

APPENDIX D

STAFF REPORT: INITIAL STATEMENT OF REASONS

**Proposed Amendments to the California Cap on Greenhouse Gas Emissions and
Market-Based Compliance Mechanisms Regulation**

AB 398: Evaluation of Allowance Budgets 2021 through 2030

State of California

AIR RESOURCES BOARD

Release Date: September 4, 2018

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Introduction

Assembly Bill (AB) 398 (Chapter 135, Statutes of 2017) provides legislative direction on the role of the Cap-and-Trade Program between 2021 and 2030.¹ AB 398 contains a specific provision directing the California Air Resources Board (CARB or Board), in adopting a post-2020 Cap-and-Trade Program, to *evaluate and address concerns related to overallocation in the state board's determination of the number of available allowances for years 2021 to 2030, inclusive, as appropriate.* (Health & Safety Code § 38562(c)(2)(D).)

In response to the direction in AB 398, staff focused on whether the allowance budgets (caps) established from 2021 through 2030 needed to be adjusted to account for any unused allowances from 2013 through 2020. Concerns have been raised about the possibility that the potential pool of unused allowances hinder the ability of the post-2020 period of the Cap-and-Trade Program (Program) to deliver the necessary greenhouse gas (GHG) emission reductions needed to achieve the 2030 target established by Senate Bill (SB) 32 (Chapter 250, Statutes of 2016). Staff conducted this evaluation by examining the following questions:

- Does the design of the Cap-and-Trade Program support a steadily increasing carbon price signal to prompt the needed actions to reduce GHG emissions?
- Are the pre- and post-2020 caps set appropriately given the Cap-and-Trade Program's role in achieving the statewide GHG reduction targets when taking into account complementary policies?
- Does California need to make adjustments to its Cap-and-Trade Program to address potential overallocation similar to actions taken in the European Union Emissions Trading System and Regional Greenhouse Gas Initiative?
- Is there any evidence that future allowance prices would not continue to steadily increase to prompt the needed actions to reduce GHG emissions?
- What would happen if caps from 2021 through 2030 were reduced in response to concerns about unused allowances from 2013 through 2020?

In answering these questions, staff found that the currently established caps would constrain GHG emissions from 2013 through 2030. This in turn would support a steadily increasing carbon price signal to prompt the needed actions to reduce GHG emissions. The results of this evaluation show that while there may be unused allowances in the early years of the Program, the design features of the Program and the established declining caps reinforce a steadily increasing carbon price signal through the next decade.

¹ See https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398.

Does the design of the Cap-and-Trade Program support a steadily increasing carbon price signal to prompt the needed actions to reduce GHG emissions?

Since the very beginning, the Cap-and-Trade Program has included several features to support a steadily increasing carbon price signal. These features include:

- an increasing Auction Reserve Price (floor price),
- holding limits to deter and prevent market manipulation by restricting the number of allowances any single entity can own,
- a self-ratcheting mechanism to remove unsold auction allowances from the market and place those in higher priced tiers, and
- banking rules to provide flexibility, help reduce volatility in the allowance prices, and limit the ability of market participants to bank an unlimited number of allowances for future use.

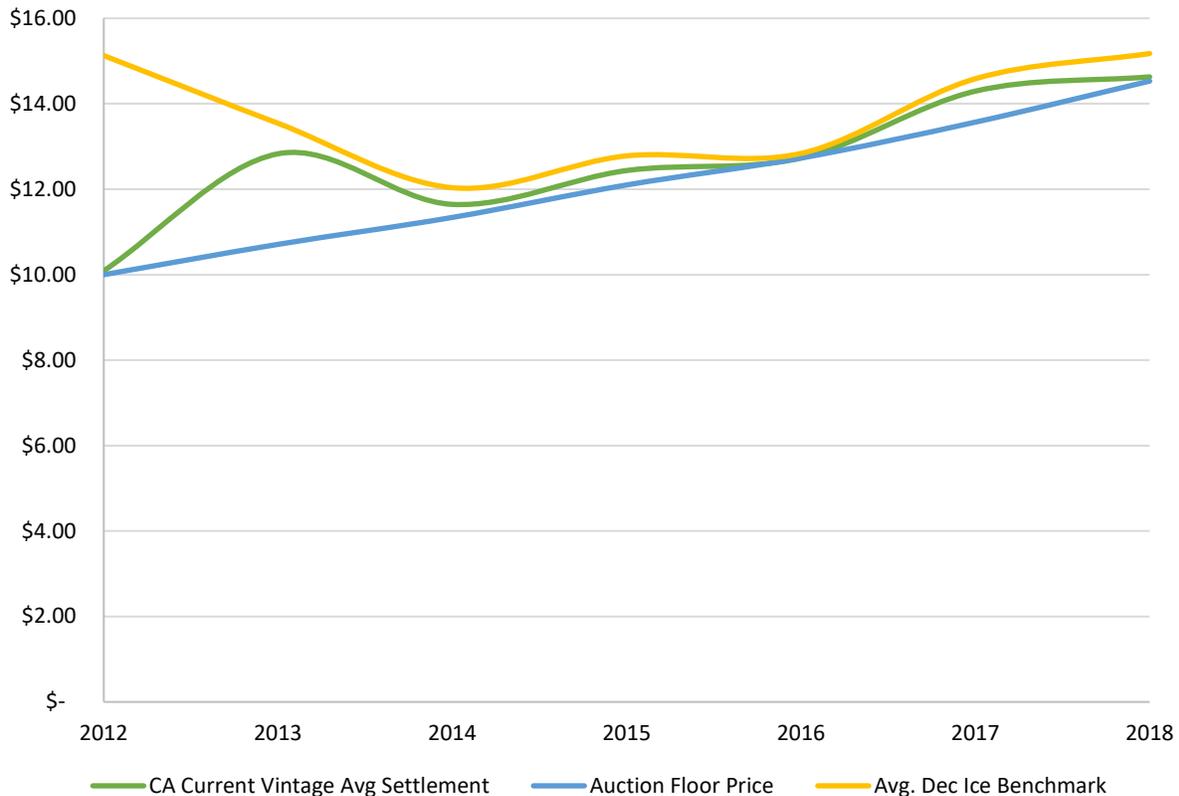
Each of these design features plays an important role in ensuring the carbon price signal is consistent and steadily increases over time and that regulated entities are continually prompted to find and act on the lowest cost opportunities to reduce GHG emissions.

Auction Reserve Price

The floor price helps to reduce price uncertainty by defining a minimum expected price for allowances. This feature can reduce Program costs by ensuring a meaningful incentive to reduce emissions, particularly in the early years of the Program. The floor price has been a design feature in the Program since its inception in 2010 and it ensures that allowance prices do not get too low to prompt emissions reductions. The floor price was initially set at \$10/metric ton for auctions in 2012. This is the same level as the floor price that was established in the Waxman-Markey cap-and-trade legislation that passed in the U.S. House of Representatives in 2009.² Staff believed setting the floor price at this dollar amount would send a signal to technology developers, as well as those investing in GHG offset projects. For all years following 2012, this floor price increases by 5 percent plus inflation (as measured by the Consumer Price Index). Figure A provides a comparison of the historical Program floor price, average annual auction settlement price for the California Program, and the secondary market Intercontinental Exchange (ICE) benchmark for December delivery. The floor price started at \$10/metric ton in 2012 and steadily increased to \$14.53/metric ton in 2018.

² American Clean Energy and Security Act of 2009, H.R. 2454, 111th United States Congress, 1st Session. (2009).

Figure A. Comparison of CA Floor Price, Average Annual Auction Settlement Price, and Secondary Market Benchmark



In Figure A, the blue line depicts the annual floor price, which has steadily increased as required in the Cap-and-Trade Regulation (Regulation). The green line provides the average annual auction settlement price, which tracks closely to the floor price and has steadily increased over time. Finally, the yellow line is the average December delivery benchmark for contracts on ICE, a secondary market where allowances can be sold and bought, and it too tracks closely to the increasing floor price. The Program’s floor price provides a strong signal to the market that allowance prices are expected to steadily increase and should be considered in financial planning for compliance with the Program and onsite investments to reduce GHG emissions.

Holding Limits

The Program also includes a design feature to prohibit efforts to “corner” the market, where an entity purchases a large share of available compliance instruments to manipulate the price of allowances and other market participants may have little choice but to buy from them. To combat this tactic, staff included the use of a holding limit, which is the maximum number of available compliance instruments that an entity or group of affiliated entities may own. The Program also includes a limited exemption to this holding limit that ensures covered entities are able to accumulate sufficient allowances to meet their compliance obligations. Holdings by affiliated entities are evaluated as if they belong to a single entity.

The holding limit applies separately to holdings of “current vintage” and “future vintage” allowances. Current vintage allowances have a vintage year corresponding to the current or previous calendar years, or are allowances purchased from the Allowance Price Containment Reserve (Reserve). Future vintage allowances have a vintage year later than the current calendar year. The current vintage holding limit applies to all current vintage allowances as one group. Thus, in 2018 the current vintage holding limit covers an entity’s holdings of 2013 through 2018 vintage allowances. However, the future vintage holding limit applies separately to each future vintage. The holding limit is based on the annual allowance budget of all the jurisdictions in the linked market; it decreases as the jurisdictional caps decline.

Financial constraints may restrict the ability of covered entities to purchase and hold allowances needed for compliance, especially up to the holding limit. This may prevent entities from undertaking purchases that would otherwise allow them to reduce their allowance acquisition costs. Voluntarily associated entities (VAE) are not covered entities but can buy, sell, hold, and retire allowances and offsets in the Program. VAEs must comply with holding limits and all Program requirements. VAEs increase liquidity and market efficiency as they can buy, hold, and sell allowances to covered entities. This helps prevent a few large entities from controlling allowance prices and exerting market power. Currently, VAEs in the Program are largely offset project operators that do not hold a significant quantity of allowances. In the last three years, the average number of California registered entities that have come within at least 95 percent of the holding limit is less than one percent.

Self-Ratcheting Mechanism

The Regulation includes a provision that removes allowances that remain unsold at quarterly auctions from circulation during periods of low auction demand and slowly reintroduces allowances back during periods of high demand. This provision supports the escalating floor price and also helps reduce price volatility from changes in allowance demand. In the 2016 regulatory amendments, staff included a provision that moves any allowances that remain unsold for eight consecutive auctions to the Reserve. This amendment was approved by the Board in July 2017. Additionally, AB 398 includes legislative direction on the treatment of unsold allowances, which is consistent with the recently adopted regulatory amendments. This mechanism has already proven to be effective. Due to low demand for allowances through 2017, at least 39 million allowances will be transferred to the Reserve and removed from general circulation. Depending on auction results in 2018, additional unsold allowances may also be transferred to the Reserve.

Banking Rules

Another important design feature of the Program is the ability of entities to bank allowances for future compliance. AB 398 contains a specific provision directing CARB, in adopting a post-2020 Program, to “[e]stablish allowance banking rules that discourage speculation, avoid financial windfalls, and consider the impact on complying entities and volatility in the market.” (Health & Safety Code § 38562(c)(2)(H).)

Since the beginning of the Program, CARB has included rules allowing banking of compliance instruments, recognizing that banking creates flexibility and “an incentive to make early reductions and encourages long-term commitment to the system from stakeholders.” (CARB 2010) Under the analysis contained above, staff believe that the existing banking provisions of the Regulation, in conjunction with holding limits and other requirements of the Program, already discourage speculation, avoid financial windfalls, and consider the impact on complying entities and volatility in the market. As such, staff has established such banking rules and has not proposed any modifications to the existing banking rules as part of the proposed amendments.

Conclusion: Historical performance of the Program demonstrates it is designed to support a steadily increasing carbon price signal.

Are the pre- and post-2020 caps set appropriately given the Cap-and-Trade Program’s role in achieving the statewide GHG reduction targets when taking into account complementary policies?

Cap Setting: 2013 through 2020

AB 32 (Chapter 488, Statutes of 2006) mandated that CARB “determine what the statewide greenhouse gas emissions (GHG) level was in 1990, and... [set an equivalent] statewide greenhouse gas emissions limit [] to be achieved by 2020.”³ Initially, the GHG emissions to be covered by the Regulation were estimated as 365 million metric tons of carbon dioxide equivalent (MMTCO_{2e}) for 2020. Facility level GHG emissions data available from the Mandatory Greenhouse Gas Emissions Reporting Regulation (MRR) allowed staff to improve on top-down estimates of the emissions from covered sectors included in the GHG top-down inventory developed for use in the 2008 Climate Change Scoping Plan. (CARB 2008) In establishing the Program caps for 2013 through 2020, staff proposed, and the Board adopted in 2011, the 2020 cap to equal 334.2 MMTCO_{2e}.⁴ The cap excludes emissions from the agricultural, high global warming gases, and waste sectors. The cap also excludes fugitive emissions in the covered sectors as those are challenging to accurately quantify for the purposes of applying a carbon price. The 2020 cap represents 77.5 percent of the statewide AB 32 target of 431 MMTCO_{2e}. The 2013 through 2020 annually declining allowance caps represent the maximum GHG emissions that could occur for the State to achieve its 2020 GHG reduction target. At the start of the Program, CARB issued a quantity of allowances equal to each year’s caps, 2013 through 2020.

Cap Setting: Post-2020

The 2016 Cap-and-Trade amendments, adopted in 2017, created the framework for the 2021 through 2030 annual allowance budgets in the Program.⁵ To establish the post-

³ Health & Safety Code § 38550. See http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf.

⁴ See <https://www.arb.ca.gov/regact/2010/capandtrade10/finalrevfro.pdf>.

⁵ Elements of the 2016 rulemaking’s creation of a post-2020 framework require harmonization with AB 398’s legislative direction. This harmonization will be achieved through the 2018 rulemaking.

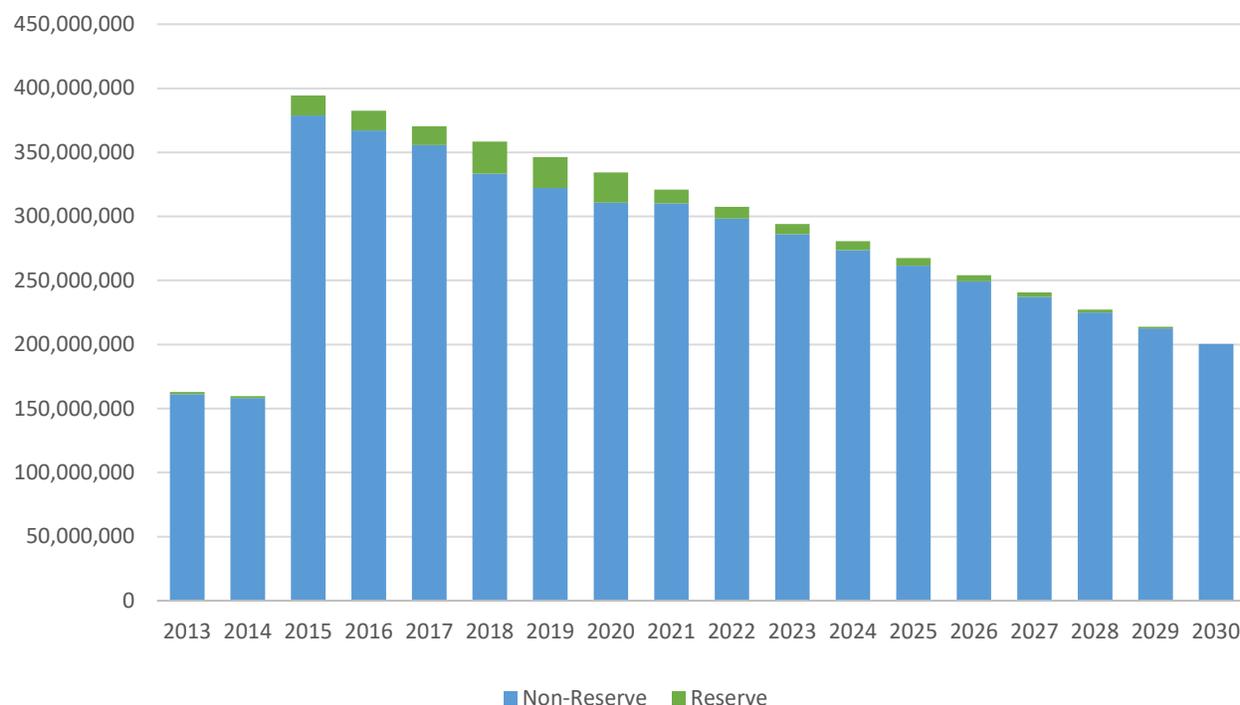
2020 annual allowance budgets, staff calculated the ratio of mandated 2020 covered emissions (334.2 MMTCO_{2e}) relative to the 2020 GHG statewide target established by AB 32 (431 MMTCO_{2e}).⁶ Then, staff multiplied the 2030 GHG statewide target mandated by SB 32 (258.6 MMTCO_{2e}) by this ratio (77.5 percent) to establish a 2030 annual allowance budget of 200.5 million allowances. Staff then set a straight-line path of emissions reductions from the 334.2 MMTCO_{2e} 2020 budget to the 200.5 MMTCO_{2e} 2030 target. The post-2020 caps are set using the same method and ratio of the covered versus non-covered emissions as the caps from 2013 to 2020.

For the post-2020 period of the Program, Section 95871(a) and Table 8-2 of the Regulation designate 52.4 million allowances from the years 2021 through 2030 to the post-2020 Reserve. These allowances are removed from general circulation and are only available for purchase by covered entities at pre-determined higher prices. These allowances reflect what CARB believes should be removed from general circulation to account for the fact that the 2020 emissions will be lower than the 2020 annual cap based on the most recent modeling completed for the 2017 Scoping Plan Update (CARB 2017b) and recently released GHG Inventory.⁷ While there is still uncertainty as to future emissions, the 52.4 million allowances reflect staff's accounting for expected lower emissions in 2021 with a straight line to the cap in 2030. The 52.4 million allowances account for approximately 2 percent of post-2020 allowances. Importantly, the pre- and post-2020 methodologies are consistent in that allowances are taken from within the annual caps (and general circulation) to populate the Reserve. This ensures that even if the Reserve is utilized, emissions will still be within the cap. Figure B provides a graph of the declining annual caps and allowances removed to the Reserve.

⁶ See 2016 ISOR <https://www.arb.ca.gov/regact/2016/capandtrade16/isor.pdf> p. 26.

⁷ See <https://www.arb.ca.gov/cc/inventory/inventory.htm>.

Figure B. Cap-and-Trade Program Caps 2013 - 2030



While the 2017 Scoping Plan Update was adopted by the Board in December of 2017, the effort to account for expected lower emissions in 2021 began in fall of 2015. There were two workshops held in October 2015 to start the public process to update the 2017 Scoping Plan Update and begin the amendments to the Regulation that were adopted in July 2017.⁸ This concurrent development process allowed staff to use the modeling results from the 2017 Scoping Plan Update development to inform the cap setting for 2021 through 2030. Consistent with the process for the 2008 Scoping Plan, the 2017 Scoping Plan Update provided key information used to establish the post-2020 caps. The final modeling data from the 2017 Scoping Plan Update shows that implementation of the Scoping Plan, including a Program with a cap set at 200.5 MMTCO₂e in 2030, will result in emissions slightly below the 2030 statewide target.

Evaluation of Allowance Supply 2013 through 2030

In early 2018, CARB provided an initial analysis of the post-2020 caps, and whether they would be binding with, and without, the removal of unused allowances from 2013 through 2020.⁹ This section provides a discussion of the key points from the initial

⁸ See https://www.arb.ca.gov/cc/scopingplan/meetings/10_1_15slides/2015slides.pdf and https://www.arb.ca.gov/cc/capandtrade/meetings/100215/ct_2016_amendments_kickoff.pdf.

⁹ See https://www.arb.ca.gov/cc/capandtrade/meetings/20180426/carb_post2020caps.pdf.

analysis, which is summarized in Table 1. Readers are encouraged to review the initial analysis for further details.

Table 1. Estimate of Total Compliance Instruments Used in the 2021-2030 Program and Cumulative 2021-2030 Reductions Achieved by the Program Caps^{a10}

	No Vintage 2013-2020 Unused Allowances	150 Million Vintage 2013- 2020 Unused Allowances
Total allowances available 2021-2030	2,607	2,757
Total post-2020 Reserve allowances	75	75
Estimated offsets used	96	103
Total compliance instruments available	2,628	2,784
Cumulative post-2020 Cap-and-Trade Program GHG reductions (MMTCO_{2e})	426 (3054-2628)	269 (3054-2784)

^a These reductions do not include the additional actions incentivized by a steadily increasing carbon price signal.

In Table 1, the total allowances available represent the caps in the Regulation summed from 2021 through 2030 with the addition of the 150 pre-2021 unsold allowances to the aggregate cap value in the right column (2607+150=2,757). The 150 million unused allowance value is an adjusted value that builds on an estimate developed by the Legislative Analyst’s Office. (LAO 2017) The post-2020 Reserve allowances are the same in each column as they represent the 52.4 million in the post-2020 Reserve and additional 22.7 million under discussion for the Reserve and price ceiling (52+22.7). The estimated offsets represent the quantitative offset usage limits from 2021 through 2030, but they are different across the two columns. For this analysis, we assume covered GHG emissions are equal to the allowances available and as the quantitative offset usage limits are a percentage of entity compliance obligation, the higher the compliance obligation—covered GHG emissions—the higher the quantity of offsets used, even though the total offset usage percent is the same for both columns. The total number of compliance instruments (offsets + allowances, excluding any allowances removed for cost-containment) available under the two scenarios is 2,628 million and 2,784 million. Table 1 assumes these are the maximum cumulative GHG emissions for 2021 through 2030.

The emissions in the covered sectors for 2021 through 2030—absent the Program—are estimated as 3,054 MMTCO_{2e}.¹¹ (CARB 2018) However, as Table 1 shows, the

¹⁰ There is inherent uncertainty in any forecast or modeling analysis, uncertainty in regards to assumptions as well as inputs into the modeling. Descriptions of the uncertainty related to PATHWAYS modeling and future emissions and market conditions relevant to the CARB staff analysis are discussed in the 2017 Scoping Plan Update. Attachment A provides an overview of the key areas of uncertainty identified by staff.

¹¹ Covered Emissions without the Cap-and-Trade Program refers to the estimates of the GHG emissions in the Cap-and-Trade covered sectors while reflecting the impact of the complementary policies only and not including any changes in GHG emissions due to the impact of a Cap-and-Trade Program. This

estimated number of compliance instruments available during this period is 2,628 and 2,784. Even though both scenarios constrain emissions to help achieve the 2030 target, compliance costs will be higher for the scenario without the 150 million allowances as it reduces allowance supply, increasing allowance scarcity relative to allowable emissions. It is important to note that additional emissions reductions may be undertaken by entities as a result of the steadily increasing carbon price – therefore a binding GHG cap is not the only feature resulting in reductions.

Conclusion: The allowance budgets from 2013 through 2030 are binding on expected GHG emissions when accounting for the effects of complementary policies and the allowance budgets conform to the statewide GHG reduction targets.

Does California need to make adjustments to its Cap-and-Trade Program to address potential *overallocation* similar to actions taken in the European Union Emissions Trading System and Regional Greenhouse Gas Initiative?

Some stakeholders have commented that unused pre-2021 vintage allowances either be cancelled or an equal quantity be removed from the caps from 2021 through 2030 to ensure the supply of allowances does not suppress allowance prices. They have pointed to similar adjustments in allowance supply made in the European Union Emissions Trading System (EU ETS) and the Regional Greenhouse Gas Initiative (RGGI).

Figure C provides a comparison of the average annual California auction clearing prices with historical auction clearing prices in RGGI and the EU ETS. The California allowances prices are the highest across the three programs. The EU ETS does not have a floor price and the floor price in the RGGI program is set at \$2.20/metric ton in 2018.¹² Between 2017 and 2018, there was a significant increase in the average annual auction clearing prices in the EU ETS as a result of program modifications (the Revisions for Phase 4 (2021 – 2030)).¹³ The Revisions included a Market Stability Reserve (MSR) to reduce the surplus of emission allowances that had accumulated in the carbon market and to improve the EU ETS's resilience to future shocks.¹⁴ This mechanism will transfer 900 million allowances from the 2014 through 2016 allowance years to the MSR instead of putting them up for auction at the end of this decade. By removing these allowances from the market, the EU ETS seeks to support a carbon

number may also include some limited fugitive emissions not covered by the Cap-and-Trade Program. In response to the initial staff analysis, one [commenter](#) stated there was an error in the CARB analysis. Staff evaluated the assertion and found that no error existed. The proposed adjustment by the commenter would have actually introduced an error. Additional information on staff's analysis of this topic can be found here: https://www.arb.ca.gov/cc/capandtrade/meetings/20180621/ct_pres062118.pdf slides 17-24.

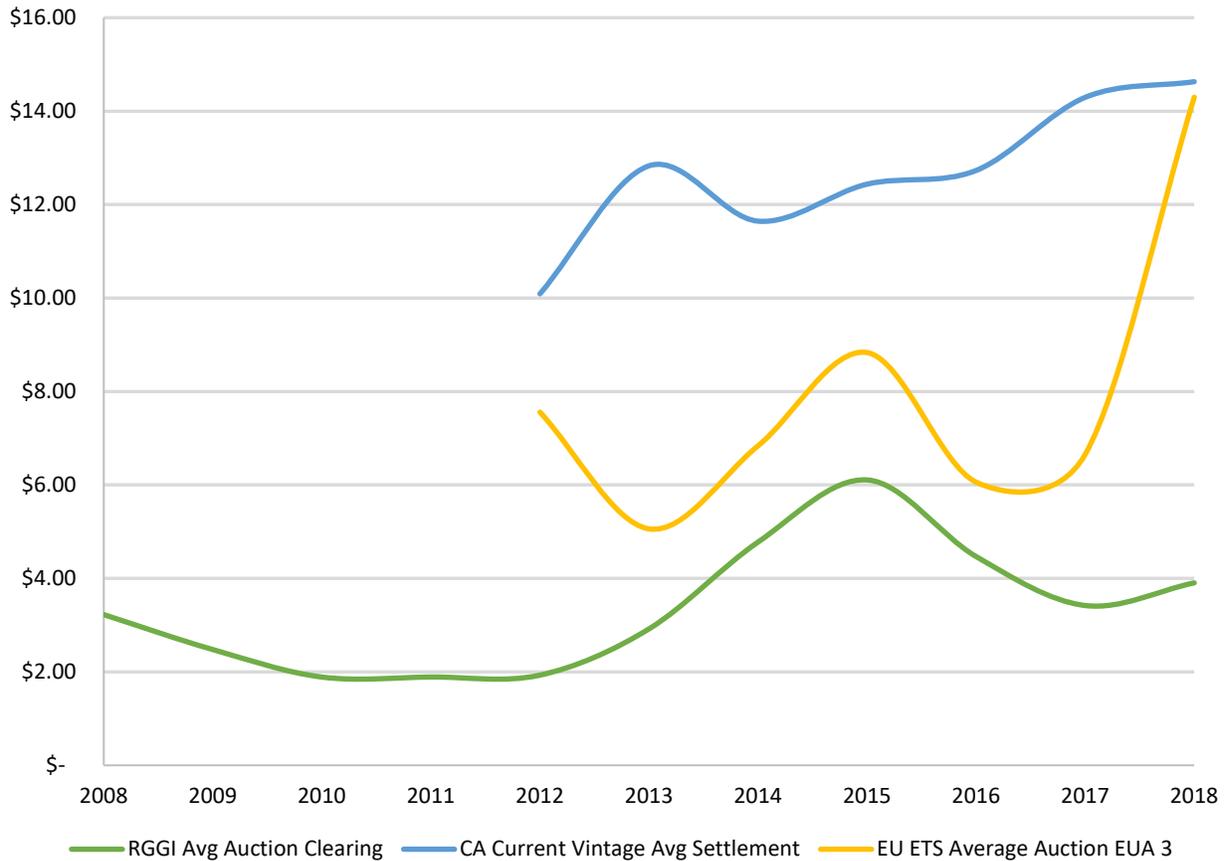
¹² See https://www.rggi.org/sites/default/files/Uploads/Auction-Materials/40/Auction_Notice_Apr_17_2018.pdf.

¹³ See https://ec.europa.eu/clima/policies/ets/revision_en.

¹⁴ See https://ec.europa.eu/clima/policies/ets/reform_en.

price signal that will incent the necessary reductions to achieve its emission reduction targets. In 2018, the EU ETS average auction clearing price is comparable to the California average auction clearing price. The removal of excess allowances is a major driver in this price increase.

Figure C. Historical Average Annual Auction Clearing Prices



The decision by these programs to not include a floor price or set a lower floor price contributed to a concern about low allowance prices and the ability of the programs to deliver the GHG emissions needed to meet their GHG reduction targets. This is not the case for the California Cap-and-Trade Program. The additional features in the Program, including the self-ratcheting mechanism, have reinforced the higher floor price that has steadily continued to increase over time.

Conclusion: Staff found California does not need to make adjustments similar to those made in RGGI and the EU ETS as data shows the allowance prices have steadily increased over time.

Is there any evidence that future allowance prices would not continue to steadily increase to prompt the needed actions to reduce GHG emissions?

As the market administrator, CARB does not evaluate or make available forecasts of market demand and prices for allowances. There are, however, third-party analyses by market analysts that do provide this information. Staff reviewed several third-party analyses and include some general findings from three of those below:

- 2030 Price Forecast of Carbon Allowances for WCI Carbon market, California Carbon.info, October 2016¹⁵
- California GHG Cap and Trade, When and why will allowance prices rise?, IHS Markit, December 2017¹⁶
- Long-Term Carbon Price Forecast Report, ICF Consulting Canada, Inc., submitted to Ontario Energy Board, July 19, 2017¹⁷

Each of these relies on different analytical tools, assumptions, and data inputs. This appendix does not evaluate the individual technical analyses of the third-party studies, but relies on their findings. Table 2 provides a summary of the findings of each of these products. There are additional analyses conducted by ClearBlue Markets¹⁸ and ICIS¹⁹ that also indicate there is a cumulative shortage in allowances from 2013 through 2030 and that allowance prices continue to increase through the next decade. Staff did not find any analyses or data that indicated that the allowances issued in the Program would not be binding on emissions through 2030, or that allowance prices would decline in any years from now through 2030.

¹⁵ 2030 Price Forecast of Carbon Allowances For WCI Carbon market (Published 15th October 2016), <http://californiacarbon.info>. Adapted with Permission.

¹⁶ See

<https://cdn2.hubspot.net/hubfs/2902649/Conference%20Campaigns/LCFS/2017%20/2017%20Carbon%20Markets%20Presentations/PatrickLuckow-Carbon-Trading-Forecast.pdf>.

¹⁷ See <https://www.oeb.ca/sites/default/files/uploads/OEB-LTC PF-Report-20170531.pdf>.

¹⁸ See <https://www.clearbluemarkets.com/>.

¹⁹ See <https://www.icis.com/energy/carbon-emissions/ca-gc-cap-trade-portal/>.

Table 2. Summary of Third-Party Supply and Demand Analyses

	CaliforniaCarbon.info ^b	ICF	IHS Markit
Analysis Timeframe	Pre- and Post- 2020	Pre- and Post- 2020	Pre- and Post- 2020
Program Scope	California, Quebec, Ontario	California, Quebec, Ontario	California, Quebec, Ontario
Cumulative Allowance Shortage Year	Mid-2020's	Mid 2020's	Mid-2020's
Estimated Allowance Price 2030^a	\$53.06 USD (\$45.67-\$59.25 under various modeling scenarios)	In 2028: \$57 CAD (2028: \$27-\$108 CAD under various modeling scenarios)	\$60 - \$70 USD

^a The single 2030 (2028 for ICF) estimated allowance prices represent baseline future scenarios, while the ranges represent sensitivities around the baseline future scenario.

^b Source CaliforniaCarbon.info.

Table 2 shows some consistency in findings across the third-party studies. Each of them estimates that emissions will exceed supply of cumulative allowances available in the mid-2020's. This is consistent with the CARB staff analysis that when the Program is considered as one continuous market from 2013 through 2030, the caps are binding on GHG emissions estimates through 2030.

While CARB staff does not forecast allowance prices, the third-party analyses estimate the price for allowances will continue to increase and will be higher than the auction floor price by 2030. CARB has not reviewed, nor is aware of any, analyses that suggest the future estimated allowance price drops below the Program floor price, which escalates by 5 percent plus inflation each year.

Conclusion: Staff is not aware of any data or analyses that indicate allowance prices would not continue to steadily increase over time.

What would happen if caps from 2021 through 2030 were reduced in response to concerns about unused allowances from 2013 through 2020?

The Program is designed to introduce a steadily increasing carbon price signal to prompt actions to reduce GHG emissions. The caps for the Program for both phases, pre- and post-2020, utilize the same methodology and are set to achieve the legislatively mandated targets in AB 32 and SB 32. The caps also rely on the best available data and reflect expectations of actual emissions at the beginning of each phase. While the exact number of unused allowances through 2020 is not known today, CARB staff and third-party analyses all indicate that the market from 2013 through 2030 is not *overallocated* with allowances and that cumulative supply will be below demand. The third-party analyses also forecast prices to be almost double the auction floor price towards the end of the next decade.

Staff believes removing any unused allowances will increase allowance prices and that prices will increase higher and sooner than would occur under the proposed amendments to the Regulation. Earlier this year, in a posting to the Energy Institute at Haas website, Dr. Severin Bornstein and Dr. Jim Bushnell discussed what removing unused allowances might achieve.²⁰ While they did not make a recommendation on what to do with any unused allowances through 2020, in their evaluation they found that removing unused allowances would almost double the probability of allowance prices reaching the price ceiling (assumes price ceiling is \$85 (\$2015) in 2030) and reduce the probability of being at the floor by the same amount, while the impact on additional reductions induced would be modest. Indeed, the recent experience in the EU ETS has shown that removing allowances will increase allowance prices in a program.

While some commenters during the public workshop process leading up to the release of the proposed amendments have suggested higher prices are necessary to achieve emission reductions, there has been little data submitted to support this view. Experience with the Cap-and-Trade Program to date has shown that at prices close to \$15, reductions can be achieved in the electricity sector. And, as those prices steadily increase over time, additional reductions will be realized across other sectors through the carbon price signal. Again, the approach to the design of the Program is to ensure the lowest cost opportunities to reduce GHGs are found and addressed first as that is the strength of a well-designed carbon pricing mechanism.

Conclusion: Allowance prices would increase if allowance supply were reduced and there would be an increased risk of prices exceeding the post-2020 Reserve tiers and potentially the price ceiling as proposed in the amendments.

Conclusion

At this time, staff is not proposing to change existing banking rules, remove unused allowances, or change post-2020 annual caps as part of this rulemaking. Based on staff and third-party analyses, it is expected that allowance prices will continue to steadily increase in the next decade. Any proposal to remove allowances from the system must acknowledge that the result will be higher allowance prices, reached sooner, than would result from the proposed amendments to the Regulation.

To ensure we are making progress towards the state's statutory GHG reduction targets, each year CARB posts an annual GHG inventory, which is publicly available on the CARB website. To further understand how GHG emissions may change year-to-year CARB tracks other factors like economic activity, fuel use, climate conditions, growth in renewables, deployment of cleaner vehicles, and others. All of these metrics, including the GHG inventory, are publicly available data. The Cap-and-Trade Program is just one

²⁰ See <https://energyathaas.wordpress.com/2018/01/02/californias-carbon-cap-is-not-in-jeopardy-because-its-not-really-a-cap/>.

of several policies in the 2017 Scoping Plan to chart the path to 2030. Thus, in addition to the Cap-and-Trade Program, we need to track all of the policies and sectors to ensure we stay on track with the reductions needed to meet our targets and, if necessary, make adjustments.

If it appears statewide emissions are not declining as needed, recognizing that year-to-year variability due to climate, global fuel prices, or economic factors can influence emissions, CARB staff will evaluate which sectors are not responding as anticipated, review all programs that cover those sectors, and ascertain why, as well as assessing the best path forward to ensure California stays on track to meet its legislatively established GHG targets. Periodic reviews of progress toward achieving the 2030 target and the performance of specific policies will also provide opportunities for the State to consider any changes to ensure we remain on course to achieve the 2030 target. The need for this periodic review process was anticipated in AB 32, as it calls for updates to the Scoping Plan at least once every five years. Additionally, there are annual oversight hearings by the Joint Committee on Climate Change Policies and CARB Board updates to review and discuss progress on achieving the State's GHG targets.

Attachment A: Uncertainty

Scoping Plan Modeling Uncertainty

It is important to note the 2017 Scoping Plan identified several types of uncertainty in both forecasting future emissions and estimating the benefits of emissions reductions policies. In developing the 2017 Scoping Plan, staff forecasted the estimated GHG emissions outcome of the Scoping Plan using PATHWAYS. Inherent in the modeling is the expectation that many of the existing GHG reduction programs will continue in their current form, and the expected drivers for GHG emissions such as energy demand, population growth, and economic growth will match our current projections. Table 3 of a staff paper released as part of one of the informal workshops held on the proposed amendments to the Program breaks out the total estimated cumulative emissions between covered and non-covered sectors. (CARB 2018) However, it is unlikely that the future will precisely match our projections, leading to uncertainty in the forecast, both of future economic conditions and the GHG reductions achieved by existing programs. Thus, the estimates in Table 3 of the staff paper should be understood to represent one possible future in a range of possible outcomes. (CARB 2018)

To generate future emissions scenarios, PATHWAYS relied on assumptions that are external to the model. PATHWAYS utilized the best available inputs related to California's capital and energy usage through 2030, such as energy demand over time, the start years for specific policies, and the penetration rates of associated technologies. Each of the assumptions provided to PATHWAYS has some uncertainty, which is also reflected in the modeling results. Thus, while the results presented in the 2017 Scoping Plan and Table 3 of the above-referenced staff paper may seem precise, these results are estimates with ranges of uncertainty.

Future Emissions and Market Conditions

Table A.1 below summarizes the key factors that will influence the demand for allowances for the full Program from 2013 through 2030.

Table A.1. Key Factors Influencing Demand for Allowances

Key Factor	Description	Impact on Post-2020 Program
Abatement opportunities in linked programs	The full range of abatement opportunities possible for different prices by entities from linked programs is unknown.	The degree to which entities from linked programs abate emissions will influence the demand for allowances from California, potentially reducing the amount of unused allowances before 2021. <i>If this were the case, there would be fewer pre-2021 unused allowances available to put towards emissions after 2020.</i>
Post-2020 offset supply	It is unknown at this time if sufficient offsets will be available for post-2020 demand for the full quantitative offset usage limits.	If full offset supply is not available for post-2020, <i>there are fewer compliance instruments available to put towards emissions after 2020.</i>
Pre-2021 offset use	Current offset use is about four percent.	If entities continue with the current trend and do not maximize their offset use pre-2021, they will continue to rely more on allowances – <i>there would be fewer pre-2021 unused allowances available to put towards emissions after 2020.</i>
Energy Imbalance Market (EIM)	CARB is currently retiring allowances to account for the full GHG emissions associated with energy transfer through the EIM.	This value is currently unknown for the period between 2018 and 2019 but could be tens of millions of allowances. Thus, it is anticipated that <i>there will be fewer pre-2021 unused allowances available to help with meeting post 2020 obligations.</i>
Bankruptcy Environmental Integrity	To ensure environmental integrity of the Program, CARB proposes to retire allowances against any outstanding emissions for which compliance instruments have not been surrendered.	There is one currently known instance where this requirement may apply. That is expected to require CARB to retire approximately 5 million allowances. <i>There would be fewer pre-2021</i>

	The Board recently voted on amendments to ensure there was absolute clarity on the ownership of outstanding compliance obligations in such situations moving forward.	<i>unused allowances available to put towards emissions after 2020.</i>
Post-2020 Allowances placed into the Reserve or Price Ceiling	The current Regulation places 52.4 million allowances into the Reserve. Staff is proposing to place an additional 22.7 to the Reserve post-2020 to account for the six percent offset usage limit for 2026-2030.	For post-2020, depending on the price of the Reserve tiers and price ceiling and how the 52 and 22.7 million are distributed among those will play a role in whether or not these instruments are readily available to use against post-2020 emissions.
Price Setting for the Post-2020 Reserve Tiers and Price Ceiling	Staff is proposing values for the Reserve tiers and a price ceiling in the proposed amendments, but the ultimate values will only be known after the amendments are approved by the Board.	If these values are placed too low, the allowances in the Reserve and price ceiling mechanism will be accessed early and the Program may not be able to constrain emissions to levels needed to achieve the 2030 target. Alternatively, if reserve tiers and the price ceiling are placed too high it may lead to higher prices than are necessary to attain the reduction targets and could promote leakage.
Performance of Complementary Policies	The covered sectors in the Program are also subject to complementary policies such as the RPS and LCFS.	Depending on how well the policies perform between now and 2030 will influence how many compliance instruments are unused and available for other sectors to use against emissions through 2030.
Reference Scenario for post-2020 in the Scoping Plan	GHG emissions could be higher or lower than projected for post-2020 than modeled for the Reference Scenario in the 2017 Scoping Plan.	Depending on actual emissions post-2020, the cumulative reductions needed to achieve the 2030 target will change. Since the complementary policies and non-covered sector policies are set at specific performance levels, the demand on the Program to deliver reductions will vary.

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