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Subject: The Design of Cost Containment Mechanisms for the AB 32 Cap-and-Trade System

Dear Mr. Kennedy,

I thank the Air Resource Board (ARB) for the opportunity to comment on the cost containment elements of the cap-and-trade system under development as a part of the ARB's AB 32 Scoping Plan. The steps the ARB is taking to add cost containment to the cap-and-trade system are important to ensuring that that California can achieve reductions in greenhouse gases (GHGs) without imposing unacceptable economic impacts on California's economy. Just as important, ARB decisions can provide important leadership by demonstrating the effective design of market-based instruments to control GHG emissions. By showing that climate policy can be designed in a way that achieves environmental benefits without undue risk to the economy, ARB can provide a constructive model for the eventual development of federal climate policy to achieve meaningful reductions in GHG emissions.

These comments complement my discussion of cost containment in a paper co-authored with Robert Stavins, "Next Steps for California Climate Policy II: Moving Ahead under Uncertain Circumstances." This paper is submitted along with these comments.

The discussion in this memo is limited to the design of an allowance reserve, which received the majority of the attention in ARB's June 22 workshop. Other mechanisms under consideration by ARB, including the relaxation of offset limits when allowance market prices hit predetermined price triggers and allowance borrowing, are discussed further in the Next Steps II paper. However, omission of these mechanisms from discussion in these comments does not suggest that they do not have a potential role in the design of effective cost containment. As discussed in the Next Steps II paper, each of the options poses certain tradeoffs that ARB should carefully consider whether implemented alone or in combination with other instruments.

The Extent of Cost Containment Provided by an Allowance Reserve

ARB has indicated that it is only considering "soft collars" that impose a fixed price floor and an allowance reserve to "reduce the risk that unacceptably high costs are incurred." [1] Compared to a price cap, which prevents allowance prices from rising above predetermined levels, under a soft collar, there would remain a risk that prices would rise to "unacceptable" levels. The design of a soft collar thus raises the immediate questions of what are "unacceptably high" prices and to what extent will the mechanism *reduce* the risk that prices rise above these levels.

To date, ARB has provided little indication of any objective criteria or guiding principles it will use to answer either question. Will ARB seek cost containment similar to that of the allowance reserves proposed in the Waxman-Markey or Kerry-Lieberman federal proposals? Or, will it seek more limited cost containment? While it is possible to have some useful discussion about the *mechanisms* used to design an allowance reserve (auctions versus windows, reserve replenishment, etc.) absent answers to

[1] ARB, "Cost Containment Options in a California Cap-and-Trade Program," June 22, 2010, slide 4.

these questions, discussions about the "best" mechanism are certainly more fruitful once these objectives are more transparent.

ARB's presentation suggests some ambivalence about providing price mitigation, noting that cost containment "limits price discovery" and "distort[s] the market."[2] While a mechanism that unnecessarily alters prices can be said to "distort" the market, a cost mechanism aims to prevent prices from rising above "unacceptably high" levels based upon the perceived tradeoff between the social benefits and costs of marginal emission reductions. Thus, a cost containment mechanism does not introduce a distortion, but aims to improve the efficiency of the environmental policy. The fact is that there are certain prices that we may not want to "discover" because the costs far outweigh the benefits, and designing a market-based policy that limits prices in pre-determined ways to intentionally avoid these outcomes can improve the efficiency of market-based policies.[3]

Designing a "soft collar" mechanism to provide a predictable amount of risk reduction is difficult in practice. Even if it is unlikely that cost containment mechanisms are triggered, the question remains how well they perform when they are triggered. Recent market and economic events, including California's electricity crisis in 2000/2001 and the recent crisis in credit markets in 2008, demonstrate that markets can perform in highly unpredictable ways, particularly when under stress. This sort of unpredictability places a greater onus on careful design of cost containment.

The following sections provide comment on two dimensions of the design of an allowance reserve:

1. Mechanism and conditions for releasing reserve allowances: Will the cost containment mechanism be designed to keep market prices from rising above trigger prices? Of, will the mechanism allow prices to float above trigger prices (and, presumably, below the market price that would have prevailed absent cost containment)? If so, what is the desirable level of mitigation?

2. Filling and replenishing the allowance reserve: Will the cost containment mechanism be designed to provide mitigation of frequent or prolonged periods of elevated prices? How will these decisions affect the costs of the cap-and-trade system?

Mechanism and Conditions for Releasing Reserve Allowances

ARB has several potential principles to guide the release of reserve allowances. One option is to design a mechanism that aims to keep allowance prices from rising above pre-determined triggers. The effectiveness of a mechanism at keeping market prices at price triggers will depend upon the sufficiency and timing of incremental allowances released from the reserve. A price cap is the only mechanisms that can guarantee that prices will not rise above the price trigger. Within the context of a "soft collar", sufficient incremental supply can most easily be provided by allowing continuous access to the reserve (assuming price triggers are exceeded), although sufficient incremental supply can potentially be provided through a series of purchase opportunities (e.g., a reserve auction), where the frequency of these events and the supply released at each event provides sufficient cumulative releases to lower prices. Several of the mechanisms for releasing allowances can, in principle, provide sufficient liquidity, including continuous purchases of allowances at a "window" or frequent auctions.

Failure to provide sufficient releases from the reserve could result in allowance prices rising above price triggers. If access to allowances appears constrained, market participants may question

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2 ARB, June 2010, slides 5 and 6.

3 William Pizer, "Combining price and quantity controls to mitigate global climate change," *Journal of Public Economics* 85(3): 409-434.

whether periodic releases of allowances from the reserve will ever be sufficient to keep prices at triggers given uncertainty about future demand for allowances. If this were to occur, prices will likely rise above price triggers. This risk may rise near the end of the compliance period,[4] particularly if the maximum quantity of incremental allowances that may be released from the reserve is limited by either the number of additional purchase opportunities or the quantity of allowances available in each purchase opportunity.[5]

Alternatively, cost containment could be designed to lower prices below those that would prevail absent cost containment, although market prices may remain above price triggers depending upon the quantity released. This approach would not aim to provide sufficient supply of reserve allowances to meet a *pre-determined price target*, but would release a *pre-determined quantity of allowances* (with pre-determined frequency) when prices rise above price triggers.

Under this approach, market prices after cost containment has been implemented will be uncertain, since it will be challenging (if not impossible) to determine in advance the reduction in prices that will be achieved by releasing a given quantity of allowances into the market. Understanding the variability of California's GHG emissions provides only limited understanding of such market reactions, since it is the intersection of allowance targets with the marginal cost of reducing emissions (i.e., GHG abatement curves) that will determine market prices for allowances.[6] Despite the excellent efforts of ARB and other researchers, there is still significant uncertainty regarding these marginal abatement curves. Figure 1, which illustrates long-run GHG abatement curves estimated by ARB, shows that prices can rise steeply as the quantity of emission reductions needed to meet emission targets increases. For example, ARB finds that requiring an additional 15 MMT-CO2e in cumulative reductions over the period 2012 to 2020 (i.e., 0.6 MMT-CO2e for each year during this period) would lead to $21 to $28 per MT increases in allowance prices.[7] Moreover, under many circumstances, market prices for allowances reflect shorter-run supply curves that are likely to be steeper than those represented in Figure 1.

Because of this uncertainty about market reactions to the release of allowance reserves, constraining allowance releases increases the risk that allowance prices will rise to unacceptable levels. Deciding upon the "right" amount of allowances to release creates a different "goldilocks" problem than the one identified by Tim Profeta, although one made with much greater uncertainty.[8] Releasing "too few" allowances could lead to unacceptably high prices (although releasing "too many" allowances at worst lowers allowance prices to price triggers, assuming that allowance not sold from the reserve at lower than trigger prices.)

Because of these factors, there is a greater risk under this approach that ARB needs to intervene in the market in a non-predictable and non-transparent fashion, which, were it to occur, could lead to

[4] Although there is a risk of high allowances prices at the end of the period, this does not imply that a cost containment mechanism that operates solely in the months prior to the end of compliance period will provide adequate cost containment. High prices can occur at any point in time during the compliance period depending on the market's perception of the magnitude of the compliance burden relative to the supply of allowances. Moreover, many, if not most, market participants are likely to manage the financial risk of compliance through financial instruments or holding of allowances. Thus, price fluctuations throughout the compliance period can have adverse financial and economic repercussions.

[5] The use of rolling compliance periods, as discussed in the Next Steps II paper, would mitigate this risk.

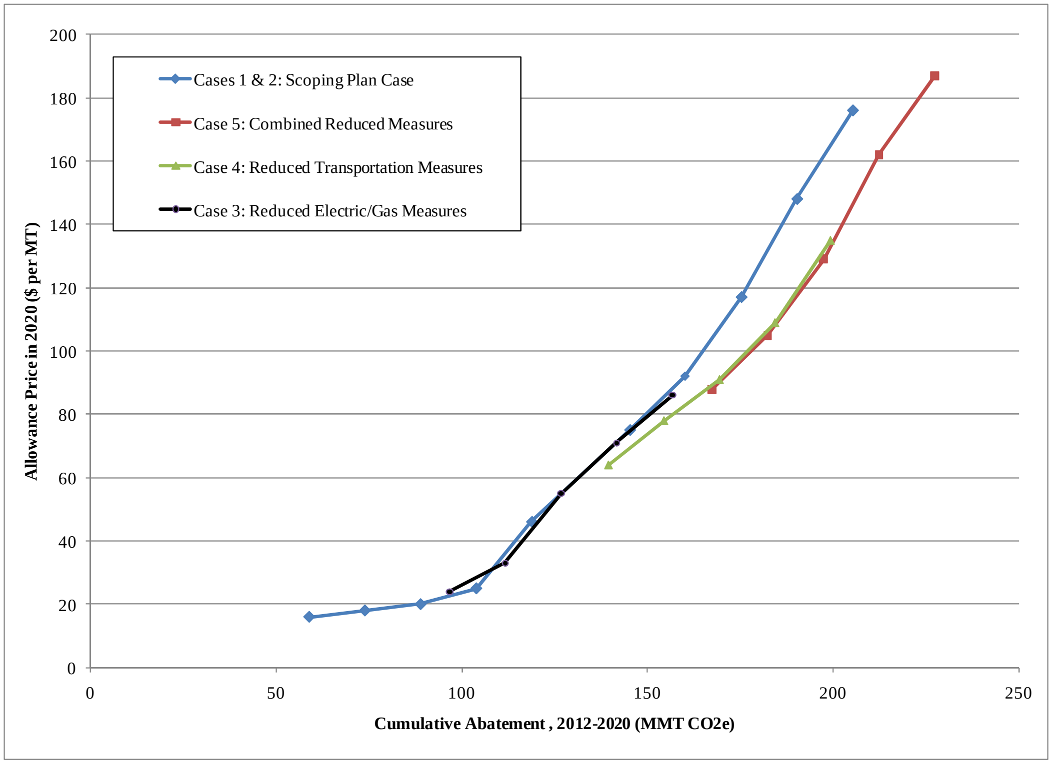
[6] Moreover, analyses of emission variability or marginal abatement costs tell us little about whether there are limits to the value of incremental emission reductions that might provide a basis for designing cost containment.

[7] ARB, March 2010, Table 17. These figures may overstate the magnitude of the price impact of increased cumulative reductions because they do not reflect emission reductions achieved from the adverse impact of the cap-and-trade system on overall economic activity.

[8] Tim Profeta suggests that trying to set market prices for GHG allowances that are neither "too low" not "too high" creates a "Goldilocks Paradox." Determining the "right" amount of allowance reserves to achieve this end adds a further – and potentially unnecessary – complicating layer onto this problem. Profeta, Tim, "Allowance Price Containment," June 22, 2010, slides 7 and 8.

many unintended consequences. By contrast, cost containment policies aiming to provide sufficient supplemental supplies to keep prices at price triggers avoid these complications.

Figure 1
GHG Cumulative (2012 to 2020) Abatement Cost Curves
Sources under the AB 32 Cap-and-Trade System



Source: ARB, "Updated Economic Analysis of California's Climate Change Scoping Plan," March 24, 2010.
Note: Abatement cost curves are estimates based upon the first stage Energy 2010 estimates of emission reduction costs (Tables 16 and 17), and thus do not reflect emission reductions caused by the adverse impact of the cap-and-trade system on economic output.

Filling and Replenishing the Allowance Reserve

Two key issues arise in decisions about filling and replenishing the allowance reserve:

1. Will there be sufficient allowances to address frequent or prolonged periods of elevated prices?
2. How will mechanisms to fill and replenish allowance reserves affect system costs?

To provide the market with mitigation of frequent or prolonged periods of elevated prices, the allowance reserve – through initial stock and subsequent replenishment – must contain sufficient allowances to address these episodes. Price caps provide the most effective approach to achieving this goal by guaranteeing sufficient allowance supply. Within the context of a "soft collar," achieving this goal requires initially stocking the reserve with sufficient allowances to address initial episodes of high prices, and mechanisms to replenish the reserve that are sufficient to prevent it becoming depleted. Because there is uncertainty about the future need to draw upon the reserve at any point in time (particularly during periods of market stress), any circumstance when the market perceives that the allowance reserve will be insufficient to address current and future episodes may lead to unstable and rising market prices in anticipation of future shortages. Thus, adverse market outcomes could arise before the reserve ever becomes depleted.

Many of the options considered by ARB for initially filling or replenishing allowances involve *shifting* allowances from under the cap, where they will be used to comply with GHG obligations (or banked for future use), to the allowance reserve, where they will be used to comply with GHG obligations *if* released from the reserve. Thus, as posed by ARB, the *price* for cost containment is an increase in the *expected* cost of the cap-and-trade system. This choice effectively places the state of California in the position of purchasing *insurance* for its cap-and-trade system, which would raise costs today to avoid the risk of higher prices tomorrow. Given that ARB is simultaneously making decisions regarding allowances reserves *and* GHG emission targets for 2012 to 2019, the interim years prior to 2020 for which emission targets were not specified in AB 32, it is not clear whether AB 32 legally requires that the system be constrained by this tradeoff. Proposals to set the "aspirational" GHG target at the quantity of GHG reductions that were anticipated as necessary to meet AB 32 statewide goals when it was passed in 2006 may provide a means of mitigating the tension between these choices.[9]

As with options for initially filling the allowance reserve, many options considered by ARB for replenishing the reserve also involve shifting allowances from under the cap to the allowance reserve. Once emission targets have been set, shifting allowances between years or compliance periods may have limited effectiveness in providing price mitigation. When allowances are shifted from one year in the current compliance period to another year in the same compliance period, prices are unlikely to change because markets will recognize that the total number of allowances available for compliance has not changed. Replenishing allowances from a future compliance period may lower prices to the extent that these allowances are sufficiently far in the future to allow markets to adjust (i.e., incentivizing investments to lower future abatement cost). To the extent that there is significant banking of allowances, price relief may be limited since the market will offset the reduction in prices due to the immediate increase in supply with an increase in the value of allowances banked for future use, driven by anticipation of the future allowance shortage.[10]

The most effective approach to replenishing the reserve is through the purchase of offsets with revenues from the sale of reserve allowances (assuming that ARB decisions regarding offset eligibility and certification allow sufficient responsiveness in offset markets). This is the only alternative considered by ARB that actually increases allowance supply. Other alternatives simply shift allowances from one period to another, and, because of other cost containment mechanisms such as banking and three-year compliance periods, are unlikely to effectively address prolonged periods of elevated prices. ARB indicates that it is no longer considering this option, largely because of legal considerations.[11] In light of the apparent limitations posed by other options, ARB might reconsider further exploration of this option to determine whether ARB's concerns might be addressed in some manner (e.g., administration of

[9] A back-of-the envelope calculation based on ARB sources suggests that the difference between GHG targets based on current estimates of 2012 GHG emissions and those based on pre-recession estimates of 2012 GHG emissions would provide roughly 200 to 225 MMT-CO2e of allowances to initially stock the allowance reserve. This calculation assumes (1) statewide GHG emissions, (2) a linear trajectory of targets from 2012 emissions to the 2020 AB 32 target. A reserve funded solely by sources under the cap would likely provide a significantly smaller quantity of allowances.

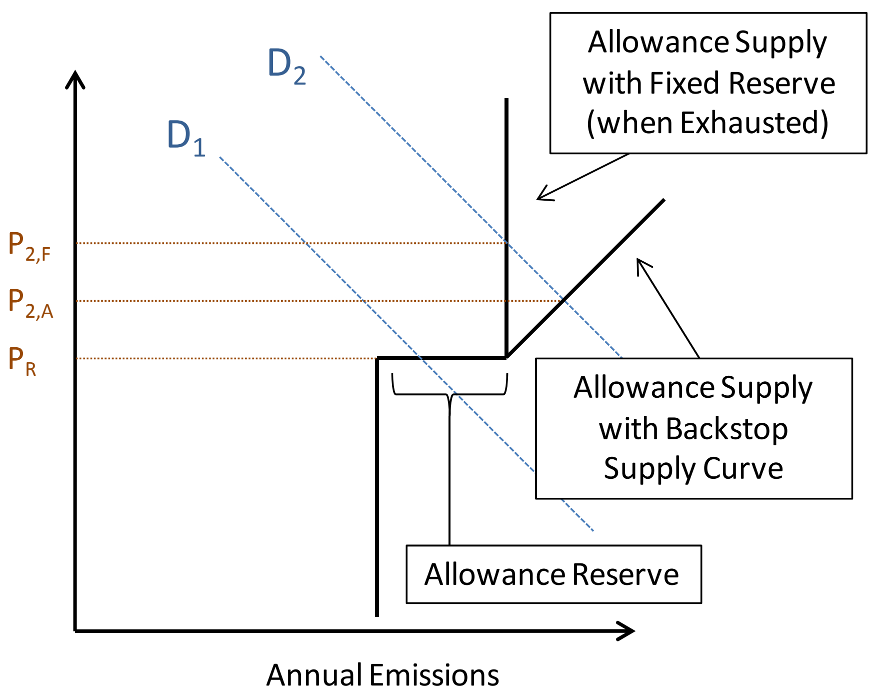
[10] ARB appears to be considering relaxing offset use limits to avoid increases in market prices that arise when allowances are taken from current or future caps and placed in the reserve. While this approach would avoid some the problems associated with simply shifting allowances across years or compliance periods, it is likely more complicated and less effective than an approach that uses allowance reserve revenues to replenish the reserve with offsets. The effectiveness of ARB's approach may be constrained by uncertainty in offset markets and the likely lags in the responsiveness of offset markets to increases in demand.

[11] At the workshop, ARB's Kevin Kennedy indicated that, irrespective of legal and administrative issues, ARB had determined that other mechanisms for replenishing the reserves were adequate. Further explanation of the basis for this conclusion would be valuable.

the allowance reserve by an independent agency). In addition, ARB might consult with individuals involved in the design of the Waxman-Markey and Kerry-Lieberman proposals, both of which include replenishment of allowance reserves with offsets.

Finally, ARB should consider steps it would take in the event the allowance reserve is exhausted. As noted, markets are likely to anticipate allowance scarcity far before the allowance actually becomes exhausted, so the design of a market backstop could be an effective tool for avoiding unnecessary market volatility. A fixed penalty for non-compliance, if set at a reasonable level, could serve as a backstop (although a penalty set at this level may not be sufficient to deter non-compliance under normal market circumstances). ARB could introduce an explicit backstop mechanism to prevent unacceptably high allowance prices. One approach is to have a backstop price, set above the trigger price for the allowance reserve. Another alternative is to supply additional allowances based on a backstop supply curve. As illustrated in Figure 2, without a backstop, the allowance supply curve is vertical once the allowance reserve is exhausted. If there were a significant increase in demand due to unforeseen events, prices could rise well above the reserve trigger price – in the example below, from the trigger price (P_R) to $P_{2,F}$. However, if allowances are supplied based upon a backstop supply curve, then the magnitude of price increases above the trigger price can be somewhat mitigated. In the figure below, for example, prices rise to a lower level ($P_{2,A}$) than would occur with no backstop. In contrast to a price cap, this approach allows prices to continue to rise above the price triggers after the reserve is exhausted, but provides some price responsiveness to provide additional supplies in a transparent fashion to address unforeseen events.[12]

Figure 1
Illustration of Alternative Price Outcomes with Reserve Exhaustion
Fixed Reserves and Administrative Backstop Supply Curve



[12] Backstop supply could be released according to the backstop supply schedule using a descending clock auction, in which buyers bid the quantity of allowances they are willing to buy at the trigger price. If the quantity exceeds the quantity in the backstop supply curve, the price is raised and a next set of quantity bids are received from buyers. This process repeats iteratively until the quantity buyers are willing to purchase is at or below the backstop supply curve.

Conclusion

As noted by in Tim Profeta's summarizing remarks, there is general agreement that "cost containment is a worthy objective" and ARB is doing valuable work in the design of mechanisms to provide cost containment. Because the approaches being considered by ARB vary in their effectiveness of achieving the stated goal to "reduce the risk that unacceptably high costs are incurred," ARB openness to feedback from market participants is important. However, ARB does not provide clear guidance on the *extent* to which it will aim to reduce allowance price risks. Aiming to partially eliminate these risks creates a new set of uncertainties that are likely to be challenging to manage. Moreover, ARB has not indicated whether this "insurance" will be obtained at the expense of raising the *expected* costs of the cap-and-trade system. In light of the concerns with the overall program costs, as well as the unlikely risks of high prices, proposals to initially fill the allowance reserve with the difference between pre- and post-recession targets provide one approach to avoid this unintended outcome.

The importance of ARB's choices may extend beyond California. With other states, provinces and the federal government still wrestling with the political decisions to undertake meaningful climate policies, California can provide leadership by demonstrating that a market-based system for climate policy can be designed in a manner that achieves GHG emission reductions without creating undue economic risks.

Thank you for considering these comments.

Sincerely,

Todd Schatzki[13]

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[13] Todd Schatzki is a Vice President at Analysis Group. He is an expert in energy and environmental economics and policy, and has performed research and written extensively on the design of climate and energy policy, and the economic analysis of climate and regulatory policy. He received a Ph.D. in Public Policy from Harvard University. These comments were prepared at the request of the Western States Petroleum Association (WSPA). While WSPA provided funding for the development of these comments, they reflect independent analysis by Analysis Group, and do not necessarily reflect the views of WSPA or any of its members.