June 26, 2017

Hon. Cristina Garcia
Assembly Member, 58th District
Room 2013, State Capitol
Sacramento, California 95814

Dear Assembly Member Garcia:

You recently asked our office to provide various analyses related to an oversupply of allowances in the state's cap-and-trade program. Specifically, in this letter, we:

- Estimate the range of the cumulative allowance oversupply in the cap-and-trade program through 2020.
- Assess the impact of allowing this oversupply to carry over into a post-2020 program on (1) future greenhouse gas (GHG) emissions and (2) near- and long-term allowance prices.
- Assess the impact of alternative approaches to addressing the oversupply of allowances and the connection between the current program and a post-2020 program.

Below, we provide some brief background on the ability to use allowances issued in earlier years to comply in later years (commonly referred to as "banking"), as well as discuss the oversupply issues identified above. As you are aware, these are complex issues, and there is substantial uncertainty about the future business-as-usual scenario, as well as impacts under different alternatives. Throughout our analysis, we describe some of the key areas of uncertainty, our assumptions, and/or potential limitations of our analysis. For example, our analysis of the oversupply of allowances focuses on California and does not include current (Quebec) or potential (Ontario) linked jurisdictions. Emissions and allowances in California make up the large majority (about 85 percent) of the current market, so our analysis likely provides a general sense of the magnitude of the oversupply and the basic issues and tradeoffs associated with different policy options. However, to the extent there is a significant imbalance between supply and demand for allowances in linked jurisdictions, it could have a significant effect on the analysis provided below.

LAO Bottom-Line. We estimate that the cumulative oversupply of allowances in California's cap-and-trade program through 2020 could range from 100 million to 300 million allowances, with it most likely being roughly in the middle of that range. Relative to a scenario where this oversupply is not available for compliance in a post-2020 program, the oversupply makes the post-2020 program less stringent, which potentially increases emissions and puts downward pressure on prices. The ultimate magnitude of this effect would largely depend on future emissions scenarios,

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which are subject to considerable uncertainty. In a scenario where there is otherwise a low demand for allowances, there would be a cumulative oversupply of allowances of about 150 million tons through 2030 and allowance prices could remain relatively low. In contrast, under a high demand scenario, the program would encourage a substantial number of GHG reductions from covered entities and allowance prices would likely be substantially higher than they are now. There are a variety of alternative program designs that could affect the oversupply—each of which has tradeoffs related to future emissions and near- and-long term prices.

Background

Current Program Allows Banking. The current cap-and-trade program allows banking. For example, a covered entity can use a 2016 vintage allowance to comply in 2020. Under certain conditions, banking does not change the *cumulative* level of emissions over the course of the entire period. However, it can change when emissions (and emission reductions) occur. Since the cap on emissions becomes more stringent in later years, banking gives firms an incentive to obtain extra allowances in early years as a way to protect against the risk of higher prices in later years when allowances are more scarce.

Relative to a program without it, banking has the effect of increasing allowance prices (and incentives for reductions) in early years, while reducing prices (and incentives for reductions) in later years. Some of the primary advantages of banking include (1) less short- and long-term price volatility and (2) incentivizing lower cost emission reduction activities in early years. However, one potential downside associated with banking is that it increases the risk that an *annual* emissions target in later years is not met because entities can comply in the later years by using banked allowances, rather than reducing emissions.

Cap-and-Trade and Emissions Certainty. Relative to other GHG reduction strategies, cap-and-trade can provide greater emissions certainty because the state controls the cumulative number of allowances issued. However, there are limitations to the amount of emissions certainty that the current cap-and-trade program provides—particularly as it relates to meeting an *annual* state emissions target, such as the 2030 GHG target established by SB 32. For example, as discussed above, allowing a significant amount of banking increases the risk that a future annual emissions target is not met. Furthermore, offsets that reduce emissions in other states can be used to comply with the cap-and-trade program, but these reductions are not currently counted in the *state* GHG inventory that is used to assess the state's progress toward meeting its GHG goals. Thus, while offsets might be a cost-effective way to reduce GHGs in other jurisdictions, they do not help keep GHG emissions from within the state below the limits established in law.

California Oversupply Likely 100 Million to 300 Million Metric Tons Through 2020

An *annual* oversupply occurs when the total number of allowances issued in a given year is greater than the number of allowances covered entities need to comply. This would result in allowances going unsold and/or being banked by private entities. There was an oversupply of allowances in the first three years of the program for which data is available (2013 through 2015) and there will very likely be an annual oversupply of allowances for the next few years of the program. In addition, since banking is allowed, there will very likely be a *cumulative* oversupply

of allowances that builds up through the first several years of the program. Under various assumptions about factors that affect the demand for allowances (specifically, future annual emissions that would occur even in the absence of cap-and-trade and the number of offsets used), we estimate that the oversupply of allowances in California's cap-and-trade program through 2020 could range from 100 million to 300 million allowances, with it most likely being roughly in the middle of that range. This is roughly the same magnitude of oversupply projected from other researchers and market participants. Again, these estimates do not include the supply and demand for allowances from current (Quebec) or potential (Ontario) linked jurisdictions. Including these other jurisdictions could either increase or decrease the estimate of oversupply. In addition, this estimate does not include the roughly 121 million allowances that are available in the Allowance Price Containment Reserve. (Four percent of allowances are placed in the Allowance Price Containment Reserve and made available at predetermined prices—a strategy intended to moderate potential spikes in allowance prices.)

Allowing Use of Oversupply Post-2020 Reduces Prices and Increases Emissions

We assessed the impact of allowing this oversupply to be used for compliance in the post-2020 program. For the purpose of this analysis, we assume the state (1) allows banking from the current program to the post-2020 program and (2) makes no adjustment to the amount of allowances that are available to decrease the oversupply. Below, we discuss how such an approach could affect emissions and allowance prices given the magnitude of the oversupply and potential scenarios affecting the demand for those allowances. We then discuss how alternative design options that reduce the ability to bank allowances or affect the magnitude of the oversupply could affect emissions and prices.

Makes Post-2020 Program Less Stringent and Reduces Allowance Prices. Relative to a scenario where there is no oversupply carried into a post-2020 program (either by limiting banking or removing the oversupply from the market), allowing some or all of the oversupply carry forward effectively makes the program less stringent. This is because it would increase the total supply of allowances in the post-2020 period, and companies could emit more than the post-2020 caps established by the Air Resources Board (ARB). Therefore, a policy to allow the oversupply to carry over would allow more *cumulative* emissions over the post-2020 period. It also makes it less likely that the state would meet its 2030 *annual* emissions target.

This increase in allowance supply in a post-2020 program also would affect allowance prices both in the near and long term. Higher supply of allowances could lead to lower near- and long-term allowance prices. Since some models predict that allowance prices are likely to be either near the price floor or price ceiling, the oversupply could simply increase the likelihood of prices being at the floor and decrease the likelihood of prices being at the ceiling.

Magnitude of Effects Depends on Future Emissions Scenarios. While we would expect that making an additional supply of allowances available post-2020 generally would reduce program stringency and allowance prices, the magnitude of these effects would depend in large part on the demand for allowances, as described below. Consequently, we assessed the difference between supply and demand for allowances through 2030 under two different demand scenarios. (We

assume the supply of allowances is the amount of allowances ARB currently plans to issue through 2030, including the pre-2020 oversupply discussed above, minus the allowances that are expected to be in the Allowance Price Containment Reserve [APCR].) The two scenarios are:

- ***Low Demand Scenario.*** In this scenario, we estimated the demand for allowances assuming that future emissions without the cap-and-trade program would decline significantly, in large part driven by various other GHG reductions policies, consistent with ARB's Scoping Plan emissions projections. We also assume that the percent of total statewide emissions from capped sources remains constant at 78 percent, and offsets are used to cover about 5 percent (250 million tons) of cumulative compliance obligations.
- ***High Demand Scenario.*** Under this scenario, we assumed future emissions without the cap-and-trade program remain flat through the entire period. The comparatively higher emissions could be driven by such things as higher-than-expected economic growth and/or other state GHG policies achieving less reductions than expected. We also assume offsets are used to cover only about 3 percent (176 million tons) of cumulative compliance.

While these scenarios reflect relatively low and high demand for allowances, it is possible that actual demand for allowances could be higher or lower.

Lower Demand Could Result in Cumulative Oversupply of Allowances Through 2030. Figures 1 (see page 6) shows the cumulative oversupply of allowances through 2030 under both scenarios. In the low demand scenario, there would be a cumulative oversupply of allowances of about 150 million tons through 2030. As shown in Figure 2 (see page 6), this means that the cap itself would not drive any reductions in emissions from covered entities. Instead, the GHG reductions from cap-and-trade would come from offsets (about 250 million tons) and whatever reductions are incentivized by the allowance floor price. In contrast, under a high demand scenario where business as usual emissions are high and offset supply is lower, the cap would be needed to encourage about 600 million tons of cumulative GHG reductions from covered entities, in addition to 176 million tons of reductions from offsets. Under this scenario, allowance prices would likely be substantially higher.

Alternative Approaches Have Tradeoffs

We assessed alternative program designs that could affect the oversupply and how those alternatives would affect emissions and prices. Since there are a number of potential alternatives, we have summarized them in Figure 3 (see page 7). Specifically, the figure describes some options that would reduce the degree to which an oversupply would be carried into a post-2020 program, as well as one option that has been discussed that would increase the magnitude of the oversupply that is carried forward. In general, these options fall into one of two categories: (1) strategies that affect the ability to bank allowances and (2) strategies that affect the amount of the oversupply. We also provide a general description of how each option could affect prices and emissions compared to a baseline case where banking is allowed and all of the oversupply is made available in the post-2020 period. These options likely would have different effects on near- and

long-term prices and emission levels. While we describe the potential effects of each approach, the actual effects would depend on a variety of factors, including emissions and allowance prices that would occur without these changes, as well as certain programmatic design features. For example, the effects of each of these policies on prices and emissions might depend on whether market prices are at the floor or the ceiling, and whether there is a hard price ceiling.

If you have further questions, please contact Ross Brown at 319-8345 or Ross.Brown@lao.ca.gov.

Sincerely,

for Mac Taylor
Legislative Analyst

Figure 1

Cumulative Allowance Oversupply Under Different Scenarios

In Millions of Allowances

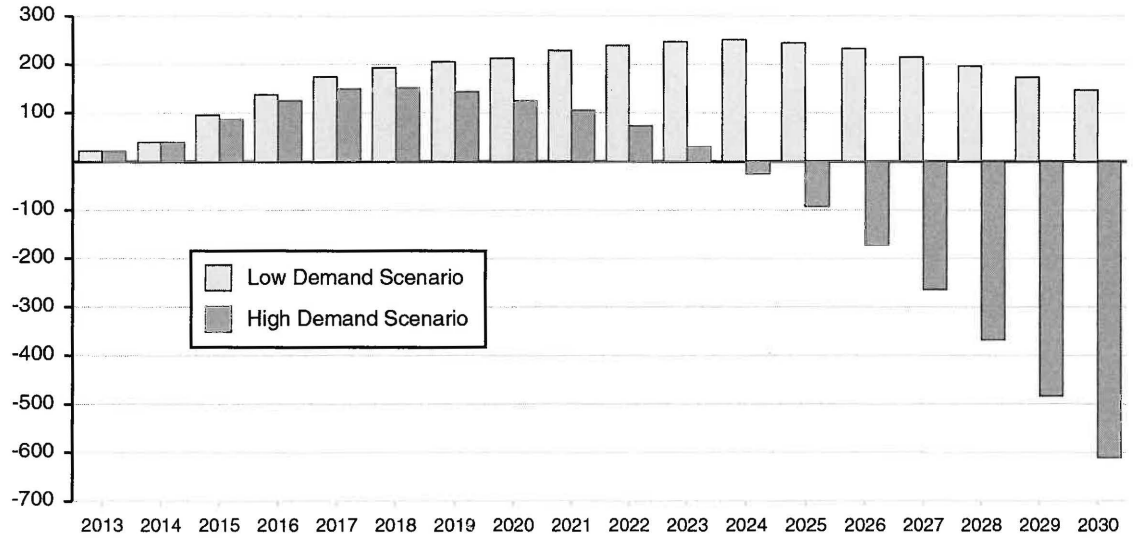

Figure 2

Cumulative GHG Reductions From Cap-and-Trade Through 2030 Under Different Scenarios

(In Million Metric Tons)

	Low Demand Scenario	High Demand Scenario
Reductions from covered entities driven by cap	—[a]	621
Offset reductions	250	176

[a] Since there is a cumulative oversupply of allowances, the cap itself is not driving emission reductions. However, there would be some emission reductions driven by a minimum allowance price.

GHG = greenhouse gas.

Figure 3

Potential Effects of Options to Address Oversupply

Baseline: Allowing Oversupply to Carryover Into Post-2020 Period at Regular Auctions (and No Adjustments to Future Caps)

Alternatives	Effect on Prices	Effect on Emissions
No banking	Lower near-term prices because current allowances cannot be used to comply when cap becomes more stringent.	Higher near-term emissions because lower allowance prices.
	Higher long-term prices because banked allowances not available in future years.	Lower emissions in later years because higher prices.
	Potentially increases price volatility.	
Limited banking (for example, banking allowed for five years)	Lower near-term prices because current allowances cannot be used to comply when cap more stringent in future years.	Higher emissions in near-term because lower prices.
	Higher long-term prices because fewer banked allowances will be available for compliance in later years.	Lower emissions in later years because higher prices.
	Effect on prices would likely be less severe than the "no banking" option.	Effect on emissions would likely be less severe than the "no banking" option.
	Potentially increases price volatility.	
Reduce the number of allowances available by retiring unsold allowances and/or reducing number of allowances issued in future years.	Higher near-term and long-term prices because overall supply of allowances is reduced.	Lower near-term and long-term emissions because prices are higher.
Make oversupply available only at specified prices ("speed bumps," for example)	Higher near-term and long-term prices if prices would otherwise be below speed bumps.	Lower near-term and long-term emissions if prices are higher.
	Effect on prices might be less severe than removing allowances from market entirely.	Effect on emissions might be less severe than removing allowances from market entirely.
	Potentially decreases price volatility.	
Make current APCR allowances available at lower prices (such as offering at regular auction or at "speed bumps")	Lower near-term and long-term prices if prices would otherwise be below the APCR prices.	Higher near-term and long-term emissions if prices are lower.
	Potentially decreases price volatility.	

APCR = Allowance Price Containment Reserve.