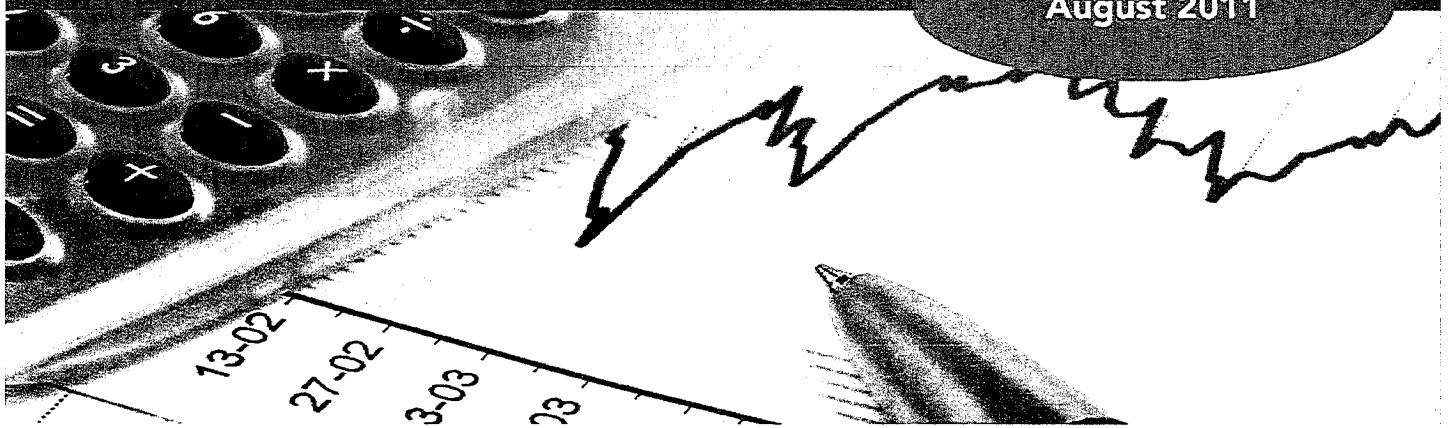


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RULES OF THE GAME:

Examining Market Manipulation,
Gaming and Enforcement in
California's Cap-and-Trade Program

August 2011



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EMMETT CENTER ON
CLIMATE CHANGE AND
THE ENVIRONMENT

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About the Emmett Center on Climate Change

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Established in 2008 with a generous gift from Dan A. Emmett and his family, the Emmett Center was founded as the nation's first law school center focused exclusively on climate change. The Emmett Center is dedicated to studying and advancing law and policy solutions to the climate change crisis and to training the next generation of leaders in creating these solutions. The Center works across disciplines to develop and promote research and policy tools useful to decision-makers locally, statewide, nationally and beyond.

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INTRODUCTION

In this paper, we assess the adequacy of the measures that have been proposed by the California Air Resources Board (CARB) to limit risks of market manipulation and rules violations in its greenhouse gas (GHG) emissions trading program. We focus in particular on the extent to which CARB has created conditions to ensure transparency in the market and sufficient liquidity to reduce the risk of market domination by a single or small number of participants. We also address CARB's ability to detect foul play, take necessary enforcement actions, and impose adequate penalties. In our analysis, we take a careful look at the experiences of regulators within other emissions trading programs and draw lessons from those experiences.

In general, we conclude that CARB has in fact crafted a market likely to be both transparent and liquid, though we have a series of recommendations to improve further these crucial market qualities. CARB has taken important steps to construct a liquid, efficient and transparent market by taking the best practices from other allowance trading programs. We think it is unlikely that CARB will experience market manipulation that can significantly affect the efficiency or fairness of the market. We do believe, however, that our recommendations would improve the provisions and therefore reduce the (small) risk of illiquid and inefficient markets.

Emissions trading, very generally, works as follows: the regulating body caps overall emissions; allocates allowances to emitters that permit an allowance holder to emit a set amount per allowance (typically a ton of the regulated pollutant); and then allows allowance holders to satisfy their regulatory obligations either by emitting up to the amount they hold in allowances, trading for additional allowances if they need to emit more, or emitting less than their allocated amount and selling/trading the difference. The theoretical promise of cap-and-trade systems is that, by harnessing market forces, emitters can find the cheapest means to reduce emissions while reducing overall pollution levels. In searching for the cheapest emissions reductions, cap and trade should also spur technological innovation. To date, evidence suggests that well-designed cap-and-trade programs can indeed deliver on their theoretical promise.

Nevertheless, all markets, including emissions markets, can fail to deliver their promised social benefits if market participants can manipulate trading and distort market outcomes. Market manipulation or "gaming" in emissions trading has long been a theoretical concern of economists and policymakers in designing cap-and-trade programs.

Gaming is an ill-defined term that we take to mean situations in which market participants exploit market rules or find weaknesses in monitoring or enforcement regulations so as to skirt the intent of the rules, to the detriment of market functioning or environmental integrity. Market manipulation is where traders attempt to profit through influencing allowance prices either directly through trading or indirectly through information releases.¹

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Market power and gaming in emissions markets have garnered concern from the earliest discussions of cap and trade in academic literature.² Designers of emissions markets have incorporated a number of measures to assure efficient and fair markets that achieve the theoretical promise of these markets and avoid the potential for gaming. In the most effective cap-and-trade programs, these measures appear to have worked. For example, in the cap-and-trade program adopted under the Clean Air Act to reduce SO₂ emissions and in the cap-and-trade programs developed by the Ozone Transport Commission and the EPA to address NO_x, “[t]ransparent data systems, public access to information, and strict and certain penalties for noncompliance have led to a virtually perfect compliance record.”³ Thus the experience of these programs and the regulatory mechanisms they have included to reduce gaming opportunities provide an excellent track record upon which CARB can rely (and has relied) in designing its program.

Speculation, Manipulation and Gaming

Speculation in a financial market refers to the assumption of risk in order to profit from price volatility. In any given market, a certain amount of speculation is expected. **Excess speculation** results in high price volatility that is unresponsive to typical market supply and demand.

Gaming the market is when an entity bends rules or exploits weaknesses in monitoring or enforcement to unfairly gain a profit.

For purposes of our analysis, we characterize attempts to directly interfere with market operations as **market manipulation**.

The most basic requirements for well-regulated markets are transparency and liquidity. Emissions registries and reporting requirements provide direct transparency to the market. Auctions serve as important price discovery mechanisms that also promote an open and transparent market. Auctions, banking of allowances, holding limits and offsets can all improve market liquidity, reduce price volatility and reduce the potential for market domination. Offsets⁴ and allowance reserves are primarily cost-containment mechanisms but can also serve to produce more smoothly functioning markets. These mechanisms all help ensure a transparent and liquid emissions trading market that in turn ensures the efficient pricing of allowances.

In addition to transparency and liquidity requirements, a properly functioning cap-and-trade program requires strong monitoring and enforcement. Strong enforcement requires that all participants are legally bound by a common set of rules in order to assure compliance with emission limits; rule breakers must, in turn, be adequately penalized.

The CARB emissions trading regulations incorporate many of the market building and market oversight features of other trading programs. The regulations include regular auctions, a three-year compliance period, unlimited banking, a heavily regulated offset program, transparency and rigorous reporting requirements, holding limits, the Allowance Price Containment Reserve, an emissions penalty provision that resembles borrowing, and the ability of CARB to refuse to

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approve trades. CARB has clearly designed its program to build an efficient and robust market using auctions, banking, and offsets to reduce the risks of gaming. Finally, the CARB regulations include significant penalties if participants attempt to manipulate any of the allowance markets.

CARB trading program: overview

CARB's emissions trading program covers CO₂ and other greenhouse gas emissions.⁵ It was initially proposed to start in 2012, but the start date has been pushed back to 2013.⁶ The program is set to run through 2020.

The first compliance period (2013–2014) will cover the electricity industry, including imported electricity, and large industrial facilities.

The second and third compliance periods (2015–2017, 2018–2020) will also cover fuel distributors. The initial cap was set to the emissions forecast for 2012, and declines approximately 2% each year in the first period. In 2015, the cap increases to account for the additional emissions from fuel distributors, and decreases approximately 3% thereafter.

CARB seeks to achieve a reduction of 273 million metric tons of CO₂e, putting the 2020 cap at about 15% below 2012 levels. Certain industrial sources and utilities will be awarded free allowances, with the remainder going to auction. About 4% of allowances will be placed in a reserve. Facilities may cover up to 8% of their emissions with offsets.

Our analysis of the strength of these CARB regulations proceeds as follows:

Part I examines the need for transparency and price discovery in the emissions trading market. We generally conclude that CARB has done an excellent job in promoting these crucial features. We do, however, recommend that CARB could strengthen price discovery and therefore promote transparency by publishing periodic allowance price forecasts and comparisons of emission control technologies for different industry sectors.

Part II considers the importance of liquidity and the reduction of price volatility to a properly functioning emissions trading market. Again, we support CARB's proposed program features to promote liquidity and have several additional recommendations. First, we think CARB should expand to all utilities the requirement that they sell freely allocated allowances at auction. We also think CARB should consider creating an alternative mechanism for dealing with the problem of offsets discovered to be invalid, perhaps one based on a compliance pool. Although we understand CARB's desire to restrict the use of offsets that do not provide additionality, we worry that the certification provisions are so restrictive that they may unduly limit market liquidity.

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In Part II we also address and make recommendations for avoiding the potential for extended price spikes. We suggest that CARB develop contingency measures, including mandated adoption of emissions technology triggered by pre-defined auction or reserve price events. And we believe that CARB should commit to specific dates for interim program evaluation, such as the end of compliance periods, in order to make any needed adjustments once the program has been up and operating.

Part III looks to the potential for liquidity issues and market manipulation in the interaction between the power market and the carbon market. Here we examine the reasons the Southern California RECLAIM program, a market-based system aimed at reducing certain air pollutants, suffered a major price spike during the 2000–2001 energy crisis. We believe that CARB has taken appropriate steps to avoid a repeat of the RECLAIM problems but nevertheless suggest that CARB study in more depth the risk of a price spike in the event that certain conditions—including a strong economy and unusually hot weather—converge. In this Part we also examine CARB's efforts to prohibit utilities from resource shuffling, defined as an attempt to count emissions reductions simply from switching fuel sources so as to direct cleaner burning fuel to California markets without making any actual emission reductions. While we believe this rule serves a critical purpose, we fear the definition of resource shuffling is too broad and could prohibit utilities from counting real and legitimate fuel changes that would result in real carbon reductions. We suggest that CARB clarify its definition to ensure that only actual resource shuffling is barred.

In **Part IV**, we discuss CARB's ability to detect market manipulation, rules violations and fraud. We again think CARB has done an excellent job in its proposed rules, and again make several recommendations. We suggest that CARB publish quarterly estimates of covered emissions, as well as publish registration information, including corporate associations, on its website in order to allow for third-party oversight. In addition, CARB should publish quarterly and annual information on emissions and market monitoring analyses. And in the event that CARB decides it cannot certify the results of an auction, the agency should clarify what steps it will take in response. In addition, CARB should create a market surveillance committee to address manipulation attempts and contract with a third-party market monitor to provide short-term monitoring support.

Part V summarizes CARB's ability to enforce its regulation on market participants. We have several recommendations to strengthen CARB's proposed enforcement regulations, though again generally agree with the approach CARB has taken. We suggest that CARB establish basic guidelines and procedures for freezing participant accounts, confiscating allowances and permitting limited challenges to regulatory enforcement actions. We think it would be helpful if CARB clarified which party has the burden of proof in the event that CARB disputes a trade. We also think that CARB should explicitly define the term "material misstatement" in a way

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that is consistent with common legal understanding rather than limiting materiality to errors that sum greater than 5%, an amount we fear encourages errors up to 5%.

We turn in **Part VI** to the efficacy of proposed penalties for violations of the regulations. Here we generally think CARB's penalties are sufficiently strong with the exception of CARB's proposed treatment of underreporting of emissions. We suggest that entities that underreport emissions by more than 5% should have to make up the full amount of underreported emissions rather than simply the amount above 5%. We also recommend that underreporters should be subject to automatic penalties in addition to having to make up the differential between actual and reported emissions. Alternatively, the automatic penalty provision could exempt unforeseen technical changes or apply only to repeat offenders. We also have a clarifying suggestion to explicitly refer to sections 96011 and 96013 in the list of potential recourses for violations of trading rules.

Finally, in **Part VII** we consider the effect of the 2020 end date for the trading program. An abrupt end to the program will have significant consequences both for emitter planning and for the value of allowances as the end date nears. In order to ease these consequences, therefore, we recommend that CARB aim to address the question of whether and how the program will continue after 2020 and what the fate of program allowances will be by the end of the first compliance period. We also suggest that CARB include language that explicitly allows for either the discontinuation of banked allowances or the transfer of them into a new program at an appropriate ratio.

Of all the recommendations in the paper, our view is that the most critical ones for improving market function and limiting the potential for manipulation are these:

- CARB should strengthen the consequences of under-reporting emissions (Recommendations VI-1 and VI-2);
- POUs should be required to auction their allowances (Recommendation II-1);
- CARB should publish periodic allowance price forecasts (Recommendation I-1); and
- The resource shuffling rule should be clarified so as not to sweep too broadly (Recommendations III-3 and III-4).

Our recommendations are aimed at strengthening an already well-designed program and minimizing even further the risks that CARB has already addressed. None of our recommendations is so critical that it need delay CARB's adoption of the program, in our view, though our preference would be for at least these four critical areas to be addressed before finalization, and the remainder given serious consideration during the program's roll-out phase.

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LIST OF RECOMMENDATIONS

Recommendation I-1: Publish periodic allowance price forecasts and comparisons of emission control technologies for different industry sectors.	20
Recommendation II-1: Expand to all utilities the requirement that they sell their freely allocated allowances at auction.	30
Recommendation II-2: CARB should require the market monitor to review the holding limits annually and report whether they should be changed.	35
Recommendation II-3: CARB should create an alternative mechanism for dealing with the problem of offsets discovered to be invalid, perhaps one based on a compliance pool.	38
Recommendation II-4: To avoid extended price spikes, CARB should develop contingency measures, including mandated adoption of emissions technology triggered by certain price events.	42
Recommendation II-5: Set specific dates for interim program evaluation, such as at the end of compliance periods.	42
Recommendation III-1: CARB should conduct a study, similar to the Economic Analysis of the Scoping Plan, that examines various weather and economic growth scenarios in order to determine whether the size of the APCR is adequate to handle price spikes.	45
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Recommendation III-3: Clarify what "new or expanded capacity" means in the definition of Resource Shuffling.	48
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Recommendation IV-2: Clarify steps to be taken in the event that CARB cannot certify the auction results.	51
Recommendation IV-3: CARB should set up a market surveillance committee to address attempts at manipulation and contract with a third-party market monitor.	52
Recommendation IV-4: The regulation should require CARB to publish registration information, including corporate associations, on CARB's website.	53
Recommendation IV-5: Require CARB to publish quarterly and annual information on emissions and market monitoring analyses.	53

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Recommendation V-2: Clarify which party has the burden of proof in a dispute over a disputed trade.	57
Recommendation V-3: Redefine "material misstatement" with reference to its common legal definition so that it encompasses both errors that, if known, would affect a person's decisionmaking and errors greater than 5%.	59
Recommendation V-4: CARB should report publicly about its cap and trade administration and enforcement budget, including how much of its total budget will be allocated for the program, how many personnel, how they will be funded and whether the resources will be additional to the agency budget or will come from within.	60
Recommendation V-5: CARB should set up an official mechanism allowing third-party administrative petitions regarding rules violations and potential enforcement actions, including a requirement that CARB respond to such petitions within 60 days.	61
Recommendation VI-1: Require entities that underreport emissions by any amount to make up the full amount of underreported emissions.	64
Recommendation VI-2: Underreporting of more than 5% should trigger automatic penalties, not just a requirement to make up the difference. Exemptions for unforeseeable technical changes could be allowed, or penalties could be linked to repeated instances of underreporting.	65
Recommendation VI-3: Explicitly reference sections 96011 and 96013 in the list of potential recourses for violations of the trading rules.	66
Recommendation VII-1: Aim to address the question of the continuation of the program and the fate of allowances post-2020, by the end of the first compliance period.	67
Recommendation VII-2: CARB should include language explicitly allowing for either the discontinuation of banked allowances or the transfer of them into a new program at an appropriate ratio.	68

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I. TRANSPARENCY AND PRICE DISCOVERY

The bedrock of competitive markets is transparency.⁷ If all market participants can observe aggregate prices and quantities transacted, then markets will have less uncertainty and more efficiency. More reliable markets will attract more participants, which will make them harder to manipulate. Emissions trading usually includes auctions of allowances at periodic intervals, spot markets where allowances can be traded at any time among any buyers and sellers, and derivatives markets (markets in financial instruments, such as futures or options, based on the allowance market). Transparency is important in each of these markets.⁸

Markets function better if participants have a clear idea about future demand and supply and can plan their decisions accordingly: “[t]o the extent that prices, trade volumes, and current bids and offers are transparent (in real time), the accuracy of prices will be enhanced, thus minimizing trading costs and uncertainty.”⁹ In emissions markets, demand for allowances is based on emissions levels and supply is mostly fixed by the allowance cap amount, though offset availability can influence supply as well. Therefore, current emissions and emissions forecasts will form the basis of allowance price forecasts. If emissions are not publicly known, then it may be possible for entities with good private information on emissions amounts to trade on that information, causing losses for other participants, and reducing confidence in the market.

Jonas Monast explains the need for transparency this way:

Regulators require sufficient information about the marketplace, including prices, volume, positions, and market trends, in order to prevent and punish market abuses. The more detailed information an oversight body receives, the better its capacity to detect trading irregularities and inconsistencies. With timely data, appropriate enforcement authority, and sufficient resources, regulators can quickly identify suspicious spikes in market price or trade volume. Similarly, accurate, timely data about prices, trade volume, and counterparty risk allow market participants to make more accurate bids and offers, thereby reducing price volatility.¹⁰

CARB has adopted several important mechanisms to ensure that its markets are transparent. These include emissions registries (which require emitters to report their annual emissions), reporting of spot-market prices and transfers of allowances, and regular auctions. CARB appears to have learned from the sometimes negative experiences of other markets that have failed to adopt such mechanisms and, as a result, CARB should minimize problems that arise from an insufficiently transparent market.

The two most successful cap-and-trade programs in the U.S. have experienced some difficulties in maximizing transparency, particularly in the early stages of the programs. Similarly, the EU trading program initially experienced difficulties due to insufficient transparency. We highlight

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these difficulties in order to demonstrate why transparency is so important and also emphasize that the proposed CARB regulations do a very good job in requiring the kind of transparency that should avoid the difficulties other programs have faced.

In the SO₂ trading program, initially it was very difficult to determine the price of an SO₂ allowance, and thus buyers and sellers had widely varying ideas on the proper market price.¹¹ Price volatility was seen in the SO₂ program at the beginning of each phase.¹²

SO₂ Trading

Title IV of the 1990 Clean Air Act Amendments imposed the first large application of cap and trade, for SO₂.¹³ Burning fossil fuels produces SO₂. SO₂ is implicated in particulate formation, a serious public health and environmental threat associated with respiratory disease, heart disease and premature deaths.¹⁴ Deposition of sulfur is commonly known as acid rain.¹⁵

Title IV distributed allowances to existing power plants based on historical emissions (1985–1987),¹⁶ such that the total allowances available remain under the target cap.¹⁷ Each year, the total number of allowances allocated declined to meet the cap.¹⁸ Newer plants do not receive an allocation but must instead purchase allowances.¹⁹ Covered emitters were required to surrender allowances on an annual basis.²⁰

The first trading phase, 1995–1999, applied to the 263 high-emitting coal power plants.²¹ The second trading phase, started in 2000, covered all coal-fired power plants with a capacity over 25 megawatts, along with some smaller ones (2262 facilities in all).²² The program did not distinguish between phase I and phase II allowances.²³

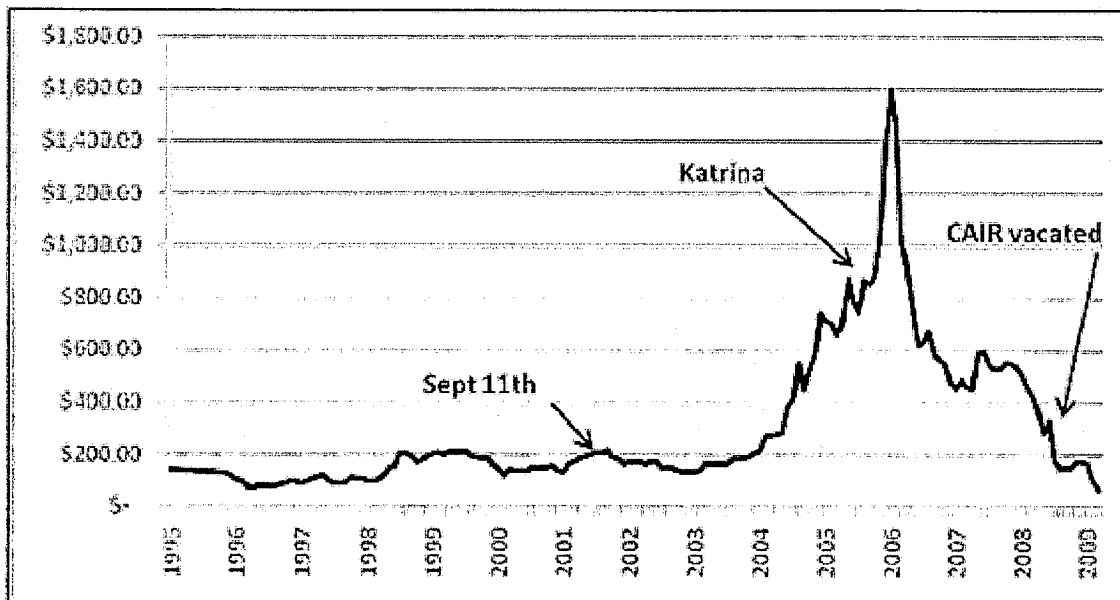
Public health and economic models suggest that benefits from the reduction in SO₂ emissions far outweighed the cost of the trading program. The emission cap, however, may be set too low to fully capture these benefits. "[T]here remains a large difference between the marginal benefits and marginal costs of emissions abatement, indicating that emissions levels under the program remain too high to reap substantial economic benefits."²⁴

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SO₂ Allowance Prices ³⁴⁸



Market volatility in the Ozone Transport Commission (OTC) NO_x trading program had two primary sources. First, in a surprise move, Maryland chose not to participate in the first season and other states were slow to adopt rules.²⁵ Lack of clarity in the rules and lack of certainty on state participation contributed to unstable initial allowance prices. Second, performance of the primary reduction strategies—load shifting and small operational modifications—was unknown at the start.²⁶ Prices dropped in the summer of 1999 after it became clear that operational strategies resulted in more efficient reductions than originally anticipated.²⁷

OTC NO_x Trading

NO_x contributes to particulate formation, acidification and ground-level ozone.²⁸ Major metropolitan areas in the eastern United States, and southern California, experience widespread nonattainment of air quality standards due in part to regional NO_x emissions.

Eleven northeast and mid-Atlantic states agreed to a cap-and-trade policy from 1999 to 2002, called the Ozone Transport Commission (OTC) NO_x Budget Program, to reduce NO_x emissions from large stationary sources.²⁹ Each state allocated its share of the total cap to sources within the state.³⁰ The states relied on EPA for support with their modeling, emissions monitoring and allowance tracking systems.³¹ Reductions from the program amounted to a 54% decrease from a summer 1990 baseline.³² Sources could bank allowances, but use of banked allowances was limited to avoid excessive seasonal emissions.³³

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The EU ETS did not have fully functional emissions registries when it began and, as a result, it was difficult to forecast the demand or price of emissions allowances.³⁴ As emissions reporting and registries were established, it became clear that allowances exceeded emissions. This over allocation, combined with the lack of banking, sent allowance prices to near-zero at the end of the initial trial period.³⁵ Moreover there is speculation that some market gaming occurred because of the lack of transparency about emissions forecasts: some observers believe that information regarding allowance allocations and emissions was leaked prior to publication and this allowed some market participants to unjustly enrich themselves by “front running” the market. This possibility highlights the need for prompt publication of compliance instrument and emissions data and strict security of the information before publication.

EU ETS

The European Union Emissions Trading Scheme (EU ETS) began operation in 2005.³⁶ EU ETS encompasses approximately 10,000 facilities representing 40% of the total greenhouse gas emissions in the EU, making it the largest trading program to date.³⁷ Each EU member nation implements its own regulations to allocate, monitor and enforce carbon credits.³⁸

In Phase I of the EU ETS (the pilot phase), member states had authority to determine the number of allowances and the method of allocation.³⁹ Most distributed allowances freely based on recent historical emissions data.⁴⁰ Banking was allowed without limit within each phase.⁴¹ Phase I ran from 2005–2007 and had 5.6% more allowances than needed to cover emissions.⁴²

A more stringent cap was set for Phase II, running from 2008–2012. The cap was set 6% lower than comparable 2005 emissions. A Phase III trading period has been proposed for 2013–2020 with a cap 11% lower than the Phase 2 cap.⁴³

EU ETS allowances are issued annually for a vintage year, at the end of February (either through auction or allocation).⁴⁴ Allowances are surrendered for compliance purposes each April.⁴⁵ This time frame, along with banking rules, “allows covered entities to effectively cover shortages in a given year with allowances issued for the next year.”⁴⁶

Each participating country operates its own electronic registry to track allowance ownership and sales.⁴⁷ Any interested traders can participate in the EU ETS market.⁴⁸

In 2008, carbon prices declined 47%, to 16 euros / ton by December. This decline was precipitated by the economic crisis throughout Europe and the world.⁴⁹

These experiences suggest that public allowance auctions, transaction reporting requirements, and derivative reporting requirements are critical to providing the necessary aggregate price and quantity data. Detailed emissions registries create transparency about the current and future demand for allowances. At the same time, disclosure of individual trade data or trade data over

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short time frames can allow speculators to anticipate allowance purchases by compliance entities, driving up the price.⁵⁰ CARB has adopted each of these mechanisms, as described below, in an effort to learn lessons from past market failures.

A. Transparency through emission registries

Emission registries, as we are using that term here, report certain information about covered entity emissions to the public. CARB has adopted stringent emission registry requirements aimed at enhancing transparency of emissions levels and, therefore, of likely allowance demand. These registry requirements are handled primarily through the Mandatory Reporting Regulation (MRR),⁵¹ which is the controlling regulation for emissions reporting in the CARB trading program. The MRR defines who must report emissions, sets forth requirements and calculation methods for that reporting, provides for verification, and contains provisions concerning enforcement, confidentiality and recordkeeping.

In our view, CARB has created robust registry requirements. It is likely to avoid some of the problems caused by poor emissions data transparency experienced by the European Union's European Trading System (EU ETS) and some of the early volatility experienced in the SO₂ and OTC NO_x trading programs.⁵²

Moreover, CARB's mandatory reporting rule became effective several years ahead of the start of California's proposed trading program and is, at this point, significantly more advanced than the EU ETS registries were when trading began there. We believe CARB's registry provisions are well designed to protect transparency.

B. Spot-Market Transparency through trade and price reporting requirements

Like other commodity markets, allowance spot markets need timely information on aggregate prices and quantities transacted. Requirements to report publicly on all spot-market trades are one way of providing that information.

Other emissions trading programs have not always done a good job with spot-market reporting and transparency. The SO₂ trading program does not require official price reporting of spot-market trades, but instead requires only the reporting of transfers of allowances.⁵³ Brokers and exchanges have stepped in, however, to fill this information gap. SO₂ trading information, along with other

Spot Markets

Spot markets, sometimes referred to as "cash markets," are public financial markets that trade commodities or other financial instruments for immediate delivery. In contrast, futures markets trade in financial instruments with future delivery dates.

Spot markets can be organized as an exchange. Or the market can be "over the counter" (OTC), meaning that contracts are made directly between two parties without an intermediary exchange.

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emissions trading information, is widely available. In the EU ETS as well, private participants stepped in to provide accurate information.

California, however, is already better placed than many other emissions trading programs on this score. Some of the private firms that have stepped in to report on the EU ETS market already report prices for California certified offsets and futures prices for California Emissions Allowances. The existing network of financial firms that specialize in emissions trading will be well-equipped to provide immediate transparency to the California carbon market and will also reduce the transactions costs of trading, leading to a more efficient and liquid market.

Moreover, CARB's proposed regulations require reporting not only the transfer of all allowances and offsets (as in the SO₂ and EU ETS markets) but also the reporting of prices. CARB plans to report aggregated price and quantity transactions data. This reporting will provide market transparency and price discovery even in the unlikely event that private firms do not provide this service.

Lastly, CARB will issue serial numbers corresponding to each carbon allowance, which will allow for tracking and further strengthen spot-market transparency. Tracking allowances through use of unique serial numbers is a simple and important reporting consideration. Tracking ownership through serial numbers can increase transparency in reported trading information.⁵⁴ SCAQMD did not serialize the allowances in the RECLAIM program, which EPA noted would have allowed "more accurate tracking."⁵⁵ Tracking also aids market players in determining actual supply and demand volumes for allowances.⁵⁶

C. Transparency through periodic price forecasting

One area in which we see an opportunity for CARB to strengthen market transparency relates to the public availability of information about likely future market conditions and price forecasting. We draw these lessons largely from the experience of southern California regulators in the RECLAIM program, in which price spikes were partly due to information deficits and asymmetries concerning likely future market conditions.

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NO_x and SO_x trading in RECLAIM

California SCAQMD's RECLAIM program was the first large-scale urban regional trading program for NO_x and SO_x. It aimed to reduce NO_x emissions 70% from business-as-usual between 1994 to 2003. To limit downwind pollution, trading was split between two zones.⁵⁷ Covered entities had an annual compliance obligation, ending in either December or June.⁵⁸ Facilities that emitted at least four tons of NO_x or SO₂ annually were subject to RECLAIM; other facilities could opt-in.⁵⁹ Approximately 350 facilities participate in the NO_x market and 40 facilities participate in the SO_x market.⁶⁰

RECLAIM did not allow for banking of allowances.

In the first year, trading was light but increased over time. From 1997–1999, NO_x prices were stable at \$1500 to \$3000 per ton. In 2000, prices spiked to a high of \$124,000 per ton.⁶¹ Average price for 1999 vintage allowances purchased in 2000 was \$15,377 per ton, compared to \$1827 per ton in 1999.⁶² 2000 vintage allowances cost an average of \$45,000 per ton if purchased in 2000, compared to \$4,284 the year before.⁶³

In 2000, a declining cap encouraged meaningful trading just as allowance demand increased from California's flawed electricity deregulation plan and a drought impaired hydroelectric generation.⁶⁴ An anticipated crossover occurred, where actual emissions would potentially exceed total allocations—requiring some facilities to take emission-reducing actions. Instead, in 2001, generators emitted 1,100 tons over their total allowance holdings (exceeding allowances by 19%⁶⁵) and many failed to comply with RECLAIM.⁶⁶ Burtraw & Szambelan identify this as the only time in which an emissions cap has been breached in a trading program.⁶⁷ In response, SCAQMD made significant changes to the program.

RECLAIM is often viewed as illustrative of some of the dangers of an ill-designed market trading program.⁶⁸ A primary criticism of RECLAIM was its inflexibility: "[RECLAIM] was unable to react to certain political and economic externalities that may have driven the price of credits to a point where it became difficult for polluters to trade credits."⁶⁹ Another criticism was its lack of actual emission reductions. An EPA study on RECLAIM observed that "the program has produced far less emission reductions than either were projected for the program or could have been expected from the subsumed CAC [command-and-control] system."⁷⁰ And the compliance rate from 1994 through 2000 varied between a low of 85% (in 1996) to 96% (in 1997).⁷¹

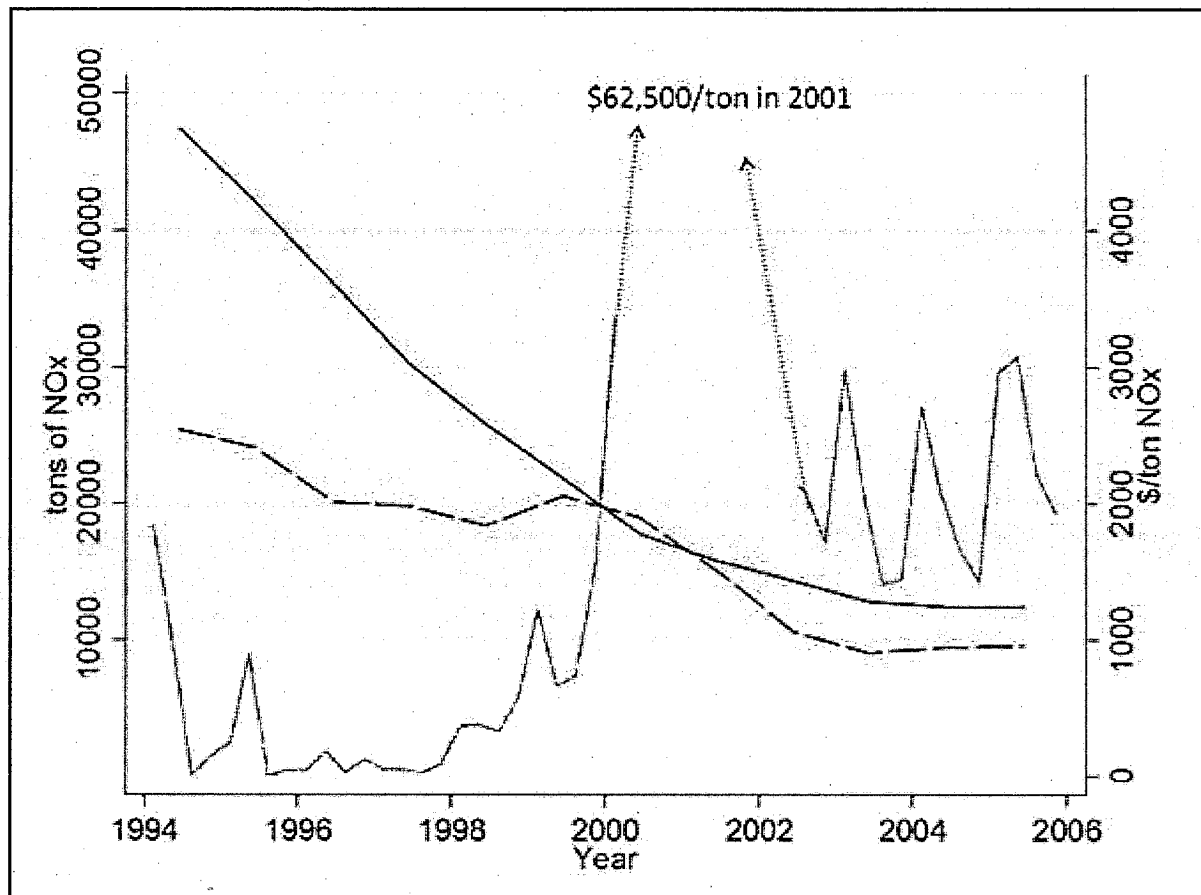
In its review of RECLAIM, EPA noted, "SCAQMD could provide more information on the performance of the market, the current state of the environment, and expected economic and market conditions."⁷² Leading up to the 2000–2001 price spike in RECLAIM allowances, regulated entities lacked sufficient market and economic information to encourage a shift to low-emission technologies.⁷³ The price spike was not completely unanticipated, and better forecasting of future demand shortages could have mitigated the spike.⁷⁴ But by 2000, a shift to better emission controls would not have moderated the price spike at that time. Purchasing and installing additional emission controls for RECLAIM facilities took, typically, 18–36 months.⁷⁵

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RECLAIM NOx Allowance Prices³⁴⁷



Large companies tend to consider the price of allowances when determining what control technology to install.⁷⁶ This requires predictions of future allowance prices, but in RECLAIM, uncertainty in this prediction made compliance difficult.⁷⁷ In addition, some critiqued facility managers for focusing too narrowly on short-term costs to the detriment of long-range planning.⁷⁸

Smaller companies are usually more concerned with market share, not environmental compliance, in their long-range planning.⁷⁹ With fewer resources, smaller companies tend to forecast only a few years in advance.⁸⁰ Thus, smaller companies are more likely to purchase credits closer to their compliance deadlines and be less sensitive to forecasts of allowance price increases.

We believe that CARB could play an important role in alleviating these information gaps and thereby encouraging regulated entities to behave in ways that maximize market function as well as their own best interests. All regulated entities should have equal, frequent access to robust,

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long-range price forecasts, and to periodic reports comparing the costs of different control technologies with each other and with the expected cost of allowances.⁸¹

Recommendation I-1: Publish periodic allowance price forecasts and comparisons of emission control technologies for different industry sectors.

D. Auctions as price discovery mechanisms

The auctioning of allowances allows firms to judge the worth of allowances. Especially in the beginning of an emissions market, no firm can be sure of the correct value of an allowance. This value depends on the incremental cost to firms of reducing emissions, which is likely not known to the firms themselves until they weigh the price of allowances against their options to reduce emissions. An auction gives firms a chance to see the value others put on allowances and to form an idea of about how much a ton of emissions will cost them. Economists refer to this process as price discovery. The broader the participation in the auction, the better the price discovery. This price discovery process in the auction ends with an aggregate price and quantity of allowances auctioned. For market efficiency and fairness, this information, along with some information on the distribution of allowance purchases, should be widely available.

CARB proposes regular auctions (described further in the accompanying text box) and plans to release the following information following each auction: (A) names of bidders; (B) settlement price; and (C) "aggregated or distributional information on purchases."⁸² Summary auction results⁸³ will be published on CARB's website after the auction is certified by CARB.⁸⁴ All of this should, in our view, serve the price-discovery function well.

CARB has also designed its auction pricing structure to avoid some of the problems of the SO₂ trading market. In that market, EPA withholds a small percentage of allowances (2.7%) and the Chicago Board of Trade (CBOT) auctions these allowances annually.⁸⁵ The SO₂ auction is price-discriminating, meaning that each winning bidder pays the price of his bid.⁸⁶ In addition, there is no minimum price for the auction sales.⁸⁷ The combination of these two rules has meant that bidders strategically bid very low.⁸⁸ The GAO has thus recommended a shift to single-price auctions, in which each winning bidder pays the *lowest winning bid price*, rather than its own bid price. Single-price auctions are expected to reduce market uncertainty and raise auction prices.⁸⁹

In keeping with the GAO's recommendation, CARB proposes single-price auctions and also plans to incorporate a price floor.⁹⁰ These measures should reduce the low-bid problem seen in the SO₂ auctions.

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CARB trading: Auctions

Auctions will be held on August 15 and November 14, 2012, and then quarterly thereafter.⁹¹ Each quarterly auction will offer 1/4 of the available current year allowances and 1/4 of allowances set aside from the vintage year 3 years in advance.⁹² Consigned allowances⁹³ and confiscated allowances⁹⁴ will also be offered from sale. Auctions are single-price, sealed bid in multiples of 1000 allowances.⁹⁵ Each auction has a \$10 reserve price, adjusted by 5% plus inflation (CPI) each subsequent year.⁹⁶

Unsold current vintage year allowances are moved to the Reserve.⁹⁷ Future vintage year allowances will be offered again for sale at the next auction.⁹⁸ This acts to reinforce the price floor, by making current vintage year allowances scarcer for subsequent auctions in the event of a low market clearing price.

E. *Transparency in the Derivatives Markets*

Derivatives and Futures

Derivatives are financial instruments whose value is based on the price of an underlying commodity or other financial instruments. For example, futures are promises to deliver a commodity (such as an allowance or a barrel of oil) at an agreed time in the future, so the value of the future is based on the estimate of the commodity's value in the future. Derivatives can take many different forms.⁹⁹

A **forward contract** is an agreement to purchase a specified number of an item at a specific future date. Price may be agreed upon in advance or at delivery.

A **futures contract** is a standardized forward contract that can be traded on exchanges, and defines a price at the initiation of the contract.

An **option** gives the buyer the right, but not the obligation, to either buy or sell an item at a specific price within a specific time period.

The Commodities Futures Trading Commission (CFTC) has jurisdiction over domestic futures and options exchanges. CFTC regulates clearing organizations and brokers for these exchanges.

Derivatives are important to the smooth functioning of allowance markets. Derivatives allow investors to transfer risk. But sometimes traders can manipulate these markets to the detriment of market efficiency.

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Those who know they will need allowances in the future can use derivatives to limit the risk that prices will rise. "The risk management potential may be especially important in the early years of a cap-and-trade system as capped entities adjust to the risk and volatility in the new carbon market."¹⁰⁰ Of course, in order to offload the price risk, market participants will have to find someone willing to take the other side of the trade so derivatives do not reduce overall risk, they only reallocate it in economically useful ways.

Using derivatives to reduce individual risk will be crucial to the carbon trading strategy of many large emitters. Power generators, for example, will need complex hedging strategies to cope with shocks that affect both electricity and carbon allowance prices.¹⁰¹ Nascent markets, such as California's cap-and-trade program, may see a majority of trading occur in derivatives until more allowances enter circulation because derivatives are based on promises of future delivery, and thus are not bound by the current volume of allowances in the marketplace.¹⁰² In EU ETS trading, most of the trading occurs in the derivatives market (particularly futures and, to a much lesser extent, options).¹⁰³

Derivatives markets regularly fall victim to market manipulation and this type of manipulation can reduce market confidence and efficiency.¹⁰⁴ Derivatives manipulation in commodities such as soybeans or oil typically uses the difficulty of physically delivering the commodity to obtain higher than market prices from the traders who are obligated to deliver the commodity. Carbon derivatives markets are more difficult to manipulate because there are no physical delivery costs and market manipulation has not been a significant problem in emissions markets derivatives to our knowledge. However, manipulation can still occur in similar markets, such as the Treasury bills market, so it is prudent to build in safeguards against derivatives market manipulation.¹⁰⁵

Transparency and speculative limits are measures designed to restrict manipulation in derivatives markets. (A speculative limit prohibits a trader from owning more than a set number of a specific type of derivatives contracts.) The Commodity Futures Trading Commission (CFTC) exercises regulatory authority over derivatives trading for emissions markets.¹⁰⁶ Under the Dodd-Frank Act, all derivative transactions are reported to the CFTC and the CFTC monitors derivatives markets for any evidence of market manipulation. In addition, the CFTC requires that any derivatives traded on exchanges are "not readily susceptible to manipulation."¹⁰⁷ Finally, the CFTC requires that any exchange-traded derivatives (such as futures) be subject to speculative limits by the exchange itself.

The Dodd-Frank Act provides for considerable more transparency than was previously the case. Derivatives are in some cases traded in exchanges with standardized contracts. These exchange-traded derivatives were always subject to CFTC regulation. However, bilateral contracts known as over-the-counter (OTC) derivatives were largely exempt from CFTC regulation. As of July 2011, OTC derivatives will be subject to reporting and trading requirements.¹⁰⁸

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As derivatives market manipulation has not been a reported problem in the SO₂ or EU ETS markets, this does not seem like a likely arena for manipulation of allowance markets. The new approach in the Dodd-Frank Act provides for more transparency and market-power regulation than previously and should decrease the risk of derivative market manipulation even further. Because the CFTC has regulatory authority over the derivatives market, however, CARB's role will be limited. It would be useful for CARB and the CFTC to formalize a relationship in order to foster strong communication and information sharing.

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II. LIQUIDITY AND REDUCTION OF PRICE VOLATILITY

As we have described above, transparency is crucial to a well-functioning emissions market. The other critical element to assure efficient market functioning and prevent manipulation is liquidity: sufficient volume so that a single or small group of buyers or sellers cannot move the price. Liquid, or “thick,” markets with a large amount of buying and selling are critical to limiting price volatility and allowing buyers and sellers recourse to spot markets at any time. Without thick markets, transparency cannot ensure a well-functioning market because traders cannot be sure of their ability to buy or sell in a given price range or at a given time. Prices are often volatile and large orders can substantially move prices in thin markets. For the same reason, thin markets are also more vulnerable to market manipulation.

History shows that concerns about thin markets and price volatility are well-founded. The SO₂ market experienced price volatility at the onset of both its phases.¹⁰⁹ In addition, trading ramped up over the first few years of the program, suggesting that firms underwent a learning process.¹¹⁰ The RECLAIM market experienced significant price volatility resulting from at least a few causes, including: increased demand for power generation in the summer of 2000; the crossover point around 2000 at which available allowances fell below actual emissions; and delay in installation of emission controls by participants in the program.¹¹¹

In light of these experiences, California should seek to ensure as liquid a market as it can, at every market stage. Probably the single most effective mechanism to ensure market liquidity is to make the number of buyers and sellers in the market sufficiently large so that no single entity can dominate trading. Liquidity requires both buyers and sellers, and therefore sufficient heterogeneity of market participants so that some are interested in buying when others are interested in selling. Therefore, it is important that emissions trading programs involve a variety of market participants (not just emitters, but financial firms, firms interested in using allowances to hedge related markets, etc.).

In addition to large market size, market design elements such as auctions, banking, allowance reserves and offsets are key to establishing liquid markets. Although these design elements are often presented as cost-containment features, they control costs by increasing supply, and therefore liquidity, when prices are high. This increase in supply not only reduces prices (relative to not having the additional supply) but likely results in a market with more trading, more participants, and therefore greater efficiency and fairness. Without mechanisms to moderate price volatility, market participants may be prone to be risk averse and not trade their allowances, resulting in thin markets that are more vulnerable to manipulation. The availability of additional supply when prices are high should allay the fears of being caught short in a market with skyrocketing prices and induce more market participation. These market functioning advantages should be weighed against the disadvantage that providing extra allowances may increase emissions.

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The other key element for increasing liquidity is to decrease the barriers and transaction costs of trading. SO₂ allowance trading grew quickly over the first few years of the market due to lack of such a trading barrier.¹¹² In contrast, the Clean Air Act offset program had high costs and paperwork barriers and consequently never developed a strong market.¹¹³ This line of research emphasizes that measures to inhibit market manipulation will be counterproductive if there are too many burdens and uncertainties to trading. CARB does not require pre-approval of trades (beyond enforcing holding limits) nor does it have other significant barriers to trading. The CARB trading regulations do have, however, a provision that allows CARB to cancel trades after the fact. As we discuss further in Part V.B, this provision should be used carefully so as not to introduce uncertainty into trading.

As with its efforts to promote transparency, we believe CARB has adopted several important mechanisms to ensure that its markets are sufficiently liquid to limit gaming and increase efficiency. These include broad market participation rules; regular public auctions; unlimited banking; holding limits; provisions for offsets; and the creation of an allowance reserve. CARB again appears to have learned from the sometimes negative experiences of other markets that have failed to adopt such mechanisms and, as a result, should minimize problems that arise from an insufficiently liquid market. Each of these mechanisms is discussed below.

A. Market size

Markets are more efficient and liquid with a greater number and diversity of participants. The more participants there are, the more difficult it is for one or a small group of participants to gain sufficient market power to manipulate prices. A greater heterogeneity of participants increases the likelihood that buyers can find sellers and vice versa.

The CARB trading program has a moderate number of covered facilities, about 350 businesses encompassing 600 facilities.¹¹⁴ This number compares favorably to the approximately 400 facilities that were initially in the SO₂ trading program¹¹⁵ and is more than the 350 facilities that participated in the NO_x portion of the RECLAIM program.¹¹⁶ But it is less than the approximately 1200 facilities currently in the SO₂ trading program.¹¹⁷ The EU ETS program is much larger at more than 12,000 facilities.¹¹⁸ The number of participants in CARB trading, however, will be larger than the number of covered facilities because financial firms, brokers, and others will be allowed to trade allowances.

The number of participants in the CARB trading program is of the same magnitude as the initial SO₂ trading program. The diversity of participants, however, may not measure up to the SO₂ trading program. The facilities in the SO₂ trading program were spread across the entire Northeast and Midwest United States. The participants in the CARB trading program are currently all in California.

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In the SO₂ trading program, facilities are spread across regions. As a result, economic growth and hence demand for allowances do not always move in lockstep. Economic growth might be quite high in some states and lower in others. Also, because different locations have access to different fuels, fuel price movements will not be identical across facilities. This diversity helps to ameliorate price spikes in the cost of SO₂ allowances. Similarly, the EU ETS has broad geographic coverage and a diversity of facilities that makes it unlikely for all sectors to experience demand increases or declines at the same time.¹¹⁹

The facilities in the CARB trading program, by virtue of all being in the same state, will all likely experience similar economic conditions. The utility industry, which is a large portion of the allowance market, will tend to experience simultaneous increases or decreases in allowance demand. For instance, shifts due to weather or prices of fuels, such as natural gas, will have similar effects on utilities throughout California. Admittedly, the CARB trading program will benefit from the geographic diversity of the state. The moderate number of facilities in the CARB trading program and the overall homogeneity in demand could, however, lead to situations where allowance demand rises or falls simultaneously across many of the covered sectors. These coordinated shifts in demand may lead to excessive volatility.

We believe that these price volatility problems are most likely to surface with utility industry allowance demand. We address the issue of industry allowance demand in greater detail in Part III below. In the subsections below, we address many of the elements that CARB has put in place to dampen price volatility. In the end, however, the most straightforward solution to this issue of a homogenous and somewhat small number of facilities in the trading program is to proceed as quickly as possible to integrate the CARB trading program with other regions in the Western Climate Initiative (WCI) and beyond. We understand that CARB is doing so to the extent that other WCI participants are committed to a cap-and-trade approach. The greater the diversity of facilities and geographic areas, the more efficiently the market will function. Until WCI integration occurs, however, CARB has taken significant and important steps to maximize liquidity in its own markets.

B. Promoting liquidity through auctions

In addition to their price-discovery functions discussed above, allowance auctions serve to limit market power. Without them, it would be possible for some market participants to amass large holdings of allowances and use that market power to manipulate prices or to exclude new entrants from product markets that require allowances. However, with an auction, a certain portion of allowances is available to any market participant, and incumbents cannot use blatant exclusion as a market-power strategy. Auctions also limit the ability to corner the allowance markets, because market participants can simply wait for the next auction rather than pay a spot-market price they judge is affected by market manipulation, provided there are multiple auctions during a compliance period. All of this aids liquidity.

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Allowance auctions can also, however, provide new opportunities for gaming. In some cases, participants can manipulate auctions to lower prices. For instance, a group of buyers could collude to buy allowances at an artificially low price.¹²⁰ Any low-bid collusion is not likely to have significant effects in a large emissions market, however, because other market participants will observe an artificially low price and bid at the next auction.

CARB has adopted quarterly allowance auctions, open to a broad set of participants. Besides auctioning current and future-year vintages each quarter, CARB will also require Investor Owned Utilities (IOUs), which receive free allowances allocated directly from CARB outside the auction system, to place all of their allocated allowances into the auction. Requiring IOUs to essentially consign their allowances to auction will essentially convert those free allowances into market value and serve to thicken the auction supply. The IOUs will receive payments for the allowances they must auction but will, of course, then need to purchase any allowances they need (if any) for compliance purposes.¹²¹

CARB has also established purchase limits to prevent any one entity from controlling the auction price. The limits apply only for auctions in 2012 through 2014.¹³⁰ In any one auction, Covered and Opt-in Covered Entities may purchase no more than 10% of the current vintage year allowances or 25% of the future vintages available; all other participants may purchase up to 4%.¹³¹

In our view, CARB's auction design is strong. The fact that its auctions will occur quarterly, as opposed to annually as in the SO₂ program, will provide better periodic liquidity and price discovery. In addition, the frequent auctions will help to prevent market manipulation in the spot market because emitters needing allowances could simply buy in the auction market instead.

We are particularly in favor of the provision that CARB has proposed to require the Investor Owned Utilities to sell all allowances (which they receive for free) through the quarterly auctions, returning the proceeds to the IOUs. This will achieve the purposes of the free

CARB trading: Participants

To participate in the trading program, an entity must register with CARB. All participants are classified as Covered Entities,¹²² Opt-In Covered Entities,¹²³ Voluntarily Associated Entities¹²⁴ or Other Registered Participants.¹²⁵ Covered Entities are certain entities/operators with regulated GHG emissions, as listed in section 95811. An Opt-In Covered Entity has GHG emissions that do not meet the thresholds specified in section 95812 but nevertheless chooses to "voluntarily elect to participate."¹²⁶ Note that, technically, Opt-In Covered Entities are also Covered Entities.

Opt-in Covered Entities are treated as equivalent to Covered Entities for their span of participation in the program, and are explicitly subject to "all reporting, verification, enforcement, and compliance obligations that apply to covered entities."¹²⁷ This statement mainly serves to subject Opt-in entities to compliance requirements, discussed later.

Voluntarily Associated Entities fall into one of three categories: (1) non-Covered Entities that voluntarily choose to hold allowances; (2) offset projects; and (3) a derivatives clearing organization.¹²⁸ Other Registered Participants are, generally, verifiers.¹²⁹

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allowance distribution while also moving more allowances through the auction and spot markets. It will ensure that a large proportion of allowances will be auctioned and establishes a thicker market than in even the SO₂ program did. IOUs will need to be active as buyers in both the auction and spot markets.

There is one area, however, in which we believe CARB could strengthen its auction design. We do not believe that the CARB regulation requiring the auction of freely allocated allowances goes far enough. Instead, by requiring these sales only of Investor Owned Utilities, the regulations may end up decreasing the efficiency of allowance trading, generating market instability, and increasing the possibility of market manipulation. Instead, we believe the requirement should be expanded to encompass Publicly Owned Utilities (POUs), as well. In 2008, electricity generation made up 25% of the emissions that would be capped in 2015,¹³² and CARB intends to dedicate approximately 90% of that amount in allowances given to the electrical distribution industry.¹³³ The allocation to POUs will make up a large part of those allowances.¹³⁴

We see at least two problems with excluding POUs from the requirement that they return their allowances for auction. First, the exclusion may remove the incentive the POUs may otherwise have to make early emissions reductions and thereby increase allowance price volatility in later years. Experience with the RECLAIM program suggests that unless firms are directly confronted with an immediate price for emissions, they will be reluctant to incur current mitigation costs. This may be particularly true of POUs, which have a complex set of responsibilities to ratepayers and the general public. If POUs have free allowances and are not required to return their allowances for auction, they will not face an immediate price for their emissions. It is certainly true that some firms may be able to correctly anticipate the trajectory of allowance prices and plan emissions reductions with foresight, and we acknowledge that POU allocation amounts will reflect some level of short-term emissions reductions. However, the RECLAIM experience suggests that some firms may act shortsightedly and fail to undertake needed investments if, in the early years, they can rely on free allowances to fulfill compliance obligations.

The consequences could be instability and price volatility in the latter compliance periods if many firms have not taken steps to reduce emissions, and therefore find themselves needing to purchase allowances. This would result in an unstable market that is vulnerable to manipulation. While the APCR, banking, and offsets will cushion a certain amount of lack of foresight, it is safer to design the market to give all possible encouragement to participants to consider emissions reductions from the beginning.¹³⁵

The second main problem created by the exclusion of POUs is that it directly harms market liquidity from the outset. The incentives created by CARB's proposal for POUs may place a large proportion of allowances out of market circulation. POUs are required to either place their

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freely allocated allowances in their compliance account or put them up for sale at the quarterly auctions, and receive the proceeds. Allowances placed into compliance accounts cannot be traded, but must instead be used only to fulfill the emitter's own compliance obligations.¹³⁶ If a POU places allowances in its compliance account, it is assured of covering its compliance needs but it also forgoes the benefits if its emissions reduction costs are less than the market allowance price. If it sells allowances through the auction, the POU could gain if the price it eventually buys allowances for is lower than it receives at auction—but stands to lose if the price is greater than it receives at auction. Asking a POU to decide how much of its allocation it will auction is like asking it to decide how large a bet it wants to make on the allowance price. Risk-averse emitters, especially utilities, may tend to play it safe by placing most allowances into their compliance account. Though we cannot predict exactly how utilities or others would make these decisions, the current rules seem to place a very heavy burden on the price- and cost-forecasting abilities of the emitters, a burden we believe they may not execute well.

The difficulty with the choice given to the POUs is that, once allowances are in the compliance account, firms have little or no immediate incentive not to emit up to that amount. The more allowances are locked away in the compliance account, the less short-term incentive emitters will have to find low-cost emissions reduction solutions. Decision makers with good forecasting and a long-term viewpoint will realize that current emissions reductions will allow them to save allowances and, eventually, save money. The experience of RECLAIM, however, shows that it is best not to base market design on the assumption that decision makers will behave with such foresight.

Instead, we recommend that all allowances freely distributed to the POUs be placed at auction and the proceeds distributed back to the POUs. This would guarantee a large and diverse pool of allowances, sellers, and buyers. Traders that believe prices will increase would be able to bid on a large number of allowances, bank them, and produce a more stable price trajectory. All emitters would need to make decisions based on market prices and as a result the market would likely be more stable.

We understand the reasoning behind the initial decision to require auctioning of distributed allowances by IOUs and not POUs. The POUs often own their power generation and have direct compliance obligations. IOUs generally are distribution entities that have few direct compliance obligations (instead, the facilities from which they buy power are generally responsible for covering emissions with allowances). The allowance distributions to IOUs are more of a pass-through that recognizes they are the best placed entities to return allowance value to consumers, for example through rebates or energy-efficiency incentives. Given that POUs are likely to have compliance obligations because they are power generators, the rationale is that they should be able to put allowances into compliance accounts rather than auctioning them.

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We do not believe, however, that these reasons outweigh the market development logic of requiring all freely distributed allowances to be auctioned. Though the example of SO₂ trading suggests that auctioning a small fraction of allowances is enough for price discovery and thick markets, we are reluctant to place too great a weight on one case. It is better to push for the most efficient and liquid market and produce the most stable possible market than it is to trust that the fortuitous circumstances of the SO₂ market will repeat themselves. This is amplified by the initial moderate number of businesses covered by the CARB trading program. (See the discussion on market size in Part II.A above.) The number of covered businesses—less than desired from a liquidity standpoint—could potentially pose a problem of too few market participants so it is important to put all emitters into the market. Moreover, requiring POUs return their allowances to auction has the added benefit of encouraging POUs to reduce emissions immediately, while allowances are low, which will in the long run keep POU compliance costs lower.

Recommendation II-1: Expand to all utilities the requirement that they sell their freely allocated allowances at auction.

C. Reducing volatility by banking allowances

Banking is a well-established trading mechanism that allows participants to save allowances from one period for use in future periods. Regulated emitters can use banking to hedge the risk of future price increases. With banking, market participants have an incentive to reserve a buffer of allowances that can either be saved for future use or tapped to satisfy current compliance needs if prices increase sufficiently. Thus, provisions allowing for banking help to provide the liquidity that safeguards against price volatility and market manipulation.

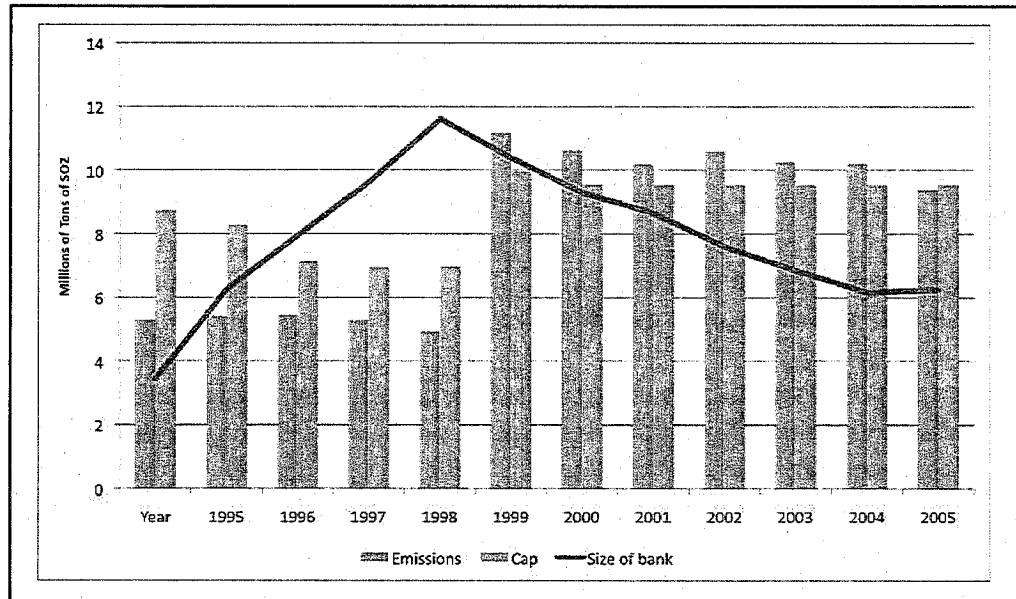
Banking of allowances has been a component of the major emissions trading programs including SO₂, the EU ETS after Phase 1, and RGGI.¹³⁷ Its use in these programs is generally seen to have been quite helpful. In the SO₂ emissions trading program, for example, emitters over-complied in early years and took advantage of their banked allowances to fill compliance obligations in later years. This resulted in lower actual emissions than originally anticipated in the beginning of the program—25% below 1990 levels in 1995¹³⁸—with a gradual leveling off as facilities drew from their banked allowances.¹³⁹ Banking, however, can prevent price collapse in an overallocation scenario, by “provid[ing] present value to allowances that would otherwise have little or no present value, as participants hold them or buy them with the expectation that they will be worth more in the future.”¹⁴⁰ In the early years of SO₂ trading, banking removed allowance supply and thereby increased prices relative to what would have occurred without banking. This increased price, in turn, provided an ample incentive to emitters to reduce emissions early.

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SO₂ Trading Program Emissions and Banking³⁴⁵



RGGI

The first mandatory, market-based GHG program in the United States, the Regional Greenhouse Gas Initiative (RGGI) covers eastern states and some Canadian provinces (as observers).¹⁴¹ RGGI began with two auctions in late 2008. The first compliance period began on January 1, 2009.¹⁴²

The cap declines by 10% between 2009 and 2018.¹⁴³

Demand at the first auction was approximately 4 times the supply, and all 12.6 million available credits were sold.¹⁴⁴ Participating states invest their share of auction proceeds in energy efficiency and renewable energy technology.¹⁴⁵ Auctions are held quarterly.¹⁴⁶

Offsets can be used by covered entities for 3.3% of their compliance obligation.¹⁴⁷

RGGI uses an allowance tracking system (COATS) and employs an independent market monitor to oversee auctions and market trading activity.¹⁴⁸ Any findings of uncompetitive activity or other misconduct is reported back to RGGI for further action by state or federal regulators.¹⁴⁹

The Chicago Climate Exchange and the Chicago Climate Futures Exchange handle allowance and futures trading, respectively.¹⁵⁰

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By contrast, RECLAIM did not allow long-term banking of allowances. In part, this was because SCAQMD anticipated that the cap was not very stringent in the early years of the program.¹⁵¹ Partly because of the limited banking,¹⁵² prices were low in the early years of the program and provided relatively little incentive for emissions reduction.¹⁵³ Surplus credits held at the end of the facility's compliance year became valueless under RECLAIM, while penalties for insufficient credits can be severe.¹⁵⁴ This structure, along with a lack of substitutes for these allowances in the short term, contributed to, in some instances, dramatic price shifts as demand changed.¹⁵⁵ After a 10-fold price increase in allowances in 2000, the program was reorganized to remove some power generation from the program.¹⁵⁶ Banking would likely have decreased the price volatility experienced in RECLAIM¹⁵⁷ and also increased the market liquidity that is the best defense against market manipulation.

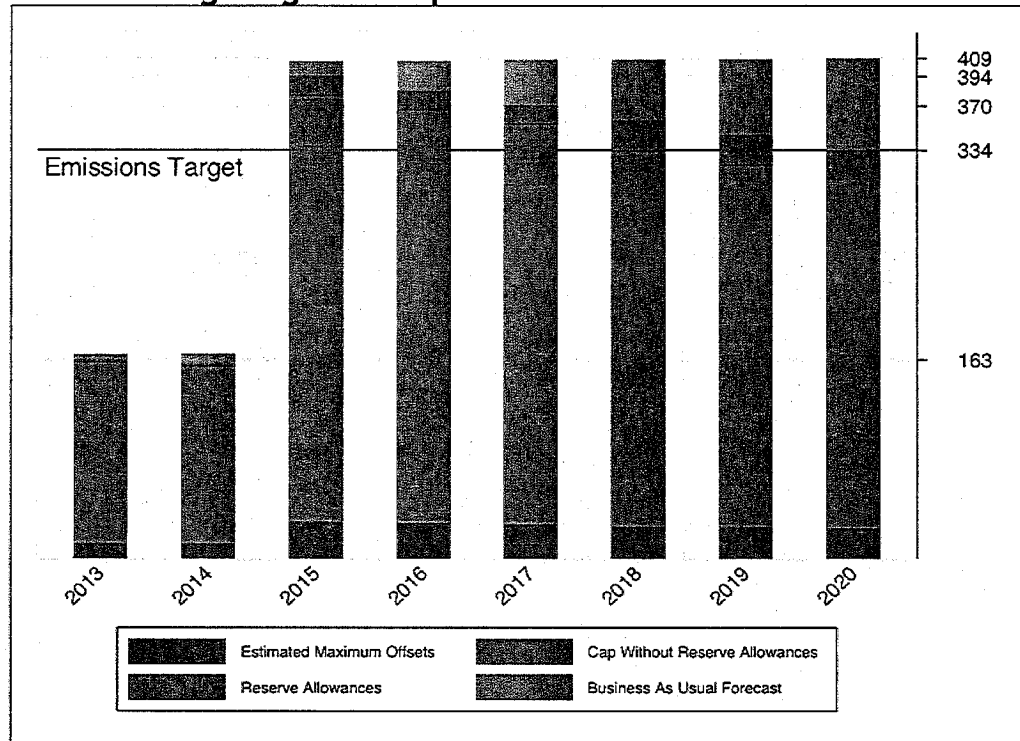
CARB has proposed unlimited banking of its allowances. Any allowance can be saved and used in later years. We believe this is the right decision and will help establish liquid markets, with little environmental downside. CARB's emissions cap starts near the Business-As-Usual (BAU) baseline and then decreases over time. Emitters will have a strong incentive to reduce emissions below the cap in the early years of the program and save those allowances for the later years of the program when the cap will be lower and emissions reductions costs higher. This collective incentive to save allowances will result in a large pool of banked allowances¹⁵⁸ that banked allowance owners might be willing to sell in the current period if current allowance prices are driven sufficiently high. This, in turn, will help to thwart attempts to manipulate prices. In the event of sharply rising prices, owners of banked allowances could sell allowances; in the event of falling prices, participants could bank allowances. Either way, manipulation would not likely be able to alter prices substantially. Thus we support the banking provisions CARB has proposed.

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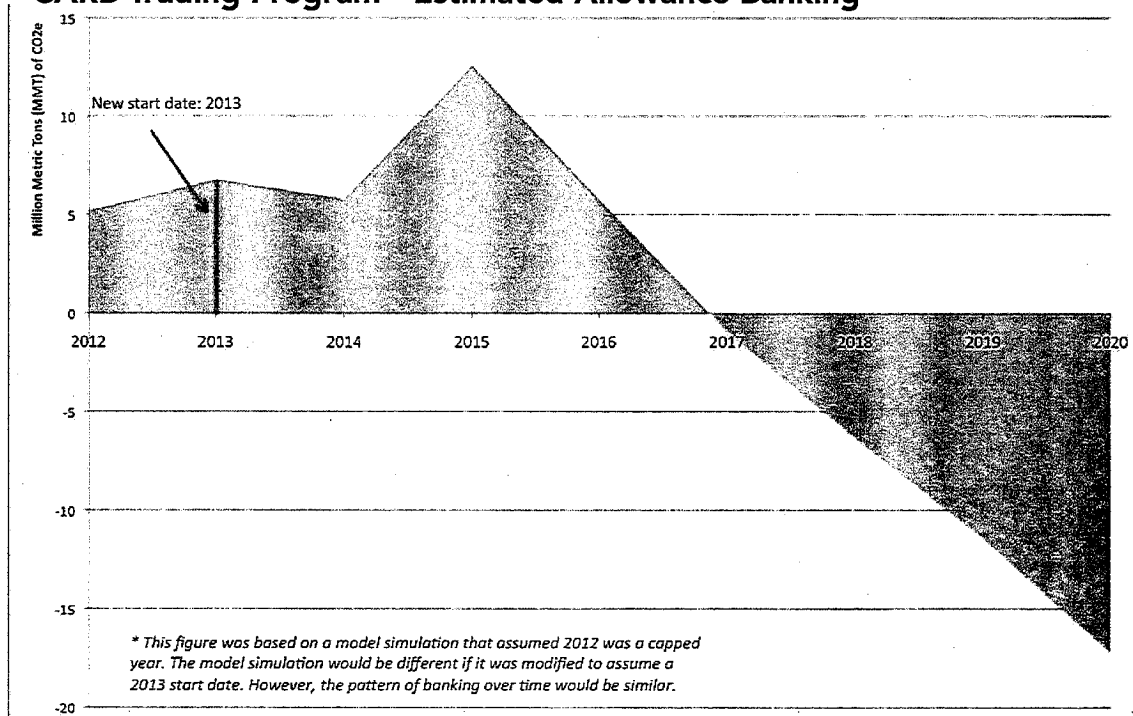
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CARB Trading Program—Cap and Estimated Reductions Needed



CARB Trading Program—Estimated Allowance Banking³⁴⁴



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D. Using holding limits to promote liquidity

Many financial markets use holding limits to assure that participants are not able to manipulate markets. Holding limits typically prescribe a maximum ownership that no market participant can exceed. They are usually expressed as a percentage of the overall market size.

The aim of holding limits is to decrease both the ability and incentive to exercise market power. Because even the fear of market manipulation can decrease liquidity, holding limits can improve markets even if traders who desire large holdings have no intent to manipulate. Holding limits are a direct check on market power because, if they are set correctly, no one trader has enough allowances to directly manipulate the market.

Holding limits do not appear to have been a critical element of market oversight in other emissions trading programs. The SO₂ trading program, for example, does not contain any holding limits, and no market manipulation has ever been reported in that program. Overall

CARB trading: Holding Limits

All Covered, Opt-in Covered or Voluntarily Associated Entities must comply with the holding limit,¹⁶⁴ which limits the total number of allowances that any one entity or association can hold.

There are, in fact, two holding limits: (1) current compliance period holding limit and (2) future compliance period holding limit.

(1) includes all allowances that could be used for compliance in the current period, which includes banked and current vintage allowances and allowances without a vintage year (i.e., allowances from the Reserve). This holding limit is approximately 2.5% of the allowances issued for the current budget year.¹⁶⁵

(2) is advance allowances purchased at auction. This holding limit is approximately 2.5% of the "allowances issued for the future compliance period."¹⁶⁶

Allowances placed in an entity's Compliance Account are exempt from the holding limit, up to the following amounts:¹⁶⁷

Compliance year 1: Exemption totaling the most recent annual emissions report set on January 1.

Compliance for future compliance years: Exemption increased on October 1 by emissions from prior year.

At the end of each compliance period, the exemption is reduced by the total compliance obligation on December 31 of the following year.¹⁶⁸ In effect, the holding limit allows covered entities to acquire sufficient allowances over time to meet their emissions obligation but preventing them from excessive control of allowances in the market.

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holdings limits do not exist within the EU ETS either,¹⁵⁹ although one of the most popular spot trading exchanges in that program, the European Climate Exchange (ECX), is regulated under U.K. laws and uses flexible holding limits to limit participants' ability to manipulate markets.¹⁶⁰

CARB has proposed a holding limit for all allowances set at 10% of the first 25,000,000 allowances, plus 2.5% of any additional allowances. The holdings limit provisions pose direct barriers to traders' obtaining market power while still allowing traders to accumulate substantial positions. They are aimed at assuring that no one trader has leverage over any auction or over the spot market. These requirements are girded by the related enforcement provision requiring registered entities to disclose all direct or indirect corporate associations with other registered entities, and by the disclosure of beneficial holdings.¹⁶¹ These required disclosures are meant to be a first defense against allowing an entity or group of entities to corner the trading market.

We agree with CARB that holding limits are generally a good idea in this context. Market manipulation that has occurred in other markets¹⁶² cannot be ruled out, and holding limits appear to be a good solution to market-power based manipulation. The tradeoff, however, is that holding limits could reduce the liquidity of the market.¹⁶³ In a nascent market, there may be only a few parties interested in supplying liquidity by buying and selling, and holding limits could hinder that trading activity.

The proper holding limit level is determined by these tradeoffs between liquidity concerns and market-power issues. Setting a holding limit is difficult in a new market because it depends substantially on the "float," or the number of allowances readily available for sale in that market. If there is little trading, then even a small proportion of the issued allowances, perhaps below the current holding limit, could be enough to exert or threaten market power. CARB has made the reasonable decision to base its holding limit on that of similar markets. Once the market is functioning, though, CARB should be aggressive about analyzing empirical data on float to reconsider its holding limit.

Recommendation II-2: CARB should require the market monitor to review the holding limits annually and report whether they should be changed.

E. Establishing well-functioning liquid markets with offsets

Offsets are another mechanism used to establish well-functioning, liquid markets. Within emissions trading programs, offset credits are granted for certain verified reductions in emissions that are achieved outside of a program's regulated entities. Offset credits can then be purchased by a regulated entity and used to satisfy that entity's own compliance obligations. In essence, offsets allow program participants to pay for (cheaper) reductions elsewhere rather than incur reductions within program boundaries.

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CARB has proposed allowing for offsets in its trading program, but limiting their use to 8% of any emitter's compliance obligation.¹⁶⁹ Three types of offsets, certified under any of three approved protocols, will be initially eligible. CARB will oversee an offset certification process aimed at ensuring that California offsets represent real emissions reductions.

As noted at the outset of this paper, other carbon markets have experienced problems with offset quality and it is understandably a concern that offsets be verifiable, additional, and long term. Because we do not examine CARB's offset verification protocol, which has been subject to extensive analysis elsewhere, we express no overall opinion on the role of offsets within CARB's program. We do, however, address the extent to which offsets can improve market liquidity, and we conclude that offsets may play an important role in thwarting market manipulation, by supplying liquidity at critical compliance points.

Offsets, like banking, provide an additional way for emitters to meet compliance obligations and therefore add flexibility to the system. Offsets will reduce price volatility and, by doing so, make the market more attractive to risk-averse emitters. For instance, consider a scenario in which less hydropower is available than usual one spring, increasing the demand for fossil fuel combustion and, therefore, the demand for allowances to cover emissions from that combustion. Without offsets in California's proposed emissions trading system, allowance prices in this scenario would have to increase in proportion with the increased power production, until high prices caused sufficient demand destruction in other areas, such as decreased retail electricity demand, to re-balance the system. Offsets help ease pressure in such circumstances because unexpectedly high demand for compliance instruments could be partially satisfied by a greater quantity of offsets (assuming a relatively responsive supply of offsets to price changes). Allowance prices will still rise in this scenario, but by less than they would without offsets.

Offsets may play an especially useful role in the sensitive periods right before compliance deadlines, when finding the correct vintage allowances for surrender may become difficult. Under CARB's proposal, covered entities do not submit their final emissions reports until well into the year following the end of a compliance period.¹⁷⁰ And they need not surrender allowances to cover their verified emissions until November 1st of the year following the close of a compliance period.¹⁷¹ Yet only allowances of the vintage of the emissions year or earlier may be used to cover compliance obligations. (For example, to cover 2014 emissions, only allowances of the 2013 or 2014 vintages may be used. But those allowances will not come due until well into 2015, at which point it may be difficult for firms to locate allowances of the 2013 or 2014 vintage.) Alternatively, covered entities can turn to offsets to cover 8% of their compliance obligation, or to the Reserve, whose allowances do not have a vintage.

This period between emissions reporting and the compliance deadline in the year following a compliance period could have relatively thin markets in the allowances that are valid for that

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deadline. Most emitters are likely to acquire the allowances they need for compliance long before the November 1st deadline and be unwilling to sell needed allowances at even very high prices because of the high noncompliance penalties. Utilities, especially, are likely to be risk averse and obtain the allowances they need quite early as they have little short-term control over their emissions.

These factors mean that it is possible that much of the compliance instrument supply could be locked up in the months before the compliance deadline. Banked allowances and the APCR should in most cases supply liquidity in the period. However, sustained unexpected allowance demand could exhaust these sources. Also, the number of banked allowances is expected to be lower at the end of the third compliance period (2018–2020) unless CARB extends the program beyond 2020 at a sufficiently early date. The scheduled end of the program in 2020 may push the value of banked allowances to zero. In addition, the stricter cap and rising allowance prices will make it less economic to bank allowances. In these circumstances, offsets would supply important liquidity in spot markets in the period right before the compliance deadline because high enough prices would move offsets from other carbon markets into the California market.

Offsets are thus an important source of flexible supply in the program. Offsets can serve to provide liquidity and to cushion the market against price spikes. Our view is that the combination of the APCR, banking, the long compliance period, and slow economic growth are likely to provide ample cushion, even without offsets. But offset availability could become critical to market liquidity if a number of factors combined to increase demand significantly.

For this reason, we do have a concern about the effect of one of CARB's offset verification provisions on market liquidity. From a liquidity perspective, it would be beneficial for offsets to be able to grow to the 8% limit if prices increase, but flaws in the current CARB regulation may prevent that. CARB oversees an offset certification process designed to ensure that California offsets represent real emissions reductions. After certification, CARB can cancel any offset for up to 8 years for any material misstatements in the certification documents.¹⁷² If an offset is canceled, the current owner of the offset is responsible for finding other compliance instruments to satisfy its compliance obligation.

This offset invalidation provision could significantly hinder the role offsets play in promoting market liquidity. As discussed earlier, markets may be tight before the November 1st compliance deadline following a compliance period. Any holder of an offset risks having to replace that offset with an allowance of the correct vintage in a period when markets may be expensive and thin. Offset buyers are not likely to have any ability to discern if any given offset had material misstatements and, if they are willing to buy offsets at all, will demand a discount.

Offset suppliers are likely to see low prices because of this discount. Because relatively few types of offsets are approved, there are likely not large sources of low-cost offset supply. The

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implication is that, under current regulations, offsets will be a smaller part of the compliance instrument portfolio than contemplated in CARB's Updated Economic Analysis.¹⁷³ This will result in (1) higher allowance prices than would obtain without the invalidation rule; and (2) less flexibility, and therefore less liquidity, in the allowance market given a smaller supply of compliance instruments.

It is likely that in the long term, markets would find a way to handle the information asymmetry problem posed by offsets. Insurance could be issued on offsets, or alternatively, prices for offsets could adjust to reflect the market's judgment on the offset quality. However, these solutions may not emerge in the first few years of the market. The difficulty is that many offset projects require years of investment before offsets can be sold. Investors will be hesitant to undertake the cost and risk if the initial regulations seem likely to result in low demand and price for offsets.

A low supply of offsets could pose risks to market efficiency and fairness, as explained earlier. If offset supply is low, then not only would allowance prices be higher, but it is more likely that markets would be thin in this crucial period and vulnerable to manipulation.

A possible solution to the problem that would maintain the overall integrity of the cap is to require offset issuers to set aside a certain proportion of their offsets as part of a pool that would replace any offsets found to have material misstatements. This would be similar to CARB's proposed Forest Buffer Account, which will contain a reserve of forestry offsets that can replace forestry offsets found to be invalid.¹⁷⁴ The International Emissions Trading Association examined records in the Clean Development Mechanism offsets used for the EU ETS and found that less than 1.5% were rejected.¹⁷⁵ Offset issuers could place some higher proportion of offsets in an offset pool for a given term. These offsets could then be used to replace any offsets that were found to be invalid later. After a set number of years in the pool, an offset could be sold and the proceeds returned to the offset supplier.

This pool system does introduce additional administrative complexity and cost. However, with the uncertainty over demand and price in the latter stages of the market it may be worth this cost to ensure that offset are available if needed. The pool could be phased out later as the market matures.

Recommendation II-3: CARB should create an alternative mechanism for dealing with the problem of offsets discovered to be invalid, perhaps one based on a compliance pool.

F. Liquidity benefits of the three-year compliance period

CARB's proposed regulations include a three-year compliance period. The compliance period works as follows: after each of the first two years, emitters must surrender allowances sufficient

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to cover 30 % of their prior year emissions. At the end of the three-year period, and by no later than November 1 of the following year, emitters must “true up” their obligation by surrendering the remaining allowances due, sufficient to cover 100 % of emissions over the three years.

CARB trading: Compliance

Entities required to cover their emissions with allowances must do so every three years. The First Compliance Period runs from 2013–2014 (2012 was recently eliminated); the Second Compliance Period runs from 2015–2017; the Third Compliance Period runs from 2018–2020.¹⁷⁸ An entity meets its compliance obligation by placing allowances in its Compliance Account (which are then periodically retired by CARB).¹⁷⁹

Entities can become a covered entity at any point if their emissions exceed the thresholds set forth in section 95812.¹⁸⁰ Entities that either exceeded the threshold in any of the three prior years to the start of a compliance period or exceed the threshold in the first year of a compliance period are considered covered entities for the entire compliance period.¹⁸¹ An entity that exceeds the threshold after the first year is a covered entity from that point forward in the compliance period.¹⁸² So an entity that exceeds the threshold in 2016 would be required to cover its emissions for 2016 and 2017.¹⁸³ If an entity exceeds the threshold in the last year of a compliance period, it must cover its emissions for that year, but does not have to do so until the next triennial compliance period.¹⁸⁴ Thus, an entity that exceeds the threshold in 2014 will not have to cover its 2014 emissions until the end of the Second Compliance Period, in 2018.

Each compliance entity (Covered and Opt-In Covered Entities) is assigned a compliance obligation either based on its emissions report or, in the case of material misstatements in the report, based on an emissions level assigned by CARB.¹⁸⁵ Calculation of emissions is detailed in Subarticle 7.¹⁸⁶

RGGI also has similar three-year compliance periods.¹⁷⁶ RECLAIM, in contrast, had annual compliance periods, staggered such that some facilities complied in December and some in June. Environmental stakeholders in RECLAIM objected that this two-cycle compliance year made it difficult to track facility compliance.¹⁷⁷

We believe that a three-year compliance period, complemented by smaller yearly surrender obligations, is useful for establishing stable, robust markets that are difficult to game. By requiring emitters to meet 30% of their compliance obligation after each of the first two years, the system should keep allowance prices stable and reduce opportunities for market manipulation. This is because it should be relatively easy to meet the first two compliance obligations with allowances that have already been allocated; it is difficult to believe there would be many emitters who could not easily meet 30% of their compliance obligation at the

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annual deadlines. The only difficult periods would be before the triennial compliance deadlines, when all remaining compliance obligations would have to be met. At all other times, participants could simply wait out a temporary dip or spike in allowances. It would be difficult and expensive to manipulate markets when participants can wait months or years for prices to return to their fundamental values.

Several predictions flow from this 30% rule. First, if the prior year saw higher than average emissions, the market will see a marked decrease in available allowances, as 30% of emissions could in fact be more than 30% of available allowances in that scenario. Correspondingly, a prior year of lower than average emissions will result in more allowances remaining available for trade. Second, facilities will naturally retire the cheapest allowances first. Older vintage allowances (for example, 2013) are somewhat more valuable due to banking: these allowances can be used in any subsequent compliance year.¹⁸⁷ Thus, facilities will devote newer vintage allowances for their annual 30% compliance obligation and bank older vintage allowances. The availability of the older allowances then will facilitate liquidity in the allowance market.

This is also the reason why it is unlikely that short-term demand shocks, such as a low supply of hydropower one year, could result in unmanageable price spikes as seen in RECLAIM. At most times, participants would be able to adjust to this extra demand over a long period of time by reducing other emissions or obtaining compliance instruments. Only either a demand shock near the end of a compliance period or a sustained, unexpectedly high demand for allowances would be likely to spike prices.

G. Avoiding temporary illiquidity through allowance reserves

Another tool CARB has proposed to supply allowances when markets are temporarily high is the Allowance Price Containment Reserve (APCR). Allowance reserves set aside a portion of allowances that are only available at a pre-defined price.¹⁸⁸ Reserves can be thought of as the equivalent of an emissions cap automatic ratchet. If prices stay low, the reserves are never purchased and the cap is lower by the amount of the reserves. If prices reach the reserve pre-defined level, then the cap is larger by the amount of reserves purchased.

In the APCR reserve, a portion of the total allowance budget is placed into three price tiers of equal size. The first tier would make allowances available initially at \$40, the second at \$45, and the third at \$50. These prices would rise at 5% plus inflation annually through 2020.¹⁸⁹ The APCR would contain 1% of the allowances from the 2013-2014 compliance period, 4% from the 2015-2017 period, and 7% from the 2018-2020 period. APCR allowances do not have a vintage and so can be used to satisfy compliance obligations in any period.

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The APCR is best understood as a guard against short-term price spikes, possibly due to illiquid markets. If long-term prices are expected to be under \$40, but there is a temporary shortage of allowances of a given vintage, emitters could turn to the APCR to fulfill compliance obligations. One possible reason for a temporary shortage of a vintage of allowances is market manipulation. However, a trader could only use market power to a limited extent because entities with compliance obligations could buy from the APCR instead. Thus the APCR would both decrease the incentive for market manipulation and decrease the damage from any manipulation that could occur.

The CARB regulation will help prevent prices from sinking too low in the face of weak economic conditions or other factors causing low demand. We noted earlier that the APCR supplies additional liquidity at high prices, but if prices stay low the APCR effectively lowers allowance supply by lowering the cap by approximately 4%. In addition, if not all auctioned allowances are sold above the \$10 price floor, then the unsold allowances would be placed in the APCR and removed from the system. This is a further automatic ratchet to lower the cap in the face of low demand and prices. These automatic ratchets protect the environmental integrity of the system against over allocation. The APCR and auction price floor also serve to reduce price volatility by placing a floor under prices. This reduction in downside price volatility should also reduce trading risk and bring more participants to the market.

Our view is that the APCR as proposed by CARB is well designed and is likely to serve its intended function of limiting price volatility and temporary illiquidity.

H. Detailing a contingency plan for extended high allowance prices

Beyond the allowance reserve, banking, and offsets, CARB has not set forth any guidance on steps it would take in the event of extended high allowance prices. At the same time, market players will likely infer that CARB views the reserve price limits as a price ceiling. Extended high prices after the depletion of the reserve may paradoxically not concern covered entities who may anticipate political intervention in that scenario.

Comparison to the RECLAIM price spike is instructive. In 2000–2001, allowance prices spiked dramatically. That spike was due in part to a decreasing cap that resulted in constrained allowance availability for the first time. Lack of banking and the California energy crisis were strong contributing factors to the price spike. In response to the price spike, SCAQMD removed power utilities from the program and significantly revamped RECLAIM rules.

CARB clearly seeks to avoid a similar scenario through its regulatory structure, including the allowance reserve, banking provisions, and so forth. CARB could go still further, however. First, it could release regular forecasts on future allowance prices over a 3–5 year period, to encourage adoption of technological upgrades to limit emissions. (We have included this

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proposal as one of our recommendations in Part I.C, above). CARB could also require adoption of specific emissions reduction technologies or operational standards for key facilities, triggered only in the event of extended high allowance prices—perhaps tied, for example, to the depletion of allowances from the reserve.¹⁹⁰ Such mandates could serve as an additional price signal to the market in the event of price spikes. CARB could also publicly or privately develop a suite of contingency measures now, before a price spike requires more drastic political measures.

Recommendation II-4: To avoid extended price spikes, CARB should develop contingency measures, including mandated adoption of emissions technology triggered by certain price events.

I. Avoiding price volatility through consistent regulation and public confidence in market oversight

It is perhaps unsurprising that major shifts in regulatory policy or market oversight can lead to increased volatility in allowance prices. As EPA noted in its review of RECLAIM, “[r]egulators should strive to create confidence and trust in the market by making a full commitment to the program and ensuring consistency in the market and their policies.”¹⁹¹ Part of CARB’s regulatory role is to engender public confidence in its oversight of the trading market.

Regulators must be able to react to unforeseen circumstances with speed and effectiveness. As researchers at the Nicholas Institute have noted, “[t]he success of cap-and-trade depends, in no small degree, on public acceptance of the market, which could unravel if excessive speculation drives prices up or high-risk instruments proliferate undetected in carbon markets.”¹⁹² The 2000–2001 price spike in RECLAIM allowances, for example, left SCAQMD with few options, requiring a major restructuring of the program and causing a loss of the integrity of the emissions cap for that year. A decreasing cap should have signaled an impending price increase in allowances.¹⁹³ As EPA noted, “[p]eriodic evaluation, revisiting of program design assumptions, and contingency strategies are crucial to keeping programs on track.”¹⁹⁴

Recommendation II-5: Set specific dates for interim program evaluation, such as at the end of compliance periods.

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III. POWER MARKET-CARBON MARKET INTERACTIONS

Overall, we believe that CARB has developed a strong regulatory program that should encourage confidence and trust in the trading market. Two areas in particular, however, could use more focused efforts to engender public trust. First, as discussed in Part VII below, CARB has not detailed what will happen to the market, and carbon allowances, at the end of the program in 2020. To the extent feasible, this end game should be discussed publicly. Second, no obvious mechanism has been established to periodically evaluate or revisit program design. To that end, CARB may wish to publicly announce and plan for program evaluation at set dates, such as 2015 and 2018 (at the end of compliance periods). It is also unclear if CARB is willing to assert regulatory authority to implement changes to the program, to the extent necessary. Being upfront about the possibility of such regulatory changes is preferable to disrupting the market later with major changes.

Because of the importance of the power industry in the proposed cap and trade program, and because of the complexity of utility economics, we discuss the power market separately here in order to address concerns that the carbon cap-and-trade program could suffer the same fate as RECLAIM did. We have already discussed several ways in which we believe CARB's proposed regulations will minimize such a possibility. Nevertheless we believe it useful to explain why a particular focus on the power industry can highlight potential risks the new carbon markets could face and, again, how to reduce those risks.

The power industry is the second largest generator of greenhouse gas emissions in California (after the transportation sector) but the most difficult industry to accommodate in the proposed carbon market.¹⁹⁵ The California power crisis of 2000–2001 is a key reason behind the fears that markets can be gamed to the detriment of social and environmental aims. The power crisis led, in part, to the power industry's inability to control its output in the short-run (electricity demand must be met) and, hence, inability to control short-term NO_x allowance demand.

The power crisis and the short-term disruption in the RECLAIM program are intimately linked because: (1) it was the tremendous increase in power demand during the crisis that caused the skyrocketing RECLAIM allowance prices and the disruption of the RECLAIM program; and (2) market manipulation and market power in the power industry appear to have been a significant factor in both the power crisis and problems in the RECLAIM program.

Here, we consider how CARB's proposed trading program will likely interact with the overall California power market and whether those interactions could adversely affect the power market and/or the allowance market.

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A. Low elasticity in retail electricity demand can lead to allowance price spikes

Three factors beyond the control of the power industry can substantially shift its output and, hence, its demand for carbon allowances: economy-based impacts on the demand for electricity; weather-based variations in the demand for air conditioning; and weather-based variations in the annual supply of hydroelectric power. These substantial shifts in demand for carbon allowances could result in price spikes.

In theory, utilities could respond to a spike in allowance prices by raising the electricity price and therefore lowering the quantity of electricity demanded. The linkage between wholesale prices and retail prices in the power market, however, is weak at best. Nor is it straightforward for industry to raise rates quickly given the regulatory structure in which utilities operate. Allowance price increases will not result in higher retail electricity prices in an immediate, direct, and rational way. In addition, the short-term price elasticity of retail demand for electricity is low.¹⁹⁶ Retail consumers, for example, take a long time to adjust—by reducing demand—to retail price increases.

As detailed above, CARB has recognized that the power industry may have unexpected demand for allowances to which it does not have the short-term ability to respond. CARB has proposed measures including the three-year compliance cycle, the APCR, banking and offsets that can help smooth out short-term demand spikes by allowing long-term adjustments in allowance prices.

These are qualitatively the correct measures. It is still possible, however, that the power industry will lack the ability to spread its adjustment to weather or economics shocks over the long term. An Environmental Defense Fund (EDF) study finds that the reserve would be sufficient to contain price spikes if there are significant numbers of offsets, but if offsets are very low the reserve could be exhausted, leading to price spikes.¹⁹⁷ The current economic weakness substantially decreases the likelihood that these shocks would lead to price shocks. However, we cannot rule out the possibility that a resumption of strong economic growth combined with weather shocks and low offset supply could lead to price spikes.

As a result, we recommend that CARB conduct a study of the effects of a combination of strong economic growth, weather shocks and large increases in energy demand to ensure that the cap-and-trade program contains sufficiently robust mechanisms to accommodate price spikes. This study would extend the approach of the EDF study to specifically examine the effects of weather-related shifts in allowance demand. Given the currently weak state of California's economy, CARB should have adequate time to conduct such a study and respond with any necessary program adjustments prior to the risk of any price spike occurring.

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Recommendation III-1: CARB should conduct a study, similar to the Economic Analysis of the Scoping Plan, that examines various weather and economic growth scenarios in order to determine whether the size of the APCR is adequate to handle price spikes.

B. Market manipulation in the California power crisis of 2000–2001

Market manipulation also appears to have been a significant factor in the California power crisis of 2000-2001.¹⁹⁸ We have already addressed why CARB's proposed carbon market is much less vulnerable to market manipulation than the California power market was in 2000-2001. Nevertheless, we examine here the ways in which the economics of the power market can make it more desirable for emitters to manipulate the carbon market.

The price in the power market is the lowest price that, at any given time, just induces enough power supply to meet demand. This means that the last bit of power—that produced by the highest cost generator supplying power—is what determines the market price. In California, this last increment of power almost always comes from natural gas generation. If we stack generators by their incremental cost of generating power, the generators on top (high cost) tend to be the least thermally efficient. That means they need more gas to deliver the same amount of power. Placing a direct cost on carbon emissions will affect all fossil fuel generation, but will increase the cost at the top of the stack more than at the bottom. The cost difference between relatively high- and low-cost power will increase with the price on carbon allowances. This profit is in itself beneficial, as it will increase investment in low-carbon power.

This profit potential, however, could provide an incentive to game the power markets through the carbon allowance market. A power firm that owns a substantial amount of low emissions power, for instance one with a considerable amount of hydropower, will increase its profits if the price of carbon allowances increases. This changes the usual market manipulation calculus. Generally a firm that wishes to, for example, corner a market by buying up a large portion of the commodity cannot do so without inevitably pushing down the price and, thus, losing money. This makes market corners very difficult to pull off successfully. However, an entity with low-carbon-intensity generation might be willing to take substantial losses pushing the price of carbon allowances up in order to make even greater profits in the power market.

Professor Wolak of Stanford University and Professor Kolstad of the Wharton School, experts on power market regulation, find evidence that manipulation of this type occurred in the RECLAIM market in 2000.¹⁹⁹ Some firms may have purchased RECLAIM allowances at inflated prices in order to increase the power price and make profits on their low NOx emissions generation. Kolstad and Wolak find evidence that energy firms with generation capacity inside and outside the RECLAIM market area were especially likely to buy allowances at higher than

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market prices because the resulting power price increase would result in pure profit for the generation outside of the RECLAIM area that did not need to purchase RECLAIM allowances.²⁰⁰

There are reasons to believe such manipulation would be more difficult and less profitable in the proposed CARB emissions trading. The price buffering features of the proposed CARB market, which we already discussed, make it much more expensive to manipulate and push prices up substantially than in RECLAIM. Because of the partial fungibility of allowances across time, a manipulator could only push up current prices by buying enough allowances to increase prices for the entire duration of the market. Moreover, part of the profitability of the RECLAIM market manipulation strategy was based on firms having generator capacity both in and outside the emissions trading market area. The proposed CARB regulations bring out-of-state sources within the carbon emissions trading area to a significant extent. Finally, the uncompetitive conditions in the California electricity market during the power crisis were the essential ingredient in firms being able to use emissions trading gaming to manipulate the power markets.

California Independent System Operator Corporation (CAISO) has the primary responsibility for regulating the power market. We urge CARB to bring up the possibility of this manipulation with CAISO and other appropriate oversight bodies for the power industry.

Recommendation III-2: CARB should consult with CAISO and other appropriate power industry regulators about the potential of market manipulation of power prices through gaming its carbon trading program.

C. Resource Shuffling

Under CARB's proposal, first deliverers of electricity are assigned compliance obligations based on the emissions generated to produce that electricity, either within California or in another jurisdiction.²⁰¹ Calculating the emissions outside of California resulting from the production of that imported electricity raises a potential for gaming. Because electrons are basically fungible, one could claim that only clean power sources (for example, solar) were used to generate the imported electricity, while diverting electricity from dirty power sources (for example, coal) to other states outside of the WCI system. The result would be decreased compliance obligation for the California first deliverer of electricity without any actual emission reductions.

In order to ensure accurate reporting of emissions related to the importation of power into California, CARB has proposed a rule prohibiting such "resource shuffling." This type of gaming is specifically addressed, and prohibited, by section 95852(b)(1). CARB has defined

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“Resource Shuffling” as “any plan, scheme, or artifice to receive credit based on emissions reductions that have not occurred” in the importation of electricity to California.²⁰² Resource Shuffling is identified using one of two criteria:

(A) An emission factor below the default emission factor is reported pursuant to MRR for a generation source that has not historically served California load (excluding new or expanded capacity). And, during the same interval(s), electricity with higher emissions was delivered to serve load located outside California . . . ;
or

(B) The default emission factor or a lower emissions factor is reported pursuant to MRR, for electricity that replaces electricity with an emissions factor higher than the default emission factor that previously served load in California; except when the replaced electricity no longer serves Californ[i]a load as a result of compliance with the Emission Performance Standards . . . pursuant to Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006).²⁰³

Where Resource Shuffling (as defined by the regulation) occurs, deliverers of electricity will not receive the benefit of reduced compliance obligations from delivering lower-emissions-intensity energy into California. Instead, they are obligated to surrender allowances sufficient to cover the higher-intensity, “shuffled” energy. Moreover, section 95852(b)(1) specifically calls Resource Shuffling fraud. Each First Deliverer must submit to CARB by certified mail, annually, an attestation certifying under penalty of perjury that the facility or company has not engaged in Resource Shuffling.²⁰⁴ The attestation also subjects the signer to jurisdiction of California and the requirements and enforcements of the trading program.²⁰⁵

We agree that a strong resource shuffling rule is critical for avoiding leakage and gaming of electricity supply. We fear, however, that the rule as proposed may be significantly broader than necessary and, indeed, may serve to thwart the very investments in clean energy it should be encouraging.

Take, for example, a coal plant in Utah that has historically supplied power to a California utility. Coal-fired generators have high carbon emissions. Now imagine three hypothetical scenarios. In the first scenario, the utility builds a new solar plant and uses that energy to entirely replace the coal power. The coal power is redirected to parts of Utah. In the second scenario, the utility begins drawing power from an existing solar plant and uses that energy to entirely replace the coal power. The coal power is redirected to parts of Utah. In the third scenario, the utility builds a new solar plant and uses that energy to entirely replace the coal power. The coal power plant is retired and produces no more energy.

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In our view, only the second of these scenarios should qualify as resource shuffling, for reasons we discuss below. But we fear that all three—including the scenario where the coal plant is taken offline—may be made vulnerable by the rule as it is proposed.

In the first scenario, the utility's investment has expanded capacity of the Western electrical grid with low-carbon intensive solar energy. Because the solar plant has not historically served California, and the coal power has been redirected outside California, it would appear that this scenario could fall into definition (A) of resource shuffling. There is, however, an exception for "new or expanded capacity." Unfortunately, the definition does not identify what capacity must be new or expanded. Assuming expansion of the Western electrical grid capacity counts, then the first scenario is not resource shuffling under definition (A). This is appropriate, because we would like to encourage solar construction in response to increased capacity needs.

Recommendation III-3: Clarify what "new or expanded capacity" means in the definition of Resource Shuffling.

In the second scenario, the utility has not expanded capacity under any definition. The solar plant already existed. Because the coal plant continues to emit carbon, the utility has merely shifted the accounting of carbon emissions to outside of California. And in fact, this scenario appears to meet definition (A) of resource shuffling.

The third scenario appears similar to the first, except that now the utility is using solar for expanding its own capacity (and that of the Western electrical grid), and the coal plant is retired. This desirable result should clearly fall outside the resource shuffling rule. But we worry about the scope of Definition (B): it defines resource shuffling (as best we can tell) to include nearly any substitution of lower-emissions-intensity electricity for higher-emissions-intensity electricity that has historically served California, without regard to a showing that that dirtier electricity has been shuffled elsewhere.

In fact, because the coal plant in our hypotheticals historically served California load, we wonder whether definition (B) would sweep in all three scenarios described. It is possible that one or more of these scenarios would be rescued by the exception for substitutions that result from "compliance with the Emission Performance Standards,"²⁰⁶ but the scope of that exception is unclear.

Admittedly, the language in definition (B) seems particularly opaque, but it appears to be significantly broader than (A) and thus controlling in almost all cases.

Recommendation III-4: Clarify the language in definition (B) of Resource Shuffling to ensure that it is not interpreted too broadly.

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IV. DETECTING MARKET MANIPULATION, RULES VIOLATIONS AND FRAUD

To this point, our paper has largely focused on program design elements aimed at preventing or limiting the risks of market manipulation, rules violations and fraud in the first instance. This section looks at CARB's ability to detect these things if and when they occur, including its plans for detection and its resources for doing so. Part V then considers CARB's options for enforcing its rules. Part VI considers the adequacy of penalties for market manipulation, rules violations and fraud.

Emissions trading systems often require more stringent monitoring than direct regulation because of the flexibility they afford emitters. As Roberts Stavins observes, "[i]n the programs where monitoring and/or enforcement have been deficient, the results have been ineffective policies."²⁰⁷ Emissions must be measured and reported regularly. Auctions and the spot market must also be monitored to prevent manipulation and fraud. And the accounts of Covered Entities must periodically be reconciled with their emissions reports, to ensure compliance.

CARB proposes several mechanisms for detecting foul play. First, it relies on the Mandatory Reporting Regulation (MRR) to prescribe requirements and procedures for emissions monitoring and reporting. Second, CARB plans to monitor auction sales and can monitor spot-market trading through its oversight of participant accounts. Third, CARB can rely on the MRR, verifiers, and its accounting structure to monitor compliance with the emissions cap. And finally, by making emissions and compliance information public, CARB can empower third parties, such as environmental justice organizations, to provide another level of oversight for its trading program.

A. *Monitoring Emissions (measurement, reporting and misreporting, auditing)*

A cornerstone of any pollution trading system is the accurate measurement and reporting of emissions levels. Emissions levels determine compliance obligations and, in turn, profoundly affect market dynamics. Underreported or misreported emissions levels undermine the integrity of the trading program. In some instances, such misreporting could be used to game the trading system. This section looks at CARB's ability to monitor emission levels and to convey that information to markets to allow efficient price discovery. Part IV.B then considers the specific question of monitoring compliance.

The measurement of CO₂e emissions is complex. Emissions can be measured directly or indirectly.²⁰⁸ To calculate CO₂e emissions, other data are generally needed, such as fuel or electricity consumption and operating hours for the facility.²⁰⁹ The Department of Energy opined

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that while one can measure 80% of a company's emissions with 20% of the effort, measuring 95% of emissions would require 50% of the effort and the last 5% would be correspondingly more difficult to measure.²¹⁰

Fortunately, California has some, albeit limited, history of greenhouse gas reporting from which to draw. In 2007, CARB adopted a robust mandatory greenhouse gas reporting rule (the Mandatory Reporting Rule, or "MRR"). Beginning in 2009, entities in California with yearly emissions levels above 25,000 metric tons of CO₂e have reported their past-year emissions to the State.²¹¹ Some facilities with emissions levels of as low as 10,000 metric tons CO₂e have also been required to report.²¹² This reporting covers 94% of point source CO₂ emissions.²¹³

Under the MRR, initial emissions reports are due in the first half of the year for previous year emissions.²¹⁴ Verifications are due soon thereafter, generally by September 1.²¹⁵ CARB is the gatekeeper for this reporting: it reviews annual verified emissions reports, accredits verifiers, and conducts audits.²¹⁶ Emissions data reported under the MRR are public, although an entity may designate certain other submitted data as confidential.²¹⁷

We would like to see a serious effort by CARB to publicize emissions data at timely intervals. RGGI, as part of its COATS tracking program, publishes quarterly and annual emissions estimates on its website.²¹⁸ While we understand that verified data will only be available on an annual basis, we believe the trading market would benefit from more regular updates on emissions. Much of these emissions data will have already been reported, automatically, to EPA under the Clean Air Act. And some of the quarterly emissions data could be derived from other sources, such as transportation fuels sales and electricity sales summaries. To even the playing field among different market participants, it would be beneficial if CARB designated a part of its website as the official source of such emissions estimates and published regular updates.

Recommendation IV-1: CARB should publish quarterly estimates of covered emissions.

B. Monitoring Fulfillment of Compliance Obligations

To build public trust in the trading market and protect the program's environmental integrity, CARB must ensure that regulated entities comply with their obligation to cover their emissions with allowances. Such compliance must be consistent, verifiable, and public.

Covered Entities (and Opt-In Covered Entities) are subject to the MRR and must therefore, as discussed in Part IV.A above, regularly report their carbon emissions.²¹⁹ These emissions reports are verified by an independent third party (a "verifier") registered with CARB. Each emissions report forms the basis of the entity's compliance obligation. Importantly, allowances placed in Compliance Accounts are subject to public disclosure.²²⁰ And CARB will maintain a publicly available Permanent Retirement Registry of retired allowance serial numbers.²²¹ This public

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registry should offer a means for third-party verification of emissions retirement and goal tracking. Thus the CARB regulations appear to promote verifiable, consistent and public compliance.

C. Monitoring Auctions

The regulations make clear that CARB will closely monitor auctions (or employ a third party to oversee auctions). Without proper oversight, auction sales raise the risk of manipulation and gaming. In particular, collusive bidding can pervert the clearing price and result in windfall profits for bad actors.

CARB will treat auction application information as confidential.²²² CARB will, however, release the following information following the auction: (A) names of bidders; (B) settlement price; and (C) "aggregated or distributional information on purchases."²²³ Summary auction results²²⁴ will be published on CARB's website after the auction is certified by CARB.²²⁵ Publishing auction summaries serves two important purposes: it informs the broader market as to supply and demand for allowances; and it allows third parties to take a critical look at auction procedures.

Before payments can be collected or allowances distributed to winning bidders, CARB must "[c]ertify whether the auction was operated pursuant to this article."²²⁶ No information is given as to what happens if CARB cannot certify the auction; presumably the auction results would be canceled. CARB also appears to keep total discretion to decide if any particular set of circumstances violated the regulations. We recommend that CARB clarify what will happen in the event that it cannot certify an auction.

Recommendation IV-2: Clarify steps to be taken in the event that CARB cannot certify the auction results.

D. Monitoring the Spot Market

CARB has taken other steps to help facilitate review of spot-market activity. All participants must file an application with CARB.²²⁷ A participant may not hold allowances until CARB (the Executive Officer) approves its registration.²²⁸ An application must include four items: (A) name and type of organization; (B) statement of basis for qualifying for registration; (C) identification of direct or indirect corporate associations; and (D) identification of any entities for which the applicant holds allowances for their benefit.²²⁹ (Item (D) appears poorly worded; it should probably state "will hold" allowances.)

One important piece of market oversight is the designation of different accounts for holding allowances. Each participant receives access to one or more account types (a "set of accounts")

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that allow it to hold and trade allowances. The security of this accounting system will be paramount in ensuring appropriate oversight of the trading system. The accounting system should be designed by those with significant security expertise, drawn from third parties if necessary, and reviewed periodically to be kept up to date.

Trades must be reported to CARB within three days of settlement. CARB will then register the trade after determining that it meets the trading requirements set forth in section 95921.²³⁰ Section 95921 requires the parties to submit to CARB certain information on the trade and prohibits deceptive, manipulative or fraudulent trading schemes. CARB agrees to keep certain information confidential, but will timely release information on the transaction price and quantity of the trades. CARB may also release information for market oversight and investigation. "All other information obtained through transaction reports" will be protected as confidential by CARB.²³¹

CARB should focus its efforts on three areas of importance. First, CARB needs to devote sufficient resources to promptly analyze, register trades and respond to any reported trading anomalies. Second, CARB should establish a market surveillance committee to review its market monitoring approach. That committee should establish a set of guidelines for detecting and reacting to perceived attempts at manipulation. Third, CARB should follow the example of RGGI and contract out short-term market surveillance and analysis to an experienced market monitoring organization.

Third-party market monitors seem to have worked well in the past. The major trading systems (SO₂, RGGI and EU ETS) all employ market monitors. The market monitor can quickly spot anomalous trading, divergence between spot and auction prices, or coordinated bidding or selling that appears to be exercising market power.

We recommend that a market surveillance committee evaluate any market irregularities in the spot market and have the ability to propose long-term solutions and guidelines. We also encourage CARB to contract out the immediate surveillance of the market to an experienced market monitoring organization.

Recommendation IV-3: CARB should set up a market surveillance committee to address attempts at manipulation and contract with a third-party market monitor.

E. Third-party monitoring

In traditional environmental regulation, third parties have often served important roles as outside monitors and enforcers of environmental obligations. Community environmental justice groups, for example, can use the political and legal process to promote better compliance with local air emission permits. Because the SO₂, OTC NO_x and RECLAIM programs were all developed

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under the Clean Air Act, each of these programs has been subject to the citizen suit provisions of the Act. CARB should work to protect this important oversight role of interested third parties.

Third parties require access to emission monitoring and trading data as part of their oversight role. Researchers at the Nicholas Institute recognize the importance of third-party oversight:

Public disclosure of individual market positions would allow the public to monitor the activities of each participant in addition to general market activity. Public watchdog organizations could evaluate market trends and draw their own conclusions about the effects of speculative behavior and the extent to which emitters are participating in the market to cover their compliance obligations versus treating allowance-based instruments as investment vehicles.²³²

Several sections of the trading regulation serve this purpose. CARB must publish summary results for each auction on its website.²³³ CARB will maintain a publicly available Permanent Retirement Registry of retired allowance serial numbers²³⁴. This public registry should offer a means for third-party verification of emissions retirement and goal tracking. Public notice and comment is required for approval and modifications to Compliance Offset Protocols.²³⁵ And CARB may make public certain registration information.²³⁶

To promote third-party oversight of trading, the regulation should require CARB to publish all non-confidential information and make it easily accessible to the public. CARB must keep two pieces of information confidential: (A) beneficial holdings information and (B) information related to the identity of real persons.²³⁷ Other registration information “may be made public.”²³⁸ This language should be strengthened into a requirement of public disclosure of registration information, emissions data reports, verification statements, and all relevant updates to this information.

Recommendation IV-4: The regulation should require CARB to publish registration information, including corporate associations, on CARB's website.

RGGI has devoted part of its website to its CO₂ allowance tracking system (COATS). Information available includes ten types of reports, including reports on account representatives, facility owner/operators, and transaction data.²³⁹ RGGI employs an independent auction and spot-market monitor, which publishes quarterly and annual reports on auction and spot-market trading results.²⁴⁰ While CARB is required to publish summary auction results on its website,²⁴¹ that requirement does not encompass the broader spot market and facility data published by RGGI. CARB should be required to publish, or to contract with an independent market monitor to publish, similar information.

Recommendation IV-5: Require CARB to publish quarterly and annual information on emissions and market monitoring analyses.

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V. ENFORCEMENT

Once a potential violation of the rules has been discovered—whether it is an attempt at gaming, noncompliance due to insufficient allowance holdings, or fraud—CARB must be able to assert jurisdiction over the wrongdoer and have authority to take enforcement action against the wrongdoer. Such enforcement may lead to the imposition of penalties, the adequacy of which is addressed in Part VI below.

CARB requires all program participants to submit to the legal jurisdiction of California as a prerequisite for program participation.²⁴² Section 96022 of the regulation specifically subjects all participants to California jurisdiction. Section 96010 lists specific actions that amount to consent to California jurisdiction, including registration, purchase of a compliance instrument, or receipt of proceeds or commission from allowance transfers.

Registration requirements, trading rules, and the certification and verification of reports can all provide CARB the necessary enforcement avenues it requires to assert jurisdiction over market participants. With sufficient enforcement resources and reliance on independent, third-party verification, CARB can reliably enforce the rules of its trading program. The program would also benefit from additional mechanisms to allow third-party oversight.

Parts V.A, V.B and V.C elaborate on CARB's enforcement triggers from registration, trading and emissions reporting. Part V.D considers the resources CARB may require for enforcement. And Part V.E recommends that third parties be given a limited ability to bring enforcement actions against rule violators.

A. Bases for jurisdiction: registration

All participants must register with CARB in order to obtain a Holding Account. Various rules provide CARB with numerous opportunities to reject or revoke registrations that either lack important information or are based on misleading information. Registration then helps to establish jurisdiction over the participants for any rule violations.

CARB can deny a registration for two reasons: (i) based on information provided (i.e., not qualified to register) or (ii) because the applicant withheld information or provided false or misleading information.²⁴³ This allows CARB a limited ability to filter out inappropriate participants from its trading program.

Compliance Entities must register within specified deadlines.²⁴⁴ A Compliance Entity that fails to register by the appropriate deadline would be in violation of the regulation, subject to any applicable penalties. Failure to register will thus not relieve a regulated entity from its obligations under the trading program.

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CARB trading: Accounts

Each registered participant receives a Holding Account, which is the basic account for holding and trading allowances.²⁴⁵

Covered and Opt-in Covered Entities receive Compliance Accounts.²⁴⁶ An entity can transfer allowances into its Compliance Account at any time, but cannot (ever) transfer allowances out of its Compliance Account.²⁴⁷ Allowances placed in a Compliance Account are exempt from the holding limit (described in more detail in Private Trading, below). CARB periodically retires allowances from the Compliance Account when compliance obligations come due. The number of allowances in an entity's Compliance Account is subject to public disclosure.²⁴⁸

Derivatives clearing organizations receive special Exchange Clearing Holding Accounts.²⁴⁹ This special account allows clearing organizations to transfer allowances in accordance with their brokerage function without being impaired by the holding limit.²⁵⁰

Certain industrial facilities and electrical distribution facilities are eligible to receive (free) allowance allocations based on formulas detailed in Subarticle 9.²⁵¹ These allocations are placed in Limited Use Holding Accounts by CARB. Only CARB may transfer allowances into a Limited Use Holding Account. Allowances in this account may only be transferred out to CARB's Auction Holding Account. All allowances for the current or prior years must be offered for sale at auction.²⁵²

CARB has its own set of accounts.²⁵³ Each allowance ("compliance instrument") created by CARB is assigned a unique, permanent serial number²⁵⁴ and placed into CARB's Allocation Holding Account.²⁵⁵ CARB can transfer allowances from the Allocation Holding Account to its Auction Holding Account, from which allowances are sold at auction.²⁵⁶ Entities with Limited Use Holding Accounts can transfer allowances to the Auction Holding Account to auction allowances via consignment.²⁵⁷

CARB also controls a Retirement Account. Allowances may not be removed from this account²⁵⁸ and CARB will maintain a publicly available Permanent Retirement Registry of retired allowance serial numbers.²⁵⁹ CARB may periodically transfer allowances from Compliance Accounts (or from Holding Accounts in CARB's control) to the Retirement Account.²⁶⁰ Alternatively, entities can voluntarily surrender allowances to CARB for retirement.²⁶¹

Another important account controlled by CARB is the Allowance Price Containment Reserve Account. Entities may purchase allowances from the Reserve in accordance with section 95913.²⁶² Unsold auction allowances, a starting allocation of allowances, and any excess penalty allowances are transferred into the Reserve.²⁶³

Participants must update their registration information within 10 days of a change.²⁶⁴ Failure to timely update registration information may subject the registered account to revocation, suspension or restriction.²⁶⁵ Failure to timely update registration information may be the first sign that the registered participant is trying to game the system or otherwise violate the rules.

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All registered accounts have a designated authorized account representative.²⁶⁶ It is through the account representative that CARB will exert much of its enforcement authority. Section 95832 sets forth the rules for designating an account representative. Of significance, an account application includes a list of entities subject to a binding agreement with the representative, which allows CARB, through the statements and actions of the account representative, to hold the underlying entity responsible.²⁶⁷

CARB has also developed similar registration requirements for auctions. All participants must register by completing an application at least 30 days prior.²⁶⁸ CARB may delegate administration of the auction to a third party.²⁶⁹ Registration must include information on the corporate identity and ownership of the applicant, direct or indirect corporate associations, disclosure of indictments, felony convictions or securities investigations.²⁷⁰ CARB also requires notification of material changes to the applicant's information at least 30 days prior to the auction.²⁷¹ At least one week prior to the auction, participants must provide a bid guarantee at least equal to the total value of its bids.²⁷² An applicant cannot participate in the auction without CARB's prior approval.²⁷³

These account and auction registration requirements should provide sufficient opportunity for CARB to assert jurisdiction against participants. By requiring attestations and forbidding misleading or fraudulent statements in registration, CARB will discourage potential rule breakers from participating in the market.

B. Bases for jurisdiction: spot trading and auction rules

CARB's ability to enforce trading rules is particularly important to the prevention of market manipulation and gaming. CARB has prohibited certain trading practices, giving itself wide discretion to take enforcement actions against suspicious trades. It has restricted the ability of auction participants to collaborate to manipulate bidding. And CARB may reverse trades and/or subject violators to penalties under its trading rules.

Trades between parties are subject to specific requirements detailed in section 95921. Trades in violation of these rules will not be registered by CARB, can be reversed by CARB, and could subject the violators to penalties under section 96013.²⁷⁴ Trades between parties can only shift allowances between Holding Accounts, or between a Holding Account and a Clearing Account.²⁷⁵

CARB's right to disapprove trades in the proposed regulations is another tool to prevent market gaming. This ability will allow CARB to stop attempts at market manipulation by refusing to approve trades if the trader appears to be engaged in market manipulation. However, this power should be used carefully and with due process. If trades are routinely delayed by regulatory

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requirements, then market uncertainties and the cost of trading will increase and the result will be thin markets that are more vulnerable to manipulation.

Owners of allowances may object to attempts by CARB to unilaterally confiscate their allowances or suspend their accounts. CARB explicitly states that allowances, however, are not property rights.²⁷⁶ As with similar statements in other trading programs,²⁷⁷ this explicit reservation should likely overcome a Fifth Amendment Takings challenge.²⁷⁸ Allowance owners however, may still be legally entitled to certain due process protections.²⁷⁹ While due process may not require notice and a hearing *before* CARB can take any action regarding allowances, it is unlikely that CARB actions regarding allowances will withstand court scrutiny unless the allowance owners are granted at least some due process protections. The interest in retaining ownership over—and benefitting economically from—allowances should require some due process safeguards.²⁸⁰

Recommendation V-1: Establish basic guidelines and procedures for freezing participant accounts, confiscating allowances and permitting limited challenges to regulatory enforcement actions.

Section 95921(e) describes specific prohibited trading practices. These include manipulation or deception, fraud, attempts to corner the market, and attempts to falsify, mislead or omit material facts.²⁸¹ The listed prohibitions appear to give CARB wide discretion to reject or reverse suspicious trades. Most of the listed terms, however, have specific legal meanings that could warrant due process review of CARB's discretion. In particular, in a dispute over a rejected trade, the issue of whether something was a "material fact" could be important. Notably, there is no mention of the burden of proof in this section, so it is unclear if CARB or the aggrieved party would need to provide evidence concerning the "material fact" in that scenario.

Recommendation V-2: Clarify which party has the burden of proof in a dispute over a disputed trade.

CARB has detailed specific rules controlling auction participation, in an attempt to prevent gaming of the auction. Violation of the rules, submission of false or misleading information, or omission of material information can result in temporary or permanent exclusion from auctions.²⁸² CARB also reserves the right to pursue any other available penalties, fines or other legal remedies.²⁸³ Entities with revoked or suspended Holding Accounts also cannot participate in the auction.²⁸⁴

An auction participant may not disclose certain confidential information that could be used to strategically coordinate bidding, such as bidding strategy, bid information or information on its bid guarantee.²⁸⁵ Disclosures in violation of section 95914 are explicitly subject to the penalties set forth in section 96013 (see Penalties, below).²⁸⁶

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These trading and auction rules provide CARB with several enforcement options, and significant discretion, to prevent market manipulation and gaming.

C. Bases for jurisdiction: reporting and verification

Emissions reporting by Compliance Entities and verification of those reports provides CARB with additional enforcement avenues. In particular, CARB requires its accredited independent verifiers to meet certain standards. And the verification statements and emission reports require attestations, allowing CARB to hold specific individuals and entities liable for false statements, omissions or other misleading information.

CARB relies on the verifier as the first line of defense against false or misleading emissions reporting. Verifiers must not have conflicts of interest or otherwise lack objectivity, as detailed in the regulation.²⁸⁷ Only if the verifier fails to provide an adequate Verification Statement will CARB then assess the emissions of a given entity. (CARB could still, however, audit the verifier and/or the facility at any time.)

Similarly, CARB relies on an accredited "Verification Body" to verify offset reports.²⁸⁸ As with emissions reports, offset project data reports are generally prepared and verified each year.²⁸⁹ The offset verifier, as with emissions verifiers, will issue a positive or qualified report.

The Verification Statement itself creates a liability for both the Covered Entity and the verifier. The verifier must provide "reasonable assurance" that the emissions data is "free of material misstatement" and "conforms to the requirements of MRR" in order to issue a positive statement.²⁹⁰ Alternatively, a verifier may issue a qualified statement if the emissions data does not conform to the requirements of the MRR but (again, with "reasonable assurance") is free of material misstatement.²⁹¹ Thus, through the Verification Statement, CARB may hold the verifier and the entity to the rules of MRR and liable for material misstatements.

The trading regulations specify that an annual (or triennial) compliance obligation must be met by November 1 of the following year.²⁹² If CARB does not receive a positive or qualified positive emissions data verification statement by the verification deadline, CARB will assign the compliance obligation per MRR § 95103(g).²⁹³ The threat of having CARB assign an entity's compliance obligation—along with penalties for violating the deadline—should serve as an incentive for timely, accurate emissions reporting.²⁹⁴

Similarly, offset verification statements assure CARB that the offset report does not contain any "Offset Material Misstatement." This misstatement is defined as any "discrepancy, omission, or misreporting" that results in the belief that the reported total GHG reductions from the project exceed 105% of the actual total.²⁹⁵

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Up to eight percent of an entity's compliance obligation can be covered by offsets. Offset purveyors are subject to a host of requirements detailed in Subarticle 13.²⁹⁶ While most of these requirements are outside the scope of this paper, verification and remedies are treated similarly to other emissions reporting.

CARB also requires attestations for the offset reports themselves. These attestations, under penalty of perjury, affirm that all information therein is "true, accurate and complete."²⁹⁷ These attestations also subject the signer to California jurisdiction and the rules of the trading program.²⁹⁸ Similarly, the MRR characterizes incomplete or inaccurate submitted report information as a violation.²⁹⁹ Thus CARB can hold not just the verifier, but also the underlying entity, liable for misstatements.

Records regarding reporting, verification statements and records for compliance obligations must be kept for at least 7 years and provided within 20 days, upon request of CARB.³⁰⁰ Documentation for Offset Project Data Reports must be kept for 15 years.³⁰¹ This recordkeeping rule provides CARB with audit capability.

"Material misstatement" is defined in the MRR as "any discrepancy, omission or misreporting . . . that leads a verification team to believe that . . . total reported GHG emissions . . . contain errors greater than 5 %."³⁰² This definition parallels the 5% underreporting buffer, discussed in Penalties, below, and a similar 5% rule for offset material misstatements. This definition is weaker than the common legal understanding of "material," which could be thought of as any item that, if known, "would affect a person's decision-making."³⁰³ CARB should push for a definition that encompasses more errors than just a 5% rule, because some statements in a data report could be considered important to decision-making without necessarily affecting the total estimated emissions.

For example, an entity could mistakenly report more operational hours than actually occurred—resulting in a false 10% increase in emissions reported—but also erroneously claim that a control technology was installed and functioning—resulting in a false 10% decrease in emissions reported. The entity would fall within the 5% rule; these misstatements would not be considered "material." First, it seems unfair to treat this report as equivalent to one where an entity spent time and resources to carefully monitor and report its emissions. Second, these errors interfere with CARB's ability to forecast emissions and allowance demand and catch future errors using historical trends. Third, to the extent this data becomes public knowledge, this erroneous reporting distorts the allowance market.

Recommendation V-3: Redefine "material misstatement" with reference to its common legal definition so that it encompasses both errors that, if known, would affect a person's decisionmaking and errors greater than 5%.

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D. Enforcement resources

CARB should be careful not to underestimate the resources necessary to adequately enforce its trading program. Particularly in its early stages, enforcement will require significant training of agency staff, inspectors and independent monitors. The amount of data produced on facility emissions can be overwhelming, particularly in the case of automated emissions tracking.

Enforcement for RECLAIM—determining facility compliance and resolving disputes—significantly exceeded SCAQMD's estimated 5% of its budget.³⁰⁴ Auditing facilities, in particular, required significant resources in that program. Inspection of a facility in a trading program requires more than checking the functioning of specific equipment at a moment in time; inspection requires verifying total emission estimates and verifying emissions reports.³⁰⁵ As SCAQMD noted, RECLAIM compliance, measured quarterly, depended on sophisticated pollution monitoring and measuring to determine total mass emissions and thus presented "special enforcement challenges."³⁰⁶ SCAQMD's audits fell behind, with the agency sometimes taking one or more years to audit a facility.³⁰⁷

SCAQMD had particular trouble automating its information systems, experiencing software and hardware failures and tracking errors.³⁰⁸ Lack of automation increased labor costs for inspections and audits.³⁰⁹ SCAQMD had difficulty with timely, adequate enforcement for RECLAIM. EPA's 2002 report pointed to hundreds of unenforced outstanding violations.³¹⁰ Settlement for violators took an average of 12 months, and some took as long as 23 months.³¹¹

By looking carefully at the experiences of past and present trading programs, we are hopeful that CARB can and will devote the necessary enforcement resources. In particular, the existing MRR program gives CARB some experience in this area, and its use of independent verifiers should allow CARB to focus its limited resources more narrowly on enforcing its rules. We recommend, however, that CARB be transparent about the resources it intends to devote to the administration and enforcement of its cap and trade program and to be clear about where those resources will come from. We have some concern that even if CARB devotes sufficient resources to the program those resources will be at the expense of other programs for which CARB is responsible, including state and federal air laws.

Recommendation V-4: CARB should report publicly about its cap and trade administration and enforcement budget, including how much of its total budget will be allocated for the program, how many personnel, how they will be funded and whether the resources will be additional to the agency budget or will come from within.

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E. Third-party enforcement

When considering CARB's enforcement resources, it is important to keep in mind the role of active third parties. Third parties will be most effective in their oversight role if they can impose a credible threat of litigation in the event of wrongdoing on the part of trading participants. The Clean Air Act, for example, allows citizens to enforce compliance through litigation after giving a 60-day notice of the alleged violation to the violator, State and EPA.³¹² This litigation threat provides the regulated entity with an incentive for compliance and also provides an incentive for prompt agency action in the case of noncompliance.

We recognize that a citizen suit provision is best implemented at the legislative level and is outside the scope of this paper. Nevertheless, CARB could take certain steps to engage third parties who may provide valuable oversight of the trading program. Specifically, CARB should create an official mechanism by which a third party may submit a petition for enforcement action that CARB must respond to within 60 days.

Recommendation V-5: CARB should set up an official mechanism allowing third-party administrative petitions regarding rules violations and potential enforcement actions, including a requirement that CARB respond to such petitions within 60 days.

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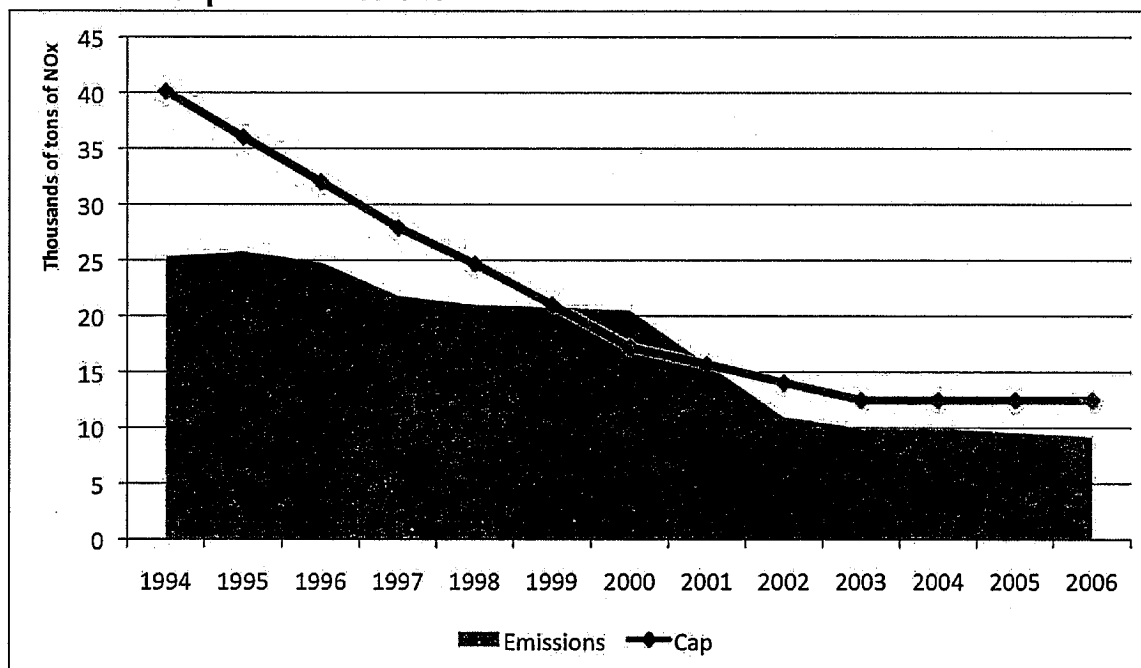
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VI. PENALTIES

Penalties are, in a sense, the last line of defense against market manipulation and gaming. But penalties for noncompliance and rules violations may be, in fact, one of the first things a potential manipulator or rules violator considers. In the SO₂ trading program, for example, continuous emissions monitoring and stiff penalties resulted in a “very high degree of compliance.”³¹³ In the SO₂ program, if a utility exceeded its allowance holdings for a given year, it would have to pay a fine of \$2000 per ton and make up excess emissions with allowances the following year.³¹⁴

RECLAIM is the only trading program to date with documented widespread noncompliance. During the price spike of 2000–2001, certain regulated entities under RECLAIM emitted more than the number of allowances they owned. Due in part to the energy crisis, public utilities had to bring dirtier emitting facilities online to cover electricity demand. This, along with lack of foresight on the part of large emitters, resulted in a price spike. Some regulated entities were either unable or unwilling to buy sufficient allowances to cover their emissions during that time period.

RECLAIM Cap and Emissions³⁴⁶



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CARB has structured its penalties to discourage underreporting, deter noncompliance, and penalize rule violators. While we have some recommendations to improve CARB's penalty structure, we believe that it is well thought-out and adequate to the task of preventing market manipulation and gaming.

CARB trading: Penalties

Several distinct sections of the trading regulation provide penalties for violations of the regulation:

§ 96011: CARB may suspend, revoke or otherwise restrict the Holding Account of any participant. CARB may also suspend or revoke a participant's registration or a verifier's accreditation.

§ 96013: Penalties assessed pursuant to Health and Safety Code § 38580 for any obligation in this article that results in a violation of this article. Health and Safety Code § 38580 states that any violation can be enjoined and is subject to penalties set forth in § 42400 et seq. and § 43025 et seq. Furthermore, any such violation "shall be deemed to result in an emission of an air contaminant for the purposes of the penalty provisions of [§ 42400 et seq. and § 43025 et seq.]"³¹⁵ Penalties under section 42400 through 42400.4 begin with a \$1000 fine / 6 months misdemeanor and go up from there. The likely maximum fine in the case of carbon emissions trading would be \$75,000 / 1 year misdemeanor.³¹⁶ Each day of the violation constitutes a separate offense. The court may consider the financial burden on the defendant in determining the amount of the fine, along with other relevant circumstances.³¹⁷

§ 96014: Separate violation for each compliance instrument not surrendered (placed in compliance account). Additional separate violation for each 45-day period after date in § 95857(b)(4) (the initial date is 3 days after the next auction or reserve sale, whichever is later).

§ 96014: falsifying or omitting material facts in a record or report is a violation.

A covered entity that does not meet the November 1 deadline is subject to the excess emissions penalty. The covered entity must surrender 4x the amount of its emissions for which it did not timely surrender allowances.³¹⁸ In other words, the entity owes allowances for its excess emissions plus a 3x penalty. This excess emissions penalty is due three days after the next auction or reserve sale, whichever is later.³¹⁹

An entity that fails to meet the excess emissions penalty deadline incurs additional penalties that are immediately due.³²⁰

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A. Discouraging underreporting

Underreporting emissions can negatively affect the trading market. An entity that underreports its emissions cheats the system by using its allowances to cover its emissions at a better than 1:1 ratio. If a covered entity emits 100 units, but reports 95 units of emissions, then it will only cost the entity 95 allowances to cover its 100 units of actual emissions. And as a result, those extra 5 units violate the integrity of the total emissions cap.

Underreporting of emissions is handled under section 95858. If an entity is found to have underreported its emissions by 5% or more, it must surrender additional allowances, but only for the amount of excess that exceed that 5% threshold.³²¹ If the underreporting is less than 5%, no further action is required.³²² So, if an entity reported 100 units of emissions but it was later determined by CARB that it emitted 110 units, the entity must surrender an additional 5 units of allowances.³²³

This formula thus gives entities an incentive to underreport emissions. If an entity keeps within 5%, it will not incur any penalty. If the entity underreports in excess of 5%, it will owe at most the amount of allowances that it would have submitted if it underreported its emissions by 5%. In addition, the entity has six additional months to acquire any additional allowances after CARB notifies it of the underreporting, and these additional allowances can be of any vintage period (i.e., borrowing is allowed).³²⁴ In sum, the provision rewards those who fail to accurately report emissions and fails to make the environment whole in any case of serious underreporting.

Neither the SO₂ trading program nor RGGI contemplates a similar 5% exemption. The RGGI model rule, for example, allows for ex-post challenges to a determination that an entity has an excess emissions violation, but indicates that each ton of excess emission is violation without exemption.³²⁵ Furthermore, the federal monitoring rules for GHG emissions require correction of "all identified errors" in emissions reporting.³²⁶

We also believe that this 5% threshold is too high in reference to the overall emissions cap. CARB is seeking a 15% reduction in emissions from 2012 to 2020; the cap declines 2% to 3% each year. If every covered entity underreported its emissions each year by 5%, the trading program would be effectively operating a year behind its target goals. We believe that CARB should modify its underreporting provisions in two respects. First, entities should have to make up the full amount by which they underreport in all cases. Second, large underreporting (above a trigger, such as 5%) or repeated cases of underreporting should result in penalties, not just a requirement to make up the difference.

Recommendation VI-1: Require entities that underreport emissions by any amount to make up the full amount of underreported emissions.

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Recommendation VI-2: Underreporting of more than 5% should trigger automatic penalties, not just a requirement to make up the difference. Exemptions for unforeseeable technical changes could be allowed, or penalties could be linked to repeated instances of underreporting.

B. Deterring noncompliance

In the case of allowance trading, penalties should adequately deter market participants from choosing not to comply for economic gain. It should not be in the economic interest of a covered entity to emit without owning (or planning to purchase) sufficient allowances or offsets to cover those emissions. From an economic perspective, the penalty times the risk of getting caught should exceed the potential gain from noncompliance.

The CARB trading program's main deterrence feature is its 4x penalty for noncompliance. CARB will also rely on serialized allowances and control and oversight of participants' accounts to track allowances. CARB can also audit facilities and verifiers to ensure compliance.

RECLAIM lacked adequate deterrence mechanisms to encourage compliance. Facility noncompliance between 1994 and 2000 ranged from 4% to 15%.³²⁷ EPA noted that "during the 2000–2001 excursion some sources were willing and openly violating their allowance limits because they could make substantially more selling their increased production than they would have to pay in penalties."³²⁸ This was a failure of the first part of the penalty times risk equation. RECLAIM's penalty scheme was likely insufficient to prevent violations in the event of a price spike.³²⁹

RECLAIM also had failures in the second part of the equation: the perceived risk of being caught. Under SCAQMD rules, the sellers are held accountable for their sold reductions, but buyers escape any liability.³³⁰ Trades cannot be canceled nor can buyers be enjoined from using fraudulent credits.³³¹ According to Joseph Panasiti, senior deputy District prosecutor, this removes the prisoners' dilemma scenario whereby buyer and seller would need to testify against each other on the issue of liability.³³² But this ex-post enforcement of only sellers increases the willingness of buyers to violate the rules. Finally, SCAQMD had trouble with both accounting for allowances and conducting audits in a timely fashion,³³³ likely leading participants to discount the risk of penalty.

CARB's trading program should not suffer from the same flaws as RECLAIM. First, an entity that does not cover its emissions with allowances must purchase 4x that amount in allowances as a penalty. Because this penalty rises with the price of allowances, it provides a strong incentive to comply. In addition, an entity would be charged a separate violation for each missing compliance unit and a separate violation for each 45-day period after the penalty due date.³³⁴ Thus, continued non-compliance leads to steeper penalties. While CARB may also refer

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violators to a prosecuting agency, as SCAQMD did,³³⁵ CARB has reserved several measures that it can take against violators on its own authority, such as freezing or confiscating a violator's account. Finally, the use of independent verifiers should help prevent the inspection/audit backlog seen with RECLAIM.

C Punishing rule violations

Beyond noncompliance, a host of other rule violations and gaming schemes may warrant punishment. Without adequate penalties for these violations, even the best monitoring and enforcement will lack teeth. Professor Pirrong, an expert on derivatives regulation, argues that ex-post penalties are good deterrents to market manipulation.³³⁶

Section 94921(f) lists CARB's possible recourses for violations of the trading rules. The potential recourses are limited to: (1) reduction in compliance instruments "below the amount allowed by the holding limit"; (2) increasing the annual compliance obligation above 30%; (3) suspension or revocation of registration; or (4) freezing the entity's Holding Account.³³⁷ Notably, (1) appears to apply only in the case when an entity attempts to acquire more allowances than permitted under its holding limit. One potential oversight to this list is the ability of CARB to invoke any of the penalties listed in sections 96011 or 96013.

Recommendation VI-3: Explicitly reference sections 96011 and 96013 in the list of potential recourses for violations of the trading rules.

CARB does assert, in section 96013, the ability to assess penalties "for any obligation contained in [the regulations] that result in a violation." We believe that CARB's discretion to assess penalties through section 96013 appears to be reasonably broad and should deter rule violations.

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VII. THE 2020 END GAME

Currently, California's carbon trading program is scheduled to end in 2020. The scheduled end of the program could end up posing problems years before 2020. It will be quite difficult for emitters to forecast allowance prices in 2020. If there are more compliance instruments than emissions, then prices will go to zero, because they are worthless after the program ends. If there are fewer compliance instruments than emissions prices could be very high.

This zero or very high price forecast places emitters in a difficult quandary. If they invest in carbon reduction, they could end up losing investors a great deal of money because allowances become cheap. Also, the investment in carbon reduction would pay little in future savings with the possible end of carbon trading. On the other hand, not investing in reduction could place them in a market with extraordinarily high prices.

If emitters worry more about the high price possibility, then some unneeded investments would take place but market functioning would not be impeded. If, on the other hand, emitters place weight on the EU ETS example where allowance prices fell to zero, then there are likely to be serious problems. An emitter that expects prices to fall to zero will wait to purchase compliance instruments. It will also do as little emissions reduction as possible in the years leading up to 2020. If many firms fall into this category, then the 2020 market would be very difficult, with too much demand for the existing compliance instruments, and likely calls for regulatory relief because of the high cost and social ramifications of reducing emissions significantly over a short time period. It is also unclear how penalties would be assessed in 2021 if emitters did not submit sufficient allowances.³³⁸

This scenario can be avoided if the State announces the continuation of emissions trading in the next few years. A good target timeframe for such an announcement would be the end of the first compliance period. At that point, there should be much more information to evaluate the success of the program, and that timeframe is far enough in advance of 2020 to avoid end-game problems.

Recommendation VII-1: Aim to address the question of the continuation of the program and the fate of allowances post-2020, by the end of the first compliance period.

Other emissions trading programs have managed transitions well by allowing partial transfer of banked allowances to a new program. Allowance prices fell at the end of the OTC NO_x program when sources realized that the program would be replaced by EPA's NO_x Budget Trading Program (NBP) (part of the NO_x SIP Call Program). EPA allowed some of the banked allowances from the OTC NO_x program to be transferred into NBP, preserving some of their value.³³⁹ NBP imposed a nearly identical limitation on the use of banked allowances to prevent seasonal emission spikes.³⁴⁰ In general, expectations concerning allowance value were not

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severely disrupted with this transition because federal policy established the terms of the exchange in advance.³⁴¹

Explicitly limiting the life of allowances can help avoid takings claims while allowing modifications to the trading program over the longer term.³⁴² For example, CARB could explicitly state that all allowances issued under its current program will expire (be retired by the State) in 2020. Or, CARB could define all allowances to have a 5-year lifespan or expire at 2020, whichever is sooner. CARB may also wish to explicitly reserve the right to convert—at a specified conversion rate—banked allowances in the current program to be used in some new trading program after 2020. At the same time, guaranteeing allowances against confiscation or discount in the short term may encourage trading.³⁴³

Recommendation VII-2: CARB should include language explicitly allowing for either the discontinuation of banked allowances or the transfer of them into a new program at an appropriate ratio.

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CONCLUSION

CARB has crafted a market likely to be both transparent and liquid, largely incorporating the best practices from other allowance trading programs. Its provisions for market structure, allowance allocation, emissions and trade reporting requirements, an allowance reserve, and other key program features seem well designed. We think it is unlikely that CARB will experience market manipulation significant enough to affect efficiency or fairness or cause unwarranted price volatility.

We also generally believe that CARB has designed a strong system of monitoring and enforcement that will allow CARB to detect foul play, take necessary enforcement actions, impose adequate penalties and more generally hold cheaters accountable.

We did find areas, however, where the proposed rules could be improved. Some of the most important of these will aid market liquidity and clarify anti-gaming rules. We suggest that publicly owned utilities be required to auction their free allowances in the same manner as independently owned utilities in order to “thicken” the market and help incentivize POUs to reduce emissions early in the program. We also suggest that CARB clarify its definition of resource shuffling, a key anti-gaming provision but one that we fear is drafted so broadly as to thwart potential clean energy investments.

We would seek to strengthen penalties for underreporting emissions, as we believe the current penalty structure is too lenient and will incentivize underreporting. When underreporting of emissions is discovered, emitters should be required to submit allowances to make up the *full* difference between their reported and actual emissions, and should be subjected to additional penalties in some circumstances.

Overall, we are impressed by CARB's program design and believe that its cap and trade market will work well as proposed. Our hope is that CARB will consider incorporating our recommendations into its program in order to strengthen an already-strong proposal.

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ENDNOTES

¹ JEFFREY H. HARRIS, REPORT ON HOLDING LIMITS TO THE WESTERN CLIMATE INITIATIVE MARKETS COMMITTEE 2 (May 2010), at <http://www.westernclimateinitiative.org/document-archives/Markets-Committee-Documents/Report-on-Holdings-Limits>.

² See R.W. Hahn, *Market Power and Transferable Property-Rights*, 99 Q. J. ECON. 753 (1984); H. vanEgteren & M. Webber, *Marketable permits, market power, and cheating*, 30 J. ENVTL. ECON. & MGMT. 161 (1996).

³ DALLAS BURTRAW & SARAH JO SZAMBELAN, RES. FOR THE FUTURE, U.S. EMISSIONS TRADING MARKETS FOR SO₂ AND NO_x 2 (Oct. 2009) (RFF DP 09-40), at <http://www.rff.org/documents/RFF-DP-09-40.pdf>.

⁴ A new focal point of concern is the use of offsets in carbon trading programs. Both the VOC reduction program in Los Angeles and the European Union's carbon market have experienced problems with offset quality and it is understandably a concern that offsets be verifiable, additional, and long-term. Fowle et al. document that offsets for reducing mobile source pollution played only a minuscule role in the NO_x RECLAIM trading regime. Meredith Fowle, Stephen P. Holland & Erin T. Mansur, *What Do Emissions Markets Deliver and To Whom? Evidence from Southern California's NO_x Trading Program*, AM. ECON. REV. (forthcoming). The controversial offsets in SCAQMDs' VOC reduction rule were not part of RECLAIM. In this paper, we do not examine the offset verification protocol, which has been subject to extensive analysis elsewhere. We do, however, address the extent to which offsets can improve market liquidity.

⁵ See generally Cal. Air Res. Bd., ARB Emissions Trading Program Overview, at <http://www.arb.ca.gov/newsrel/2010/capandtrade.pdf>.

⁶ Cal. S. Select Cmte. on Env't, Economy & Climate Change, Testimony of Mary D. Nichols, Chairman, Cal. Air Res. Bd. (June 29, 2011), at <http://www.arb.ca.gov/cc/testimony/testimony.pdf>.

⁷ See, e.g., Jonas Monast, *Climate Change and Financial Markets: Regulating the Trade Side of Cap and Trade*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10051, 10055 (2010) (summarizing testimony from September 2009 Senate Agricultural Committee hearing on the importance of transparency for carbon markets).

⁸ Transparency should not extend to individual transactions or to the identities of the transacting parties, though, as that information can be used to manipulate markets.

⁹ JONAS MONAST, JON ANDA & TIM PROFETA, NICHOLAS INST., U.S. CARBON MARKET DESIGN: REGULATING EMISSION ALLOWANCES AS FINANCIAL INSTRUMENTS 5 (Feb. 2009), at <http://nicholasinstitute.duke.edu/climate/carbon-market-oversight/u.s.-carbon-market-design-regulating-emission-allowances-as-financial-instruments>.

¹⁰ Monast, *supra* note 7, at 10062.

¹¹ Isabel Rauch, *Developing a German and an International Emissions Trading System - Lessons From U.S. Experiences with the Acid Rain Program*, 11 FORDHAM ENVTL. L.J. 307, 339 (2000).

¹² BURTRAW & SZAMBELAN, *supra* note 3, at 9-10.

¹³ *Id.* at 3.

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ Technically, based on heat input during the historical base period multiplied by an emissions rate. *Id.* at 5.

¹⁷ *Id.* at 5. A small percentage of allowances were dedicated for auction and market stabilization. Karl S. Coplan, *Public Trust Limits on Greenhouse Gas Trading Schemes: A Sustainable Middle Ground?*, 35 COLUM. J. ENVTL. L. 287, 293 (2010).

¹⁸ Arthur G. Fraas & Nathan Richardson, *Banking on Allowances: The EPA's Mixed Record in Managing Emissions-Market Transitions*, CS023 ALI-ABA 51, 82 (2010).

¹⁹ BURTRAW & SZAMBELAN, *supra* note 3, at 5.

²⁰ Fraas & Richardson, *supra* note 18, at 82.

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²¹ Lesley K. McAllister, *The Overallocation Problem in Cap-and-Trade: Moving Toward Stringency*, 34 COLUM. J. ENVTL. L. 395, 399 (2009)..

²² BURTRAW & SZAMBELAN, *supra* note 3, at 5; McAllister, *supra* note 21, at 400.

²³ See Fraas & Richardson, *supra* note 18, at 83 (suggesting that the 1:1 transition for allowances between phase I and II helped market stability).

²⁴ BURTRAW & SZAMBELAN, *supra* note 3, at 7.

²⁵ *Id.* at 22.

²⁶ *Id.* at 22. In 1999, the market was thin and it was unclear if utilities could in fact meet the emissions cap. Fraas & Richardson, *supra* note 18, at 65.

²⁷ BURTRAW & SZAMBELAN, *supra* note 3, at 23.

²⁸ *Id.* at 3.

²⁹ *Id.* at 21.

³⁰ *Id.*

³¹ *Id.*

³² *Id.* at 22.

³³ Fraas & Richardson, *supra* note 18, at 64. Under "progressive flow control," when the use of banked allowances exceeding 10% of the total annual budget, additional banked allowances could only be used at a 2:1 ratio. *Id.* Thus banked allowances generally traded at a discount to current-vintage allowances. *Id.* at 65.

³⁴ PARKER, *supra* note 52.

³⁵ The initial EU ETS market incorporated an experimental period from 2005-2007 precisely in order to learn about and solve any problems in the initial design of the program. Banking was not included because the designers did not wish any over allocation of allowances to spill over into the latter periods that were designed to meet Kyoto treaty requirements.

³⁶ Tessa Schwartz, William Sloan & Adam Young, *Legal Issues for Carbon-Related Transactions: Regulations, Markets, Technology & Enhancing Value*, 1718 PLI/CORP. 71, 83 (2009).

³⁷ *Id.* at 83; McAllister, *supra* note 21, at 409; Monast, *supra* note 7, at 10057.

³⁸ Schwartz et al., *supra* note 36, at 98.

³⁹ McAllister, *supra* note 21, at 409.

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.* at 410.

⁴⁴ MONAST ET AL., *supra* note 9, at 9.

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.* at 10.

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ Monast, *supra* note 7, at 10062-63.

⁵¹ Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, 17 Cal. Code of Reg. § 95100 et seq. (proposed 15-day modifications July 2011) [hereinafter "MRR"], at <http://www.arb.ca.gov/regact/2010/ghg2010/mandatory15dayreg.pdf>.

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⁵² LARRY PARKER, CONG. RESEARCH SERVICE, CLIMATE CHANGE AND THE EU EMISSIONS TRADING SCHEME (ETS): LOOKING TO 2020 (Jan. 2010), at <http://fpc.state.gov/documents/organization/137269.pdf>.

⁵³ A. DENNY ELLERMAN ET AL., CAP-AND-TRADE: CONTRIBUTIONS TO THE DESIGN OF A U.S. GREENHOUSE GAS PROGRAM (2008).

⁵⁴ Monast, *supra* note 7, at 10062.

⁵⁵ U.S. EPA REGION 9, AN EVALUATION OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT'S REGIONAL CLEAN AIR INCENTIVES MARKET—LESSONS IN ENVIRONMENTAL MARKETS AND INNOVATION ii (Nov. 2002), at <http://www.epa.gov/region9/air/reclaim/reclaim-report.pdf>.

⁵⁶ *Id.* at 22–23.

⁵⁷ BURTRAW & SZAMBELAN, *supra* note 3, at 18.

⁵⁸ *Id.*

⁵⁹ Nash & Revesz, *supra* note 85, at 610.

⁶⁰ U.S. EPA REGION 9, *supra* note 55, at 1.

⁶¹ Email from Jill Whynot, Assistant Deputy Executive Officer, SCAQMD to M. Rhead Enion (Aug. 11, 2011) (on file with author).

⁶² U.S. EPA REGION 9, *supra* note 55, at 15.

⁶³ *Id.*

⁶⁴ BURTRAW & SZAMBELAN, *supra* note 3, at 19.

⁶⁵ McAllister, *supra* note 21, at 404.

⁶⁶ BURTRAW & SZAMBELAN, *supra* note 3, at 19.

⁶⁷ *Id.*

⁶⁸ *But see id.* at 20 (noting one study that determined firms within RECLAIM had 24% lower compliance costs than similar firms under command-and-control regulations).

⁶⁹ James Nicholas & Julian Conrad Juergensmeyer, *Market Based Approaches to Environmental Preservation: to Environmental Mitigation Fees and Beyond*, 43 NAT. RESOURCES J. 838, 851 (2004) (citing U.S. EPA REGION 9, *supra* note 55, at 44).

⁷⁰ U.S. EPA REGION 9, *supra* note 55, at 57. *But see* SCAQMD, OVER A DOZEN YEARS OF RECLAIM IMPLEMENTATION: KEY LESSONS LEARNED IN CALIFORNIA'S FIRST AIR POLLUTION CAP-AND-TRADE PROGRAM EX-1 (June 2007), at http://www.aqmd.gov/reclaim/docs/Policy_Paper_Part1.pdf ("[RECLAIM] has resulted in an additional 68 % (27,643 tons) and 59 % (6,073 tons) decrease in allowable emissions for NOx and SOx, respectively; and a 62 % (15,758 tons) and 50 percent (3,611 tons) reduction in actual emissions for NOx and SOx, respectively since 1993.").

⁷¹ *Id.* at 12–13.

⁷² *Id.* at i.

⁷³ *See id.* at 23–24 (noting that facilities made no new capital expenditures until 1999 because they held excess allowances and that regulated facilities had not planned for the 2000 market shift).

⁷⁴ *See, e.g., id.* at 45 ("[E]nvironmental stakeholders, such as Communities for a Better Environment, claim to have correctly predicted when the cross-over point would occur and they argue that industry and SCAQMD should also have been able to predict this in advance. However, brokers note that it was commonly thought the price spike would occur slightly later, between 2000 and 2001.").

⁷⁵ *Id.* at 20.

⁷⁶ *Id.* at 18.

⁷⁷ *Id.*

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⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ EPA recommended similar reporting measures for SCAQMD in the RECLAIM program. See *id.* at 22, 66–67.

⁸² Cal. Proposed Trading Reg. § 95912(f)(2)(A)–(C).

⁸³ *Id.* § 95912(d)(2).

⁸⁴ *Id.* § 95912(k)(5).

⁸⁵ Jonathan Remy Nash & Richard L. Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 *ECOL. L. Q.* 569, 585 (2001).

⁸⁶ Rauch, *supra* note 11, at 344.

⁸⁷ *Id.* at 344–45.

⁸⁸ *Id.* at 345; Jonathan Remy Nash, *Too Much Market? Conflict Between Tradable Pollution Allowances and the "Polluter Pays" Principle*, 24 *HARV. ENVTL. L. REV.* 465, 492 (2000).

⁸⁹ Rauch, *supra* note 11, at 345 (citing GAO/RCED-95-30)).

⁹⁰ Cal. Proposed Trading Reg. § 95910 (d)(4) (auction settlement price); *id.* § 95910(b) (auction reserve price).

⁹¹ *Id.* § 95910(a).

⁹² *Id.* § 95910(c). Ten percent of allowances from vintage years 2015–2020 are designated as advance sales. *Id.* § 95870(b).

⁹³ *Id.* § 95910(d).

⁹⁴ *Id.* § 95910(d)(2) (withdrawal of allowances from suspended or revoked holding accounts).

⁹⁵ *Id.* § 95911(a).

⁹⁶ *Id.* § 95911(b)(6).

⁹⁷ *Id.* § 95911(b)(4)(A). Consigned allowances are returned to their respective Limited Use Holding Accounts; confiscated allowances are held for the next auction. *Id.* § 95911(b)(5).

⁹⁸ *Id.* § 95911(b)(4)(B).

⁹⁹ Adapted from MONAST ET AL., *supra* note 9, at 7–8.

¹⁰⁰ *Id.* at 8.

¹⁰¹ CRAIG PIRRONG, BROOKINGS INST., *MARKET OVERSIGHT FOR CAP AND TRADE: EFFICIENTLY REGULATING THE CARBON DERIVATIVES MARKET* 12 (Sep. 2009), at http://www.brookings.edu/~media/Files/rc/papers/2009/09_cap_and_trade_market_oversight_pirrong/09_cap_and_trade_market_oversight_pirrong.pdf.

¹⁰² MONAST ET AL., *supra* note 9, at 8.

¹⁰³ *Id.* at 7.

¹⁰⁴ Craig Pirrong, *Squeeze Play: The Dynamics of the Manipulation End Game*, 14 *J. ALT. INVESTMENTS* 26 (2008).

¹⁰⁵ PIRRONG, *supra* note 101, at 11.

¹⁰⁶ U.S. COMMODITY FUTURES TRADING COMM'N, *REPORT ON THE OVERSIGHT OF EXISTING AND PROSPECTIVE CARBON MARKETS* 44 (Jan. 2011).

¹⁰⁷ *Id.* at 45.

¹⁰⁸ *Id.* at 47.

¹⁰⁹ BURTRAW & SZAMBELAN, *supra* note 3, at 9.

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¹¹⁰ *Id.* (noting that the volume of trading doubled in each of the first three years). Only 12 facilities participated in 21 trades for amounts over 5,000 allowances in the first 3 years. Rauch, *supra* note 11, at 338. One company—Illinois Power & Light—made up 61% of the total interutility trades. *Id.*

¹¹¹ U.S. EPA REGION 9, *supra* note 55, at 15.

¹¹² A. Denny Ellerman, *Markets for Clean Air: The U.S. Acid Rain Program* (2000).

¹¹³ Tom Tietenberg, *The Evolution of Emissions Trading*, in *BETTER LIVING THROUGH ECONOMICS* 42–58 (John J. Siegfried ed., 2010).

¹¹⁴ <http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm> downloaded 8/10/11.

¹¹⁵ A. Denny Ellerman, *Markets for Clean Air: The U.S. Acid Rain Program* 157 tbl.6.4 (2000).

¹¹⁶ SCAQMD, *supra* note 70, at EX-1.

¹¹⁷ EPA, *Acid Rain Program 2009 Progress Reports—Appendix 1—Detailed Facility-Level Emission and Allowance Data* (Excel spreadsheet), <http://www.epa.gov/airmarkets/progress/ARP09.html>.

¹¹⁸ Mark Jickling & Larry Parker, Cong. Research Service, *Regulating a Carbon Market: Issues Raised by the European and U.S. Sulfur Dioxide Allowance Markets 2* (Feb. 2010), at http://nepinstitute.org/get/CRS_Reports/CRS_Climate_and_Environment/Carbon_and_CO2/Regulating_A_Carbon_Market.pdf.

¹¹⁹ Though, of course, truly global events such as the current recession will affect all sectors and lead to large price swings.

¹²⁰ This is a key reason for only disclosing aggregate price-quantity information. If auction participants know the identities and bids of other participants, they can collude to submit low bids without any direct communication.

¹²¹ Due to the required divestment of generating capacity in the 1990s, IOUs have only limited emissions, and thus, limited compliance obligations. See generally John C. Hilke & Michael Wise, *Who Turned Out the Lights? Competition and California's Power Crisis*, 15 ABA ANTITRUST 76 (2001).

¹²² California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, 17 Cal. Code of Reg. § 95811 (draft July 2011) [hereinafter "Cal. Proposed Trading Reg."], at <http://www.arb.ca.gov/regact/2010/capandtrade10/candtmmodreg.pdf>.

¹²³ *Id.* § 95813.

¹²⁴ *Id.* § 95814(a).

¹²⁵ *Id.* § 95814(b).

¹²⁶ *Id.* § 95813(a) and (b).

¹²⁷ *Id.* § 95813(c). Opt-in entities can opt out at the end of a compliance period. *Id.* § 95813(f).

¹²⁸ *Id.* § 95814(1)–(3). Derivatives clearing organizations are also regulated under Commodities Exchange Act and are registered with the CFTC. See *id.* § 95814(a)(3); 7 U.S.C. §§ 1a(9) and 7a-1(a).

¹²⁹ *Id.* § 95814(b)(1).

¹³⁰ *Id.* § 95911(c)(2).

¹³¹ *Id.* § 95911(c)(4)(A) and (C). Utilities subject to the consignment provision are not subject to the purchase limit. *Id.* § 95911(c)(4)(B).

¹³² CAL. AIR RES. BD., *PROPOSED REGULATION TO IMPLEMENT THE CALIFORNIA CAP-AND-TRADE PROGRAM*, at appx. J-13 & fig.J-3 (Oct. 2010) (Allowance Allocation), <http://www.arb.ca.gov/regact/2010/capandtrade10/capv4appj.pdf>.

¹³³ *Id.* at appx. J-15.

¹³⁴ See CAL. AIR RES. BD., *APPENDIX A: STAFF PROPOSAL FOR ALLOCATING ALLOWANCES TO ELECTRICITY DISTRIBUTION UTILITIES 9–10* (July 27, 2011), <http://www.arb.ca.gov/regact/2010/capandtrade10/candtappa2.pdf>.

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¹³⁵ The free allowance distribution rules could, in particular, reduce the effectiveness of banking. Under the CARB design, profit-maximizing entities should buy allowances and bank them, increasing prices in the early years and decreasing them in later years and producing a more stable and predictable market. For this to work, though, emitters or investors would need to purchase and bank enough allowances to push current prices up.

¹³⁶ These compliance account allowances may be banked but only for use by the emitter, so they have a limited effect on market liquidity.

¹³⁷ ELLERMAN, *supra* note 53.

¹³⁸ BURTRAW & SZAMBELAN, *supra* note 3, at 6.

¹³⁹ Fraas & Richardson, *supra* note 18, at 82–83.

¹⁴⁰ McAllister, *supra* note 21, at *Id.* at 416.

¹⁴¹ Schwartz et al., *supra* note 36, at 89.

¹⁴² *Id.* at 90.

¹⁴³ MONAST ET AL., *supra* note 9, at 13.

¹⁴⁴ Schwartz et al., *supra* note 36, at 90.

¹⁴⁵ *Id.* at 90.

¹⁴⁶ *Id.* at 90.

¹⁴⁷ MONAST ET AL., *supra* note 9, at 13.

¹⁴⁸ *Id.* at 13–14.

¹⁴⁹ *Id.* at 14.

¹⁵⁰ *Id.*

¹⁵¹ BURTRAW & SZAMBELAN, *supra* note 3, at 19. In a later review, SCAQMD stated that banking would have “present[ed] too great a risk of facilities “hoarding” unneeded credits in the earlier years, to be used in later years when allocations were to be reduced, thus threatening progress towards attainment.”). SCAQMD, *supra* note 70, at I-3-4.

¹⁵² Banking and borrowing did occur within a six month window corresponding to the overlapping annual compliance cycles. BURTRAW & SZAMBELAN, *supra* note 3, at 18.

¹⁵³ Fowlie et al., *supra* note 4.

¹⁵⁴ U.S. EPA REGION 9, *supra* note 55, at 18–19.

¹⁵⁵ *Id.* at 18–19.

¹⁵⁶ Fowlie et al., *supra* note 4, at 8.

¹⁵⁷ BURTRAW & SZAMBELAN, *supra* note 3, at 20.

¹⁵⁸ CAL. AIR RES. BD., UPDATED ECONOMIC ANALYSIS OF CALIFORNIA’S CLIMATE CHANGE SCOPING PLAN—STAFF REPORT TO THE AIR RESOURCES BOARD (2010), at <http://www.arb.ca.gov/cc/scopingplan/economics-sp/economics-sp.htm>.

¹⁵⁹ The EU ETS does limit new entrants to using allowances to account for only 50% of their emissions reduction. Europa, Press Release—Questions and Answers on the revised EU Emissions Trading System, <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/796>.

¹⁶⁰ HARRIS, *supra* note 1.

¹⁶¹ Cal. Proposed Trading Reg. §§ 95833 and 95834.

¹⁶² See, eg. HARRIS, *supra* note 1.

¹⁶³ HARRIS, *supra* note 1.

¹⁶⁴ Cal. Proposed Trading Reg. § 95920(b)(1).

¹⁶⁵ Specifically, 2.5 million metric tons of CO₂e + 2.5% * (annual budget – 25 million metric tons). *Id.*

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§ 95920(d)(1).

¹⁶⁶ Specifically, 7.5 million metric tons of CO₂e + 2.5% * (future allowances – 75 million metric tons). *Id.* § 95920(e).

¹⁶⁷ *Id.* § 95920(2).

¹⁶⁸ *Id.* § 95920(2)(H).

¹⁶⁹ Cal. Proposed Trading Reg. §§ 95820(b)(2) and 95854.

¹⁷⁰ *Id.* §§ 95976.

¹⁷¹ *Id.* §§ 95856.

¹⁷² *Id.* § 95985(b).

¹⁷³ CAL. AIR RES. BD., *supra* note 158.

¹⁷⁴ Cal. Proposed Trading Reg. § 95983.

¹⁷⁵ Letter from Int'l Emissions Trading Assoc. to CARB, Handling the Invalidation of Offset Credits in California's Cap-and-Trade Regulations: A Proposed Approach that Ensures Environmental Integrity and Market Functionality (2010), at 9.

¹⁷⁶ RGGI Model Rule § XX-1.2(am) (Control period) [hereinafter, "RGGI Model Rule"], at <http://www.rggi.org/docs/Model%20Rule%20Revised%2012.31.08.pdf>.

¹⁷⁷ U.S. EPA REGION 9, *supra* note 55, at 34.

¹⁷⁸ Cal. Proposed Trading Reg. § 95841 tbl. 6-1.

¹⁷⁹ *Id.* §§ 95856(c), 95856(g)(1).

¹⁸⁰ *Id.* § 95853.

¹⁸¹ *Id.* § 95853(a)–(b).

¹⁸² *Id.* § 95853(c)–(d).

¹⁸³ The entity would also be a covered entity for the entire next compliance period (2018–2020) because it exceeded the threshold in one of the prior three data years (i.e. 2016). *Id.* § 95853(a).

¹⁸⁴ *Id.* § 95853(d).

¹⁸⁵ *Id.* §§ 95850(b), 95852(a)(1), 95853(a).

¹⁸⁶ *Id.* § 95850 et seq.

¹⁸⁷ See *id.* § 95856(b)(2) ("[A] compliance instrument must be issued form an allowance budget year within or before the year during which the compliance obligation is calculated . . .").

¹⁸⁸ ELLERMAN ET AL., *supra* note 53.

¹⁸⁹ Cal. Proposed Trading Rule § 95911(b)(6)(B).

¹⁹⁰ Cf. U.S. EPA REGION 9, *supra* note 55, at 59 (suggesting, in hindsight, that RECLAIM would have benefitted from contingency measures to force the installation of emission controls to avoid the pending allowance shortage of 2000).

¹⁹¹ *Id.* at ii.

¹⁹² MONAST ET AL., *supra* note 9, at 5.

¹⁹³ In fact, SCAQMD's annual RECLAIM reports did forecast that a crossover point would occur in 1998 or 1999. U.S. EPA REGION 9, *supra* note 55, at 13. Some environmental stakeholders also claim to have correctly predicted the crossover point. *Id.* at 45.

¹⁹⁴ U.S. EPA REGION 9, *supra* note 55, at ii.

¹⁹⁵ Cal. Air Res. Bd., California's Greenhouse Gas Inventory Data—Graphs, <http://www.arb.ca.gov/cc/inventory/data/graph/graph.htm>.

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¹⁹⁶ P.L. Joskow & E. Kahn, *A quantitative analysis of pricing behavior in California's wholesale electricity market during Summer 2000*, 23 ENERGY J. 1 (2002).

¹⁹⁷ Env'tl. Defense Fund, Cost Containment through Offsets in the Cap-and-Trade Program under California's Global Warming Solutions Act, <http://www.edf.org/sites/default/files/EDF.AB%2032offsetsmodelingmemo.Aug2011.pdf> (summarizing S. GOLUB, N. KEOHANE & J. FINE, ENVT'L. DEFENSE FUND, MODELING THE EFFECTIVENESS OF A STRATEGIC ALLOWANCE RESERVE IN A CAP AND TRADE PROGRAM IN CALIFORNIA (2010)).

¹⁹⁸ Joskow & Kahn, *supra* note 196; S. Borenstein, J.B. Bushnell & F.A. Wolak, *Measuring market inefficiencies in California's restructured wholesale electricity market*, 92 AM. ECON. REV. 1376 (2002).

¹⁹⁹ Jonathan T. Kolstad & Frank A. Wolak, Using Environmental Emissions Permit Prices to Raise Electricity Prices- Evidence from the California Electricity Market (Aug. 2008), at http://hc.wharton.upenn.edu/jkolstad/kolstad_wolak_aug08.pdf.

²⁰⁰ Kolstad & Wolak, *supra* note 199, at 15.

²⁰¹ Cal. Proposed Trading Reg. § 95852(b). Emissions generated in a linked jurisdiction are exempt from this calculation. *Id.*

²⁰² *Id.* § 95802(245).

²⁰³ *Id.* § 95802(245)(A)-(B).

²⁰⁴ *Id.* § 95852(b)(1) and (b)(1)(A).

²⁰⁵ *Id.* § 95852(b)(1)(B).

²⁰⁶ Possible under scenarios 1 and 2. In scenario 3, LADWP continues to use the coal power.

²⁰⁷ ROBERT N. STAVINS, RES. FOR THE FUTURE, MARKET-BASED ENVIRONMENTAL POLICIES: WHAT CAN WE LEARN FROM U.S. EXPERIENCE (AND RELATED RESEARCH) 9 (Aug. 2003), at <http://www.rff.org/documents/RFF-DP-03-43.pdf>.

²⁰⁸ See Schwartz et al., *supra* note 36, at 93 (giving the example of emissions from smokestacks (direct) and emissions from purchased electricity (indirect)).

²⁰⁹ *Id.*

²¹⁰ *Id.*

²¹¹ Cal. Air Res. Bd., Mandatory Greenhouse Gas Reporting—Reported Emissions, <http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-reports.htm>.

²¹² CAL. AIR. RES. BD., STAFF REPORT: INITIAL STATEMENT FOR RULEMAKING—REVISIONS TO THE REGULATION FOR MANDATORY REPORTING OF GREENHOUSE GAS EMISSIONS PURSUANT TO THE CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006 (ASSEMBLY BILL 32), at vi (Oct. 2010), at <http://www.arb.ca.gov/regact/2010/ghg2010/ghgisor.pdf>.

²¹³ Raymond Olsson, Reporting, Verification, and Enforcement, at slide 4 (Presentation to the Program Design Technical Stakeholder Workshop, June 3, 2008), at http://www.arb.ca.gov/cc/scopingplan/pgmdesign-sp/meetings/060308/rve_presentation.pdf.

²¹⁴ MRR § 95103(a)(7) and (e).

²¹⁵ *Id.* § 95103(f).

²¹⁶ Olsson, *supra* note 213, at slide 4.

²¹⁷ MRR § 95106.

²¹⁸ RGGI Inc., RGGI CO₂ Allowance Tracking System: Reports: Quarterly Emissions, https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=reportsv2.quarterly_emissions_rpt&clearfuseattrs=true.

²¹⁹ Cal. Proposed Trading Reg. § 95850(a).

²²⁰ *Id.* § 95921(d)(4).

²²¹ *Id.* § 95831(b)(3)(C).

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²²² *Id.* § 95912(f)(1). There is a disclaimer—"to the extent permitted by state law"—which could encompass certain public record requests and criminal or civil investigations. *Id.*

²²³ *Id.* § 95912(f)(2)(A)–(C).

²²⁴ *Id.* § 95912(d)(2).

²²⁵ *Id.* § 95912(k)(5).

²²⁶ *Id.* § 95912(k)(1).

²²⁷ *Id.* § 95830(c).

²²⁸ *Id.* § 95830(b) and (d)(3).

²²⁹ *Id.* § 95830(c)(1)(A)–(D).

²³⁰ *Id.* § 95921(a)(1).

²³¹ *Id.* § 95921(d)(3).

²³² MONAST ET AL., *supra* note 9, at 5.

²³³ Cal. Proposed Trading Reg. § 95912(k)(5). The summary information includes the names of bidders, settlement price and "aggregated or distributional information on purchases." *Id.* § 95912(f)(2)(A)–(C).

²³⁴ *Id.* § 95831(b)(3)(C).

²³⁵ *Id.* § 95971.

²³⁶ *Id.* § 95830(c)(2). CARB must keep confidential (A) beneficial holdings information and (B) information related to the identity of real persons. *Id.* § 95830(g)(1).

²³⁷ *Id.* § 95830(g)(1).

²³⁸ *Id.* § 95830(g)(2).

²³⁹ RGGI Inc., RGGI CO₂ Budget Trading Program—Public Reports, http://www.rggi.org/market/tracking/public_reporting.

²⁴⁰ RGGI Inc., RGGI CO₂ Budget Trading Program—Market Monitor Reports, http://www.rggi.org/market/market_monitor.

²⁴¹ Cal. Proposed Trading Reg. § 95912(k)(5).

²⁴² *Id.* §§ 96010 and 96022.

²⁴³ *Id.* § 95830(c)(2).

²⁴⁴ Generally, 30 days of the effective date of the regulation or, for Opt-in entities, by November 30 of the year prior to the first voluntary compliance year. *Id.* § 95830(d).

²⁴⁵ *Id.* § 95831(a)(2).

²⁴⁶ *Id.* § 95831(a)(4).

²⁴⁷ *Id.* § 95831(4).

²⁴⁸ *Id.* § 95921(d)(4).

²⁴⁹ *Id.* § 95831(5).

²⁵⁰ Note that Cal. Proposed Trading Reg. § 95831(5) has a broken cross-reference: the voluntarily associated entity is described in § 95814(a)(3); there is no § 95814(a)(2)(C).

²⁵¹ *Id.* § 95890 et seq.

²⁵² *Id.* § 95892(c).

²⁵³ Other accounts not discussed in this section are the Forest Buffer Account, *id.* § 95831(b)(5), and the Voluntary Renewable Electricity Reserve Account, *id.* § 95831(b)(6)).

²⁵⁴ *Id.* § 95820(a).

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²⁵⁵ *Id.* § 95831(b)(1).

²⁵⁶ *Id.* § 95831(b)(2).

²⁵⁷ *Id.* § 95831(b)(2)(B) and (C).

²⁵⁸ *Id.* § 95831(b)(3)(A).

²⁵⁹ *Id.* § 95831(b)(3)(C).

²⁶⁰ *Id.* § 95831(b)(3).

²⁶¹ *Id.* § 95831(b)(3).

²⁶² *Id.* § 95831(b)(4)(D).

²⁶³ *Id.* § 95831(b)(4)(A)–(C); see also *id.* § 95870 (initial allocation of allowances to the Reserve); *id.* § 95857(d) (excess emissions penalty).

²⁶⁴ *Id.* § 95830(f).

²⁶⁵ *Id.* § 95830(f).

²⁶⁶ *Id.* § 95830(c)(3).

²⁶⁷ *Id.* § 95832(a)(3) and (a)(4). The authorized representative must attest, under penalty of perjury, that he is authorized to act on behalf of anyone with an ownership interest in the account, *id.* § 95832(a)(4), and that all information submitted with the application is "true, accurate, and complete," *id.* § 95832(a)(6). Each person with ownership interest is "fully bound . . . by any order or decision issued to me by the accounts administrator or a court regarding the account." *Id.* § 95832(a)(5).

²⁶⁸ *Id.* § 95912(c)(2).

²⁶⁹ *Id.* § 95912(a).

²⁷⁰ *Id.* § 95912(c)(2).

²⁷¹ *Id.* § 95912(d).

²⁷² *Id.* § 95912(h).

²⁷³ *Id.* § 95912(c)(3).

²⁷⁴ *Id.* § 95921(b).

²⁷⁵ *Id.* § 95921(a)(2).

²⁷⁶ *Id.* § 95820(c) ("A compliance instrument issued by the Executive Officer does not constitute property or a property right.").

²⁷⁷ See, e.g., Schwartz et al., *supra* note 36, at 99 (quoting 42 U.S.C. § 7651b(f)) (SO₂ trading); *id.* at 99 (quoting Section XX-1.2(k) of the Model Rules of RGGI, http://rggi.org/docs/model_rule_corrected_1_5_07.pdf); Susan A. Austin, *Tradable Emissions Programs: Implications Under the Takings Clause*, 26 ENVTL. L. 323, 328 (1996) (quoting SCAQMD Rule 2007(b)(2)–(3)) (RECLAIM trading).

²⁷⁸ See Justin Savage, *Confiscation of Emission Reduction Credits: The Case for Compensation Under the Takings Clause*, 16 Va. Envtl. L.J. 227, 246 (1997) ("With explicit disclaimers, an ERC owner almost surely holds no property right under the Fifth Amendment."); Austin, *supra* note 277, at 347 ("[E]ven if tradable emission permits were considered property within the meaning of the Fifth Amendment, a taking would not be found so long as nothing in the statutory language had guaranteed that the government would not reduce the amount of pollution allowed under the permits.").

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²⁷⁹ The fact that CARB has explicitly stated that allowances do not convey a property right is not dispositive, but merely "but one factor to be considered." *Fed. Lands Legal Consortium ex rel. Robart Estate v. United States*, 195 F.3d 1190, 1197 (10th Cir. 1999) (quoting *Coomes v. Adkinson*, 414 F.Supp. 975, 993 (D.S.D. 1976)); *Bd. of Regents v. Roth*, 408 U.S. 564, 571 (1972). The property interest in emission allowances could be compared to that of radio frequency licenses. A combination of statutory language and court rulings have provided due process protections for holders of radio frequency licenses. See Rochelle Quiggle, *Smog Futures: The Latest in Commodities Trading Lacks Procedural Due Process Safeguards*, 2 DICK. J. ENVTL. L. & POL'Y 105, 118–121 (1992).

²⁸⁰ Cf. Quiggle, *supra* note 279, at 125.

²⁸¹ Cal. Proposed Trading Reg. § 95921(e)(A)–(F).

²⁸² *Id.* § 95914(c).

²⁸³ *Id.* § 95914(c)(2).

²⁸⁴ *Id.* § 95914(b).

²⁸⁵ *Id.* § 95914(d)(1).

²⁸⁶ *Id.* § 95914(d)(4).

²⁸⁷ *Id.* § 95802(56).

²⁸⁸ *Id.* § 95802(274).

²⁸⁹ *Id.* §§ 95802(171) and §95976(d). Non-sequestration offset projects must be verified annually. *Id.* § 95977(b). Sequestration offset projects require verification every six years. *Id.* § 95977(c).

²⁹⁰ *Id.* § 95802(198) and (199).

²⁹¹ *Id.* § 95802(220) and (221).

²⁹² *Id.* § 95856(d).

²⁹³ *Id.* § 95856(e)(2).

²⁹⁴ CARB must calculate an entity's emissions (and thereby assign a compliance obligation) using the "best information available." MRR § 95131(c)(5)(C). Several practical requirements, however, suggest that the entity is better off submitting a timely emissions report. First, an entity must provide all necessary data within 5 days of CARB's request and provide CARB access to relevant personnel. *Id.* § 95131(c). In effect, the entity is submitting to a CARB audit of its emissions. Second, CARB will generally use sector specific calculation methodologies, which may not be as favorable to the specific entity's actual emissions. *Id.* § 95131(c)(B)(1). Third, CARB will rely on the punitive missing data provisions in the event of missing data, which seems more likely to happen under a rushed CARB audit than under normal verification procedures. *Id.* § 95131(B)(2). Finally, missing the reporting deadline is considered a violation, allowing CARB to impose penalties on the entity.

²⁹⁵ Cal. Proposed Trading Reg. § 95802(167).

²⁹⁶ *Id.* § 95970 et seq.

²⁹⁷ *Id.* § 95975(c).

²⁹⁸ *Id.* § 95975(c).

²⁹⁹ MRR § 95107(a) (proposed 2010 revisions).

³⁰⁰ Cal. Proposed Trading Reg. § 95850(c).

³⁰¹ *Id.* § 95976(d)(2).

³⁰² MRR § 95102(231).

³⁰³ BLACK'S LAW DICTIONARY (9th ed. 2009) ("material").

³⁰⁴ U.S. EPA REGION 9, *supra* note 55, at 30–31.

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³⁰⁵ See, e.g. U.S. EPA REGION 9, *supra* note 55, at 31.

³⁰⁶ SCAQMD, *supra* note 70, at I-3-2.

³⁰⁷ U.S. EPA REGION 9, *supra* note 55, at 31–32; see SCAQMD, *supra* note 70, at I-3-6.

³⁰⁸ U.S. EPA REGION 9, *supra* note 55, at 31.

³⁰⁹ *Id.*

³¹⁰ *Id.*

³¹¹ *Id.*

³¹² 42 U.S.C. § 7604.

³¹³ STAVINS, *supra* note 207, at 9.

³¹⁴ Coplan, *supra* note 17, at 29; 42 U.S.C. § 7651j(a) and (b) (Clean Air Act § 411).

³¹⁵ The state board can translate violations into a number of days in violation according to a method adopted by the state board, where appropriate. Cal. Health & Safety Code § 38580(b)(3).

³¹⁶ Cal. Health & Safety Code § 42400.8.

³¹⁷ *Id.* § 42400.3 (willful and intentional emission of an air pollutant in violation of regulations).

³¹⁸ Cal. Proposed Trading Reg. § 95857(b).

³¹⁹ *Id.* § 95857(b)(4).

³²⁰ *Id.* § 95857(c).

³²¹ *Id.* § 95858(b).

³²² *Id.* § 95858(a).

³²³ Per the formula in Cal. Proposed Trading Reg. § 95858(b): $110 - 100 - (100 * 0.05) = 5$.

³²⁴ *Id.* § 95858(c).

³²⁵ RGGI Model Rule § XX-6.5(d) (Compliance). The SO₂ trading program has a similarly broad enforcement statement, defining a violation of any excess emissions without qualification. See 42 U.S.C. § 7651m.

³²⁶ 40 C.F.R. § 98.3(h). Federal monitoring rules do require that monitoring equipment must be calibrated to industry standards and specifically require 5% accuracy. 40 C.F.R. § 98.3(i)(1). Accuracy of instrumentation, however, is mostly about determining the variance—not bias—in measurements. We understand the limitations of emissions measurement, but consider that to be a distinct issue better dealt with using industry standard calibration procedures. In contrast, we are concerned with preventing bias in measurement data, as would currently be allowed under CARB's 5% exemption.

³²⁷ U.S. EPA REGION 9, *supra* note 55, at 12–13. But see SCAQMD, *supra* note 70, at EX-2 (claiming compliance rates of 96% to 98% with the exception of the 2000 to 2001 California power crisis).

³²⁸ U.S. EPA REGION 9, *supra* note 55, at 33.

³²⁹ Under RECLAIM, violations of permit and district rules are classified as misdemeanors punishable by a fine up to \$1,000 and/or six months imprisonment. Cal. Health & Safety Code §§ 42400(a), 42400.1(a), 42400.2(a) (West 1993); see also Nancy J. Cohen, *Emissions Trading and Air Toxics Emissions: RECLAIM and Toxics Regulation in the South Coast Air Basin*, 11 UCLA J. ENVTL. L. & POL'Y 255, 292 (1993).

³³⁰ Cohen, *supra* note 329, at 262.

³³¹ *Id.*

³³² *Id.*

³³³ See SCAQMD, *supra* note 70, at II-2-6 (noting the enforcement lag in auditing potential violations). The statute of limitations in civil prosecutions is three years from when SCAQMD "knew or should have known" about the violation. *Id.*

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³³⁴ Cal. Proposed Trading Reg. § 96014. In addition, submission of false information with intent to deceive, late submissions, or failure to submit emissions reports are separate violations for each day after the submission/due date. MRR § 95107(a) and (b).

³³⁵ Cal. Health & Safety Code § 42400(c).

³³⁶ STEPHEN CRAIG PIRONG, *THE ECONOMICS, LAW AND PUBLIC POLICY OF MARKET MANIPULATION* (1996).

³³⁷ Cal. Proposed Trading Reg. § 95921(f).

³³⁸ Auctions and reserve sales trigger the non-compliance penalties. Without another auction or reserve sale after 2020, there is no trigger for the penalty deadline and, read literally, the penalty never comes due. See Cal. Proposed Trading Reg. § 95857(b)(4). In fact, read literally, every entity could choose to not submit allowances in 2021 and receive a penalty that never comes due.

³³⁹ BURTRAW & SZAMBELAN, *supra* note 3, at 23. The transition ratio was approximately nine OTC NO_x credits to two NBP allowances. Fraas & Richardson, *supra* note 18, at 69.

³⁴⁰ Fraas & Richardson, *supra* note 18, at 69. Due to certain state restrictions in the OTC NO_x program, certain OTC NO_x allowances had effectively an expiration deadline. Not surprisingly, it was these "use-or-lose" allowances that utilities dedicated to the 2:1 progressive flow control restriction.

³⁴¹ Fraas & Richardson, *supra* note 18, at 70.

³⁴² Savage, *supra* note 278, at 247–48

³⁴³ *Id.* at 248.

³⁴⁴ Adapted from CAL. AIR RES. BD., *supra* note 158, at 52 fig.6, http://www.arb.ca.gov/cc/scopingplan/economics-sp/updated-analysis/updated_sp_analysis.pdf.

³⁴⁵ Adapted from McAllister, *supra* note 21, at 402 tbl.1.

³⁴⁶ Adapted from McAllister, *supra* note 21, at 406 tbl.2.

³⁴⁷ From Fowlie et al., *supra* note 4, at 21 fig.1.

³⁴⁸ From BURTRAW & SZAMBELAN, *supra* note 3, at 10 fig.1 (citing data provided by Gary Hart of ICAP Energy).