

****FOR DISCUSSION PURPOSES ONLY****

Supporting Material for Assessment of Post-2020 Caps

Introduction

Assembly Bill (AB) 398 (Chapter 135, Statutes of 2017) provides legislative direction on the role of the Cap-and-Trade Program (Program) between 2021 and 2030.¹ AB 398 contains a specific provision directing the California Air Resources Board (CARB or Board) to *evaluate and address concerns related to overallocation in the state board's determination of the available allowances for years 2021 to 2030, inclusive, as appropriate*. In addition, some commenters have raised concerns that early reductions beyond those needed to achieve the 2020 target, which have resulted in unused allowances to date, will hinder the ability of the post-2020 period of the Program to deliver the necessary GHG reductions needed to achieve the 2030 target.

This staff paper provides a comprehensive evaluation, in response to legislative direction, using **public data** and the most recent information provided by modeling to support the 2017 Scoping Plan Update adopted by the Board in December 2017.² This paper provides additional information to help inform on this topic.

This paper is organized in specific topic areas as follows:

- Background on Cap Setting for 2013 through 2020
- Current Framework for Post-2020 Caps
- Distribution of Allowances
- Allowance Banking Limits and Other Constraints
- Evaluation of Potential Pre-2021 Unused Allowances and Post-2020 Cap Setting
- Discussion: Post-2020 Caps
- Attachment A: Uncertainty

Process

This paper, and Attachment A, offers additional information for stakeholders to review and consider when providing comments for where, per AB 398, staff will need to develop recommendations for the Board's consideration later this year. There are no specific regulatory proposals included in this paper. Staff is seeking specific comments from stakeholders on the following topics and questions:

- Are there other uncertainties not mentioned in this paper or in Attachment A that should be considered when evaluating the post-2020 caps?
- What additional abatement opportunities and cost data should staff evaluate?
- Stakeholder thoughts on the staff analysis approach/methodology
- What additional information can stakeholders share to evaluate for windfall profits?
- What additional adjustments should staff consider to further reduce price volatility?

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

² <https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>

Background on Cap Setting for 2013 through 2020

AB 32 mandated CARB to “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 Cap-and-Trade Regulation (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 Scoping Plan. 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}. The 2013 through 2020 annually declining allowance caps represented the limit on the GHG emissions that could occur for the State to achieve its 2020 GHG reduction target. CARB issues a quantity of allowances equal to each year’s caps.

Current Framework for Post-2020 Caps

The 2016 Cap-and-Trade rulemaking, adopted in 2017, created the framework for the 2021 through 2030 annual allowance budgets in Program.⁴ To establish the post-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}).⁵ 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 200,500,000 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.

Distribution of Allowances

The Cap-and-Trade Regulation stipulates distribution of allowances and including removing some allowances from general circulation for cost containment purposes and to recognize purchases of voluntary renewable electricity generation that is not used to meet mandatory renewable energy requirements in California or any other jurisdiction. For the years 2013 through 2020, section 95870(a) designates 121,883,000 allowances to the Allowance Price Containment Reserve (Reserve),⁶ and section 95870(c)

³ [http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf](http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_0001-0050_ab_32_bill_20060927_chaptered.pdf)

⁴ 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.

⁵ 2016 ISOR <https://www.arb.ca.gov/regact/2016/capandtrade16/isor.pdf> p. 26

⁶ As in previous staff concept papers, the term “current Reserve” means the existing allowance price containment reserve with the three price tiers, “post-2020 Reserve” means the collapsed single tier reserve as currently included in the Cap-and-Trade Regulation, and “new post-2020 Reserve” means the two tier reserve structure as directed in AB 398. See https://www.arb.ca.gov/cc/capandtrade/meetings/20180302/ct_price_concept_paper.pdf.

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designates 7,077,750 allowances from to the Voluntary Renewable Electricity Reserve Account.

For the post-2020 period of the Program, Section 95871(a) and Table 8-2 designate 52,400,000 allowances from the years 2021 through 2030 to the post-2020 Reserve. These allowances would be removed from general circulation and only available at 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. In other words, this amount of allowances reflects staff's accounting for expected emissions in 2021 with a straight line to the cap in 2030. The 52,400,000 allowances account for approximately 2 percent of post-2020 allowances. Importantly, the pre- and post-2020 methodologies are consistent in that allowances are allocated to the Reserve from within established caps. This means that allowances are taken from within the caps and general circulation to populate the Reserve. This ensures that even if the Reserve is utilized, emissions will still be within the cap.

Similarly, as indicated in the first staff concept paper,⁷ staff is considering whether it would be appropriate to allocate an additional two percent of allowances from budget years 2026 through 2030 into the price ceiling or new post-2020 Reserve tiers. This is because AB 398 increases the offset usage limit in 2026 to six percent from the four percent limit it imposes for compliance years 2021 through 2025. A removal of an additional two percent of allowances from the 2026 through 2030 annual allowance budgets would be consistent with the policy decision made in the current program to remove allowances from the annual allowance budgets to effectively represent allowance budgets with a four percent offset usage limit. This additional two percent of the 2026 to 2030 budgets is equal to 22,726,000 allowances.

Table 1 depicts annual allowance distribution for 2013 through 2030. The total quantity of allowances already designated for the current Reserve totals approximately 174.2 million allowances. Staff is considering adding an additional 22.7 million allowances to the new post-2020 Reserve, which would remove approximately 195 million allowances from general circulation and only make them available in either the new post-2020 Reserve or price ceiling.

⁷ See https://www.arb.ca.gov/cc/capandtrade/meetings/20180302/ct_price_concept_paper.pdf.

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Table 1. Distribution of Allowances

Year	Total Budget	Non-APCR	Existing Regulation APCR	Under Consideration Additional APCR
2013	162,800,000	161,172,000	1,628,000	0
2014	159,700,000	158,103,000	1,597,000	0
2015	394,500,000	378,720,000	15,780,000	0
2016	382,400,000	367,104,000	15,296,000	0
2017	370,400,000	355,584,000	14,816,000	0
2018	358,300,000	333,219,000	25,081,000	0
2019	346,300,000	322,059,000	24,241,000	0
2020	334,200,000	310,806,000	23,394,000	0
2021	320,800,000	308,027,400	10,500,000	2,272,600
2022	307,500,000	295,927,400	9,300,000	2,272,600
2023	294,100,000	283,727,400	8,100,000	2,272,600
2024	280,700,000	271,427,400	7,000,000	2,272,600
2025	267,400,000	259,327,400	5,800,000	2,272,600
2026	254,000,000	247,027,400	4,700,000	2,272,600
2027	240,600,000	234,827,400	3,500,000	2,272,600
2028	227,300,000	222,727,400	2,300,000	2,272,600
2029	213,900,000	210,427,400	1,200,000	2,272,600
2030	200,500,000	198,227,400	0	2,272,600

Allowance Banking Limits and Other Constraints

AB 398 directs staff to *[e]stablish allowance banking rules that discourage speculation, avoid financial windfalls, and consider the impact on complying entities and volatility in the market.*

The existing Regulation contains banking provisions designed to reduce allowance purchase costs and allowance price variability. Three-year compliance periods allow entities flexibility in when to acquire allowances, giving them time to adjust to unanticipated changes in either emissions or allowance prices. Entities may purchase allowances when prices are low for surrender at a later date if they expect that prices will increase. Alternatively, they may postpone purchases if they expect future prices to be less than current prices plus their cost of “carrying” allowance purchases to future periods. These banking provisions help smooth prices over time.

Most covered entities will have financial constraints which prevent them from purchasing and holding allowances, especially up to the holding limit. This may prevent them from undertaking purchases that would otherwise allow them to reduce their allowance acquisition costs. Voluntarily associated entities (VAE) help provide

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allowances to covered entities when they need them. VAEs include entities with financial resources that allow them to bank at lower carrying costs compared with many covered entities. These VAEs can buy allowances, hold them, and then sell them to covered entities at a later date. This helps prevent a few large entities from controlling allowance prices and exerting market power.

CARB staff included VAEs in the Program to increase the number of entities to increase liquidity and efficiency in the market. Increased liquidity allows entities to purchase and sell allowances in the market quickly without causing a drastic change in the allowance price. However, both staff and stakeholders recognized that circumstances could arise which could result in market manipulation.

The existing Regulation also contains banking rules designed to prevent purchases by entities to accumulate sufficient allowances to manipulate market prices. Specifically, the Regulation imposes a holding limit, which sets the maximum number of allowances an entity (or group of entities that are corporate affiliates) may hold, or bank, at any one time. 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 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. 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. For 2018, the current vintage holding limit is approximately 15.7 million allowances. Table 2 shows the holding limits for all market participants in the linked market.

Table 2. Holding Limits (2018-2030)

Year	Holding Limit
2018	15,717,500
2019	15,217,650
2020	14,715,200
2021	14,302,950
2022	13,848,950
2023	13,392,700
2024	12,936,200
2025	12,482,200
2026	12,025,950
2027	11,569,475
2028	11,115,725
2029	10,659,225
2030	10,202,975

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The Regulation allows covered entities to exempt allowances they must accumulate to meet their compliance obligations from inclusion within the holding limit.⁸ As a result, all entities, voluntary or covered, have the same holding limit in the Program across the linked program.

It is important to note that not all entities have the financial capacity to purchase up to their holding limits. Smaller covered entities with low emissions and small compliance obligations do not need to hold much in their holding accounts. They also will have little interest in providing banking services for other entities. And, the VAE category includes a large number of entities, such as offset project operators, that do not hold or transact in allowances.

To date, staff and the market monitor have not observed any evidence of financial windfalls. Speculative behavior in the allowance market is limited by the existing holding limits and the inclusion of voluntary entities and linkages increases the liquidity and efficiency of the market – mitigating price volatility. More importantly, the majority of market participants are not availing themselves of the maximum holding limit. For any entity to utilize the maximum current holding limit, it would cost approximately \$235 million (15,717,500 * \$15 – the approximate market price for 2018 allowances). And, to the extent State-owned allowances are unsold at auction and held by CARB on behalf of the State, those allowances are not in circulation and cannot be applied towards emissions.

Evaluation of Potential Pre-2021 Unused Allowances and Post-2020 Cap Setting

To date, annual emissions from covered sectors have been below annual allowance caps. Based on analysis of the recent 2017 Scoping Plan Update modeling, GHG inventory, and MRR GHG emissions data, California will achieve the 2020 target before 2020 – meaning the covered GHG emissions may remain below the annual caps through 2020. This means that some of the 2013 through 2020 allowances will be unused and will carry over into the post-2020 period of the Program. Some view the unused allowances as a positive signal of over-compliance resulting from early-action responses, carbon pricing, better-than-expected performance of complementary measures, and broad economic conditions. Others believe this quantity of unused allowances may hinder the State's ability to achieve the 2030 target as these pre-2021 allowances could increase the supply of compliance instruments above the post-2020 caps and allow for GHG emissions to exceed the amount needed to achieve the target, while enabling entities to remain in compliance with the Regulation.

⁸ For more information on limited exemptions, see here:
https://www.arb.ca.gov/cc/capandtrade/limited_exemption.pdf.

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Some observers and the Legislative Analyst's Office (LAO) estimate the magnitude of the cumulative vintage 2013 through 2020 unused allowances to be in the range 100-300 million. The LAO estimate indicates the most likely estimate to be about 200 million allowances.⁹ For the purposes of this analysis, staff begins with the LAO estimate as it is comparable to previous third-party papers that looked at the same issue, and accounts for Program features like the Reserve. In the LAO estimate, offset usage rate and emissions reductions are two uncertain factors cited as contributing to the large range of unused allowance projections. Staff's understanding is the LAO estimate of 200 million allowances does not account for the following factors:

- The mechanism of moving into the Reserve allowances that remain unsold for eight consecutive auctions – which is particularly important during sustained periods of low demand for allowances
- Allowances set aside for the Voluntary Renewable Electricity Program
- Retirement of allowances to account for “missing” imported electricity emissions in the Energy Imbalance Market
- Abatement opportunities in linked programs
- Does not differentiate as to what quantity of unused allowances would be held in private accounts versus held by CARB on behalf of the State, and thus not available for compliance

Each of these factors would decrease the unused quantity of allowances to a value that is smaller 200 million.

To better reflect the current status of the Program, staff refined the estimate of unsold allowances to account for several of the factors detailed above that have not previously been included in many of the estimates that looked at supply versus demand of allowances. Staff refinements are as follows:

- Movement of allowances into the Reserve: Approximately 40 million unsold auction allowances transferred to the Reserve¹⁰
- Allowances for the Voluntary Renewable Energy Program: Approximately 7 million allowances set aside for the Voluntary Renewable Energy Program
- Other known Allowance Retirements: Approximately 5 million allowances to be retired in response to a recent bankruptcy¹¹

⁹ Cap-and-Trade Extension: Issues for Legislative Oversight (December 2017): <http://www.lao.ca.gov/reports/2017/3719/cap-trade-extension-121217.pdf>

¹⁰ The quantity of unsold allowances that would be transferred to the Reserve can be estimated using public information on this page: https://www.arb.ca.gov/cc/capandtrade/auction/auction_archive.htm

¹¹ The recent bankruptcy relates to the La Paloma Generating Company, which was acquired by LNV Corporation through bankruptcy proceedings. The generating facility at issue emitted approximately 2 million MTCO_{2e} per year (1.6 million in 2015 and 2.07 million in 2016). La Paloma submitted compliance

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These adjustments reduce the estimated 200 million unused allowances to approximately 150 million, but this number still does not account for:

- Abatement opportunities in linked programs
- Retirements for ensuring environmental integrity for missing emissions from transfers within the Energy Imbalance Market. This latter retirement of allowances could be several million allowances a year from 2018 through 2020.

Further, as noted above, the Program places holding limits on banked allowances and entities have financial constraints that put practical limits on allowance banking in private accounts. Allowances that remain held by CARB on behalf of the State are not in circulation and cannot be used against emissions by covered entities. So, while these allowances may be available post-2020, they are not in circulation or available for compliance use until purchased from the State.

CARB staff evaluated whether the currently established caps will be binding on emissions during the next decade given refined estimates of the unused allowances for the 2013 through 2020 period. To estimate the emissions reductions that may be achieved by the Program, staff relied on modeling presented in the 2017 Scoping Plan Update.¹² Staff compared the cumulative 2021 through 2030 covered emissions projected in the modeling for a scenario that excludes the Cap-and-Trade Program to a scenario that includes the Cap-and-Trade Program under a representative compliance scenario. This modeling comparison is detailed in the follow subsections.

Cumulative 2021-2030 Modeled GHG Emissions with No Cap-and-Trade Program

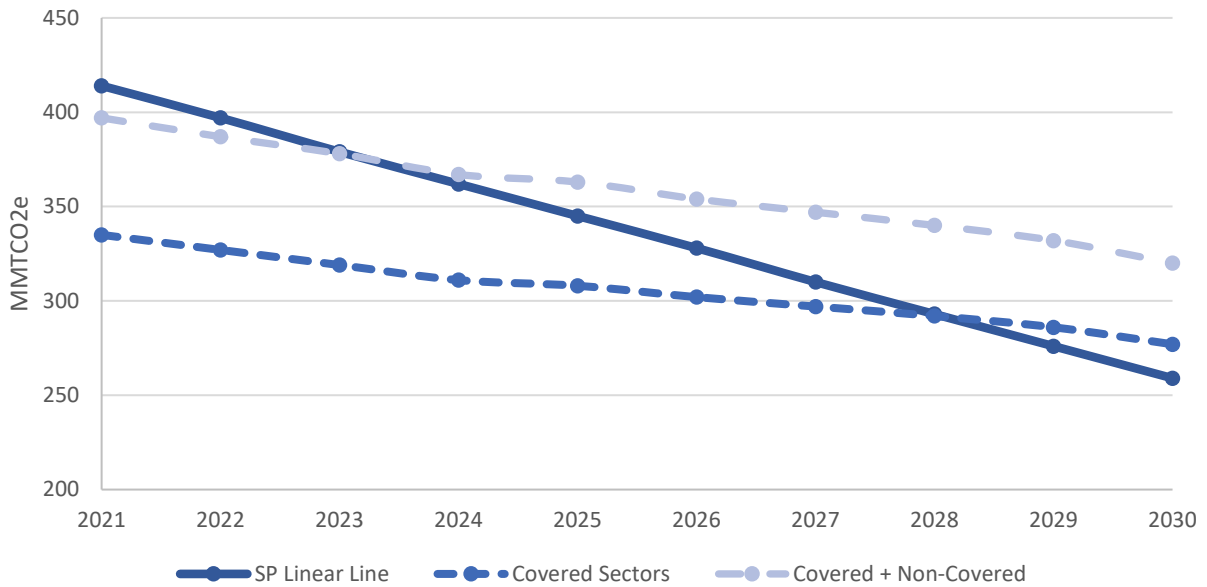
The Scoping Plan Scenario modeled using PATHWAYS projects statewide emissions under the full range of California's GHG reduction policies identified as key measures to achieve the 2030 target (e.g., Renewables Portfolio Standard, Low Carbon Fuel Standard, Mobile Source Strategy, Short-Lived Climate Pollutant Strategy, etc.), but does not model the impact of the Cap-and-Trade Program. The PATHWAYS model

instruments to satisfy the 30 percent annual surrender obligation for its 2015 and 2016 emissions, leaving a remainder of 2.6 million tons plus any emissions from 2017 still unaccounted for. If 2017 emissions are approximately the same as in 2016, this results in approximately 4.6 to 5 million metric tons of GHG emissions that will have to be accounted for through the retirement of allowances. See CARB 2016 Compliance Report, <https://www.arb.ca.gov/cc/capandtrade/2016compliance/2016compliance.pdf>; CARB Updated 2015 Compliance Report, <https://www.arb.ca.gov/cc/capandtrade/2015compliance/2015compliance.pdf>; and CARB Staff Report: Initial Statement of Reasons, Appendix B (January 30, 2018), at p. 14, available at <https://www.arb.ca.gov/regact/2018/capandtradeghg18/appb.pdf> (citing estimated 2 million metric tons per year of GHG emissions).

¹² California's 2017 Climate Change Scoping Plan Update (December 2017): <https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>

provides sector-specific estimates of statewide emissions, and staff believes this to be the most recent and best available projection of statewide emissions. Cap-and-Trade covered emissions include the transportation, electricity, residential and commercial, and industrial sectors, and non-covered emissions are from the agricultural, recycling and waste, and high global warming potential gas sectors.

Figure 1. 2021 - 2030 Estimated Statewide GHG Emissions Scoping Plan Scenario without Cap-and-Trade



In Figure 1, the combined GHG emissions from the covered sectors and the non-covered sectors are above the Scoping Plan linear path from 2020 to 2030. The SP Linear Line represents a linear decrease in GHG emissions from the 2020 target of 431 to the 2030 target of 260. While GHG emission from any year can be above or below any of the trend lines in Figure 1, the linear line provides a reference for tracking progress towards achieving the 2030 target, assuming there is the same year-over-year decrease in GHG emissions over time. The total GHG emissions estimated to occur between 2021 and 2030 without accounting for the effect of the Cap-and-Trade Program are 3,586 MMTCO₂e. Table 3 breaks out the total estimated cumulative emissions between the covered and non-covered sectors.

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Table 3. Estimated Cumulative 2021-2030 Emissions in the Absence of the Cap-and-Trade Program - PATHWAYS Model of Scoping Plan Scenario[#]

Cumulative 2021-2030 Emissions (million MT CO₂e)^{##}	
Covered Emissions w/out Cap-and-Trade Program^{###}	3,054
Non-Covered Emissions	532
Total GHG Emissions	3,586

[#] The Scoping Plan Scenario accounts for all key GHG reduction policies except the Cap-and-Trade Program.

^{##} https://www.arb.ca.gov/cc/scopingplan/comparison_graphs_6cases101817.xlsm

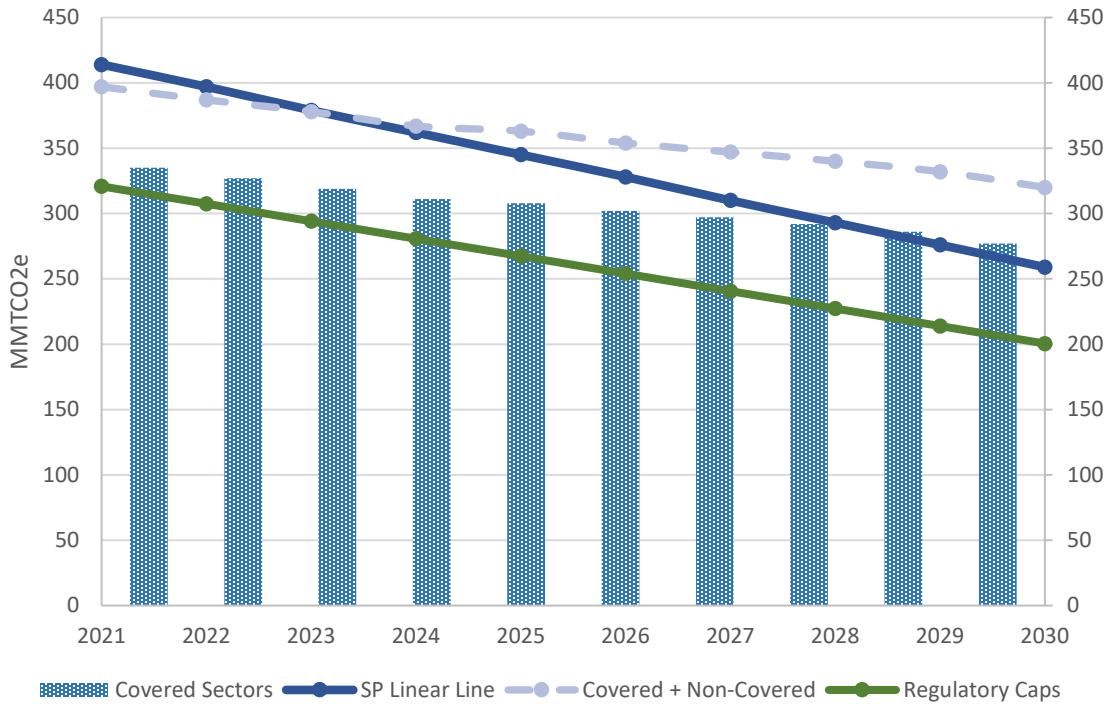
^{###} Covered Emissions w/out Cap-and-Trade Program refers to the estimates of the GHG emissions in the Cap-and-Trade covered sectors while reflecting the impact of the complimentary policies only and not including any changes in GHG emissions due to the impact of a Cap-and-Trade Program. This number may also include some limited fugitive emissions not covered by the Cap-and-Trade Program.

In the 2017 Scoping Plan Update, the Cap-and-Trade Program is one of several measures identified in achieving the 2030 target and covers a large portion of the economy. The post-2020 caps will need to reduce GHG emissions to ensure sufficient reductions are delivered to achieve the statewide GHG reduction target.

Figure 2 is essentially the same as Figure 1, but it now includes the post-2020 caps in the Regulation. This figure clearly shows that the post-2020 caps, shown by the green line, are lower than the estimated emissions in the covered sectors, shown in the shaded dark blue bars.

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Figure 2. Comparison of Post-2020 Caps and 2021 - 2030 Estimated Statewide GHG Emissions in the Covered Sectors without Cap-and-Trade



2021 through 2030 Cap-and-Trade Compliance Scenario and Post-2020 Caps

In approaching this analysis, staff had to design a post-2020 compliance scenario to understand if the amount of allowances and offsets available would limit GHG emissions from 2021 through 2030. This scenario allows for the comparison of what the compliance needs may be by the covered sectors against the amount of compliance instruments available. To be sure, there are an infinite number of compliance scenarios for post-2020 that could be constructed. Staff chose to build a scenario that is based on observed patterns that are informed by public information. While historical trends may not be indicative of future actions, this analysis requires some type of characteristic demand for compliance instruments to understand how any pre-2021 unused allowances factor into a post-2020 program.

Staff designed a 2021 through 2030 compliance scenario that includes use of offsets consistent with the limits for offset use directed in AB 398 and expected availability of offsets based on compliance offset issuance information to date. AB 398 directs the offset usage limit to be reduced from the current eight percent to four percent in 2021 through 2025 and up to six percent in 2026 through 2030.

To date, CARB has issued approximately 105 million compliance offsets. Of those, approximately 20 million offsets were issued for projects in-state, or approximately 20

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percent. For the representative compliance scenario, staff included the assumptions that there would be sufficient out-of-state offsets to count towards the offset usage limit, but the availability of in-state offsets that met the requirements of providing direct environmental benefits in the state would be limited. At this time, staff is continuing to develop what is within the scope of “direct environmental benefits in the state” and for the purposes of this analysis relied on stakeholder comments to define only those offsets that originate within the state to qualify as those with direct environmental benefits. In-state offsets may be constrained by several factors. First, identification of new compliance offset project protocols will be limited as the Program covers approximately 80 percent of the State’s emissions and offsets cannot be generated within covered sectors. Second, for many potential new project types, further research is needed to support accurate quantification of GHG benefits in complex biological systems such as those in the natural and working lands sector. Third, a significant amount of offsets (~17 million) have been generated under the Compliance Offset Protocol for Ozone Depleting Substances and as those banks of existing materials are destroyed, there will be less available for future offset projects. While the existing information to date indicates there has not been full utilization of the offset limit within the Program, CARB staff will continue to look for new offset project types¹³ and increased utilization of existing protocols to ensure this cost-containment mechanism supplies sufficient offsets to maximize the cost benefits of this design feature.

The following information was used to develop a representative Cap-and-Trade Program compliance scenario post-2020:

- 2021 through 2025 offset usage: three percent
- 2026 through 2030 offset usage: four and a half percent

Table 4 provides information on how the post-2020 caps limit GHG emissions under this compliance scenario with, and without, the use of the 150 million 2013 through 2020 unsold auction allowances.

¹³ AB 398 requires the establishment of a Compliance Offset Task Force. This Task Force will provide guidance to CARB in establishing new offset protocols for the Cap-and-Trade Program with direct environmental benefits in the state while prioritizing disadvantaged communities, Native American or tribal lands, and rural and agricultural regions.

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Table 4. Estimate of Total Compliance Instruments Used in the 2021-2030 Program and Cumulative 2021-2030 Reductions Achieved by the Program

	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)

In Table 4, 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). The post-2020 Reserve allowances are the same in each column as they represent the 52 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 offset usage limits described above, but they are different across the two columns. For this analysis, we assume GHG emissions are equal to the allowances available and since the offset usage limits are tied to the compliance obligation, the higher the compliance obligation—GHG emissions—the higher the quantity of offsets, even though the total offset usage percent is the same for both columns. The total compliance instruments available (offsets + allowances, excluding any allowances in the Reserve/Price Ceiling) is 2,628 MMTCO_{2e} and 2,784 MMTCO_{2e}. We will assume these are the maximum cumulative GHG emissions for 2021 through 2030.

In looking at Table 3, we know the estimated emissions in the covered sectors for 2021 through 2030 is 3,054 MMTCO_{2e}. But, we know from Table 4, the estimated number of compliance instruments available is 2,628 MMTCO_{2e} and 2,784 MMTCO_{2e}. If the number of compliance instruments available in Table 3 is assumed to be the maximum amount of emissions that can occur, the Program does limit cumulative GHG emissions to be lower than the 3,054 MMTCO_{2e} with, and without, the availability of the pre-2021 unused allowances by 426 and 269 MMTCO_{2e}, respectively. Even though both scenarios reduce emissions to help achieve the 2030 target, compliance costs will be higher for the scenario without the 150 allowances as it reduces allowance supply, which increases allowance scarcity relative to allowable emissions.

In this compliance scenario, none of the Reserve allowances are accessed between 2021 and 2030, including the 40 million allowances placed into the price ceiling per AB 398. This compliance scenario does include some implicit assumptions that abatement can be achieved without accessing the two post-2020 Reserve tiers and price ceiling.

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The following factors each make it likely that the vintage 2013 through 2030 unused allowances are less than third-party estimates available publicly:

- Mechanism of moving into the APCR allowances that remain unsold for eight auctions, which will move at least 40 million unsold auction allowances to the Reserve
- Allowances set aside for the Voluntary Renewable Electricity Program
- Retirement of allowances to account for imported electricity emissions in the Energy Imbalance Market
- Uncertainties of emission reductions in linked programs
- Retirement of allowances to ensure environmental integrity in situations of bankruptcy

Beyond the reduction in unused allowances available for post-2020, when all of the factors above are known and implemented, there still remains the limit to how many unused allowances will actually be held in private accounts due to the existing holding limits and carrying cost associated with the purchase and private banking of allowances.

Discussion: Post-2020 Caps

This staff evaluation is prepared in response to direction in AB 398 and relies on the best available and currently available public data. Staff has identified uncertainties and unknowns that are important considerations in evaluating if unused allowances – those not retired for compliance-- from 2013 through 2020, when considered in the context of the post-2020 allowances budgets, would hinder the ability of the Program to achieve reductions needed to meet the 2030 target.

Current unknowns include knowing the full range of abatement for different prices across all sectors covered by the Cap-and-Trade Program. Staff has requested stakeholders to provide information or references to help understand this better. Staff did make some assumptions about abatement opportunities as part of the uncertainty analysis in the development of the 2017 Scoping Plan Update and did not receive data or comments on those assumptions. As a regulator, CARB does not have full knowledge of abatement opportunities for each sector and individual regulated entities, which is mitigated, in part, by a Cap-and-Trade Program where covered businesses can look within their own operations to identify the most cost-effective opportunities to reduce their GHG emissions. This also means the Cap-and-Trade Program can deliver reductions at lower costs than other prescriptive alternatives. We do know that some sectors will respond more quickly to a carbon price than others. For example, the electricity sector is already responding to today's carbon price since the price has been incorporated into dispatch models in response to the Cap-and-Trade Program. CARB

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staff will continue to evaluate existing and emerging technology that can reduce GHG emissions without merely reducing production to continuously inform on magnitudes of reductions and which sectors are expected to be responsive to escalating carbon prices.

To address uncertainty and support a price signal at the annually escalating floor price, the Program was initially designed with a self-ratcheting mechanism to remove unsold auction allowances from circulation during periods of low demand. But, these unsold allowances can be reintroduced into circulation through auctions in a measured amount each time during periods of high demand. In August 2016, CARB staff included a proposed amendment that if these unsold auction allowances do not come back to auction within eight consecutive auctions, they be transferred to the Reserve. This amendment was approved by the Board in July 2017. Additionally, AB 398 includes legislative direction on this topic and the recently adopted amendment is consistent with legislation. This mechanism has already proven to be effective. Due to low demand for allowances through 2017, approximately 40 million allowances will be transferred to the Reserve and removed from general circulation. Depending on auction results for this year, additional previously unsold allowances may also be transferred to the Reserve.

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 our 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. Cap-and-Trade is just one of several policies in the Scoping Plan to chart the path to 2030. Thus, in addition to Cap-and-Trade, we need to track all of the policies and sectors to ensure we stay on track with the reduction 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 would 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.

Next Steps

Staff will also continue discussions on this topic, as well as other modifications required by AB 398, with our linked partners in Québec and Ontario. Any proposed changes to California's Program will be carefully assessed in terms of many factors including potential impacts on the ability to meet our GHG reduction targets, leakage, and impacts on the linked programs. As staff develops more refined proposals for potential amendments, additional analyses and discussion with stakeholders is planned ahead of any formal regulatory proposal.

Attachment A Uncertainty

Staff recognizes and notes the uncertainty within the analysis inputs and assumptions. Descriptions of the uncertainty related to PATHWAYS modeling and future emissions and market conditions are provided in this attachment.

Scoping Plan Modeling Uncertainty

It is equally important to note the 2017 Scoping Plan Update identified several types of uncertainty in both forecasting future emissions and estimating the benefits of emissions reductions policies. In developing the 2017 Scoping Plan Update, staff forecasted the estimated the 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. 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.

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 Update and Table 3 of the 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 to what extent the post-2020 GHG emissions will be limited by the quantity of compliance instruments available.

****FOR DISCUSSION PURPOSES ONLY****

Table A-1. Key Factors Influencing Post-2020 GHG Reductions from the Cap-and-Trade Program

Key Factor	Description	Impact on Post-2020 Program
Abatement opportunities in linked programs	The full range of abatement 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 2021.</i>
Post-2020 offset supply	It is unknown at this time if sufficient offsets will be available for post-2020 demand for the full 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 2021.</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 2021.</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 2020, but could be tens of millions of allowances. Thus, it is anticipated that there will <i>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 will retire allowances against any outstanding emissions for which compliance instruments have not been surrendered. The Board recently	There is one currently known instance where this requirement will apply. That is expected to require CARB to retire approximately 5 million allowances. <i>There would be fewer pre-2021 unused allowances available to put towards emissions after 2021.</i>

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	voted on amendments to ensure there was absolute clarity on the ownership of outstanding compliance obligations in such situations moving forward.	
Post-2020 Allowances placed into the Reserve or Price Ceiling	The current Regulation places 52 million allowances into the Reserve. Staff is taking comment on where to place an additional 22.7 million 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 currently taking public comments on where to set the Reserve tiers and price ceiling values.	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 Complimentary 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 Update.	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.

