Update on the Implementation of AB 32: Cap and Trade in Focus

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Senator Pavley, thank you for the opportunity to be here today. I am a senior fellow at Resources for the Future (RFF), a 60-year-old research institution based in Washington, DC, that focuses on energy, environmental, and natural resource issues. RFF is independent and nonpartisan, and does all of its work in the public domain. RFF shares the results of its economic and policy analyses with environmental and business advocates, academics, government agencies and legislative staff, members of the press, and interested citizens. RFF neither lobbies nor takes positions on specific legislative or regulatory proposals.

I have studied cap-and-trade programs for several years. I served previously on California's Market Advisory Committee, which offered guidance to the state Air Resources Board on the design for a cap-and-trade program for carbon dioxide (CO_2) emissions. I also served on the Economic and Allocation Advisory Committee, which provided recommendations for the initial distribution, or allocation, of emissions allowances under a trading program.

I emphasize that my views are my own, and not those of my employer, Resources for the Future.

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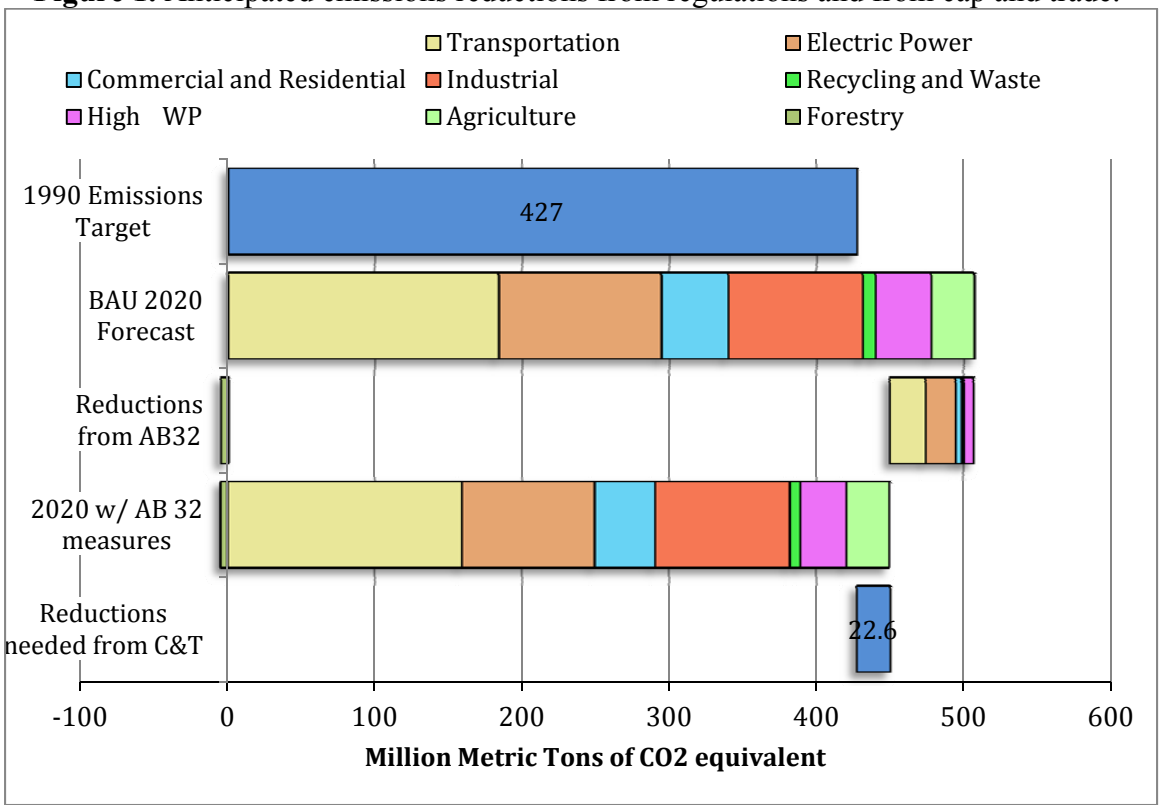
My remarks this afternoon address the overall design of the cap-and-trade program including the specific issues of **(1) cost management**; and **(2) why, when and how to auction emissions allowances**. Finally, I discuss considerations for the most important issue of all: **(3) dealing with auction revenue**.

The Global Warming Solutions Act (AB32) directs the Air Resources Board to develop a series of technical standards and measures to improve energy efficiency and reduce emissions of greenhouse gases. The goal is to reduce emissions from all sources to 1990 levels by 2020. This amounts to a reduction of about 80 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) from forecast baseline levels of 507 $MMTCO_2e$. As illustrated in Figure 1, regulatory standards and measures already in place or underway

are expected to achieve nearly 80 percent of the emissions goal in AB32. These measures include the low carbon fuel standard, energy efficiency and conservation measures, and a 33 percent renewable portfolio standard. The cap-and-trade program is expected to achieve the additional emissions reductions necessary to meet the overall target, and moreover to *leave no low-cost emissions behind*.

Figure 1. Anticipated emissions reductions from regulations and from cap and trade.



The cap and trade program covers sources responsible for 85 percent of greenhouse gas (GHG) emissions within the State of California. The remaining 15 percent come from diffuse sources that are difficult to monitor. The program begins by covering just the electricity and industrial sectors in its first phase (2013 – 2015), before also covering natural gas and transportation fuels in its second (2015 – 2017) and third (2017 – 2020) phases.

Emissions cap and trade is different from previous regulations that allowed emitters to pollute for free as long as they met regulatory standards. Under cap and trade, even if emitters meet regulatory standards they are required to surrender an emissions allowance for each unit of pollution. Since emissions allowances can be bought and sold, they have a price. When an emitter uses an allowance to cover its emissions it also loses the value of the allowances it surrenders. Consequently, emitters are expected to invest in all the emissions reductions that cost less than the price of allowances, even if some are not specifically indentified and required by regulations.

The cap-and-trade approach is more than theory. It has been put into practice many times especially in the regulation of air pollution, and can be attributed with cost savings of billions of dollars compared to traditional regulatory approaches. Such cost savings are good for business and consumers; and cost savings are good for the environment because it means society can afford greater emissions reductions.

Nonetheless, there are important decisions in the general design of an emissions-trading program. Most of these have been addressed in the Air Resource Board's Regulation. Legislation has determined the environmental goal, and regulation has determined the sources that would be covered by cap and trade and the timing of the program. With these features in place, I want to focus on the especially important issues or cost management, the use of auctions and the use of cap and trade revenue.

Cost Management

The cap-and-trade program introduces a tradable commodity called an emissions allowance. The demand for allowances and the opportunities for emissions reductions will determine the scarcity of allowances and the allowance price. Modeling can indicate what the expected price of an emissions allowance might be, but there remains uncertainty about it. This raises the concern that if the price is extremely volatile it makes planning difficult for the firms that must comply with the program. If the price is very much higher than anticipated it could have a negative effect on economic growth. If the price is much lower than anticipated it could undermine investments in climate-friendly technologies.

Unexpected variations in price have been a moderately important issue in some cap and trade programs where there was poor consideration of cost management. In the sulfur dioxide trading program in the U.S. prices fell well below anticipated levels. While this is unequivocal good news for businesses and consumers, it did mean that the stringency of the program was less than originally envisioned. The problem in this case was the absence of an allowance price floor. In the European Unions CO_2 Emissions Trading Scheme, allowance prices fell to zero in the first phase, removing the incentive to make investments to reduce emissions and making previous investments look like a poor decision. In this case there was no allowance price floor and also there was no banking allowed into future compliance periods, which would have preserved the value of allowances that were otherwise excess. In the second phase of the EU program the stringency of the program was recovered and banking was allowed into the future, but with the economic downturn again allowance prices have fallen to low levels. In one other case, the southern California RECLAIM program, allowance prices spiked to very high levels. In each this case there was no allowance banking or offsets. None of these programs have had a price floor or an allowance reserve.

There are of several features of the California program design that will help manage allowance price fluctuations and guard against substantial deviations from the expected cost of the program. One feature is banking. Emissions allowances can be saved and used in later years, which provides an incentive to take advantage of low-cost opportunities

when they are available. The existence of the bank should dampen price fluctuations that arise because of potential short run fluctuations in emissions. A second feature is the ability to use emissions offsets from emissions sources not covered by the cap. As the price of emissions allowances rises, it provides an incentive to tap into potential sources of emissions offsets, which should expand the set of compliance options and soften any price swings.

Third and perhaps most importantly is the price collar, which refers to the price floor and ceiling in the market. Unlike banking and offsets, which have justifications in addition to cost management, the price collar is designed specifically to constrain fluctuations in allowance prices.

The price collar design reflects the best available information about how to design a cap and trade program. A large portion of California's emissions allowances will be introduced to the market through an auction, and a price floor for the total market is enforced by introducing a reserve price into the auction for emissions allowances. The reserve price starts at $10 and rises over time. If the price of allowances in the market were to fall below the price floor, then bidders would be unwilling to pay the reserve price in the auction and some portion of the potential supply of allowances in the auction would not come into the market. This would constrict supply and cause the price to trend back up.

There is nothing tricky about a reserve price in an auction. It is considered a standard feature of good auction design. It is even common on eBay, where one can set a price floor on items for sale.

The price ceiling is more complicated because regulators have to decide how strongly they will defend the ceiling if prices rise to the ceiling. Environmental advocates express concern that supporting the price ceiling by putting more allowances into the market would undermine the environmental integrity of the program while industry expresses concern that high prices might harm the economy. The Air Resources Board's regulation uses a well-considered design for the price ceiling to mitigate the risk of high prices. A limited quantity of allowances are introduced into the market from an *allowance reserve* at price triggers of $40, $45 and $50 in 2013 and which rise over time. Because there is a limited potential supply of reserve allowances, prices could rise above these trigger points in the allowance reserve. However, recent modeling of uncertainty in allowance markets suggests that this design strikes a good balance. A limited quantity of reserve allowances provides most of the protection against high prices that would occur with an unlimited quantity, while also mitigating environmental concerns that total emissions could rise far above the emissions cap (Fell et al. 2012, *J. Env. Econ and Man.*).

Together, these three mechanisms provide strong protection that allowance prices will move within expected bounds, while preserving incentives for innovation and capturing the benefits of market-based regulatory strategies. This is an excellent up-to-date design for cost management in an emissions allowance market.

Why, when and how to auction emissions allowances?

In the early cap and trade programs the approach to initially distributing emissions allowances was to give allowances away for free as **compensation to the regulated firms**. This approach is called "grandfathering" because it gives special status to the incumbent emitters, and was used in the first large-scale cap and trade program for the sulfur dioxide in the U.S. and in the early phases of the E.U.'s CO_2 Emissions Trading Scheme. Grandfathering has been criticized for a number of reasons, including that firms often earn windfall profits under grandfathering because they can charge consumers for emissions allowances through higher product prices even when they receive allowances for free. Concern about windfall profits led the northeast states participating in their regional CO_2 cap and trade program (the Regional Greenhouse Gas Initiative) to rely almost exclusively on auctioning to initially distribute emissions allowances. Moreover, the E.U. has now embraced auctioning as the preferred approach and will begin implementing it on a wide scale in the third phase of its program in 2013.

In 2010 the Economic and Allocation Advisory Committee, an advisory committee to the Air Resources Board on which I sat, rejected the notion of free allocation of emissions allowances and recommended that the largest share possible should be initially distributed through an auction. This approach is also the dominant preference of economists working on the design of cap and trade. It is widely believed than an auction will do as well or better than free allocation in identifying the efficient price of allowances in the market and providing incentives within the culture of the firm to find opportunities for emissions reductions. Because a well-designed auction is fairly transparent, it can help guard against market manipulation. It prevents the opportunity to earn windfall profits, as noted above. Finally, it makes the decision about the allocation of allowance value transparent and explicit, hopefully leading to more efficient and more equitable emission reductions and economic outcomes.

The frequency of auctions involves a tradeoff between administrative costs and the timing of new information in the market. Auctioning on a quarterly basis makes sense because that corresponds to seasonal information about natural gas prices while not presenting an administrative burden. Spot auctions refer to auctions for allowances with a current year or period vintage. Forward auctions refer to auctions of allowances that cannot be used until a subsequent compliance period. There are advantages to both and both should be used. A specific advantage of a forward auction is that it provides a long-term price signal that can help guide investors who are reluctant to rely on the allowance bank (although the long term price signal and the price of allowances in the bank are intimately related). Further, a forward auction can make revenues available in the near term that can be used to promote program related investments and may provide economic stimulus and help reduce the cost of compliance in the subsequent period.

These features are embodied in the Air Resources Board's regulation plan, and also have been in practice successfully in the northeast Regional Greenhouse Gas Initiative since 2009.

Finally, there are many options for the design of an auction but a uniform price sealed bid auction has emerged as the most common design in allowance markets. This is a simple and transparent design and what most people envision when they think about an auction. Its simplicity is an advantage because covered entities can easily understand the rules and participate without needing to consider strategic issues that emerge more often in other auction designs. This design performs well in identifying a market-clearing price even when there are unexpected changes in demand or supply, and it performs well in preventing market manipulation. This is the design used in the northeast Regional Greenhouse Gas Initiative, was embodied in the proposed Waxman-Markey legislation at the national level and is part of the Air Resources Board regulatory plan.

Allocation of Cap and Trade Revenue

From a conceptual perspective there is a broad set of ways the revenues from an auction might be used, but in practice the choices are constrained by the laws and regulatory decisions already in place.

Conceptually, the Economic and Allocation Advisory Committee identified four possible alternatives to grandfathering.

One would be to direct auction revenue to the **state's general fund to reduce other budgetary obligations**. Public finance economists note that doing so could allow the state to reduce marginal tax rates including income and sales taxes. Advocates of this approach point to evidence from economic theory and modeling that the reduction in marginal tax rates could help the economy to grow and substantially reduce the overall cost of climate policy. This would benefit everyone in the state. However, a disadvantage would be that the benefits would fall unevenly across the income distribution. Unfortunately, there are practical constraints that prohibit the use of revenues from cap and trade to go into the general fund without explicit legislative authorization, probably requiring a two-third majority.

A second alternative would be to direct revenue to **strategic energy investments and program related goals.** This appears to be explicitly authorized under AB32 and allowable under other existing law. This is the approach that is used for a majority of the auction revenue in the cap and trade program in the northeast states (the Regional Greenhouse Gas Initiative, or RGGI), where recent evidence indicates that these investments, primarily in energy efficiency, have offset the potential increase in costs from cap and trade by lowering electricity demand and have stimulated the regional economy (Hibbard et al. 2011).

A third alternative would be to direct revenue to **offset the price impacts of the policy for businesses and consumers.** An important concern is that some jobs and business in California could be unfairly and negatively affected by the program, especially firms that are subject to competition from companies outside of California that do not incur any costs from AB32. Strategic assignment of allowance value can be used to offset the costs for these firms so they do not suffer unfair competition that would not only harm the

economy, but that would potentially compromise the environmental efficacy of the program as both business and associated emissions shifted to sources outside California . This approach would give allowances for free to firms, but it is different from grandfathering because the allocation would be based on economic activity and updated depending on whether firms maintain economic activity in the state. Because these firms cannot raise prices, if executed correctly, there should be no possibility for them to earn windfall profits.

A fourth alternative would be to make **payments directly to individuals**. One justification would be to compensate households for the increase in energy costs, or to compensate households for the damage to the environment from pollution. Equal per capita payments is an approach used in Alaska, for example, for distribution of royalties from oil and gas development. For a point of comparison, with California's current population of roughly 37.7 million[1] and an allowance price of $37[2], equal per capita dividends would result in payments of $252 per person on an annual basis in 2020. The legal feasibility of direct payments is uncertain because it may fail to satisfy the legal test[3] that there be a clear link ("nexus") between the activity on which a fee is levied (pollution) and the way the revenues are used, unless payments could be justified on the basis of compensation to individuals for harm they suffer due to degradation of the environment.

Practically the set of possibilities is limited by legal considerations, as noted. Moreover, AB 32 specified this guideline for use of allowance revenue:

> "The state board may adopt by regulation, after a public workshop, a schedule of fees to be paid by the sources of greenhouse gas emissions regulated pursuant to this division, consistent with Section 57001. The revenues collected pursuant to this section, shall be deposited into the Air Pollution Control Fund and are available upon appropriation, by the Legislature, for purposes of carrying out this division."[4]

Decisions already made by the Air Resources Board identify three avenues for the use of revenues.

One is to direct revenue to the **benefit of electricity ratepayers** to offset increases in electricity prices. The Public Utilities Commission will decide how to use revenues going to the investor owned utilities. This avenue for using revenues draws on several of the

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[1] US Census Bureau, People Quick acts Estimate: http://quickfacts.census.gov/qfd/states/06000.html.

[2] This estimate has been converted to $2011 and metric tons and was taken from the 2009 Market Price Referent (MPR), which uses carbon price projections from Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning. Synapse Energy Economics. March 2, 2007. Updated July 2008, Synapse 2008 CO2 Price Forecast (in $2007). (Table 2, p. 16) http://www.synapse-energy.com/Downloads/SynapsePaper.2008-07.0.2008-Carbon-Paper.A0020.pdf.

[3] This refers to the 1997 California Supreme Court ruling in the Sinclair Paint Company versus the State Board of Equalization case that clarified the legal use of revenue from regulatory fees and taxes.

[4] AB 32 Part 7 Sec. 38597

conceptual possibilities I mentioned previously. Depending on how the Commission implements the policy, some portion of the revenue could go toward investments in energy efficiency and renewable technology. The major portion is likely to be used to mitigate the price increase for all customer classes. The investor owned utilities favor using the revenue to directly offset the price increase, but the disadvantage of this approach is that it removes the price signal for electricity consumers and with it, the incentive to reduce consumption. An alternative, proposed by the Division of Ratepayer Advocates, would use a different approach for residential class customers. It would direct revenue back to these customers on an annual basis in an envelope that is separate from utility bills. This would allow residential customers to see an increase in their electricity price, but compensate them for that increase at the end of the year, so that they retain the incentive to reduce consumption.

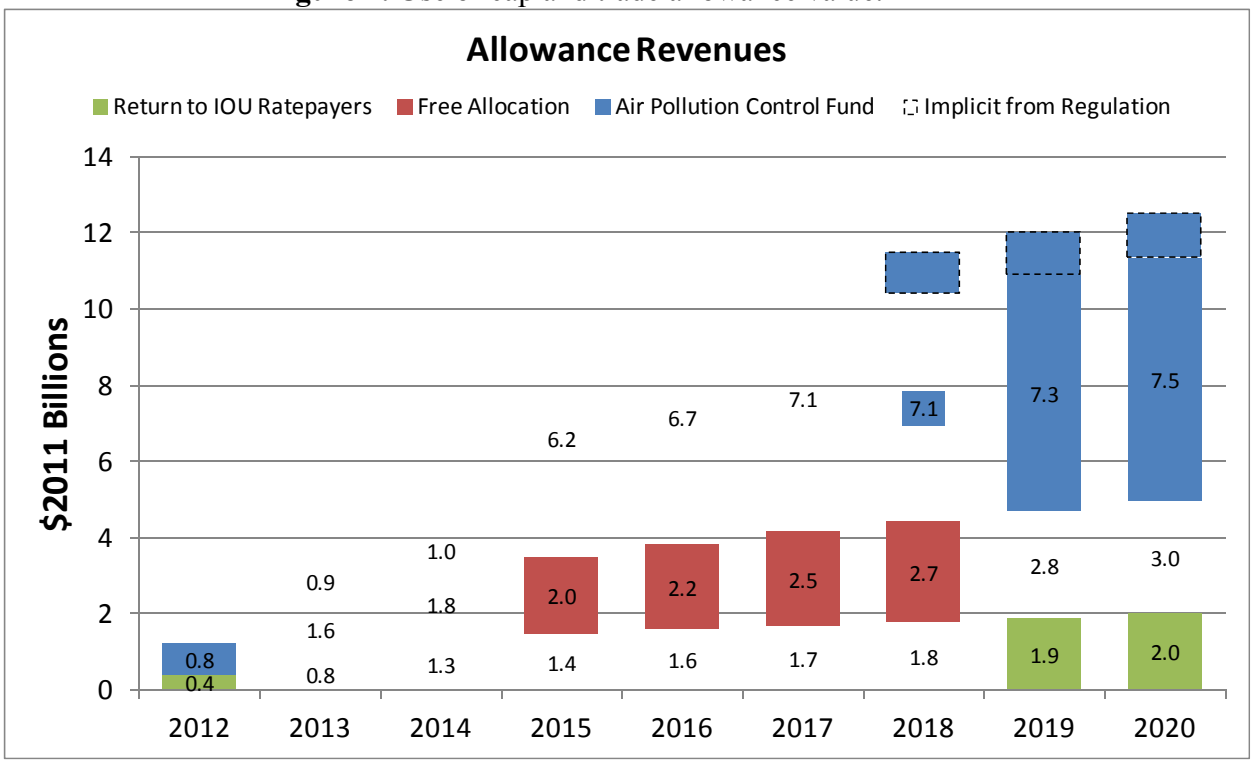
A second avenue for the use of revenue is to **protect Emissions Intensive Trade Exposed Industries** (EITEs) by offsetting their increase in costs. This group supplies the majority of emissions from the industrial sector. This approach was recommended by the Economic and Allocation Advisory Committee, but the committee suggested that just a small share of total allowance revenue be dedicated to this purpose. Furthermore the allocation should be tied to economic activity by these industries; if they reduce activity their allocation should be reduced. It is important that the Air Resources Board maintain a commitment to revisit and re-evaluate this allocation to ensure that allocation accomplishes its strategic purposes.

A third avenue is to direct funds to the Air Pollution Control Fund to be used to achieve the **statutory objectives of AB 32**. All or most of the allowances for the natural gas and transportation fuels that enter the program in 2015 will be directed to this Fund. Hence, although the Fund will collect a small share of allowance revenue in 2013, the revenue in the Fund will quickly grow. In fact the first forward auction for allowances for 2015 will be held in August 2012. In 2015, about 62 percent of allowance revenue will accrue to the Fund. The time path and use of cap and trade revenue is illustrated in Figure 2.

The Governor's Proposed Budget for 2012-2013 assumes that $1 billion in revenue will be collected from the 2012-13 auctions. It offers estimates that $500 million already has been appropriated from general fund to existing GHG reduction activities and these costs will be offset by this new revenue.[5] The budget assumes that the other $500 million will be dedicated to clean fuel and energy efficiency; low carbon transportation; natural resource protection; and sustainable infrastructure. After initial auctions, the administration plans to submit a plan to the legislature outlining programs it aims to fund and will wait at least 30 days after submitting the plan to the legislature before apportioning any funds.

[5] The Legislative Analyst's Office has questioned this amount, suggesting that a much smaller percentage of current appropriations would qualify given the legal constraints of the Sinclair test.

Figure 2. Use of cap and trade allowance value.



Notes:

1.) The dashed line encircling a portion of revenues 2018-2020 represent projected revenue from advance auctions selling allowances from 2021-2023. The Final Regulation Order does not indicate the amount of advance auction permits in 2018-2020, consistent with each prior year we assume 10 percent from 2021-2023 will be made available.

2.) The free allocation is comprised of free allocation to publicly owned utilities (POUs) and industrial entities. The free allocation to industrial covered entities was estimated to be roughly 90 percent of emissions for each industry in 2013 (59.8 MMtCO2e) and declines over time with the cap and with each industries industrial assistance factor (IAF).

3.) Allowance prices were taken from the 2009 Market Price Referent, which uses forecast carbon prices from Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning. Synapse Energy Economics. March 2, 2007. Updated July 2008, Synapse 2008 CO_2 Price Forecast (in $2007/short ton). (Table 2, p. 16) http://www.synapse-energy.com/Downloads/SynapsePaper.2008-07.0.2008-Carbon-Paper.A0020.pdf

4.) Allowance prices in 2013 are forecast to be $17.82/metric ton ($2011) for vintage 2013 rising to $36.59 for vintage 2020.

5.) Allowance prices for future allowances in advance auction were calculated using the three-year-ahead allowance price in constant dollars discounted using a 5 percent real discount rate. The forecast price of a vintage 2015 allowance in the advance auction in 2012 is $20.01/ metric ton ($2011) rising to $38.59 ($2011) in 2020 for a vintage 2023 allowance.

6.) We convert prices into $2011 dollars using the CPI from the Bureau of Labor Statistics, and we convert units from short tons to metric tons.
7.) Containment reserve not included in calculation due to the assumption that the allowance price will not exceed the price required to trigger the first tier containment reserve.
8.) The Voluntary Renewable Electricity Reserve Account was not included in this calculation under the assumption that there will be no renewable generation in excess of the RPS target that qualifies for this mechanism.

The decision about how to allocate the allowance value is probably the most important design feature from both efficiency and equity perspectives. My evaluation is that the choices made by the Air Resources Board to date are again excellent. These decisions are not what I would call the "first best" options, which might be to reduce preexisting taxes or give payments directly back to households. But, we do not live in a first best world. California exists within an open economy with the risk of unfair competition from out of state jurisdictions that have yet to address their climate related responsibilities. And, legal constraints limit the options available for using allowance revenues. Within this context, the allocation plan heretofore is nearly ideal.

The issue to be considered further is what happens in 2015 when annual contributions to the Air Pollution Control Fund grow importantly to nearly $6.2 billion (in $2011). After the state has recovered its incurred expenses for climate related activities and made new investments that are cost effective, what is to become of the accumulating funds? Will sufficient cost effective investments remain available? My concern is that while safeguards are in place for business, there may be inadequate safeguards for consumers and households given the options available to the Air Resources Board to direct allowance revenue. In the long run, this should remain of interest to the legislature.

References

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