Key Issues Facing California's GHG Cap-and-Trade System for 2021-2030

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Executive Summary

Todd Schatzki and Robert N. Stavins[1]

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California's Greenhouse Gas (GHG) cap-and-trade program is a key element of the suite of policies the State has adopted to achieve its climate policy goals. The passage of AB 398 (California Global Warming Solutions Act of 2006: market-based compliance mechanisms) extended the use of the cap-and-trade program for the 2021-2030 period, while also specifying modifications of the program's "cost containment" structure and directing CARB to "[e]valuate and address concerns related to overallocation in [ARB's] determination of the allowances available for years 2021 to 2030." The changes being considered by CARB will not only affect the program's stringency, but also its performance by affecting the ability of the "cost containment" structure to mitigate allowance price volatility and the risk of suddenly escalating allowance prices.

This white paper addresses key design issues that were identified by the legislature in AB 398 and

over time, thus providing an on-going incentive for market participants to maintain a sizable bank of allowances.

Allocation, Holding,

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California's Greenhouse Gas (GHG) cap-and-trade program is a key element of the suite of policies the State has adopted to achieve its climate policy goals. With the passage of AB 398 ("California Global Warming Solutions Act of 2006: market-based compliance mechanisms…"), California's legislature extended the use of the cap-and-trade program and identified a set of modifications that should be made to the program. The most important of these modifications alte(8g.6 (( )]t01 -1.804 Tap)Tj 0 1)9.2 2-2.3 (A)S(m)17a6uau-

I. MARKET DESIGN DECISIONS RELATED TO THE PRICE LEVELS

A. Key GHG Cap-and-Trade Rulemaking Issues

AB 398 extends the GHG cap-and-trade program through the year 2030, keeping core elements of the system intact. Sources covered by the program are required to obtain allowances to cover their actual GHG emissions. The total quantity of allowances is capped at annual budgets to be set by CARB, with the annual budget for the year 2030 set at 40 percent below 1990 emission levels. Faced with the choice between using an allowance or reducing emissions, in principle, covered sources will opt for the less costly of the two, resul0.9 (C)4 escocee 40, i(co)2 (.)11.3 (F)1..2 (nc)-1.6 (e)9.2 (s)-2205 Tc .7 (s) th thssul0.94.6 (h)10p l0

balanced decision-making. As a result, there is an increased likelihood that poor decisions are made that undermine the credibility of the system.

Third, because it reduces the need for *ad hoc* decisions, the price ceiling creates greater certainty for the market which, all else equal, is more conducive to investment in low-GHG technologies. Such technologies often require many years to recover upfront investment costs, making certainty about the durability of the cap-and-trade system important to financing such investments.

AB 398 also directs CARB to establish **Price Containment Points**:

> "Establish two price containment points at levels below the price ceiling. The state board shall offer to covered entities non-P:ce C-PtC:

other relevant climate policies. The Committee will be comprised of experts on emission trading market design that, in principle, can provide the Board and legislature with recommendations on changes to

b) Leakage

Leakage occurs when the cost of complying with a new (or more stringent) regulation leads to a

prevent allowance prices from reaching levels that the region may deem necessary to achieve its climate policy objectives. However, a price ceiling set too high may also make it less desirable to link with that system, because allowance prices could reach economically and politically unacceptable levels.

the abatement cost per metric ton of GHG (from the Scoping Plan) to set the Price Ceiling may inappropriately attribute all costs incurred by the program to only a portion of the environmental benefit, reductions in GHG emissions. CARB notes this in the Scoping Plan:[23]

> The cost (or savings) per metric ton of CO_2e reduced for each of the measures is one metric for comparing the performance of the measures. Additional factors beyond the cost per metric ton that could be considered include continuity with existing laws and policies, implementation feasibility, contribution to fuel diversity and technology transformation goals, as well as health and other benefits to California. These considerations are not reflected in the cost per ton metric below.

Of course, it is also possible that non-GHG benefits are relatively small for certain policies. If this is the case and the estimated cost per $MTCO_2e$ is particularly high, it may raise questions about the efficacy of this particular policy in addressing climate change, rather than serve as a sensible benchmark for other policies.[24]

CARB might also be considering the cost to deploy a particular "backstop" technology as a benchmark for the Price Ceiling, particularly a technology at an early stage of development. There are several concerns with this approach. First, this approach also conflates costs with benefits. Simply because a technology exists to reduce GHGs does not mean it is sound policy to deploy at any cost. Second, the development of any particular technology faces many unknowns, making the timing of commercialization and eventual costs highly uncertain. Moreover, cap-and-trade is not well suited to promoting the development of particular technologies because it creates uniform incentives for innovation that are technology neutral, encouraging the least-cost means of achieving emission reductions, regardless of technology.

Finally, many policies in the CARB Scoping Plan may affect a limited scope of economic activity. **Simply because CARB has adopted a policy with a high (marginal) economic cost that affects a limited amount of economic activity does not imply that it is sensible to impose such a cost on all economic activity covered by the GHG cap-and-trade program.**

f) Carbon "Shadow Prices"

A few corporations have voluntarily adopted an internal social cost of carbon, or carbon "shadow price," for use in internal decision-making.[25] CARB indicates it intends to consider these shadow prices in its decision regarding where to set the price ceiling.[26] It should not do so for several reasons.

[23] CARB, 2017 Scoping Plan, p. 44.

[24] For example,dowre (m)8.1607 0/6 Tm (6 6on >g84.09gc.7293 184.11.2 (red)14)4.n30.5 (e0 012 (,)8]TJ 0 ( )0.5 eagc.78 (ad)1

allowance prices suddenly increase from the currently low prevailing market prices. By providing a supply of allowances at intermediate points between these extremes, the Price Containment Points reduce the likelihood that prices fluctuate or swing between these extremes.

Price volatility can have adverse consequences, including inefficient operations and investment (if abatement is undertaken in response to temporary high prices), uncertainty in investment and pricing of energy and energy-intensive goods and services, financial losses (and risks) for companies short on allowances, and challenges to the operation of a well-functioning allowance market. Price volatility, in turn, has consequences for the strategies used by companies to manage their compliance risks. The Price Containment Points reduce market volatility by increasing the supply of allowances as allowance prices increase. This additional supply of allowances can bound the range of price movements and provide additional time for price discovery.

In the context of California's GHG cap-and-trade program, empirical analysis indicates that allowance price volatility could be very high. Borenstein, Bushnell and Wolak (Borenstein et al., hereafter) find that there are limited options to reduce GHG emissions (at reasonable cost) if market conditions increase the demand for allowances.[29] The limited supply of abatement options is largely due to the many complementary climate policies that limit the incremental opportunities for covered sectors to reduce emissions under the cap-and-trade program. Due to the limited supply of abatement options, there is a risk that allowance prices fluctuate rapidly between the price floor and Price Ceiling in response to relatively small changes in allowance demand.

Specifically, Borenstein et al. find that 145 $MTCO_2e$ of emissions can be reduced at a cost less than \$85 per $MTCO_2e$. As result, if demand increases more than 145 $MTCO_2e$ (over the course of the 2021-2030 period) due to, for example, increased economic activity, then allowance prices could suddenly rise from the allowance price floor to the allowance price ceiling. Given allowance banking and the market's anticipation of future market conditions, the market could capture changes in allowance prices relatively quickly if underlying market conditions change to project future allowance scarcity. **Price Containment Points at intermediate points between the allowance price floor and Price Ceiling can mitigate such the large increase in allowance prices that could occur under these circumstances.**[30]

[29] Borenstein, Severin, et al., "California's Cap-and-Trade Market Through 2030: A Preliminary Supply/Demand Analysis", Energy Institute at Haas, Working Paper 281, July 2017, Table 1. For earlier analysis, *see* Borenstein, Severin, James Bushnell, Frank Wolak and Matthew Zaragoza-Watkins, "Report of the Market Simulation Group on Competitive Supply/Demand Balance in the California Allowance Market and the Potential for Market Manipulation," Energy Institute at Haas, Working Paper 251, July 2014; Borenstein, Severin, James Bushnell, Frank Wolak and Matthew Zaragoza-Watkins, "Expecting the Unexpected: Emission Uncertainty and Environmental Market Design," Energy Institute at Haas, Working Paper 274, August 2016.

[30] Volatile commodity prices can impose economic costs, although such costs may not (and typically do not) justify regulatory interventions given the costs such interventions impose, particularly when they introduce distortions of the commodity's true opportunity cost. However, allowance markets differ from commodity markets in at least two respects. First, economic volatility arising from the program can undermine the political consensus needed to support the underlying regulatory policy. Second, allowance markets arise from a regulatory design used to achieve certain environmental objectives, and the regulation's design reflects tradeoffs among many factors, including variability of environmental and economic outcomes. A tax and cap-and-trade differ in the tradeoff between variability of environmental and economic outcomes; and a cap-and-trade program with allowance reserves, such as the Price

Borenstein et al.'s analysis illustrates the potential benefit of the Price Containment Points in the context of California's market. Their analysis finds that, due to the limited supply of GHG abatement, prices are likely to be at one of the two extremes, the price floor or the Price Ceiling. With the addition of two Price Containment Points, the likelihood that prices in 2030 are between these two extremes increases from 20% to 39%.[31] Thus, the Price Containment Points substantially reduce the likelihood that allowance prices are not at the price floor and Price Ceiling, consistent with less volatile market outcomes.

To illustrate how placement of the Price Containment Points can affect market outcomes, **Figure 2** compares the range of allowance prices between two Price Containment Point configurations. On the left, the Price Containment Points are distributed evenly between the price floor and Price Ceiling. Under this configuration, a sudden increase in demand will cause prices to rise to the first Price Containment Point, allowing the market to readjust. On the right, the Price Containment Points are placed at the top of the

that covered entities reduce emissions outside the program. However, the effectiveness of these programs in reducing emissions is uncertain, which in turn creates uncertainty about these programs' impacts on the GHG cap-and-trade program.

3. Technological Change: The effectiveness of many of the state's complementary policies and the future cost of GHG abatement depends on the availability of new low-

allowances. The cap-and-trade program also has a mechanism that further tightens the cap when demand for allowances remains low for extended period. AB 398 creates a new requirement that any allowances that remain unsold in the auction for 24 months be transferred to the APCR, which would raise the price at which these allowances could be accessed. Further, any allowances shifted to the APCR would then be moved into the Price Ceiling reserve as of 2021, making it even more costly to access this allowance supply.

III. DECISIONS RELATED TO ALLOCATION, HOLDING, AND USE OF PRICE CEILING AND PRICE CONTAINMENT POINT ALLOWANCES

Operation of the cap-and-trade system requires rules and procedures for determining how allowances are allocated to market participants, and how they can be traded, held, and used. These rules are important because they can affect market participants' abilities to trade al i r.002o11.6 (de)--0.011 Tw -8 (i)02r a

price ceiling, there is no need to have periodic sales. Allowances can be sold at the end of the compliance period so that entities that are short on allowances can come into compliance.[42]

Offer

that market participants do not purchase allowances at the Price Ceiling and bank them for use in the future compliance period.

decisions due to the risk of allowance devaluation. CARB should preserve the current banking rules with one exception: it should consider modifying the current limits on the quantity of allowances that can be held in allowance accounts ("holding limits"). Holding limits were imposed to address the concern that a market participant could accumulate a large share of allowances and manipulate allowance prices through the exercise of market power. These limits, however, are imposed uniformly across all market participants irrespective of the difference in the costs they impose on different types of market participants. These limits could constrain the ability of firms subject to cap-and-trade to hedge the financial risks of compliance by banking allowances for use in future periods. Other markets with similar holding limits (e.g., derivative markets regulated by the Commodity Futures Exchange Commission) provide exemptions for legitimate business activities, such as hedging. ARB should modify these holding limits to account for legitimate hedging and banking activities through exemptions or increases in holding limits that reflect the size of market participant's compliance obligations.[44]

IV. CONCLUSION

California's GHG cap-and-trade system is well designed, serving as a template for systems in other parts of the world. However, its performance has not to date been seriously tested, because of a combination of factors, including the existence of complementary policies that achieve emission reductions (albeit at higher cost). As it moves into the 2021-2030, CARB must address a number of rules and considerations that will affect the likelihood that more scarce market conditions occur, and will affect the market's performance. Decisions aimed at mitigating economic risks while achieving environmental objectives will provide the greatest net