it” approach to cap-and-invest systems. Emission reduction trajectories, allowance budgets, emission reduction goals, and other design elements need to be able to adjust to unforeseen or changing circumstances.

Periodic Program Reviews

Periodic reviews of a cap-and-invest program are essential to ensure success and to refine program design elements. A state does not want to change the program drastically — continuity and predictability are important in a market-based system — but new developments, allowance auction results, participant feedback, environmental necessity, statutory changes, and many other factors may dictate a need for design changes.

For example, statutory emissions reduction targets may be strengthened in the future to account for new scientific information. Likewise, if allowance budgets are set too high in the early

years of a program, emitters may bank so many allowances for future use that state emission reduction goals cannot be achieved. Program reviews enable a jurisdiction to adjust its cap-and-invest program to account for these and other circumstances.

A key question is how often program reviews should occur — and whether they should occur on a set schedule or as the need arises. Again, there is a balance to be struck between keeping the program aligned with changing circumstances and providing continuity, predictability, and stability to market participants.

Automatic Adjustment and Price Certainty Mechanisms

Regardless of the frequency of program reviews, they will not be constant. The world moves quickly, and developments will arise that were not anticipated at the outset of a cap-and-invest system or during the last periodic program review. Even the best planning can fail to foresee changes in the economy, technologies, geopolitics, and more that can make emission reductions either easier and cheaper or more difficult and expensive to achieve at any given point in time. It is not practical or feasible to go through a rigorous program review process every time some new development occurs. Instead, it is important to design a cap-and-invest program with automatic adjustment mechanisms that can respond in real time to changes that affect market prices and provide

participants with more certainty about their obligations under the program.

The main types of automatic adjustment mechanisms are cost containment reserves (CCRs) and emissions containment reserves (ECRs), which operate at opposite ends of the price spectrum:

- *Cost containment reserves* (sometimes called allowance price containment reserves) kick in when allowance prices get too high. If circumstances are such that there is unexpectedly high demand for emission allowances during an auction, the price of allowances will rise accordingly. When auction prices exceed a certain

predetermined level, more allowances are auctioned to increase supply and lower their cost. Where these extra allowances come from is an important consideration in terms of the integrity of the overall cap and emissions targets. If a jurisdiction creates new allowances to add into the market, it risks raising the overall cap and exceeding targets. If the extra allowances are sourced from current or future auction budgets, a jurisdiction can make more allowances available in a particular auction without necessarily jeopardizing the overall integrity of the program's cap.

- *Emissions containment reserves* kick in when allowance prices are low. When auction prices fall below a certain predetermined level, allowances are removed from the auction to reduce supply. For example, if sectoral programs (e.g., industrial energy efficiency programs) are more effective than regulators anticipated, there will be less demand for allowances from emitters in those sectors, causing allowance prices to drop. Automatically reducing the allowance budget in such circumstances prevents emitters in other sectors from buying up cheap allowances and emitting more greenhouse gases than they would have otherwise. (Decreased emissions in one sector leading to lower allowance prices and thus increased emissions in other sectors is known as *the waterbed effect*.) An ECR can direct at least some of the benefits from lower demand toward the environmental goal of the cap-and-invest program. Low allowance prices imply emissions reductions are easier

and less expensive to achieve than expected, so more reductions can be achieved and fewer allowances are needed than originally anticipated. Allowances withdrawn from an auction could be placed into a reserve to possibly be offered at a future auction (or allocation), or they may be removed from the system altogether.

The addition or removal of allowances under a CCR and ECR can occur in steps. In other words, when a price point is reached, a tranche of allowances is added or removed. There may be only one price point and tranche (one step), or there can be several price points and tranches (multiple steps) to better fine tune the quantity of allowances and corresponding price levels.

The most fine-tuned approach would be a continuous, rather than stepped, system, where the quantity of allowances added or removed is directly correlated with the price level. A continuous approach is discussed more at the end of this paper.

Cap-and-invest programs also always include price floors, which guarantee a minimum carbon price and level of revenue, and sometimes include price ceilings, which prevent allowance prices from rising above a certain point. The price floor is sometimes referred to as the auction reserve price.

The combination of price ceilings, price floors, CCRs, and ECRs gives cap-based systems some features of a carbon tax or fee, since these elements provide additional price and revenue certainty.

What Do Other Jurisdictions Do?

Cap-and-invest programs already exist or are under development in some other North American jurisdictions. Maryland can learn from others' experiences and approaches.

Table 1: Summary of Other Jurisdictions' Review, Adjustment, & Price Certainty Features

Jurisdiction	Scheduled Program Reviews	Cost Containment Reserve	Emissions Containment Reserve	Price Ceiling	Price Floor
California		✓		✓	✓
Quebec		✓			✓
Washington	✓	✓	✓*	✓	✓
RGGI	✓	✓	✓**		✓
New York	✓	✓	✓	✓	✓

* Partially implemented

** Eliminated starting in 2027

California. California's cap-and-invest [program](#) does not have regularly scheduled program reviews. It responds, instead, to various factors that require change. The California Air Resources Board (CARB) first approved the cap-and-trade regulation in 2011 (with the program starting in 2013). The [regulation](#) has been [amended](#) eight times since 2011 — in June 2012, October 2013, April 2014, September 2014, June 2015, July 2017, March 2018, and December 2018 — in order to "[reflect](#) the increased climate ambition laid out in statutes, lessons learned through implementation, linkages with other similar programs, and other direction from the Legislature." CARB is currently exploring [additional changes](#) to the regulation.

While the cap-and-invest program does not have regularly scheduled reviews, CARB is statutorily required to develop a [Scoping Plan](#) at least every five years to guide the state's overall strategy to reach its climate targets. The portfolio of measures includes but also

goes well beyond the cap-and-invest program. The original Scoping Plan was adopted in 2008, with updates in 2013, 2017, and 2022. The 2022 Scoping Plan is one of the principal factors driving CARB's current exploration of additional changes to the cap-and-trade regulation, along with the enactment of [AB1207](#) in September 2025, which extended the cap-and-invest program through the end of 2045.

As for automatic adjustment and price certainty mechanisms, California's program has an [allowance price containment reserve](#) (APCR), as well as a price ceiling and a price floor (an auction reserve price). The basic structure of California's program is shown in [Figure 1](#).

A portion of allowances is set aside each year into the APCR. (As specified in the [regulation](#), the APCR [received](#) 1% of allowances from 2013-14, 4% from 2015-17, and 7% from 2018-2020; from 2021-2030, the APCR receives a set number of allowances that is equivalent to about 4% in 2021 and declines each year until it

is equivalent to about 1% in 2030.) The APCR has two tiers of prices, which increase 5% plus inflation each year. In 2025, the Tier 1 price is \$60.47, while Tier 2 is \$77.70.

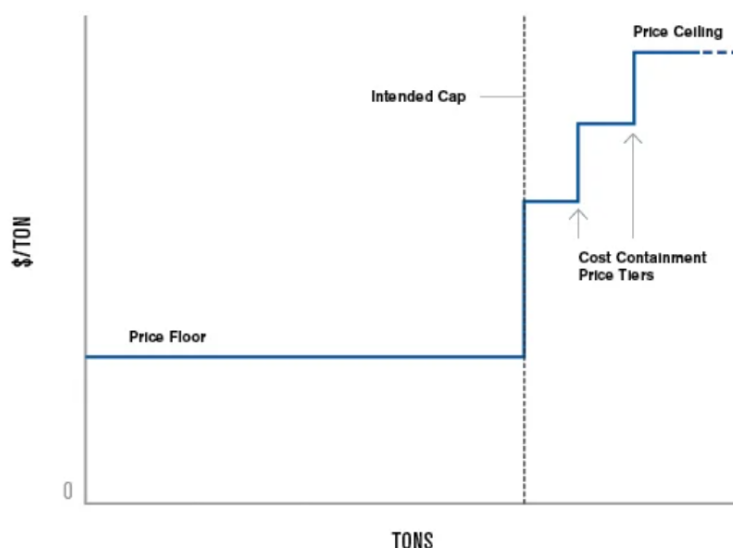
When the price in a quarterly allowance auction reaches or exceeds 60% of the lower APCR tier price, CARB will offer allowances through a separate [APCR sale](#). CARB also offers to hold an APCR sale each year right before the compliance deadline. Entities in linked jurisdictions (e.g., Quebec) are not eligible to buy allowances in a California APCR sale. All allowances in the APCR will be offered in any APCR sale. The sale starts with the lower tier and then proceeds to the higher tier, continuing until either all APCR allowances are sold or all accepted bids are filled.

If there are no allowances remaining in the APCR and there are still entities that have insufficient allowances to meet their compliance obligations before an impending compliance deadline, CARB will hold a [price ceiling sale](#). The [price](#) in 2025 is \$94.92 and rises 5% per

year, plus inflation. The Price Ceiling Account [contains](#) unsold allowances from some earlier auctions, as well as some other allowances; if there are not enough to meet the need, CARB will issue more. Prior to the adoption of AB1207 in September 2025, proceeds from price ceiling sales were to be spent to achieve emissions reductions on at least a ton-for-ton basis; [AB1207](#), however, directed price ceiling sale proceeds to be deposited in a new California Climate Mitigation Fund that the Legislature can appropriate for “purposes including, but not limited to, providing direct rebates and investments to reduce household energy costs, including incentives to transition to zero-emission vehicles and energy efficient housing.” AB1207 also gave CARB the power to alter the APCR and/or the price ceiling if it finds that one or both is not adequately protecting California consumers.

Each auction has a price floor, known as an [auction reserve price](#), and no allowances will be sold at bids below the floor. In [2025](#), the price floor is \$25.87. The reserve price rises 5% per year, plus inflation.

Figure 1: California’s Allowance Price Adjustment Mechanism Structure



Source: Dallas Burtraw, [Robust Carbon Markets](#) (Western Climate Initiative graphic)

For much of the program’s existence, allowance prices were right around the auction reserve price, as shown in [Figure 2](#). There has [not yet](#) been a need for CARB to utilize the APCR and price ceiling mechanisms.

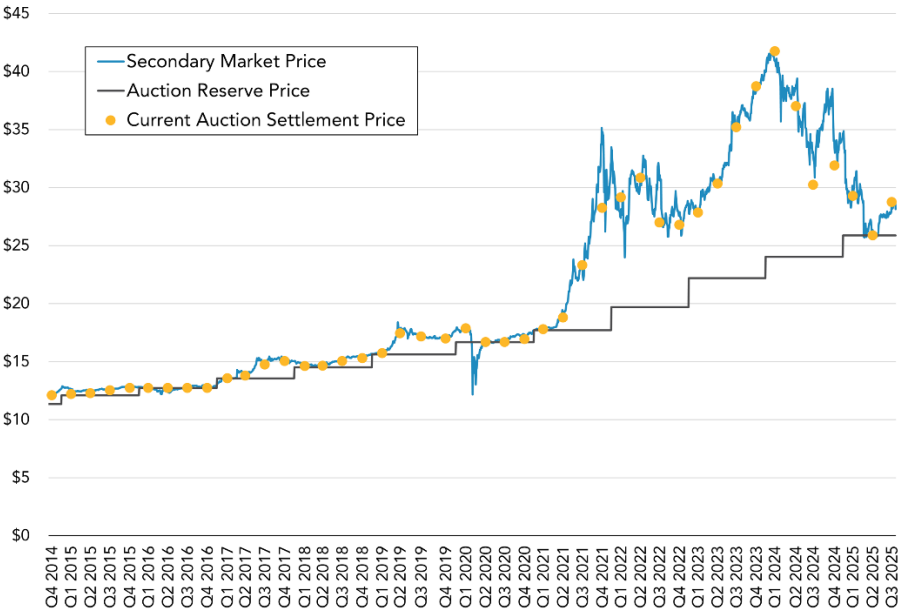
California’s cap-and-invest system does not have an emissions containment reserve, but it does have a [mechanism](#) that removes allowances that remain unsold at quarterly auctions from the market during periods of low demand and withholds them from auction until there are two consecutive auctions with prices above the price floor. If allowances go unsold for two years, they are moved into the APCR.

CARB is [exploring](#) potential updates to its cap-and-invest program, including how “cost-

containment features [can] reflect a real-time valuation of allowance prices and be designed to enhance price stability” and whether it should “create a new mechanism where auction supply reflect[s] recent auction settlement price(s)” to increase supply when prices are high and reduce supply when prices are low.

In sum: California does not have a set program review schedule but rather updates its cap-and-invest regulation regularly as needed. Its program includes a price floor, a price ceiling, the APCR (its cost containment reserve), and a mechanism that delays the sale of allowances during periods of low demand and potentially withdraws them from the general market, moving them to the APCR if they go unsold for two years.

Figure 2: California Allowance Prices and the Price Floor



Source: CARB, [Cap-and-Trade Program Data Dashboard](#)

Quebec. Quebec’s cap-and-invest [system](#), which is linked with California’s, likewise does not have regularly scheduled review periods,

responding instead to various factors that require change. Indeed, since adoption of the cap-and-trade regulation in 2011, the regulation

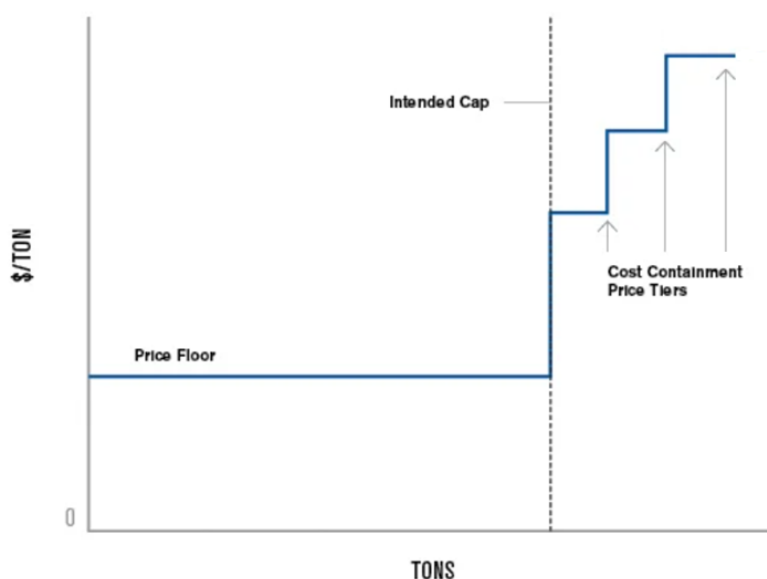
has been [updated](#) almost annually: in 2012, 2013, 2014, 2015, 2017, 2020, 2021, 2022, and 2023. Determinations of annual emissions caps for 2013-2020 were made in 2012, and determinations for 2021-2030 were made in 2017. Jointly with California, Quebec is in the process of [assessing](#) the operating parameters of its cap-and-invest system and could issue updated regulations in late 2025 or early 2026.

While the cap-and-invest program does not have regularly scheduled reviews, the Quebec government does issue an annual 5-year [implementation plan](#) for its *Plan for a Green Economy 2030*, defining the climate actions, budgets, and targets that various ministries and agencies will carry out.

As for automatic adjustment and price certainty mechanisms, Quebec's program has a cost containment reserve, as well as a price floor. The basic structure of Quebec's program design is shown in [Figure 3](#).

Quebec's CCR is known as the Minister's reserve, from which there can be "[sales by mutual agreement by the Minister](#)". The Minister's reserve received 1% of emission unit (allowance) budgets from 2013-14, 4% from 2015-17, 7% from 2018-2020, and 4% from 2021 onwards. These allowances were divided into three tiers (A, B, and C). In 2021, reserve prices for tier A were set at \$41.40, \$53.20 for tier B, and \$65 for tier C (in Canadian dollars). The prices for each tier rise 5% per year, plus inflation. To avoid arbitrage, given linkage with California, if the price is higher in one partner's system, the allowances are sold at that higher price. Generally, prices in California's two-tier APCR and price ceiling reserve are higher than in Quebec's three-tier Minister's reserve. Sales from the Minister's reserve are only for Quebec emitters. Sales are planned for the end of a compliance period and following an auction where the price reaches or exceeds the price of the lower reserve category (A), though the Minister can hold such sales at any other time. [No sales by mutual agreement](#) have been held to date.

Figure 3: Quebec's Allowance Price Adjustment Mechanism Structure



Source: adapted from Dallas Burtraw, [Robust Carbon Markets](#) (Western Climate Initiative graphic)

Unlike California, Quebec has no price ceiling *per se*. Quebec does have three tiers in its CCR (compared to California's two), but there are only a limited number of allowances in the Minister's reserve. Unlike California's price ceiling reserve, more will not be issued. (This is why [Figure 3](#), unlike Figure 1, has a finite solid horizontal line for its third CCR tier.)

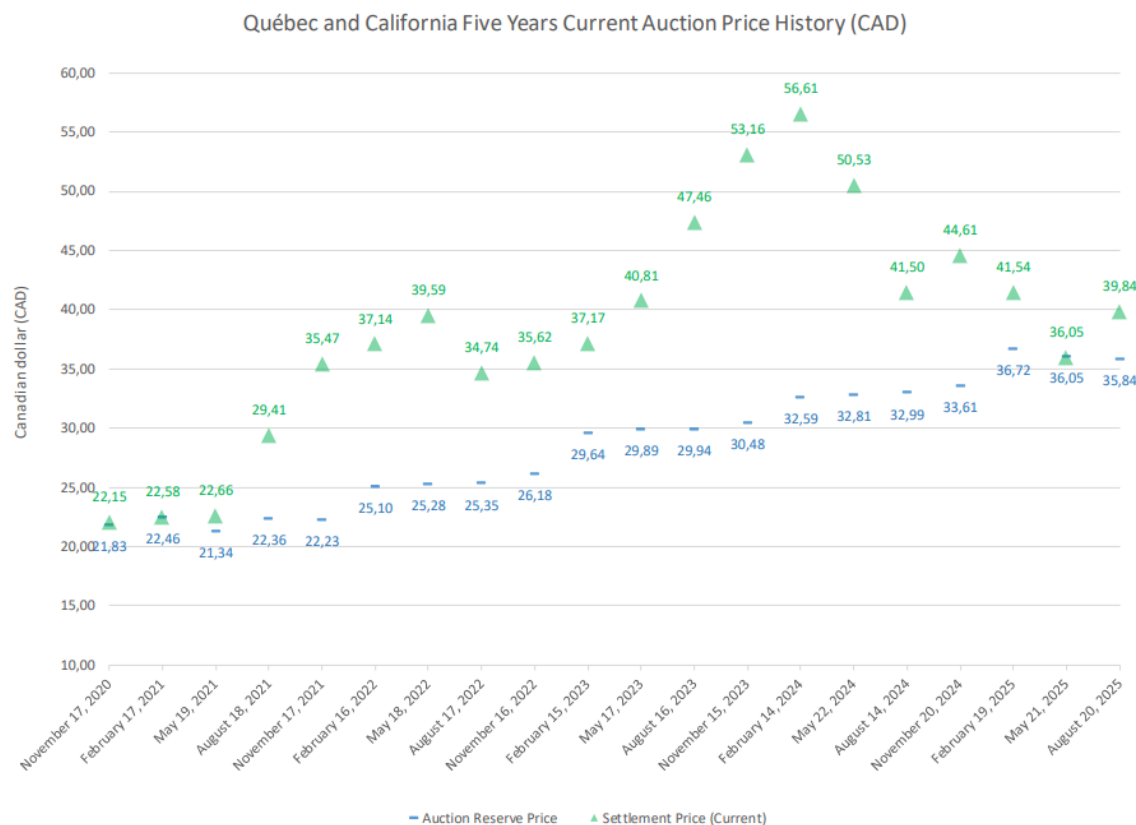
As in California, each auction has a floor price (an [auction reserve price](#)). Quebec set the floor price at \$10 in 2012, rising 5% plus inflation every year, but as with the cost containment sales, the joint auction's floor price is whichever partner government's floor price is higher (typically California's). In 2025, the \$25.87 California floor price [translates](#) to a \$24.73 (Canadian) Quebec auction reserve price. Since the auctions are joint with California, the

pattern in [Figure 4](#) (which presents the past 5 years only) is identical to the one in Figure 2 — allowance prices only starting to rise above the floor price in 2021 — but in Canadian dollars.

As in California, Quebec's system does not have an emissions containment reserve, but like California, it does have a [mechanism](#) that removes allowances that remain unsold at quarterly auctions during periods of low demand and withholds them from auction until there are two consecutive auctions with prices above the price floor. If allowances go unsold for three years (versus California's two), they are moved into the Minister's reserve.

In sum: Quebec's structure is very similar to California's with some minor differences, which makes sense given that the systems are linked.

Figure 4: Quebec Allowance Prices and the Price Floor



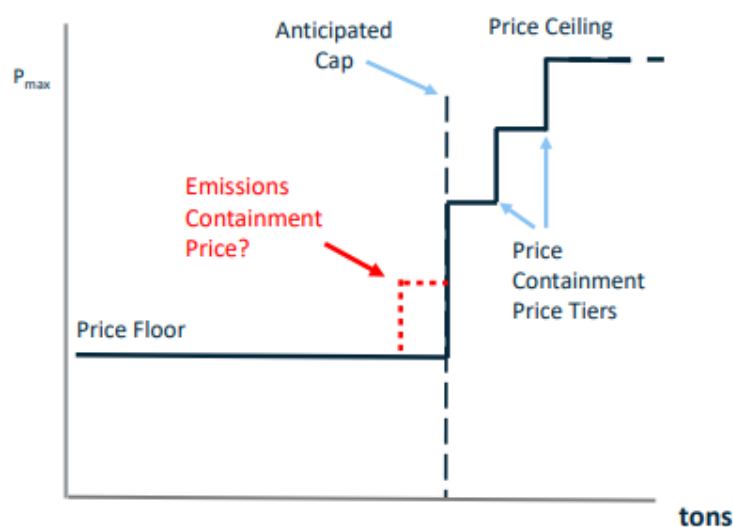
Source: Quebec MELCCFP, [Current Auction Price History](#)

Washington. Washington's cap-and-invest [program](#) — the nation's newest — entered into force January 2023 and held its first allowance auction in February 2023. Washington [law](#) directs the Department of Ecology to conduct various program reviews and evaluations at specific times. Program [reviews](#) were originally set for Dec. 1, 2027, and every four years thereafter, but to facilitate linkage with other jurisdictions, legislation passed in 2024 got rid of the requirement for four-year compliance periods and changed the schedule to Dec. 1, 2027, and by December 1 of the year following the end of each compliance period. Ecology must submit a report with "a comprehensive review of the implementation of the program to date, including but not limited to outcomes relative to the state's emissions reduction limits, overburdened communities, covered entities, and emissions-intensive, trade-exposed businesses." Washington [law](#) further dictates when Ecology must update its emissions baseline, adopt future allowance budgets, and evaluate whether adjustments to allowance budgets are needed in light of the program's performance in reducing greenhouse gases.

As for automatic adjustment and price certainty mechanisms, Washington's program has an allowance price containment reserve (its cost containment reserve) and a largely unimplemented emissions containment reserve, as well as a price ceiling and a price floor. The basic structure of Washington's program design is shown in [Figure 5](#).

Washington's [APCR](#) was stocked from the beginning of the program with 5% of the allowances to be issued from 2023 through 2030, with the amounts available in any given year front-loaded so that higher volumes are available in the early years. (Ecology [further front-loaded](#) the allowances in late 2023 in response to high allowance prices, moving allowances from 2026 availability into the 2024 pool of available allowances.) As defined by [regulation](#), the APCR has two tiers, with set prices that rise 5% per year, plus inflation; in 2025, the [prices](#) are \$60.43 (Tier 1) and \$77.63 (Tier 2), a few cents below California's. Ecology will offer an APCR sale in three cases: (1) in the quarter following a quarterly auction in which the allowance price was equal to or more

Figure 5: Washington's Allowance Price Adjustment Mechanism Structure



Source: Burtraw & Shobe, [CARB Comment](#) (graphic to describe potential modification to Western Climate Initiative design for California & Quebec, but representative of Washington's design)

than the Tier 1 APCR price; (2) when new entities enter the program and there are no allowances in the ECR; and (3) before each annual compliance deadline. Unlike California and Quebec, Washington's APCR mechanism has been [utilized](#) — twice in 2023 in response to high auction prices, as shown in [Figure 6](#), and [once](#) in 2024 before the compliance deadline. In the first APCR sale, Ecology made half of the allowances available in Tier 1 and half in Tier 2, but in the second and third sales Ecology made all allowances [available](#) at the Tier 1 price; unless and until Washington links its program with others, Ecology will continue to offer APCR allowances at Tier 1 prices.

Immediately before a compliance deadline, if there are no allowances left in the APCR and if [requested](#) by a covered entity, Ecology will issue [price ceiling units](#) to covered entities that need them for compliance. The ceiling price, which in [2025](#) is \$94.85 (again a few cents below California's), rises 5% per year, plus inflation. Similar to California, Washington [statute](#) directs Ecology to issue the number of price ceiling units needed to permit all covered entities to achieve compliance. Revenues raised from price ceiling unit sales must be spent to achieve greenhouse gas emission reductions on at least a ton-for-ton basis. The price ceiling mechanism has not yet been used.

Each Washington auction of allowances has a [price floor](#), below which allowances may not be sold. The floor price in [2025](#) is \$25.85, and the price [increases](#) 5% per year, plus inflation.

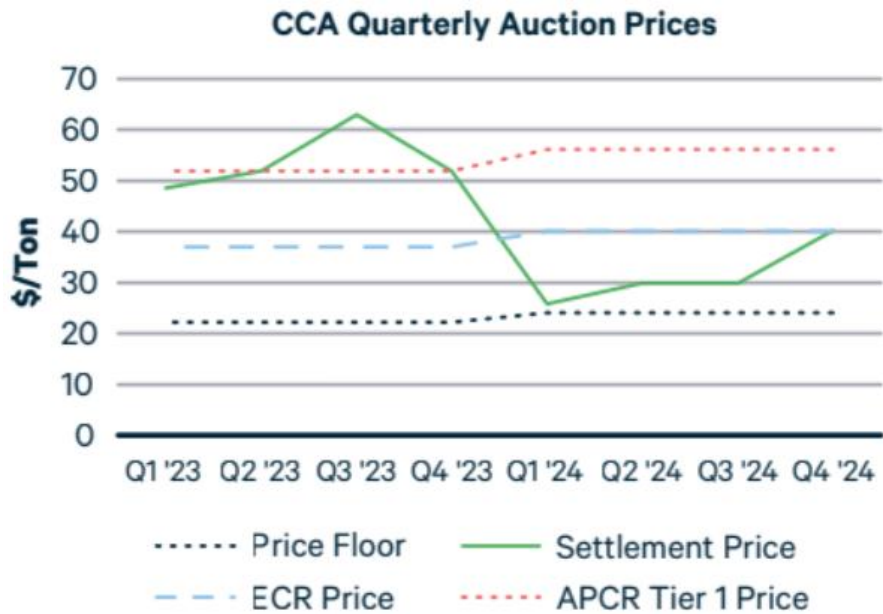
Unlike California and Quebec, Washington has an emissions containment reserve, though it remains largely unimplemented. The ECR is meant "[to help](#) ensure that the price of allowances remains sufficient to incentivize reductions in greenhouse gas emissions" and

"to secure additional emissions reductions."

The ECR is supposed to have a trigger price above the price floor, and if the clearing price is below the trigger price during an auction, Ecology would have to automatically [withhold](#) up to 10% of the available allowances from the auction and move them to the ECR account. The ECR account also holds no less than 2% of allowances available for 2023-2026, allowances that go [unsold](#) for 2 years, and allowances from facilities that curtail, close, or fall below the program's emissions threshold. When new entities enter the program, allowances will be [distributed](#) from the ECR. Ecology has not yet adopted an ECR trigger price, however; as of October 2022, the ECR trigger price has been [suspended](#) until reinstated by rule. Ecology [argued](#) in September 2022 that "[m]odeling predicts (and current activity in the California/Québec market confirms) that allowance prices paid at auction will rise faster than the auction floor price, and an ECR trigger price is not needed. That situation may change. Therefore, Ecology will monitor the market over the next few years and explore the possibility of reinstating the ECR trigger price should it become useful to do so." (Note that the price in the [March 2024](#) auction was only \$25.76, as shown in [Figure 6](#), having [dropped](#) dramatically due to lower demand driven by concerns about an ultimately unsuccessful measure on the November 2024 ballot to repeal the cap-and-invest program.)

In sum: Washington has periodic program reviews, though it can make adjustments as needed. Its program has a price floor, a price ceiling, a two-tier APCR (that is currently functioning as one tier), and an ECR that currently lacks a trigger price. Washington is both fine-tuning a new program and anticipating linkage with California and Quebec.

Figure 6: Washington Allowance Price, Volumes, and APCR Trigger



Source: Roy, Russo, & Burtraw, [Considerations for Washington's Linkage Negotiations with California and Québec](#) (based on Washington auction reports)

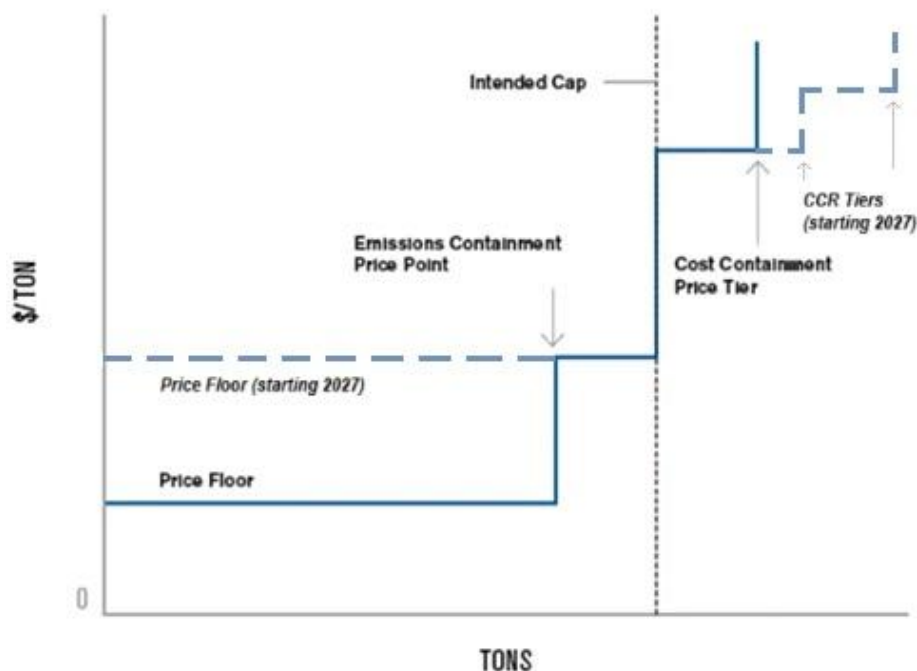
The Regional Greenhouse Gas Initiative. The Regional Greenhouse Gas Initiative (RGGI) is a cooperative regional cap-and-invest [program](#) established in 2009 by several Northeastern and Mid-Atlantic states (including Maryland) that covers just the electric power sector. The RGGI states conduct comprehensive periodic [program reviews](#) to assess successes, impacts, and various design elements. The [first program review](#) was a 2-year process that finished in February 2013 and resulted in improvements such as revised emissions caps and the addition of a CCR. The [second program review](#) was completed in 2017 and resulted in several additional changes, including a decision to reduce the cap 30% between 2020 and 2030 and the creation of an ECR. The third [program review](#), which started in 2021 and concluded in July 2025, further reduced the regional allowance budget through 2037, made several changes to the automatic adjustment and price

certainty mechanisms, and removed offsets from the RGGI program design.

As for those automatic adjustment and price certainty mechanisms, prior to the third program review, RGGI [had](#) both a CCR and an ECR, as well as a price floor (a minimum reserve price). Following the third [program review](#), starting in 2027, RGGI will have a second CCR tier, no ECR, and a higher price floor. The basic structure of RGGI's program design both at the moment and starting in 2027 (as laid out in the updated [RGGI model rule](#)) is shown in [Figure 7](#).

Through 2026, RGGI's single CCR [consists](#) of allowances equivalent to 10% of the cap; in 2025, that translates to roughly 8 million allowances. The third [program review](#) expanded the size of the CCR and added an additional tier; starting in 2027, *each* CCR tier will include roughly 11.75 million

Figure 7: RGGI's Allowance Price Adjustment Mechanism Structure



Source: adapted from Dallas Burtraw, [Robust Carbon Markets](#) (dashed lines represent changes starting in 2027)

allowances across all 10 participating states, each year. Unlike in other jurisdictions, these allowances are *in addition* to the emissions cap. The CCR is replenished at the start of each calendar year. The additional CCR allowances are sold if allowance prices exceed the CCR trigger price(s). In 2025, the CCR trigger price is \$17.03 (and rises 7% for 2026); starting in 2027, the CCR tier 1 trigger price (matching the current trajectory) will be \$19.50, while the CCR tier 2 trigger price will be \$29.25, with each rising 7% annually. Unlike other cap-and-invest programs, the RGGI CCR allowances are released during the [same auction](#) as the original allowances under the cap (not in a separate subsequent auction); they are released until the final auction clearing price equals the CCR trigger price or until the CCR allowance pool is depleted. Once the CCR pool is depleted, no further CCR allowances will be

available until the following calendar year, when the pool is replenished. RGGI has [sold](#) CCR allowances during six quarterly auctions: in March 2014, September 2015, December 2021, December 2023, March 2024, and March 2025 — as shown (through June 2024) in [Figure 8](#).

RGGI's ECR only [started](#) in 2021, and Maine and New Hampshire do not participate in it. The ECR trigger price in 2025 is \$7.86, and it will rise 7% in 2026. If the interim auction clearing price is below the ECR trigger price, up to 10% of the budgets of participating states will be withheld (and [will not](#) be re-offered for sale) until the clearing price [equals](#) the trigger price or until the 10% ECR limit is reached. Once the ECR limit is reached, no further allowances can be withheld until the following calendar year, when the ECR is reset. RGGI auction prices have not yet triggered the ECR,

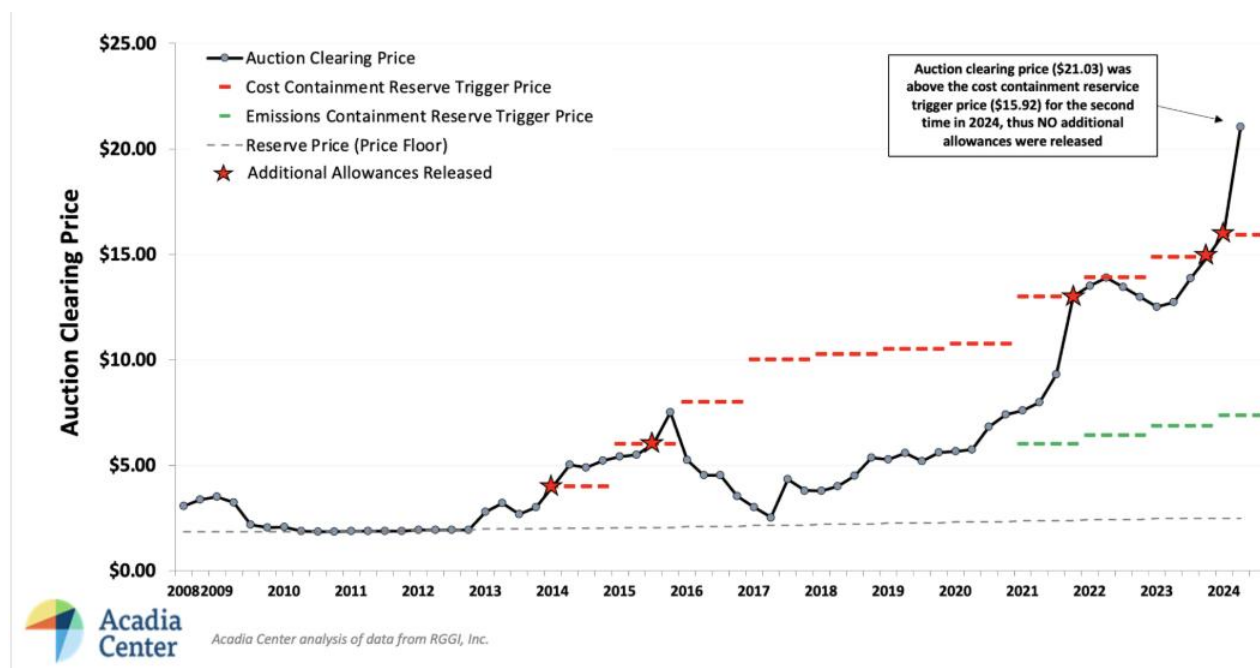
as shown in **Figure 8**. The third [program review](#) eliminates the ECR starting in 2027.

Each RGGI auction has a minimum reserve price (price floor), which is the minimum acceptable bid price for allowances. The [reserve price](#) in 2025 is \$2.62, and it will rise 2.5% in 2026. The third [program review](#), while eliminating the ECR, raises the minimum reserve price starting in 2027 to match the ECR trigger price trajectory, setting it at \$9.00 in

2027 and increasing it 7% annually thereafter. There is [no](#) bid price ceiling.

In sum: The RGGI states undertake regular program reviews every few years to make necessary revisions to the program design. The RGGI program includes a price floor, a CCR mechanism that has allowances that are additional to (not taken from within) the cap, and (through the end of 2026) an ECR mechanism.

Figure 8: RGGI Prices Relative to the CCR Trigger, ECR Trigger, and Floor Price (through June 2024)



Source: Acadia Center, [RGGI 64th Auction](#)

New York. New York is still in the process of developing its economy-wide cap-and-invest [program](#), so the state has not yet made final decisions about program design.

New York [anticipates](#) its program reviews will be every 3-5 years or so, generally replicating its experiences with RGGI program reviews, but it is soliciting feedback on what the periods for program reviews should be.

Based on New York's December 2023 [pre-proposal outline](#), the anticipated automatic adjustment and price certainty mechanisms include a CCR and an ECR, as well as a price ceiling and a price floor. The anticipated structure of New York's program design is shown in **Figure 9**.

The CCR would consist of 5% of allowances, sourced from within the allowance budget. If auction prices end up above the CCR trigger

price (which has yet to be determined but will have a set value in 2025 and 2027 and then increase 8% each year), only the allowances needed to maintain the CCR trigger price would be sold. The rest would stay in the CCR for future use. As the program gets underway, there will be a special schedule for CCR allowances during the program's first six years, with 2025-2026 allowances made available at 2025 trigger prices and 2027-2030 allowances made available at 2027 trigger prices.

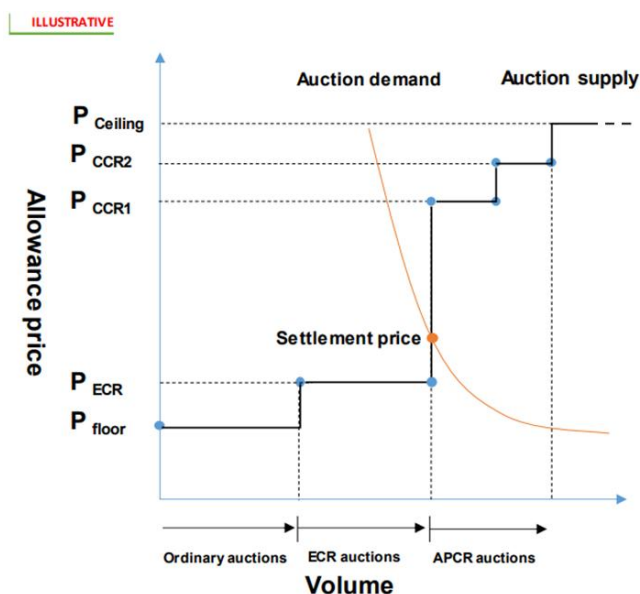
New York is planning to implement a hard price ceiling similar to California's and Washington's. Prior to compliance deadlines, entities that need more allowances for compliance will be able to buy price ceiling units to satisfy their compliance obligations. These units will be newly created and offered for sale in whatever quantities are needed to meet compliance needs. Price ceiling unit costs have yet to be determined, but they would have a set value in 2025 and 2027 and subsequently increase 8% each year.

Towards the other end of the allowance price spectrum, New York's ECR would receive 10% of allowances from each allowance budget, and those allowances would only be released for sale if auction prices exceed the ECR trigger price (which has yet to be determined but will have a set value in 2025 and 2027 and subsequently increase 8% each year). If the ECR price is not triggered, those allowances will stay in the ECR and will not be sold in the auction.

Each New York auction will have a price floor. The minimum reserve price, which (like everything else in the program) has not yet been determined, will increase 8% every year.

In sum: Many of the details remain to be decided in the New York program, but it looks like there will be regular program reviews, a CCR, an ECR, a price floor, and a price ceiling.

Figure 9: Anticipated New York Automatic Adjustment Mechanisms



Source: adapted from New York DEC & NYSERDA, [Preliminary Scenario Analyses](#)

Discussion

The differences and commonalities among other jurisdictions' cap-and-invest programs can be instructive for Maryland as it considers its own program.

As shown, jurisdictions take different approaches to the frequency and scheduling of program reviews. California and Quebec do not have scheduled program reviews, instead updating their regulations as frequently as needed. Washington and New York have (or contemplate) scheduled program reviews, as does RGGI. RGGI's use of periodic reviews makes sense, as changes to the RGGI program require agreement among multiple states, which then must adopt their own implementing regulations — making constant regulatory updates unwieldy. For single-state programs, however, either approach has benefits. Frequent regulatory updates allow for quicker responses to changing circumstances, while scheduled reviews ensure comprehensive reevaluations of programs' performance.

As the preceding section also makes clear, jurisdictions vary in their use of automatic adjustment and price certainty mechanisms. There are some commonalities, though. Every jurisdiction, for instance, has a price floor to ensure minimal price signals and revenues. Every jurisdiction also utilizes a cost (or allowance price) containment reserve, though jurisdictions vary in the number of CCR tiers (as designed or as implemented) and in the source of the CCR allowances. As noted earlier, if a jurisdiction creates new CCR allowances to add into the market, as RGGI does, it risks raising the overall cap and exceeding targets. If the CCR allowances are sourced from current or future auction budgets, as allowances in other jurisdictions reviewed in this paper are, a jurisdiction can make additional allowances available in an auction without jeopardizing the overall integrity of the cap.

While every jurisdiction utilizes a price floor, not all have adopted a price ceiling. Jurisdictions that do not have a price ceiling (Quebec and RGGI) are relying on their CCRs to keep prices at reasonable levels. Should there be more demand than supply for CCR allowances, prices in these jurisdictions will rise, and there may be some entity noncompliance. In contrast, jurisdictions with a price ceiling (California, Washington, and likely New York) ensure their entities can comply (by creating more allowances) while maintaining a firm, maximum price for allowances. Both of those aspects create certainty for market participants, but creating more allowances could allow the emissions cap to be breached. This is the reason states with price ceilings have generally required revenues from price ceiling sales to be spent to achieve emissions reductions on at least a ton-for-ton basis (although California's AB1207 has now put the focus more on protecting households from cost increases). The feasibility of achieving one-for-one reductions is uncertain, however, and no jurisdictions reviewed in this paper have ever had to use their price ceiling mechanisms.

Emissions containment reserves are more recent additions to the cap-and-invest design portfolio, having been adopted in the newer programs (Washington and likely New York) and in RGGI (through 2026). California and Quebec have yet to adopt an ECR. Although RGGI framed its revisions as "replacing" the ECR with a higher minimum reserve price, those mechanisms serve different purposes. As noted earlier, minimum reserve prices provide some certainty about prices and revenue levels, whereas ECRs respond to situations where

demand for allowances is lower (meaning emissions reductions are easier and less expensive to achieve) by further reducing the number of allowances, thereby increasing the environmental benefits of the program.

The more tiers a jurisdiction has in its ECR and its CCR, the closer it gets to a continuous adjustment framework, with better correlation between quantity of allowances and price levels — and thus minimization of the waterbed effect.

What Should Maryland Do?

MDE has discussed the possibility of developing an economy-wide cap-and-invest program to supplement the sectoral programs in its *Climate Pollution Reduction Plan*, and key design elements to figure out include the frequency of program reviews and the nature of the automatic adjustment and price certainty mechanisms.

With respect to program reviews, there is merit to both periodic comprehensive reviews and minor regulatory adjustments as and when needed, and Maryland could seek to implement both. Maryland should conduct periodic comprehensive reviews to assess the effectiveness and performance of the cap-and-invest program and evaluate any significant changes to program design that may be required. MDE should also have the ability to make more minor regulatory adjustments between program reviews, if necessary.

As all other jurisdictions have, Maryland's cap-and-invest program should have a price floor to ensure minimum levels of price signal and revenue. Unsold allowances should be permanently withdrawn from future sale. Whether Maryland should also adopt a price ceiling mechanism is more challenging. The certainty provided to market participants in terms of compliance and price is important, but the potential risks to the integrity of the emissions cap are concerning. Particularly given that no jurisdiction has yet had to utilize its price ceiling mechanism, it may be prudent for Maryland to begin its program without a price ceiling. Somewhat like Washington is doing with its ECR, MDE could assess over

time whether a price ceiling mechanism is ultimately needed or not.

As for automatic adjustments, Maryland should pursue one of two options:

Option 1. Maryland could follow the path already taken by some other jurisdictions, adopting reserves on both ends of the price spectrum: an emissions containment reserve to ensure that the program's environmental goals benefit when demand and prices for allowances are low, and a cost containment reserve for when demand and prices are too high (with allowances taken from within the cap, not created as additional allowances as in RGGI). Maryland should consider having multiple tiers in both its CCR and its ECR, to better correlate allowance supply and price level, as shown in **Figure 10(a)**.

Option 2. Alternatively, Maryland could take the next step in the evolution of automatic adjustment mechanisms, moving from multi-tiered reserves to a continuous allowance supply budget. A continuous approach would provide a more comprehensive response to the waterbed effect and would be the most fine-tuned way of correlating allowance availability

and price/demand levels. For each price point, there would be a unique quantity of allowances available, and vice versa.

A continuous system would make automatic allowance supply adjustments during the running of an auction. This would be similar to the way that RGGI currently makes its CCR and ECR adjustments within a single auction.

As in systems with tiered mechanisms, regulators would specify an allowance budget (or cap) for each auction that would reflect expected levels of demand. Regulators, however, would also pre-determine and publish minimum and maximum prices and all associated quantities in between, so the quantity of allowances sold for any given clearing price (the lowest accepted bid) would be known in advance. Any clearing price above expected demand would result in the addition of allowances into the auction from a CCR. Any clearing price below expected demand would

result in the removal of allowances from the auction into an ECR. The trigger prices present in tiered systems would be eliminated, with abrupt changes in prices and allowance quantities replaced by a more finely calibrated adjustment mechanism, as shown in **Figure 10(b)**.

As has been explained, under a tiered approach, prices can fall within a range for the same volume of allowances (as represented by each vertical line in Figure 10(a)), creating the waterbed effect. Some may be under the impression that this price ambiguity is necessary to allow the market (and not regulators) to determine the allowance price, but this is not the case. Under a continuous system, the market will *still* determine the level of demand and thus the corresponding price point; the difference is that under a continuous system, one volume of allowances will no longer be available at multiple price points.

Figure 10: (a) Multi-tiered Allowance Budget and (b) Continuous Straight Allowance Budget

