May 10, 2018

Dear ARB Board Members and staff,

Thank you for the opportunity to comment on the materials provided for ARB's April 2018 workshop on the implementation of AB 398's cap-and-trade program reforms. Our comments today focus on two issues: the inadequacy of ARB's Post-2020 Caps Report[1] and remaining uncertainties associated with staff's proposed interpretation of AB 398's offsets limits. We refer staff to more extensive analysis on the Post-2020 Caps Report in an attached Near Zero Research Note[2] and, on offsets, to our previous comment letter and its attachments.[3]

1. **ARB's analysis of allowance overallocation does not provide a reasoned basis for addressing AB 398's requirements. ARB should conduct rigorous new analysis and evaluate the market reforms enacted in the RGGI and the EU ETS programs to address market overallocation.**

   AB 398 requires ARB to "[e]valuate and address concerns related to overallocation" in the cap-and-trade program.[4] In turn, ARB released its first formal evaluation of allowance overallocation in the April 2018 Post-2020 Caps Report. As we show in the attached Research Note,

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1 ARB, Supporting Material for Assessment of Post-2020 Caps (Apr. 2018) (hereinafter, the "Post-2020 Caps Report"), https://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm.

2 See attachment 1 to this comment letter.

3 See attachment 2 to this comment letter.

4 Cal. Health & Safety Code § 38562(c)(2)(C).

however, the Post-2020 Caps Report does not provide a reasoned basis for addressing AB 398's requirements because it falls short on two critical grounds.

First, despite the clear concern that excess allowances from the program's pre-2021 period could enable covered emissions to exceed program caps and undermine the state's ability to meet its legally binding emission limit in 2030, the Report does not analyze the impact of overallocation on 2030 emissions. As a result, it does not speak to the key concern identified by numerous independent analysts[5] and therefore does not satisfy AB 398's requirements.

Second, our attached Research Note shows that the Report contains a major factual error. Once this error is corrected using the method ARB staff employed in the original 2010 cap-setting rulemaking, the Report's analysis suggests that overallocation will cause emissions to exceed the 2030 limit. Rather than justify ARB's proposal not to take any action to address allowance overallocation, the Report's corrected analysis indicates that overallocation is a serious problem that puts California's emissions limit at risk.

ARB should acknowledge the error in its Report, review the extensive set of studies conducted by independent analysts, and undertake a more substantive assessment of allowance overallocation and its risks. A new analysis should include a careful evaluation of the extent to which the economic recession exogenously reduced emissions below program caps because emission reductions caused by lower-than-anticipated economic growth are not attributable to "early action" undertaken by market participants.

We emphasize that there are a variety of solutions available to ARB, as evidenced by the reforms other prominent cap-and-trade programs have implemented in recent years. Both the northeastern states' RGGI program and the EU ETS have made adjustments to reduce

[5] See attachment 1 to this letter.

excess allowance supplies that have built up in part because of the effects of the recession.

These policy systems not only show that it is possible to analyze overallocation and make adjustments to future program caps, but also provide examples of how objective metrics that track actual allowance banking can be used to dynamically manage a program's stringency. For example, the EU ETS automatically increases or decreases future allowance supplies depending on the extent of allowance banking that regulators observe in the market; RGGI uses a related approach to introduce or remove allowances from the program cap in response to market prices.

When it comes to developing solutions to allowance overallocation, ARB has at least two broad options. One approach would be to review the existing and high-quality independent studies that make prospective estimates of allowance overallocation to inform an adjustment to the California program's stringency. Alternatively—or in parallel—the Board could develop objective banking metrics and design dynamic program adjustments to implement changes that are based on actual market outcomes as they arise, just as RGGI and the EU ETS have done.

We urge the Board to take seriously the concern that overallocation could put the state's 2030 climate target at risk and conduct a more thorough evaluation of the issue in order to satisfy AB 398's requirements.

2. **ARB still needs to address concerns related to staff's proposed interpretation of AB 398's offsets reforms.**

As we and others articulated in comment letters responding to ARB's March 2018 workshop, ARB's proposed interpretation of AB 398's offsets requirements raises a number of important concerns. Board staff neither addressed these comments in their summary of March 2018 comments nor provided any new information on these issues in

the April 2018 workshop. We re-iterate here the concerns we expressed in our March 2018 comment letter and call on ARB to address these issues.

a. ARB needs to indicate how its proposed post-2020 offset limits are consistent with AB 398's requirements.

ARB's proposed interpretation of AB 398's total limits on post-2020 carbon offsets increases the total number of offset credits that can be used in 2024 and 2025 relative to a literal reading of the statute. In its March 2018 workshop materials, ARB did not offer any justification for this more expansive interpretation. ARB staff should explain how the proposed interpretation is consistent with the plain text of AB 398 as well as the statute's legislative intent.

b. ARB should exclude consideration of greenhouse gas emissions from its proposed bottom-up determination of an offset project's "direct environmental benefits."

AB 398 limits the eligibility of offset credits that do not generate a "direct environmental benefit" to air or water quality in California. Board staff have proposed evaluating this requirement on a project-by-project basis, but have so far been unwilling to clarify whether they are open to allowing offset projects to claim a direct environmental benefit on the basis of their project-level greenhouse gas reductions.

The preliminary discussion draft suggests that "a GHG reduction anywhere is a benefit everywhere."[6] This is true, but only where there are net GHG reductions. Offset projects do not generate net GHG reductions because project-level reductions generate offset credits, which in turn increase emissions under the cap-and-trade program by an equivalent amount. As a result, offset projects generate no climate benefits, and therefore it would be irrational to conclude they generate

[6] ARB, Preliminary Discussion Draft regulatory text (Feb. 2018) at 17.

a "direct environmental benefit" on the basis of their project-level greenhouse gas emission reductions.

If Board staff accept the argument that "a GHG reduction anywhere is a benefit everywhere," then all offset projects would qualify on the basis of purported climate benefits, despite the fact that none of these projects produce net climate benefits. This interpretation is inconsistent with the plain language and intent of AB 398. Because all offset projects would qualify under this expanded definition, it would also erase AB 398's entire direct environmental benefits requirement, contrary to the standard judicial canons of statutory construction.

We appreciate that Board staff are trying to develop an efficient approach to evaluating whether existing and future carbon offset projects produce a direct environmental benefit and appreciate the administrative challenge this entails. Nevertheless, the Board can and should clarify that offset projects cannot demonstrate a direct environmental benefit on the basis of their project-level greenhouse gas reductions—no matter where they are located. This clarification would not limit the Board's ability to develop a fair and efficient implementation process.

Thank you for the opportunity to comment and please feel free to contact us if we can provide any additional information.

Sincerely,

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Michael D. Mastrandrea PHD

Disclaimer: Dr. Cullenward is a member of the California Independent Emissions Market Advisory Committee; however, this letter does not represent the official views of the IEMAC.

Attachment 1:

Mason Inman, Danny Cullenward, and Michael Mastrandrea, Ready, fire, aim: ARB's overallocation report misses its target. Near Zero Research Note (May 7, 2018).

Attachment 2:

Near Zero comment letter to ARB re: March 2018 cap-and-trade workshop (Mar. 16, 2018).

RESEARCH NOTE

Ready, fire, aim: ARB's overallocation report misses its target

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May 7, 2018

Executive summary

ARB's April 2018 Staff Report fails to "[e]valuate and address concerns related to overallocation" in the cap-and-trade program, as required by AB 398. Despite widespread concern that overallocation could cause emissions to exceed California's legally binding 2030 limit, the Report does not actually analyze this key question. More troublingly, the Report makes a fundamental methodological error that ARB specifically warned against in its original 2010 cap-and-trade regulatory process; once corrected, the Report's method leads to the conclusion that overallocation will cause the state to exceed its 2030 emissions limit.

Introduction

Last year's cap-and-trade extension bill, AB 398, directs the California Air Resources Board (ARB) to "[e]valuate 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."[1] Allowance overallocation is a critical issue because it could undermine the effectiveness of the cap-and-trade program. ARB's 2017 Scoping Plan calls on the cap-and-trade program to deliver over 45% of the annual GHG emission reductions needed to achieve California's 2030 climate target.[2]

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1 Cal. Health & Safety Code § 38562(c)(2)(D) (as added by AB 398).

2 ARB, California's 2017 Climate Change Scoping Plan (Nov. 2017) at 26 (Table 2) (indicating that regulations are expected to reduce GHG emissions by 69 $MMtCO_2e$ in 2030 under the Scoping Plan Scenario), https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf; *id.* at 30 (indicating that the cap-and-trade needs to reduce another 60 $MMtCO_2e$ to achieve the SB 32 target for 2030). The share that cap-and-trade must contribute (60 $MMtCO_2e$) is 46.5% of the total reductions required relative to business-as-usual emissions in 2030 (60 + 69 = 129 $MMtCO_2e$).

As the Legislative Analyst's Office (LAO) has explained, overallocation could put the state's 2030 climate target at risk by potentially enabling market participants to bank excess allowances not needed in the program's initial phase for use in later years.[3] If too many allowances are banked, future emissions could exceed program budgets, undermining the cap-and-trade program's intended role as a "backstop" state climate policy. Allowance overallocation (also called oversupply) has been discussed extensively in independent expert reports,[4] in the media,[5] at ARB's public workshops,[6] in public comment letters to ARB,[7] in legislative committee hearings attended by ARB Chair Mary Nichols,[8] and in legislative committee reports.[9]

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3 LAO, Cap-and-Trade Extension: Issues for Legislative Oversight (Dec. 2017), http://lao.ca.gov/Publications/Report/3719.

4 *See*, *e.g.*, Environmental Commissioner of Ontario, Ontario's Climate Act: From Plan to Progress – Appendix G: Technical Aspects of Oversupply in the WCI Market (Jan. 2018), https://eco.on.ca/reports/2017-from-plan-to-progress/; Chris Busch, Oversupply Grows in the Western Climate Initiative Carbon Market, Energy Innovation Report (Dec. 2017), http://energyinnovation.org/wp-content/uploads/2018/02/WCI-oversupply-grows-February-update.pdf; Danny Cullenward & Andy Coghlan, Structural oversupply and credibility in California's carbon market, *Electricity Journal* 29: 7–14 (2016).

5 *See*, *e.g.*, Herman K. Trabish, Is cap and trade the climate solution? The jury's still out, *Utility Dive* (Jan. 19, 2018), https://www.utilitydive.com/news/is-cap-and-trade-the-climate-solution-the-jurys-still-out/514747/; Justin Gillis and Chris Busch, A Landmark California Climate Program Is in Jeopardy, *The New York Times* (Dec. 12, 2017), https://www.nytimes.com/2017/12/12/opinion/california-climate-program-emissions.html.

6 ARB hosted informal workshops on potential AB 398 implementation strategies on March 2, 2018, and April 26, 2018, documents available at https://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm.

7 *See*, *e.g.*, comments on ARB's March 2, 2018, workshop from NextGen California, California Environmental Justice Alliance, the Natural Resources Defense Council, and Near Zero, https://www.arb.ca.gov/lispub/comm2/bccommlog.php?listname=ct-3-2-18-wkshp-ws.

8 Joint Legislative Committee on Climate Change Policies (JLCCCP), 2030 Target Scoping Plan (Jan. 4, 2018), http://climatechangepolicies.legislature.ca.gov/previous-hearings; Senate Environmental Quality Committee (SEQ), California's Cap-and-Trade Program: The Air Resources Board's 2018 Scoping Plan (Jan. 17, 2018), http://senv.senate.ca.gov/informationalhearings.

9 JLCCCP Oversight Hearing Background Document: 2030 Target Scoping Plan (Jan. 4, 2018),

In April 2018, ARB staff released a report (hereinafter, the "Post-2020 Caps Report" or "the Report") that provides the Board's first official response to AB 398's statutory direction to evaluate and address concerns related to overallocation.[10] The Report suffers from two major shortcomings.

First, despite the clear concern that overallocation could undermine the state's 2030 climate target, the Report makes no inquiry into the impact of overallocation on *annual* emissions in 2030. Instead, the Post-2020 Caps Report calculates the *cumulative* balance of projected emissions and compliance instrument budgets for the years 2021 through 2030, from which Board staff infer the cumulative greenhouse gas (GHG) emission reductions attributable to cap-and-trade. The Report does not analyze what is likely to happen in 2030 and therefore does not address the primary risk from allowance overallocation.

Taking overallocation risks seriously requires significantly more analysis than what ARB has provided. On this basis alone, the Post-2020 Caps Report does not provide a reasoned basis for satisfying AB 398's requirement to "[e]valuate and address concerns related to overallocation."

Second, the Report makes a fundamental error in its calculations that undermines its own conclusions. Specifically, the Report misses a key step in estimating emissions subject to the cap-and-trade program that ARB identified in 2010 as essential to any analysis of overallocation (see Appendix).[11] Once the Report's mistake is corrected—using the same method of adjustment the Board used in its original 2010 cap-setting regulatory process—ARB's own methods show that overallocation will cause the cap-and-trade program to deliver significantly fewer emission reductions than what is

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http://climatechangepolicies.legislature.ca.gov/previous-hearings; SEQ, California's Cap-and-Trade Program: The Air Resources Board's 2017 Scoping Plan – Background Document (Jan. 17, 2018), http://senv.senate.ca.gov/sites/senv.senate.ca.gov/files/hearing_background_final.pdf.

[10] ARB, Supporting Material for Assessment of Post-2020 Caps (Apr. 2018), https://www.arb.ca.gov/cc/capandtrade/meetings/20180426/carb_post2020caps.pdf.

[11] ARB, 2010 Cap-and-Trade Regulation, Staff Report: Initial Statement of Reasons (October 28, 2010), Vol. 1, Appendix E: Setting the Program Emissions Cap, at E7 through E-8, https://www.arb.ca.gov/regact/2010/capandtrade10/capv3appe.pdf.

called for in the 2017 Scoping Plan. Thus, the error undercuts staff's conclusion that an overallocated cap-and-trade program "achieves [the] reductions needed to meet the 2030 target."[12]

Rather than rely on an erroneous analysis that doesn't address the primary concern related to market overallocation, the Board should engage the substantial body of analysis that is now available to inform a serious discussion of potential impacts and solutions.

Post-2020 Caps Report: ARB's Methods

ARB staff's Post-2020 Caps Report estimates the cap-and-trade program's cumulative supply/demand balance over the period 2021 through 2030 by projecting emissions (demand) and estimating the number of compliance instruments available (supply), including allowances and carbon offsets. To evaluate the impact of allowance overallocation, the Report calculates the cumulative supply/demand balance for two scenarios. The first assumes no overallocation and the second assumes that 150 million allowances (150M) from the pre-2021 period will be banked for use in the post-2020 period, effectively increasing the supply of compliance instruments in that later period.

In both of ARB's scenarios, projected emissions (demand) exceed compliance instruments (supply); the difference (demand minus supply) is reported as the cumulative emission reductions from cap-and-trade from 2021 through 2030 (expressed in million tons of carbon dioxide equivalent, or $MMtCO_2e$). Table 1 reports the calculations published in ARB's Post-2020 Caps Report and in an accompanying workshop presentation.[13] Based on this analysis, Board staff conclude that overallocation will not put the state's 2030 climate target at risk.

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[12] ARB, Workshop to Continue Informal Discussion on Potential Amendments to Cap-and-Trade Regulation (Apr. 26, 2018), slide 28, https://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm.

[13] ARB, Post-2020 Caps Report at 11 (Table 3) and 14 (Table 4); *see also* ARB, Cap-and-Trade Workshop, *supra* note 12 at slide 28.

Table 1: ARB's cumulative overallocation analysis for 2021-2030 ($MMtCO_2e$)

#	Series	Case A (No overallocation)	Case B (150M overallocation)
1	Covered emissions w/o cap-and-trade program (demand)	3,054	3,054
2	Post-2020 allowances (w/o Post-2020 Reserve)	2,532	2,532
3	Pre-2021 allowances (overallocation)	0	150
4	Offset credits	96	103
5	Total compliance instruments (supply) (#2 + #3 + #4)	2,628	2,785
6	Cumulative reductions from cap-and-trade (#1 – #5)	426	269

A detailed discussion of the report's methods follows, with corresponding lines in Table 1 in parentheses:

- **Projecting demand (#1).** ARB uses a straightforward method for projecting future covered emissions, which represents the future demand for cap-and-trade compliance instruments. However, ARB's method makes a fundamental error that, once corrected, shows that cap-and-trade is expected to fall short of the role identified for it in the Scoping Plan. We describe ARB's methods here and present the error in the next section.

  The Post-2020 Caps Report estimates GHG emissions through 2030 using the PATHWAYS model projections developed for ARB's 2017 Scoping Plan Scenario. The Scoping Plan Scenario models GHG emissions after taking into account the effect of all of California's climate regulations except for the impact of the cap-and-trade program; the projections therefore indicate expected GHG emissions without taking into account the effects of the cap-and-trade program.

The Post-2020 Caps Report separates the PATHWAYS projections into "covered sectors" and "non-covered sectors." As the Report explains:

> 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 [GWP] gas sectors.[14]

To calculate emissions from "covered sectors," ARB staff added up the GHG emissions projected from 2021 through 2030 from each of the four sectors identified above (transportation, electricity, residential and commercial, and industrial), based on PATHWAYS output.[15] We manually confirmed that this data source and method accurately reproduces the cumulative emissions ARB published in its Post-2020 Caps Report—a total of 3,054 million tons of carbon dioxide equivalent ($MMtCO_2e$).[16] Projected emissions are the same across ARB's two overallocation scenarios, which vary only in the number of allowances banked from the pre-2021 period into the post-2020 period.

- **Projecting supply (#2 through #5).** The Post-2020 Caps Report's supply projections are also straightforward. The Report analyzes two scenarios to evaluate potential overallocation outcomes: one in which zero pre-2021 allowances are banked for use in the post-2020 market period, and a second in which 150M pre-2021 allowances are banked for use in the post-2020 period.

  The calculation begins with the total supply of all allowances for vintage years 2021 through 2030, a total of 2,607M under current regulations.[17] Next, the calculations subtract ARB's proposed post-2020 Reserve allowances, a pool of allowances that were set aside from the post-2020 allowance budget. Including current post-2020 Reserve allowances (52M) and additional post-2020 Reserve allowances that

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14 ARB, Post-2020 Caps Report at 10.

15 *Id*. at 11, Table 3, note ## (link to https://www.arb.ca.gov/cc/scopingplan/comparison_graphs_6cases101817.xlsm).

16 *Id*. at 11, Table 3.

17 *Id*. at 13-14.

Board staff proposed to set aside in a February 2018 discussion document (22.7M), there are about 75M post-2020 Reserve allowances.[18] The Post-2020 Caps Report assumes these 75M allowances will not be needed for compliance under the cap-and-trade program, and therefore removes them from the supply calculation (2,607M – 75M = 2,532M, as shown in Table 4 of the Post-2020 Caps Report). The Report also assumes that additional compliance instruments available for sale at the price ceiling will not be accessed.[19]

The supply estimate is then increased to account for the expected use of carbon offset credits. The Report assumes that carbon offsets usage will equal 3% of covered emissions from 2021-2025 and 4.5% from 2026-2030.[20] The total number of offset credits used varies slightly depending on how many emissions there are, which in turn depends on the number of pre-2021 allowances that are banked into the post-2020 period. In the first scenario, with no banking of pre-2021 allowances, the Report assumes 96M offset credits will be used; in the second scenario, with 150M banked pre-2021 allowances, the Report assumes 103M offset credits will be used.

Finally, the Report adds up these supplies across its two scenarios to evaluate potential overallocation outcomes. In the first scenario, zero pre-2021 allowances are used for post-2020 compliance, resulting in 2,628M total compliance instruments over the period 2021 through 2030. In the second scenario, 150M pre-2021 allowances are used for post-2020 compliance, resulting in a total supply of 2,785M total compliance instruments over the period 2021 through 2030.

- **Calculating GHG emission reductions (#6).** The final step in ARB's analysis is to calculate the GHG emission reductions the cap-and-trade program is projected to deliver in each scenario. Because the Post-2020 Caps Report projects emissions (demand) and compliance instruments (supply) on a cumulative basis, so too does ARB calculate

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18 ARB, Preliminary Concepts: Price Containment Points, Price Ceiling, and Allowance Pools (Feb. 2018), https://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm.

19 ARB, Post-2020 Caps Report at 14.

20 *Id*. at 14.

GHG emission reductions on a cumulative basis over the period 2021 through 2030.

Calculated GHG emission reductions are reported as the difference between projected emissions under the Scoping Plan Scenario (demand) and the number of compliance instruments (supply) available over the same period. Conceptually, this makes sense because, over a given period, the cap-and-trade program requires cumulative covered emissions to be no higher than the total number of available compliance instruments (allowances and offsets). As a result, if projected baseline GHG emissions are higher than the total number of compliance instruments, GHG emitters subject to the cap-and-trade program must reduce their emissions by a corresponding amount.

For each of the two scenarios described above, the Post-2020 Caps Report calculates GHG emission reductions. For the first scenario, in which zero pre-2021 allowances are used for post-2020 compliance, the Report's calculated GHG reductions are 426 $MMtCO_2e$ (3,054M – 2,628M = 426M). For the second scenario, in which 150M pre-2021 allowances are used for post-2020 compliance, the Report's calculated GHG reductions are 269 $MMtCO_2e$ (3,054M – 2,785M = 269M).

- **Drawing conclusions.** One curious feature of the Post-2020 Caps Report is that it never specifies a metric for evaluating whether or not the calculated GHG emission reductions are sufficient. Despite the lack of a clear metric, the Report concludes that even with 150 million excess allowances from the pre-2021 period, cap-and-trade will still "reduce emissions to help achieve the 2030 target."[21] ARB Assistant Division Chief Rajinder Sahota made similar comments in ARB's April 2018 workshop, saying that the staff analysis shows that a 150 million allowance overallocation "does not endanger" the chances of emissions in 2030 remaining below the limit.[22]

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[21] *Id.* at 14.

[22] As transcribed from the workshop, Ms. Sahota's full comment was: "The banking question really is about protecting against windfall profits, and then also endangering the post-2020 period. In looking at the analysis that we did on overallocation, 150 [million allowances] and what that might mean for post-2020, we know that the caps are so steep relative to what the emissions would be without cap-and-trade, pulling that 150 [million allowances] forward does not endanger that."

> We assume that ARB is comparing the calculated GHG emission reductions discussed above against reductions called for from the ARB's 2017 Scoping Plan. The 2017 Scoping Plan concludes that under the Scoping Plan Scenario, cap-and-trade needs to deliver 236 $MMtCO_2e$ in cumulative reductions over the period 2021 through 2030.[23] In both of the Report's scenarios, projected GHG reductions are larger than this amount, suggesting that the cap-and-trade would provide the cumulative emissions cuts identified in the Scoping Plan.

Again, we note that the Report's analysis does not evaluate what impact overallocation has on the state's ability to meet its legally binding GHG emissions target in 2030. At best, the Report's methods might indicate whether expected *cumulative* cap-and-trade reductions match the cumulative reductions called for in ARB's Scoping Plan—but the Report never addresses the impact of overallocation on California's *annual* emissions in 2030. State law requires ARB to reduce emissions to hit an *annual* target in 2030, not a *cumulative* target over the period 2021 through 2030.[24] Even if projected cumulative reductions are equal to or greater than the cumulative reductions called for in the Scoping Plan, it is still possible for emissions to significantly exceed the 2030 limit.[25]

ARB's Erroneous Covered Emissions Projection

The Post-2020 Caps Report makes a fundamental error in the way it projects future GHG emissions, inflating projected "covered emissions" subject to the cap-and-trade program by approximately 277 $MMtCO_2e$ over the period 2021 through 2030. Once corrected for this error, the Report's calculations show that ARB's estimated overallocation of 150M allowances would cause the cap-and-trade program to be non-binding over the same period, and therefore fall well short of the reductions ARB called for in the final 2017 Scoping Plan.

Simply put, the Post-2020 Caps Report used the wrong data to project "covered emissions"—that is, the emissions actually subject to the cap-and-trade program. Rather than estimate future "covered emissions" subject to the cap-and-trade program, the Report instead projected emissions

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[23] ARB, 2017 Scoping Plan, *supra* note 2 at 28.

[24] Cal. Health & Safety Code § 38566.

[25] *See*, *e.g.*, LAO, *supra* note 3.

from "covered sectors"—a broader category with emissions that are about 10% higher than "covered emissions." By projecting an erroneously high emissions trajectory, ARB's calculation also inflates the calculated GHG emission reductions attributable to cap-and-trade.

The core problem is this: not all emissions in "covered sectors" are "covered emissions" subject to the cap-and-trade program. "Covered sector" emissions include 100% of the emissions from sources classified as being in these four high-level sectors (transportation, electricity, residential and commercial, and industry). In contrast, "covered emissions" are essentially a subset of these emissions, although not a perfect subset.[26] Total statewide GHG emissions, which are subject to the legislative limits set for 2020 and 2030, are the sum of "covered sector" and "non-covered sector" emissions.

As Figure 1 illustrates, the difference between "covered emissions" and "covered sector" emissions is visually striking. Table 2 presents the difference in numerical terms. Each year for which there are data, the gap between "covered sector" emissions and "covered emissions" grew larger, starting at 30.6 $MMtCO_2e$ per year in 2011 and increasing to 37.5 $MMtCO_2e$ per year in 2015. Over these five years, the average difference was 34.8 $MMtCO_2e$.

We correct the Report's error by adopting ARB's historical practice of revising sector-wide emission estimates using facility-level data gathered through California's Mandatory Greenhouse Gas Reporting Regulation (MRR) (see Appendix). Just as ARB did in its original 2010 cap-setting regulatory process, which developed program caps through 2020, we employ the ratio of covered emissions subject to the cap-and-trade program (using MRR data) to total covered sector emissions (from the state GHG inventory). Consistent with the Board's previous cap-setting exercise, this approach uses actual historical data describing emissions subject to the cap-and-trade program to improve forecasting accuracy.

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[26] "Covered emissions" are not a perfect subset of "covered sector" emissions because some covered emissions are categorized in non-covered sectors (agriculture, high GWP gases, or recycling and waste). For example, most emissions in the agriculture sector are not subject to the cap-and-trade program, but some emissions from agricultural energy use (such as the combustion of liquid fuels and natural gas) are, even though those emissions are counted in both the PATHWAYS model and the state greenhouse gas inventory as coming from the agriculture sector.

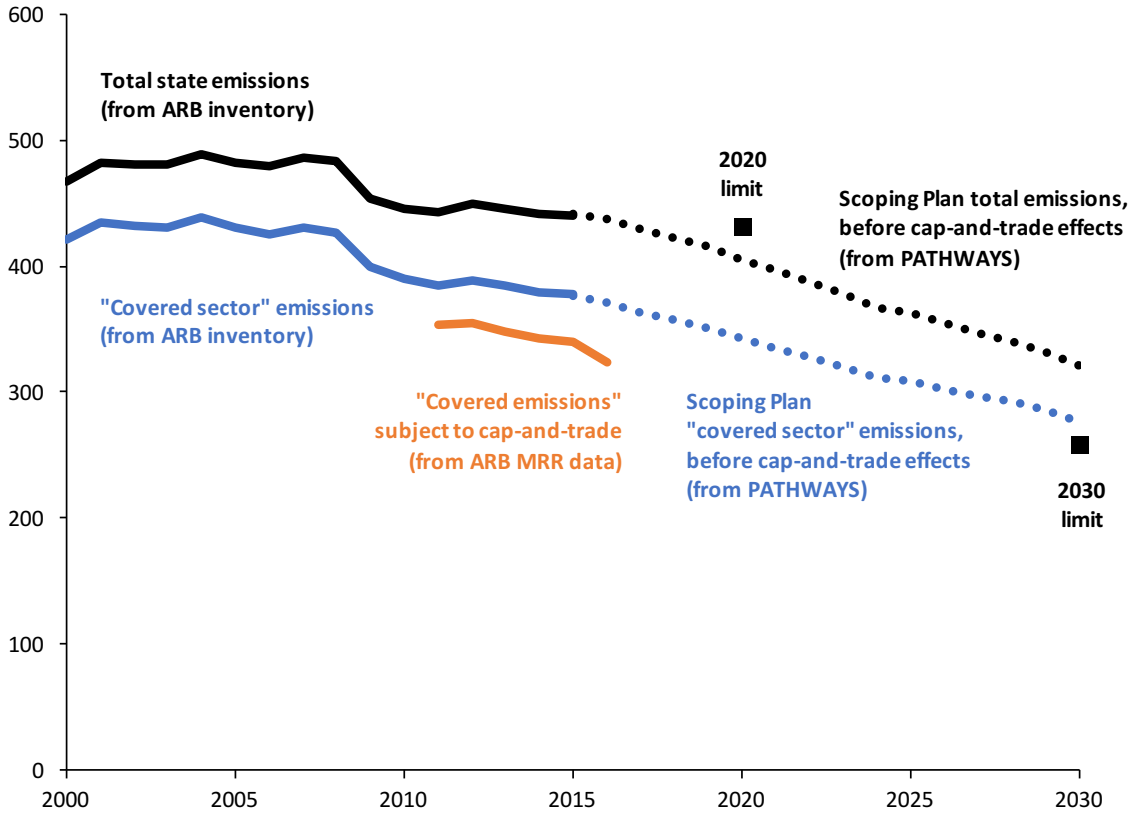

Figure 1: Comparison of statewide, covered sector, and covered emissions ($MMtCO_2e$). Total statewide emissions data are from ARB's GHG inventory (black solid line)[27] and the projection is from the PATHWAYS projection for the Scoping Plan Scenario (black dotted line).[28] Historical "covered sector" emissions (blue solid line) are derived from ARB's GHG inventory and projected "covered sector" emissions are from PATHWAYS (blue dotted line). Historical "covered emissions" (orange line) are reported under ARB's MRR regulation.[29] On average, annual emissions in "covered sectors" have been about 35 $MMtCO_2e$ higher than "covered emissions" subject to the cap-and-trade program. ARB erroneously used these higher numbers to calculate the GHG emission reductions attributable to cap-and-trade in the post-2020 period.

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27 ARB, California GHG Emission Inventory (2017), https://www.arb.ca.gov/cc/inventory/data/data.htm.

28 The PATHWAYS output file is available at https://www.arb.ca.gov/cc/scopingplan/comparison_graphs_6cases101817.xlsm.

29 ARB, Mandatory GHG Reporting Regulation, https://ww2.arb.ca.gov/mrr-data.

To correct the PATHWAYS projections for covered sector emissions, we multiply each year's projected emissions by the average ratio between actual historical covered emissions and sector-wide emissions over the period 2011 through 2015 (0.909, see Table 2). This correction reduces ARB's projected covered emissions 2021 through 2030 by a cumulative 277 $MMtCO_2e$.[30] Over the ten-year projection period from 2021 through 2030, this suggests that ARB over-estimated GHG emissions subject to the cap-and-trade program by approximately 277 $MMtCO_2e$.

Table 2: Comparison of covered sector emissions and covered emissions ($MMtCO_2e$)

Series	Source	2011	2012	2013	2014	2015	Avg. 2011-15
Covered sector emissions	State GHG Inventory	383.9	388.3	384.8	379.4	377.9	382.9
Covered emissions	MRR Data	353.3	355.4	348.5	342.9	340.4	348.1
Difference		30.6	32.9	36.3	36.5	37.5	34.8
Ratio, covered emissions (MRR) to covered sector emissions (Inventory)		0.920	0.915	0.906	0.904	0.901	0.909

Correcting the Post-2020 Caps Report

We replicated ARB's calculations from the Post-2020 Caps Report, correcting for the error in projected emissions described above. The corrected covered emissions projection for the period 2021 through 2030 is 2,777 $MMtCO_2e$ (3,054M – 277M = 2,777M), reflecting expected GHG emissions subject to the cap-and-trade program after California's non-cap-and-trade regulations take effect, but before the cap-and-trade program takes effect. We then examine the impact of this correction on the estimated reductions ARB expects from the cap-and-trade program over this period across its two overallocation scenarios (see Table 3).

[30] For the original and corrected GHG projection data, see the spreadsheet published along with this report on Near Zero's website, www.nearzero.org.

Table 3: Correction to ARB's cumulative overallocation analysis, 2021-2030 ($MMtCO_2e$)

#	Series	Case A (No overallocation)	Case B (150 M overallocation)
1	Erroneous covered emissions w/o cap-and-trade program (demand)	3,054	3,054
2	Correction to covered emissions (Near Zero calculation)	-277	-277
3	Corrected covered emissions (demand) (#1 + #2)	2,777	2,777
4	Post-2020 allowances (w/o Post-2020 Reserve)	2,532	2,532
5	Unused allowances at end of 2020	0	150
6	Offset credits	96	103
7	Total compliance instruments (supply) (#4 + #5 + #6)	2,628	2,785
8	Cumulative reductions from cap-and-trade (#3 – #7)	149	0 (*)

(*) Calculated reductions are negative (2,777M – 2,785M = -8M). This indicates the program is non-binding under these conditions and therefore produces no cumulative reductions.

In ARB's zero overallocation scenario (Case A), the corrected demand for compliance instruments (before cap-and-trade effects) remains larger than the supply, indicating the cap-and-trade program will reduce cumulative GHG emissions. Specifically, ARB assumes that cap-and-trade will reduce emissions until they are equal to the supply of compliance instruments, so the reduction in emissions due to cap-and-trade is 149 $MMtCO_2e$ (2,777M – 2,628M = 149M).

In ARB's 150M overallocation scenario (Case B), the corrected demand for compliance instruments (before cap-and-trade effects) is less than the supply of compliance instruments. According to ARB's methods, in this case the cap-and-trade program does not require any further reduction in GHG emissions. As a result, the calculated reductions attributable to cap-

and-trade would be zero. In this case, ARB's method projects that statewide GHG emissions will exceed the 2030 limit.[31]

Figure 2 compares the reductions called for in the 2017 Scoping Plan against the calculations in the Post-2020 Caps Report (from Table 1) as well as corrected calculations (from Table 3).

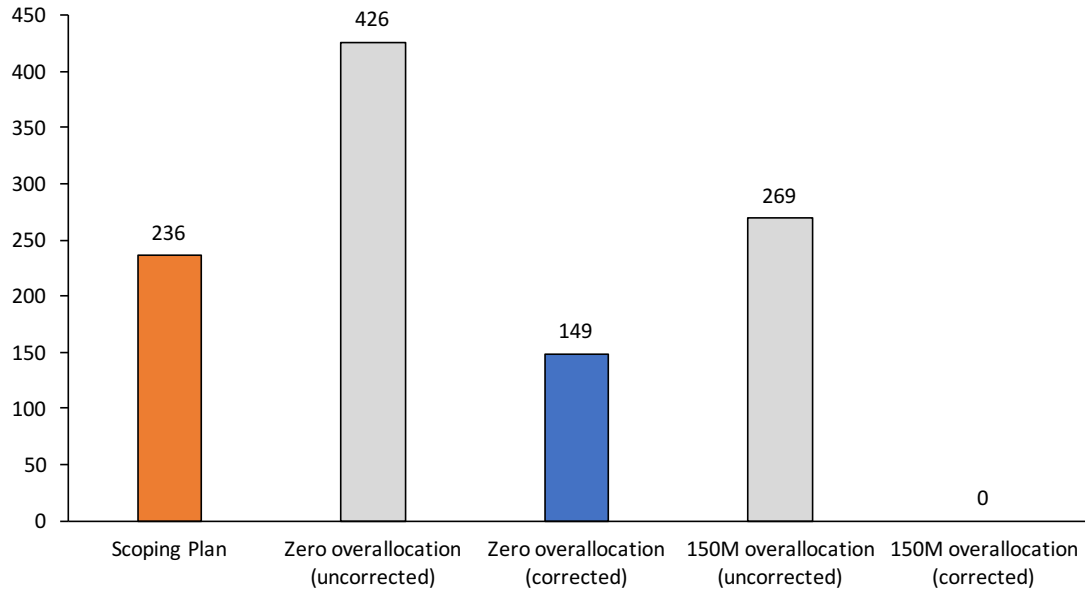

Figure 2: Calculated reductions from cap-and-trade, 2021 through 2030 ($MMtCO_2e$)

ARB's uncorrected estimates suggest that whether or not there are 150M overallocated pre-2021 allowances, the cap-and-trade program will deliver at least as many reductions as called for in the Scoping Plan. Once corrected for ARB's error, however, the Report's analysis indicates that the status quo market design is expected to fall short of the Scoping Plan's requirement—with or without 150M overallocated allowances.

In our view, neither the original Post-2020 Caps Report calculation (reported in Table 1) nor the corrected calculations (reported in Table 3) offer a reasonable basis for evaluating whether overallocation puts California's 2030 climate target at risk. Nevertheless, we have illustrated how a critical

[31] A calculated effect of zero implies that California's greenhouse gas emissions trajectory would follow the PATHWAYS Scoping Plan scenario projection. In reality, a non-binding cumulative program cap would still impose supplemental reductions as a result of the auction price floor. However, the Scoping Plan analysis does not explicitly model the effects of price-induced mitigation from the cap-and-trade program.

error in ARB's calculations undermines the Post-2020 Caps Report's conclusions. Additional and more substantive analysis is needed to address the risks of overallocation.

Conclusion

ARB's Post-2020 Caps Report offers the Board's first formal analysis of how allowance overallocation might impact the cap-and-trade program's effectiveness in ensuring California meets its legally binding 2030 climate target. This issue is critical to state climate policy because the Board decided to rely on cap-and-trade to deliver over 45% of the annual GHG emission reductions needed to achieve California's 2030 climate target.[32] If overallocation leads to excess allowance banking in the cap-and-trade program, then climate emissions will not fall in line with program limits and the state will overshoot its 2030 target.

The Report falls short of AB 398's instruction to "[e]valuate and address concerns related to overallocation" on two grounds.

First, the Report does not address the primary concern related to overallocation—namely, the risk that excess allowances will be banked and used such that emissions in 2030 exceed the state's legally binding emissions limit. Instead of evaluating whether overallocation could lead to 2030 GHG emissions exceeding the state's climate target, ARB calculated the cumulative balance of market supply and demand over a ten-year period. This method is insufficient to address the serious risks LAO and independent researchers have identified. As a result, the Post-2020 Caps Report does not provide a reasoned basis for responding to AB 398's instruction to "evaluate and address concerns related to [allowance] overallocation" in its rulemaking process.

Second, the Report incorrectly asserts that overallocation of up to 150 million pre-2021 allowances will not impact the state's ability to meet its 2030

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[32] ARB, 2017 Scoping Plan, *supra* note 2 at 26 (Table 2) (indicating that regulations are expected to reduce GHG emissions by 69 $MMtCO_2e$ in 2030 under the Scoping Plan Scenario); *id.* at 30 (indicating that the cap-and-trade needs to reduce another 60 $MMtCO_2e$ to achieve the SB 32 target for 2030). The share that cap-and-trade must contribute (60 $MMtCO_2e$) is 46.5% of the total reductions required relative to business-as-usual emissions in 2030 (60 + 69 = 129 $MMtCO_2e$).

climate target. The Report contains a fundamental analytical error that undermines its own conclusion. Once corrected for this factual error—using the same method the Board adopted in its original cap-and-trade rulemaking—the Report shows that the cap-and-trade program is expected to deliver significantly fewer emission reductions than what the Board called for in the 2017 Scoping Plan.

This error is not an esoteric technical detail. It is a question of basic emissions accounting. ARB properly addressed these issues when the Board set the original program caps in a 2010 rulemaking, observing that projections of "covered sector" emissions have to be adjusted downward to account for the fact that "covered emissions" subject to the cap-and-trade program are smaller than total "covered sector" emissions (see Appendix). Given the fundamental importance of cap-setting to the environmental and economic performance of California's cap-and-trade program, the lack of substantive analysis in the Report is striking—especially in comparison to the Board's prior efforts to analyze the same question in 2010.

We hope that ARB will acknowledge the shortcomings of its new Report, improve its analytical standards to maintain the scientific integrity for which the Board is known, and seriously engage the well-founded concern that overallocation risks undermining California's 2030 climate target.

Appendix: ARB's 2010 Cap-Setting Analysis

In a 2010 cap-and-trade rulemaking process, ARB developed the original cap trajectory through 2020. The Board's Initial Statement of Reasons (ISOR) explained that overallocation is a critical problem that could undermine the program's efficacy. Furthermore, staff showed how projections of broad sector-based emissions must be adjusted to account for the fact that covered emissions subject to the then-proposed cap-and-trade program would be lower than sector-wide totals. Moreover, in 2010 staff also identified the mandatory reporting regulation (MRR) data as an appropriate data source for calculating the difference between actual "covered emissions" and broad sector-based totals. We replicated the Board's exact methods from its 2010 rulemaking process to correct the Post-2020 Caps Report in this research note.

The following excerpt is from the ISOR Volume 1, Appendix E.[33] All text is original, except for text in [square brackets], which we added to clarify how terminology used in the 2010 ISOR relates to the terminology now in use today.

* * * *

2. Reliance on Mandatory Reporting Data to Ensure Accuracy in Cap Setting

Setting the cap to achieve an appropriate level of stringency is critical to the proper functioning of a cap-and-trade program. If the cap is set too tight, unacceptably high allowance prices will result. If the cap is set too loose, prices will be lower than expected and a weakened incentive to reduce emissions will be created. Accuracy in emissions estimates from covered entities is a key component of ensuring that the desired level of cap stringency is implemented. Throughout the regulatory process, staff heard concerns from environmental groups that the cap would be unintentionally set too lax—a condition sometimes referred to as "oversupply" or "overallocation."

[33] ARB, 2010 Cap-and-Trade Regulation, ISOR, Vol. 1, Appendix E: Setting the Program Emissions Cap, at E-7 through E-8, https://www.arb.ca.gov/regact/2010/capandtrade10/capv3appe.pdf.

The over-allocation condition occurs if too many allowances are supplied to covered entities relative to expected business-as-usual emission levels. This issue arose in the early years of the European Union's Emission Trading Scheme (EU ETS). During the trial phase of the program, which ran from 2005–2007, caps were set without a good source of GHG emission data for the facilities covered in the program.

The lack of accurate emissions data led to initial cap levels that, although intended to require a reduction of 4 percent at the outset of the program, in actuality created a surplus of approximately 4 percent. This oversupply—8 percent beyond intended levels—coupled with the fact that allowances could not be saved from the trial periods for use in the later phases, led to a price crash in August 2006, when the first year of verified emissions data were made publicly available.*

In 2007, ARB put in place a mandatory reporting program to provide accurate greenhouse gas emissions data for the sources that will be covered in the first compliance period of the cap-and-trade program [the MRR regulation]. The data gathered through this program [the MRR data] will help ensure that the over-allocation issue is not repeated in the California context.

3. Adjustment of the Cap-and-Trade 2020 Target from Scoping Plan Levels Using Mandatory Reporting Data

The Scoping Plan's rough estimate of the target for the 2020 allowance budget (Point E in Figure E-1) was 365 $MMTCO_2e$. Since the plan was adopted, staff have developed more specificity on what emission sources within the different sectors will be covered in the cap-and-trade program. Staff have also used the 2008 facility-level data gathered through the mandatory reporting program [MRR data] to improve emissions estimates for the covered entities. Using these improved estimates, staff calculated a new broad scope 2020 allowance budget of 334 $MMTCO_2e$. This number was developed by multiplying the Scoping Plan 365 $MMTCO_2e$ 2020 budget estimate [based on "covered sector" emissions] by the ratio of the improved estimate of 2008 broad scope emissions (403 $MMTCO_2e$, de-

* Pricing Carbon: The European Union Emissions Trading Scheme. A. D. Ellerman, F. J. Convery, C. Perthuis, E. Alberola, and B. Buchner. Cambridge University Press. Cambridge, U.K. 2010. [Citation in original ARB document.]

termined using information from mandatory reporting of GHGs at the facility level [the MRR data]) to the 2008 emissions inventory estimate for broad-scope sector categories (440 $MMTCO_2e$, calculated used the Scoping Plan accounting [covered sector emissions from the state GHG inventory]).

* * * *

About Near Zero

Near Zero is a non-profit environmental research organization based at the Carnegie Institution for Science on the Stanford University campus. Near Zero provides credible, impartial, and actionable assessment with the goal of cutting greenhouse gas emissions to near zero. This research note is for informational purposes only and does not constitute investment advice.

Data used in this research note are available at our website.

www.nearzero.org

March 16, 2018

Dear ARB Board Members and staff,

Thank you for the opportunity to comment on the materials provided for ARB's March 2018 workshop on the implementation of AB 398's cap-and-trade program reforms. Our comments today focus on two issues: ARB's overall market design proposal and staff's proposed interpretation of AB 398 offsets limits. We will keep our comments brief and refer staff to more extensive analysis contained in two attached Near Zero Research Notes.[1]

1. **Pursuant to AB 398, ARB still needs to evaluate market oversupply conditions and allowance banking regulations.**

   AB 398 requires ARB to "[e]valuate and address concerns related to overallocation"[2] in the cap-and-trade program and "[e]stablish allowance banking rules that discourage speculation, avoid financial windfalls, and consider the impact on complying entities and volatility in the market."[3] The Board's March 2018 workshop materials include some discussion of these requirements, but do not evaluate either issue. Staff has requested further stakeholder input on these topics.

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1 Danny Cullenward, Mason Inman, and Michael Mastrandrea (2018a), Implementing AB 398: ARB's initial post-2020 market design and "allowance pool" concepts. Near Zero Research Note (Mar. 16, 2018) (attached here as Attachment 1); Danny Cullenward, Mason Inman, and Michael Mastrandrea (2018b), Interpreting AB 398's offset limits. Near Zero Research Note (Mar. 15, 2018) (Attachment 2 here).

2 Cal. Health & Safety Code § 38562(c)(2)(C).

3 *Id.* at § 38562(c)(2)(H).

Troublingly, ARB staff have indicated that they view the current oversupply of allowances in the market as a sign of its success, not a result of relative program laxity.[4] Staff present no evidence to support this view.

Without mentioning any of the various independent studies and reports that have concluded the market is experiencing a significant oversupply condition—including analysis from the Legislative Analyst's Office,[5] the Environmental Commissioner of Ontario,[6] Energy Innovation,[7] Near Zero,[8] and the Carbon Market Compliance Association,[9] to name only a few—Board staff suggest that the "relationship between GHG reductions and carbon price requires a more thoughtful and in-depth evaluation – not simply [an analysis of] supply vs. demand."[10] If the Board believes that there are methodological deficiencies with these existing conclusions, it should make more specific criticisms and identify a better approach. We identify the elements of an oversupply calculation the Board should

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4 ARB, Amendments to the Cap-and-Trade Regulation Workshop (March 2, 2018), slides 22-24.

5 Legislative Analyst's Office (2017), Cap-and-Trade Extension: Issues for Legislative Oversight (Dec. 12, 2017), http://lao.ca.gov/Publications/Report/3719.

6 Environmental Commissioner of Ontario (2018), Ontario's Climate Act: From Plan to Progress, Appendix G: Technical Aspects of Oversupply in the WCI Market, https://eco.on.ca/reports/2017-from-plan-to-progress/.

7 Chris Busch (2017), Oversupply grows in the Western Climate Initiative carbon market: An adjustment for current oversupply is needed to ensure the program will achieve its 2030 target. Energy Innovation LLC Report.

8 Danny Cullenward, Mason Inman, and Michael Mastrandrea (2017), California's climate emissions are falling, but cap-and-trade is not the cause. Near Zero Research Note, http://www.nearzero.org/wp/reports/.

9 Comment letter from Andre Templeman (CMCA) to Richard Corey (ARB) (Sept. 15, 2016) (estimating oversupply at up to 300M allowances), available in ARB, Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanism: Final Statement of Reasons (Aug. 2017), 499-500, https://www.arb.ca.gov/regact/2016/capandtrade16/ctfinsor.pdf.

10 ARB workshop presentation, supra note 4, slide 23.

consider and would be glad to provide additional information to assist ARB staff.[11]

Although ARB staff officially dispute the view that today's oversupply condition puts the program's environmental performance at risk, we note that the Board's proposed allowance pool concept would transfer some of the excess allowances in the post-2020 program budgets to the new price containment points and/or the price ceiling.[12] The total number of allowances that would be transferred under ARB's proposal is 75.1 million allowances. While removing this quantity of allowances from the auction supply curve could help address market oversupply conditions, the total transfers represent only 28% of Chris Busch's central estimate of market oversupply in 2020 (270 ±70 million allowances).[13] They are therefore insufficient to address the extent of market oversupply documented by credible, independent studies.

We are preparing our own estimate of the number of compliance instruments banked at the end of 2017, beyond entities' expected compliance obligations. We believe our analysis will show strong evidence that substantial banking has already occurred. As soon as this analysis is complete, we will send it to ARB and also release it publicly. Because ARB has made several public statements arguing that market participants are not banking significant amounts of allowances beyond their need for emissions already incurred,[14] we strongly encourage ARB to perform its own analysis and publish the results, methods, and underlying data.

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11 Cullenward et al. (2018a), supra note 1 at Appendix 2 (see Attachment 1 to this letter).

12 ARB, Preliminary Concepts: Price Containment Points, Price Ceiling, and Allowance Pools (Feb. 2018).

13 Busch (2017), supra note 7.

14 See, e.g., ARB, Responses to Questions, for Joint Oversight Hearing of the Senate Environmental Quality Committee and Senate Budget and Fiscal Review Subcommittee No. 2 on Resources, Environmental Protection, Energy and Transportation (Jan. 17, 2018). http://senv.senate.ca.gov/sites/senv.senate.ca.gov/files/arb_responses.pdf.

2. **Rather than dispute the cause of market oversupply, ARB should consider how to develop a post-2020 market design that manages a transition from today's low prices to the higher prices that are likely needed to achieve California's 2030 target.**

   Today's market prices are low because the supply of compliance instruments significantly exceeds near-term demand. Eventually, oversupply conditions will diminish and, absent a recession or major technological breakthroughs, carbon prices will likely rise—potentially to significantly higher levels. However, ARB staff have proposed a market design that does not include mechanisms to actively manage a gradual transition. By relying on market oversupply conditions to keep near-term prices low, the Board's proposal defers serious action, risks rendering the program ineffective at reducing emissions in the short term, and creates a political liability for the next administration to manage.

   We urge the Board to consider an alternative approach wherein oversupply conditions are carefully managed via program cap adjustments, banking rules that discount the value of banked allowances, and/or other creative approaches developed collaboratively with stakeholders. Instead of relying on oversupply to manage prices—a strategy that will eventually stop working as caps decline in the years to come—the Board might consider setting price containment points at lower levels and implementing a graduated price ceiling that starts at a lower initial price and increases more rapidly over time. We note that these alternative cost containment strategies are warranted only if ARB simultaneously resolves market oversupply conditions; if combined with no action on oversupply, they would only weaken the status quo market design.

3. **ARB needs to indicate how its proposed post-2020 offset limits are consistent with the legislative intent in AB 398.**

   ARB has proposed interpreting AB 398's post-2020 offset limits in a way that substantially increases the number of allowable offset credits

in the years 2024 and 2025. Rather than apply the AB 398 offset limits on a calendar year basis—in which case 2024 and 2025 emissions would be subject to the lower 4% limit—ARB has proposed applying the higher 2026 calendar year limits (6%) to the bulk of compliance obligations associated with emissions in calendar years in 2024 and 2025.[15]

We calculate that this interpretation would increase the number of permissible offset credits by approximately 8.5 million, relative to a scenario in which the AB 398 limits applied on a literal calendar year basis and assuming covered entities' emissions are equal to program year allowance budgets plus maximum allowable offsets in each scenario.[16]

ARB has not justified its interpretation as being consistent with the statutory text in AB 398, which appears to apply to calendar year limits. ARB should explain how its proposed interpretation is consistent with the legislative intent behind AB 398.

4. ARB should exclude consideration of greenhouse gas emissions from its proposed bottom-up determination of an offset project's "direct environmental benefits."

In addition to setting overall limits on offsets usage, AB 398 also requires that no more than half of total post-2020 offsets limits come from projects that do not provide a "direct environmental benefit" ("DEB") to California air or water quality.[17] ARB has proposed a bifurcated approach to determining a DEB wherein certain bright-line conditions would automatically qualify an offset project as providing a

[15] ARB workshop presentation, supra note 4, slide 25.

[16] Cullenward et al. (2018b), supra note 1 (see Attachment 2 to this letter).

[17] Cal. Health & Safety Code § 38562(c)(2)(E).

DEB while allowing all other projects the opportunity to make an individualized case as to whether or not they provide a DEB.[18]

We agree that a bifurcated approach to determining a DEB could, if executed carefully and consistently, fairly balance the need for program flexibility with AB 398's statutory requirements. However, if the Board elects this approach, it is critically important that ARB identify arguments that cannot be used to demonstrate a DEB.

Specifically, ARB should clarify that offset projects may not argue that their gross avoided or reduced GHGs generate a DEB. Offset projects produce no net GHG reductions because for every avoided or reduced GHG emissions, ARB awards an equal number of offset credits that will eventually be used by covered entities to increase their own GHG emissions by the same amount the offset project reduces or avoids. Thus, there is no basis whatsoever for an offsets project to claim a DEB on the basis of its gross GHG reductions.[19] Accordingly, ARB should explicitly foreclose this argument in whatever process the Board ultimately adopts for determining whether or not an offsets project provides a direct environmental benefit to state air or water quality.

5. ARB needs to show how its proposed market design is consistent with the role the Board identified for cap-and-trade in the final 2017 Scoping Plan.

Finally, we reiterate the need for ARB to show how the market design it selects in the AB 398 implementation process is consistent with the large role the Board identified for the cap-and-trade program in its final 2017 Scoping Plan. The cap-and-trade program was identified as the single largest contributor to California's climate goals, representing 38% of the required cumulative emission reductions over

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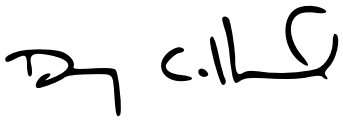
[18] ARB, Preliminary Discussion Draft of Potential Changes to the Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms (Feb. 2018), at 17-19.

[19] Cullenward et al. (2018b), supra note 1 (see Attachment 2 to this letter).

the period 2021-2030[20] and almost 47% of the annual reductions projected for the year 2030.[21] Whatever choices ARB makes in implementing its discretionary authority under AB 398 should be consistent with the role ARB identified for the cap-and-trade program.[22]

We appreciate that the design choices facing ARB require difficult policy judgments and complicated technical analysis. Nevertheless, we urge ARB to be transparent in its process and to address the fundamental challenges present in the current market. If we can provide analytical support to the ARB in the future, please feel free to contact us.

Sincerely,



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Disclaimer: Dr. Cullenward is a member of the California Independent Emissions Market Advisory Committee; however, this letter does not represent the official views of the IEMAC.

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[20] ARB, 28.

[21] *Id*. at 26.

[22] We expressed this view in the Scoping Plan process. *See* Comment letter from Michael Mastrandrea and Mason Inman (Near Zero) to Rajinder Sahota (ARB) (Oct. 27, 2017), http://www.nearzero.org/wp/2017/10/27/cap-and-trade-2030/.

Attachment 1:

Danny Cullenward, Mason Inman, and Michael Mastrandrea (2018a), Implementing AB 398: ARB's initial post-2020 market design and "allowance pool" concepts. Near Zero Research Note (Mar. 16, 2018).

Attachment 2:

Danny Cullenward, Mason Inman, and Michael Mastrandrea (2018b), Interpreting AB 398's offset limits. Near Zero Research Note (Mar. 15, 2018).

RESEARCH NOTE

Implementing AB 398: ARB's initial post-2020 market design and "allowance pool" concepts

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Mar. 16, 2018

AB 398 requires the California Air Resources Board (ARB) to make several important reforms to the cap-and-trade program's post-2020 market design. For example, the statute requires ARB to implement a hard price ceiling at which unlimited compliance instruments will be offered for sale at a fixed price; establish two new price containment points at which limited quantities of allowances will be made available at a fixed price; and impose new limits on carbon offsets, to name only a few changes.

Earlier this month, ARB released its initial thinking on how to implement the post-2020 market design reforms required by AB 398 (ARB 2018a, 2018b, 2018c). As a threshold matter, it is important to observe that ARB has not yet addressed two key issues on which AB 398 requires further evaluation—potential changes to banking rules and adjustments for over-allocation (also known as oversupply). Both of these statutory provisions require ARB to consider the extent to which the current cap-and-trade program has too many allowances relative to near-term demand. So far, ARB has characterized lax market conditions as a success, not a liability.

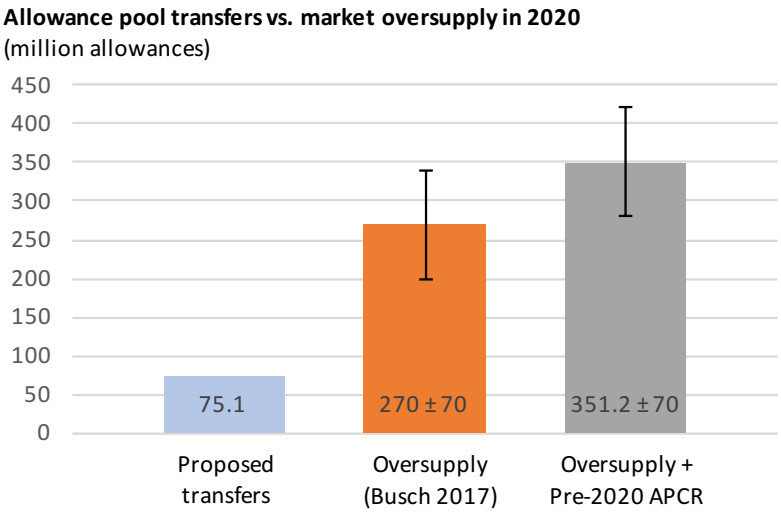
On the whole, ARB's proposal (summarized in Appendix 1) features high long-term price ambitions, but no serious efforts to balance long-term mitigation needs against near-term oversupply conditions.

Key features of ARB's proposal include:

- **High long-term price ambitions.** ARB has proposed setting two new price containment points no lower than $70 per allowance in 2021 (2015 USD), and has suggested the new market price ceiling will, in 2030, be no lower than $81.90 and no higher than $147 per allowance (2015 USD). Pursuant to AB 398, ARB must offer unlimited additional compliance instruments for sale at the price ceiling. The ambition of the price containment point and price ceiling would allow allowance prices to rise substantially from recent levels, which remain near the

price floor (just under $15 per allowance). Price increases significantly above the floor are likely necessary to achieve California's ambitious 2030 climate target.

- **No serious action on oversupply.** Board staff continue to argue that the oversupply of allowances currently present in the program is a sign of the program's success, rather than a reflection of the program's lack of stringency (ARB 2018a: 22-24). ARB has offered no evidence to support this view. Staff also suggest that oversupply has no potentially deleterious effects, despite the findings of multiple independent studies that have identified serious environmental risks (e.g., Busch 2017, Cullenward et al. 2017, LAO 2017, Environmental Commissioner of Ontario 2018). However, the staff presentation indicates ARB has received stakeholder feedback calling for reductions in the number of allowances under the program caps and/or rules to adjust the value of banked allowances over time (ARB 2018a: 22).



Despite disputing the risks of current market oversupply conditions, ARB's proposed "allowance pool" transfers (ARB 2018c) would take modest action to address oversupply risks. ARB has proposed transferring up to 75.1M allowances from the post-2020 annual allowance budgets into two new price containment points. While these transfers are not equivalent to removing excess allowances from the market and therefore do not fully resolve concerns related to market oversupply, ARB's proposed transfers would make these allowances more expensive to purchase and therefore would tend to incentivize greater GHG reductions relative to the status quo. However, the magnitude of any

potential benefits will depend on where ARB ultimately sets the price level of the two price containment points.

On the other hand, the scale of the proposed transfer (up to 75.1M allowances) represents only a small share of market oversupply projected through 2020 (270M ±70M allowances) (Busch 2017). These calculations do not include the excess 81.2M pre-2021 APCR allowances AB 398 requires ARB to place in two post-2020 price containment points. If market prices reach these levels, allowances in the price containment points will contribute to projected oversupply conditions (raising the total to 351.2M ±70M allowances).

- **No mechanism for managing a transition from low to high prices.** The likely consequence of extending the market design without adjusting for oversupply is that market prices are likely to stay low for several years, during which time the supply of allowances will exceed near-term demand and prices will likely incentivize relatively few GHG reductions from the cap-and-trade program. Eventually, declining program caps will become binding and likely lead to a transition to higher carbon prices. This presents two related problems. First, low prices in the near term may lead to regulated entities' underinvestment in GHG mitigation in advance of a market transition from low to high prices. Second, carbon prices may rise significantly and quickly once emitters consume the extra allowances in the market (i.e., as market oversupply conditions fade).

- **Tension between near-term price impacts and encouraging action to reduce climate pollution.** ARB's initial thinking on the trade-offs between program stringency and laxity indicate that the Board is particularly concerned about limiting near-term price impacts (ARB 2018a: 23). We believe there are technical reforms that could enable dynamic adjustments to program allowance budgets and/or banking rules that respond in real time to relative program laxity based on empirical metrics. Some of these interventions could improve market stringency while deferring price impacts to a later point in time. However, there is no avoiding the fundamental trade-off between price impacts and GHG emission reductions. No market design can guarantee large emission reductions at low prices. Deferring adjustments to program stringency would delay and likely reduce total GHG reductions from the cap-and-trade program.

- **No analysis of how the proposed market design will achieve the role identified for cap-and-trade in the 2017 Scoping Plan.** Finally, we note that the preliminary discussion draft of ARB's proposed regulations does not include any analysis that substantiates the role ARB identified for cap-and-trade in its 2017 Scoping Plan. We understand that ARB may be planning to release more information in the future. In particular, it will be important for ARB to illustrate how any trade-offs it proposes with respect to cap-and-trade program stringency are likely to deliver on the reductions needed to close the gap between California's regulatory programs and the Scoping Plan scenario.

There are no easy answers to the challenges identified above. Fundamentally, however, we believe ARB will need to manage a transition from today's low prices to significantly higher prices in the years to come. Rather than dispute the cause of today's low prices and avoid discussion of the need to increase program stringency to defer price increases, ARB may wish to consider how proactive market reforms could enable an earlier and more gradual carbon price trajectory that contributes to the state's ambitious climate targets. With the goal of informing a constructive discussion, we offer two conceptual thoughts:

- **Price containment point prices interact with market oversupply concerns.** ARB's proposal to set the two post-2020 price containment points at relatively high price levels (starting in 2021 at no lower than $70 in 2015 USD) has important advantages and disadvantages.

  On the one hand, this approach would largely avoid exacerbating market oversupply conditions by making a sizeable supply of excess allowances (at least 81.2M) available only at high prices (no less than $70 per allowance)—almost five times higher than today's costs (about $15 per allowance). So long as the market price remains below the price containment points, these excess allowances won't contribute to market oversupply. If market prices reach these levels, however, the allowances sold from the price containment points would enable higher GHG emissions and contribute to market oversupply. For the same reasons, if ARB were to set the price containment points at low price levels, the excess allowances in these accounts would likely enter circulation and exacerbate the market's oversupply problem.

  ARB's proposal also has an important downside. Although high price containment points avoid worsening market oversupply—so long as

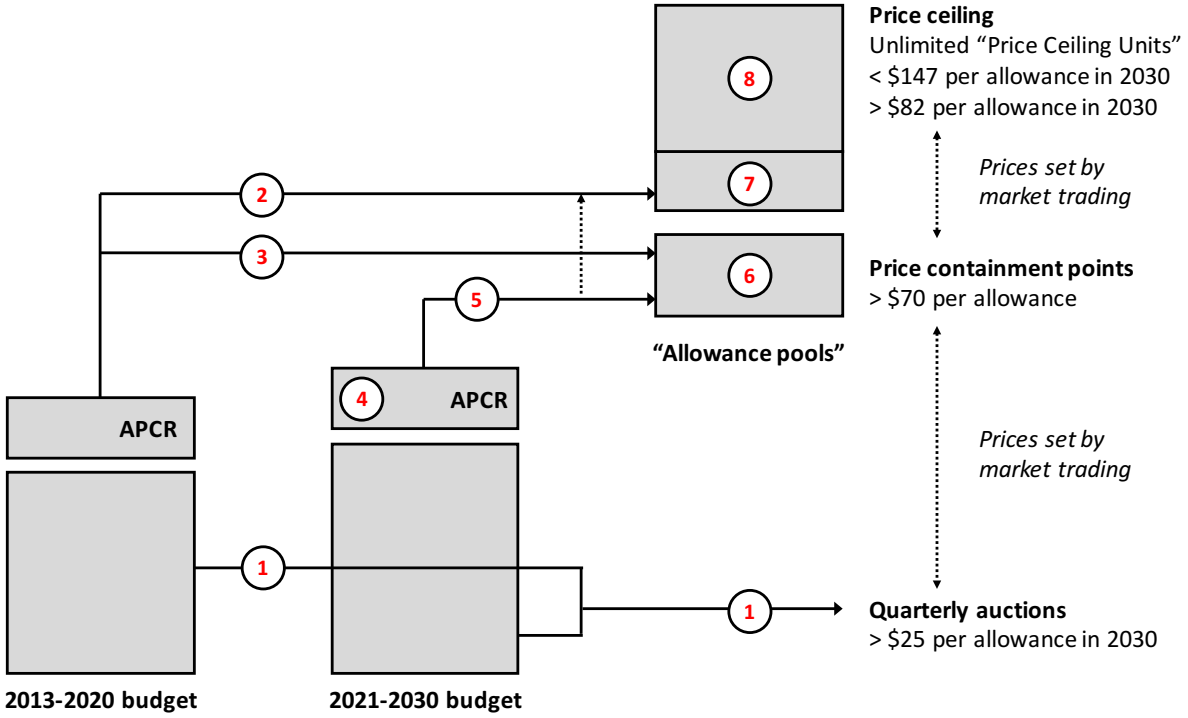
prices stay below the containment points—the Board's proposal does not mitigate potential carbon price volatility in between current prices ($15) and the proposed price containment points (starting in 2021 at no lower than $70 in 2015 USD). Thus, ARB's proposed market design creates the potential for a disruptive market transition in the early 2020s (as oversupply conditions fade) without any guarantee of significant GHG emission reductions prior to that time (due to low prices from the near-term oversupply conditions).

- **An alternative paradigm for managing the transition to higher carbon prices?** To date, the cap-and-trade program has experienced low prices as a result of oversupply conditions, which themselves are attributable to the economic recession, the success of California's other clean energy policies, and reductions in the cost of low-carbon technologies (Cullenward et al., 2017). In this paradigm, carbon prices remain low so long as the supply of allowances exceeds near-term demand, but there are no mechanisms in the current market design to ensure an orderly transition from low to high prices once oversupply conditions are gone. The fundamental challenge is twofold. First, today's low prices bear little relationship to the costs ARB projects for the kinds of efforts needed to achieve California's ambitious 2030 climate target (ARB 2017a: 46). Second, tomorrow's carbon prices could rise too quickly as oversupply conditions fade in the early 2020s.

  To escape the constraints the current paradigm imposes, ARB may wish to consider a different approach to managing program costs. Rather than rely on allowance oversupply to keep costs low, ARB could evaluate other approaches. One option would be to re-orient its market design to carefully reduce allowance oversupply while containing price trajectories via lower price containment points and a graduated price ceiling level that starts at a lower initial price and increases more rapidly over time. This would require (1) a thoughtful study to evaluate market oversupply conditions and carefully address them via adjusting allowance budgets and/or banking rules (see Appendix 2), as well as (2) the establishment of price ceiling and/or price containment points at lower prices to contain costs within the Board's discretionary authority under AB 398. Collectively, these reforms would better enable the Board to balance the trade-offs between program stringency and costs, relying on explicit controls to manage costs and increasing the transparency of the program's implementation.

Appendix 1: ARB's proposed post-2020 market design

ARB has proposed modifying the market design by shifting several quantities of allowances from the pre- and post-2020 allowance budgets into several so-called "allowance pools" (ARB 2018c). The summary figure below indicates how various quantities of allowances would be transferred from annual allowance budgets into standard quarterly auctions, two new price containment points, and a new set of accounts at the post-2020 market price ceiling:



1. Allowance banking and auctions
2. 1/3 of pre-2020 APCR sent to price ceiling
3. 2/3 of pre-2020 APCR allowances sent to price containment points
4. Post-2020 budget carve-outs
5. Post-2020 budget carve-outs sent to two price containment points and/or ceiling
6. Two price containment points
7. Price ceiling account
8. Unlimited, non-tradable "Price Ceiling Units"

Notes: All prices are given in units of 2015 USD, consistent with ARB's new documents and the 2017 Scoping Plan. Figure not drawn to scale.

1. Allowance banking and auctions

Under current and proposed market regulations, regulated entities and third-party buyers can bank allowances for use in any future program years, subject only to corporate association-level holding limits (in 2018, up to 15.7M of current and each future year allowance vintage) (ARB 2017b). Allowances from the pre-2020 program budgets that are purchased at auction or freely allocated can be banked for post-2020 compliance purposes. Similarly, allowances from the post-2020 budgets that are purchased at auction or freely allocated can be banked for post-2020 compliance purposes. ARB has not proposed modifying the auction price floor, citing concerns about harmonizing WCI market design in Ontario and Québec; at the current schedule, the auction price floor would be $25.16 per allowance in 2030 (2015 USD).

2. 1/3 of pre-2020 APCR sent to price ceiling

AB 398 requires ARB to create a new price ceiling at which unlimited new compliance instruments will be made available for purchase (see item #8, below). AB 398 also requires ARB to transfer 1/3 of the allowances in the pre-2020 Allowance Price Containment Reserve (APCR) at the end of 2017 into a separate price ceiling account (see item #7, below) that would be offered for sale before ARB issues unlimited new Price Ceiling Units (see item #8, below; these former APCR allowances come from the original program allowance budgets). At the end of 2017, there were 121.8M allowances in the APCR; thus, 1/3 of these allowances (40.6M) will be transferred into the post-2020 price ceiling account.

3. 2/3 of pre-2020 APCR sent to two price containment points

AB 398 requires ARB to send the remaining 2/3 of the allowances in the APCR at the end of 2020 to two new "price containment points" (see item #6, below). At the end of 2017, there were 121.8M allowances in the APCR; thus, 2/3 of these allowances (81.2M) will be transferred into the two price containment points (40.6M each).

4. Post-2020 budget carve-outs

ARB finalized post-2020 market regulations in 2017, after the passage of AB 398 but before making an effort to comply with the statute's requirements. These regulations were approved by the Office of Administrative Law and therefore constitute current law. These regulations retained the

structure of the pre-2020 APCR but did not include a price ceiling, which is inconsistent with AB 398 and therefore requires reform. Accordingly, ARB is taking current regulations as the starting point for reforms and proposing changes relative to this baseline. In the 2017 regulations, ARB set aside 52.4M allowances for the APCR (see § 95871, Table 8-2).

ARB has now proposed increasing the size of the post-2020 APCR set-aside, reflecting the logic the Board employed in the pre-2020 market design period. In 2010, ARB had considered reserving 4% of the 2013-2020 allowance budgets for the APCR, mirroring the then-proposed 4% limit on offsets use. When ARB ultimately adopted an offsets limit of 8%, the Board also increased the APCR set-aside to 8%. Consistent with that approach, ARB now proposes to increase the post-2020 APCR set-aside by 2% of the allowance budgets for the period 2026-2030, reflecting the 6% offsets limit that applies in this period (6% being 2% higher than 4%). This would result in an addition 22.7M post-2020 allowances being transferred to the new price containment points (distributed equally from all post-2020 annual budgets, rather than from 2026-2030 budgets only).

Thus, ARB has proposed increasing the total post-2020 budget carve-out from 52.4M allowances (as specified in current regulations) by an additional 22.7M allowances, for a total of 75.1M allowances.

5. Post-2020 budget carve-outs to two price containment points and/or price ceiling

ARB is considering sending all of the allowances set aside for the APCR from the post-2020 allowance budgets (including proposed additions, see items #3 and #4, above) to one or both of the two new price containment points (see item #6, below) and/or the price ceiling account (see item #7, below). Including proposed additions to the post-2020 APCR above what is currently in ARB's official market regulations, the total number of allowances in question is 75.1M (see item #4, above).

6. Two price containment points

AB 398 delegates broad authority to ARB to design two new price containment points, which are essentially pools of allowances made available for purchase at specified prices.

ARB has proposed that the lower of these two price containment points be no lower than $70 in 2021 (2015 USD). Under ARB's proposal, allowances

in the two price containment points would be made available for sale at an annual offering, as well as on a quarterly basis if the previous quarter's auction clears at or above 60% of the lower of the two price containment point reserve prices.

7. Price ceiling account

AB 398 delegates broad authority to ARB to design a new market price ceiling. Pursuant to statute, ARB must offer unlimited compliance instruments for sale at the price ceiling. The Board has proposed setting the 2030 price ceiling price no lower than $81.90 per allowance and no higher than $147 per allowance (both units in 2015 USD).

ARB can also offer other compliance instruments for sale at the price ceiling level. For example, AB 398 requires that 1/3 of the allowances in the APCR at the end of 2017 be transferred to the price ceiling account (40.6M, see item #2 above). In addition, under current regulations, allowances that remain unsold at auction after 24 months are automatically transferred to the APCR. AB 398 requires that ARB to transfer any allowances remaining in the APCR at the end of 2020 into the price ceiling.

Because current market regulations restrict the rate at which previously unsold allowances can be re-introduced, at least some of the previously unsold allowances will remain unsold for 24 months, be transferred into the APCR, and eventually removed to the post-2020 price ceiling account. Even if all allowances re-introduced at auction sell, approximately 40M will ultimately be transferred to the post-2020 price ceiling (Busch 2017).

8. Unlimited, non-tradable "Price Ceiling Units"

ARB has proposed distinguishing the unlimited compliance instruments it must offer at the price ceiling from "normal" allowances that are part of the program's overall allowance budget. ARB proposes calling the new unlimited instruments "Price Ceiling Units" and making them subject to different rules. The Price Ceiling Units would be made available for purchase at an annual event that is separate from the quarterly auctions. The new Price Ceiling Units would not be tradable, but would instead be available for purchase in a manner that allows regulated entities to close any gaps in their annual compliance obligations in a timely manner.

AB 398 requires the Board to spend all revenue raised from sales of additional compliance instruments at the price ceiling on additional reductions

of greenhouse gases—an environmental integrity provision (see Cullenward et al. 2018). Under ARB's proposal, only these Price Ceiling Units would be subject to AB 398's environmental integrity provision. All other, "normal" allowances offered for sale at the price ceiling (see item #7, above) would not be subject to this requirement.

Appendix 2: Overallocation / oversupply study needs

AB 398 requires ARB to evaluate and address as appropriate "concerns related to [allowance] overallocation" (Cal. Health & Safety Code § 38562(c)(2)(D)). In order to properly evaluate market overallocation / oversupply, a study would need to consider several important factors:

- The gap between pre-2020 allowance budgets and pre-2020 GHG emissions, both in terms of observed (through 2016) and projected (2017-2020) emissions;

- The role carbon pricing may have played in the difference between allowance budgets and actual emissions, including anticipatory mitigation undertaken by covered entities;

- An estimate of the extent to which extra allowances in the pre-2020 allowance budgets are being banked in private and government accounts, and a mechanism for tracking banking behavior on an ongoing basis;

- The supply of carbon offset credits through 2020 and their impact on the size of allowance banking;

- The balance of compliance instrument supply and demand across linked programs in California, Québec, and Ontario;

- The extent to which the delayed re-introduction of previously unsold allowances from undersubscribed auctions will result in the de facto retirement of some of these allowances; and,

- The carry-forward of pre-2020 APCR allowances into post-2020 price containment points.

We believe the existing literature provides a helpful start to answering many of these issues and are confident that further study could produce a thoroughly vetted analysis with broad stakeholder input to inform ARB's planning. We urge ARB to take seriously the need to design a cap-and-trade program that addresses the program's current challenges and to conduct a public estimate of market oversupply conditions to inform the Board's options.

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About Near Zero

Near Zero is a non-profit environmental research organization based at the Carnegie Institution for Science on the Stanford University campus. Near Zero provides credible, impartial, and actionable assessment with the goal of cutting greenhouse gas emissions to near zero. This research note is for informational purposes only and does not constitute investment advice.

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RESEARCH NOTE

Interpreting AB 398's carbon offsets limits

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AB 398 requires the California Air Resources Board (ARB) to incorporate new limits on the use of carbon offsets in its post-2020 cap-and-trade market design. ARB has released its initial thinking on how to implement these new statutory provisions. We review two key issues here.

First, AB 398 requires ARB to limit the use of offsets to 4% and 6% of an entity's emissions in the periods 2021-25 and 2026-30, respectively. ARB has proposed a novel interpretation of how to calculate the timing of applicable restrictions such that the higher limit would apply to most emissions that take place in calendar years 2024 and 2025, in addition to those that occur in 2026 through 2030. The proposed interpretation would increase the maximum quantity of offset credits that can be used by a total of approximately 8.5 million instruments, relative to a scenario in which AB 398's limits are applied to calendar-year emissions.

Second, AB 398 further limits the total number of offset credits that covered entities can use from projects that do not generate a "direct environmental benefit" (or "DEB") to air or water quality in California. We explore under what conditions an offset project produces a DEB. ARB has proposed a project-by-project evaluation but has not yet offered any bright-line rules to limit acceptable arguments for establishing a DEB. While a project-by-project approach could make sense, we argue that ARB's DEB assessment should exclude greenhouse gas (GHG) emissions from consideration because carbon offsets create no net reduction in GHGs and therefore no net climate benefits that could be said to constitute a DEB to California air or water quality.

Background: AB 398 sets new offset limits

Under California's original climate law, AB 32, the legislature gave ARB broad discretion to determine whether and to what extent covered entities may use carbon offsets to satisfy their compliance obligation under the state's cap-and-trade program. For the period 2013 through the end

of 2020, ARB eventually selected a limit that enables covered entities to submit ARB-approved carbon offset credits for up to 8% of their covered emissions.[1]

Although 8% might seem small, the original offsets limit is actually quite large compared to the emission reductions expected from the current phase of the cap-and-trade program. Dr. Barbara Haya at UC Berkeley calculated that this limit—which enables covered entities to use more than 200 million offset credits through 2020—could, if fully exploited, generate 100% of net reductions expected under the cap-and-trade program through 2020 (Haya 2013). In the market's first compliance period (2013-14), however, covered entities submitted allowances equal to 4.4% of their covered emissions in the market's first compliance period—just over half of the limit.[2] That share rose to 7.9% and 8.3% of compliance obligations submitted in 2015 and 2016, respectively, although it is not possible to say whether offsets usage is changing relative to the first compliance period because only 30% of the total compliance obligations for 2015 and 2016 have come due.[2] Data on the share for the full second compliance period (2015-17) is not yet available, as the compliance obligation will come due later this year.[3]

In contrast to the broad discretion ARB enjoys with respect to carbon offsets under AB 32, AB 398 imposes new offset limits that apply to the state's post-2020 market design:

> (I) From January 1, 2021, to December 31, 2025, inclusive, a total of 4 percent of a covered entity's compliance obligation may be met by surrendering offset credits of which no more than one-half may be sourced from projects that do not provide direct environmental benefits in state.
>
> (II) From January 1, 2026, to December 31, 2030, inclusive, a total of 6 percent of a covered entity's compliance obligation may be met by surrendering offset credits of which no more than one-half may be sourced from projects that do not provide direct environmental benefits in the state.[4]

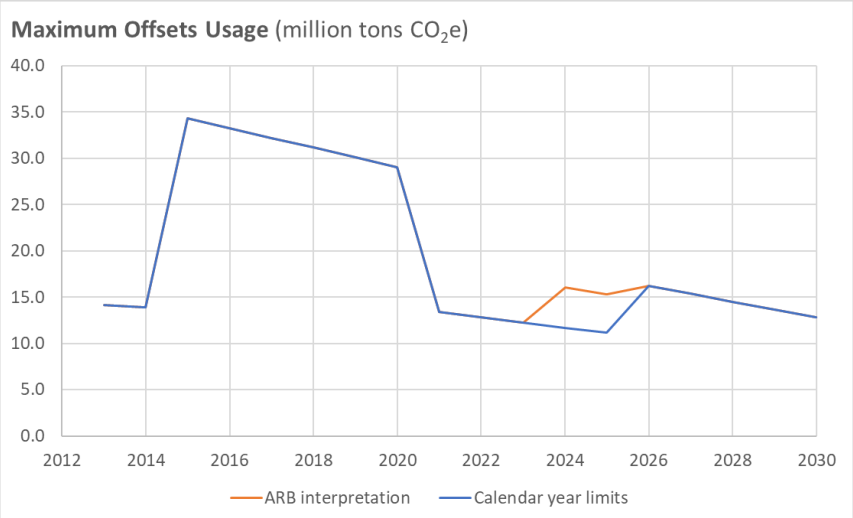
The Board's attention has turned to developing regulations that implement AB 398's requirements, including the new offset limits.

A permissive interpretation of AB 398's total offset limits

ARB has proposed an initial interpretation of AB 398's new offset limits that increases the total number of carbon offsets that can be surrendered by covered entities to account for their emissions in 2024 and 2025, compared to an interpretation in which the AB 398 offset limits are directly applied to calendar-year emissions (ARB 2018a: slide 25).

The proposal is based on the way ARB requires covered entities to submit compliance instruments within three-year compliance periods. For each of the first two years of a compliance period, ARB requires covered entities to submit compliance instruments to account for at least 30% of their annual emissions obligation.[3] In the third and final year, however, covered entities must submit compliance instruments to cover any remaining emissions from those previous years (up to 70% of each year's total) as well as all of the emissions in the final year of the compliance period.[3] Thus, the compliance obligation that comes due for the third year of a compliance period can represent a substantial majority of a covered entity's emissions over the entire three-year compliance period.

This distinction matters because the market's fifth compliance period spans 2024-26, during which time the carbon offsets limits under AB 398 increase from 4% to 6%. Under ARB's proposal the higher limit would apply to all emissions in 2026, as well as up to 70% of emissions in both 2024 and 2025 that covered entities could elect to submit to cover their 2026 compliance obligations.



SOURCE: NEAR ZERO CALCULATIONS, BASED ON ARB (2018a)

In the figure above, the dark blue line ("Calendar year limits") represents the annual offsets limits that would apply if ARB interpreted the AB 398 limits literally, based on the calendar year of emissions. The orange line ("ARB interpretation") shows the limits that ARB staff proposed in its March 2018 preliminary discussion draft regulations. For simplicity, both scenarios assume that covered emissions will be equal to annual program budgets for each year plus the maximum number of permissible offsets. Other outcomes would be possible if covered entities bank allowances from year to year. If covered entities' GHG emissions are higher than program budgets in 2024 and 2025 due to banking of previously unused allowances, then maximum offsets usage would be higher; if covered entities' GHG emissions are lower than program budgets for 2024 and 2025, then maximum offsets usage would be lower.

	2023	2024	2025	2026	2027
Calendar Year Limits	4%	4%	4%	6%	6%
ARB Interpretation	4%	5.4%	5.4%	6%	6%

SOURCE: NEAR ZERO CALCULATIONS, BASED ON ARB (2018a)

Expressed numerically, the effect of ARB's proposed interpretation is to increase the effective carbon offsets limit for emissions that occur in 2024 and 2025 from 4% to 5.4%. In total, ARB's interpretation would allow covered entities to submit approximately 8.5 million more offset credits relative to an interpretation that applies the limits in AB 398 to the emissions by calendar year.

What constitutes a "direct environmental benefit"?

AB 398 not only sets a limit on the total number of carbon offset credits that can be surrendered by covered entities in the post-2020 market period, but also on the types of offsets that qualify. Beginning in 2021, additional restrictions apply to projects that do not provide "direct environmental benefits" (or "DEB") in California. No more than half the total number of allowable offsets may come from such projects. AB 398 defines a DEB as:

> [T]he reduction or avoidance of emissions of any air pollutant in the state or the reduction or avoidance of any pollutant that could have an adverse impact on waters of the state.[4]

In its preliminary discussion draft regulations, ARB has proposed a bifurcated approach to interpreting this statutory requirement.

First, ARB has proposed a set of bright-line rules that, if met, would automatically deem an offset project as producing a DEB. For example, a project located in California that reduces air pollution would qualify; so too would any project that reduces water pollution and is located either in California or adjacent to a body of water that flows into California (ARB 2018: 17-19). If any of these bright-line rules are met, ARB would automatically deem the project to provide a DEB.

Second, if ARB does not deem a project to provide a DEB based on these bright-line rules, ARB staff have proposed a process whereby projects may make individualized applications to ARB to demonstrate their case. ARB has invited comment on what factors, data, and analysis should be considered in this process.

ARB's bifurcated approach offers important advantages, in that it both outlines bright-line rules for inclusion and contemplates a bottom-up process to provide opportunities for projects to justify direct environmental benefits to California air or water quality. However, ARB has not provided any bright-line rules that would foreclose unacceptable arguments for establishing a DEB—that is, ARB has not proposed any limits on arguments that would qualify a project as providing a DEB. As a result, there are several important open questions that will need careful consideration to implement the legislative intent of AB 398 while also ensuring that ARB's regulatory implementation respects constitutional standards that apply to state regulation of interstate commerce.

The most challenging issue concerns the role of GHG emissions. ARB's preliminary discussion draft regulations suggest that ARB believes "a GHG reduction anywhere is a benefit everywhere" (ARB 2018b: 17)—a position the state and its allies successfully took in a landmark dormant commerce challenge to California's Low Carbon Fuel Standard.[4] Furthermore, in response to questions at its March 2018 workshop, ARB staff indicated that they believe GHGs are included in the operative phrase "any air pollutant" used in AB 398's DEB definition, suggesting

that the Board may be open to offset projects demonstrating a DEB by demonstrating a reduction in GHG emissions.

However, recognizing reduced or avoided project-level GHG emissions as the basis for a DEB would raise significant concerns because offset projects by definition produce zero *net* GHG reductions. In return for gross reductions or avoided emissions of GHGs as measured at the offset project, ARB awards an equal number of offset credits to the project developer. Project developers sell these credits to covered entities, which use them to emit additional GHGs equal in quantity to the offset project's reduced or avoided GHG emissions. Thus, there is no net reduction in GHGs attributable to any offset project.

Even though there is a marginal but incontrovertible climate benefit everywhere when GHGs are reduced anywhere, that benefit accrues only when there is a *net* reduction in GHGs. By definition, an offset project produces no net GHG reductions because the gross reduction measured at the project level is counteracted by an increase in GHG emissions by covered entities that acquire the project's offset credits.

A more complicated example: ozone depleting substances

Although no offset project can claim net GHG reductions when its credits are used by covered entities to emit more GHGs, the Ozone-Depleting Substances (ODS) Protocol raises several additional complications.

The ODS Protocol credits the destruction of ODS that would have eventually leaked out of devices such as older air conditioning and refrigeration units. ODS projects take ODS-containing equipment—including some equipment collected in California—and ship this equipment to an out-of-state facility for controlled gas destruction. Does the out-of-state destruction of ODS-containing equipment that was previously located in California constitute a "direct environmental benefit" to California?

To evaluate this question, we consider an ODS offset project that avoids 1 metric ton of carbon dioxide equivalent (tCO_2e) from ODS-containing equipment that was originally located in California but was subsequently shipped to an out-of-state facility for destruction. As a result of the offset project, in-state ODS emissions are reduced by 1 tCO_2e. At the same time, however, an in-state entity will be able to use the resulting offset credit to increase its CO_2 emissions by 1 tCO_2e. Thus, as with other off-

set projects, there is a gross GHG reduction at the project level, but no net change in GHGs on a global level.

The ODS example illustrates additional challenges in interpreting what constitutes a direct environmental benefit under AB 398 because ODS gases are both GHGs and gases that contribute to the destruction of the ozone layer. Although there is no net climate benefit to ODS destruction projects that earn offset credits, the avoidance of ODS emissions that would have occurred in California could be interpreted as an "avoidance of emissions of any air pollutant in the state." Furthermore, ODS destruction arguably provides a net global benefit to reduced ozone layer destruction that partially accrues to California—although the benefit would more accurately be described as an indirect environmental benefit, rather than a direct environmental benefit to state air or water quality.

	Before offset (*)	After offset	Net change
In-state ODS (tCO2e)	10	9	–1
In-state GHGs (tCO2e)	100	101	+1
Total GHGs (tCO2e)	110	110	0
In-state co-pollutants	Lower	Higher	Higher
Indirect ozone layer impacts	Higher	Lower	Lower

* VALUE IS ARBITRARY; NET CHANGE IS NOT

As this example illustrates:

- Like all offset projects, an ODS offset project produces a gross GHG reduction but zero net GHG benefits. As a result, there is no net climate benefit to California air or water quality.

- Like all offset projects, ODS projects can also lead to higher net in-state co-pollutants if covered entities that emit GHGs and co-pollutants increase emissions of both local and global air pollutants relative to a scenario in which no ODS offset credit is available.

- Nevertheless, ODS credits awarded for destruction of ODS-containing equipment in California—which would have eventually emitted ODS in California—could plausibly be said to involve the "reduction or avoidance of any air pollutant in the state."[4]

- ODS projects also provide a net reduction in impacts to the ozone layer, although the corresponding environmental benefit to California air or water quality would better be described as indirect—not a direct environmental benefit to California air or water quality.

Conclusions

In this note we evaluated two key issues related to implementing AB 398's new offset requirements.

First, ARB must implement AB 398's overall limits on offset usage. We show that ARB's proposed interpretation of AB 398's limits increases the quantity of offset credits that can be used in 2024 and 2025 by a total of approximately 8.5 million, relative to a scenario in which the statutory limits apply to calendar year emissions and assuming that emissions in those years are equal to the annual program budget plus the maximum allowable offsets usage. Under ARB's proposed interpretation, covered entities could submit offset credits equal to 5.4% of their 2024 and 2025 emissions, rather than 4%.

Second, ARB must determine what constitutes a "direct environmental benefit" to California air or water quality. We show that if ARB interprets the "reduction or avoidance of any emissions of any air pollutant" by looking only at the gross reduction of greenhouse gas emissions from offset projects, local air pollution could actually increase without producing any climate benefits. We recommend that ARB be explicit and consistent in its analysis of the gross vs. net impacts on local environmental pollution, greenhouse gas emissions, and any other environmental issues (such as reduced ozone layer depletion). Once emissions from offset credit use are taken into account, no offset projects reduce net greenhouse gas emissions and therefore no offset projects provide net climate benefits to California air or water quality—whether direct or indirect.

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Barbara Haya (2013), California's Carbon Offsets Program – The Offsets Limit Explained, http://beci.berkeley.edu/barbara-haya/.

Notes

1. Cal. Code Regs., tit. 19, § 95854(b).
2. Compliance obligations for 2015 and 2016 represent 30% of emissions by covered entities in the respective year. Compliance reports are available at https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.
3. Cal. Code Regs., tit. 19, §§ 95855–95856.
4. Cal. Health & Safety Code § 38562(c)(2)(E) (as added by AB 398).
5. Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070 (9th Cir. 2013). Full disclosure: Dr. Cullenward represented environmental scientists who made this argument in support of ARB's position in the case.

About Near Zero

Near Zero is a non-profit environmental research organization based at the Carnegie Institution for Science on the Stanford University campus. Near Zero provides credible, impartial, and actionable assessment with the goal of cutting greenhouse gas emissions to near zero. This research note is for informational purposes only and does not constitute investment advice.

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