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**Using the Value of Allowances from
California's GHG Cap-and-Trade System**

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Using the Value of Allowances From California's GHG Cap-and-Trade System

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August 27, 2012

Using the Value of Allowances From California's GHG Cap-and-Trade System

Executive Summary

Todd Schatzki and Robert N. Stavins¹

August 2012

The GHG cap-and-trade system is a key element of the policies designed to achieve California's ambitious goal of reducing GHG emissions to 1990 levels by the year 2020. The cap-and-trade program creates allowances necessary for regulatory compliance that become valuable because of their limited supply. Decisions about how to initially allocate these allowances have important consequences for the cap-and-trade program's environmental effectiveness, economic performance, and distributional impact.

Regulators have three basic options for allocating allowances initially: allocating pre-determined fixed quantities for free ("fixed allocations"), allocating each year's allowances in proportion to recent actual production output ("updating output-based allocations"), and auctions. The choice among these alternatives does not directly affect environmental performance. Regardless of the choice of allocation method, aggregate emissions are limited by the emissions cap. However, allocation choices may indirectly affect emissions through emissions leakage if economic activity shifts to unregulated sources due to cap-and-trade costs. In the context of California's GHG cap-and-trade program, leakage is most likely to occur if all allowances are distributed through some combination of auctions and fixed allocations. Appropriately designed output-based allocations can reduce leakage and thus increase emission reductions achieved by AB 32 policies.

The choice among allowance allocation options does not directly affect the cost-effectiveness of actions taken by emission sources to reduce emissions. Under most circumstances, allowance trading provides incentives for the most cost-effective actions to be taken to meet the emissions cap regardless of whether allowances are auctioned or distributed through fixed or updating output-based allocations.

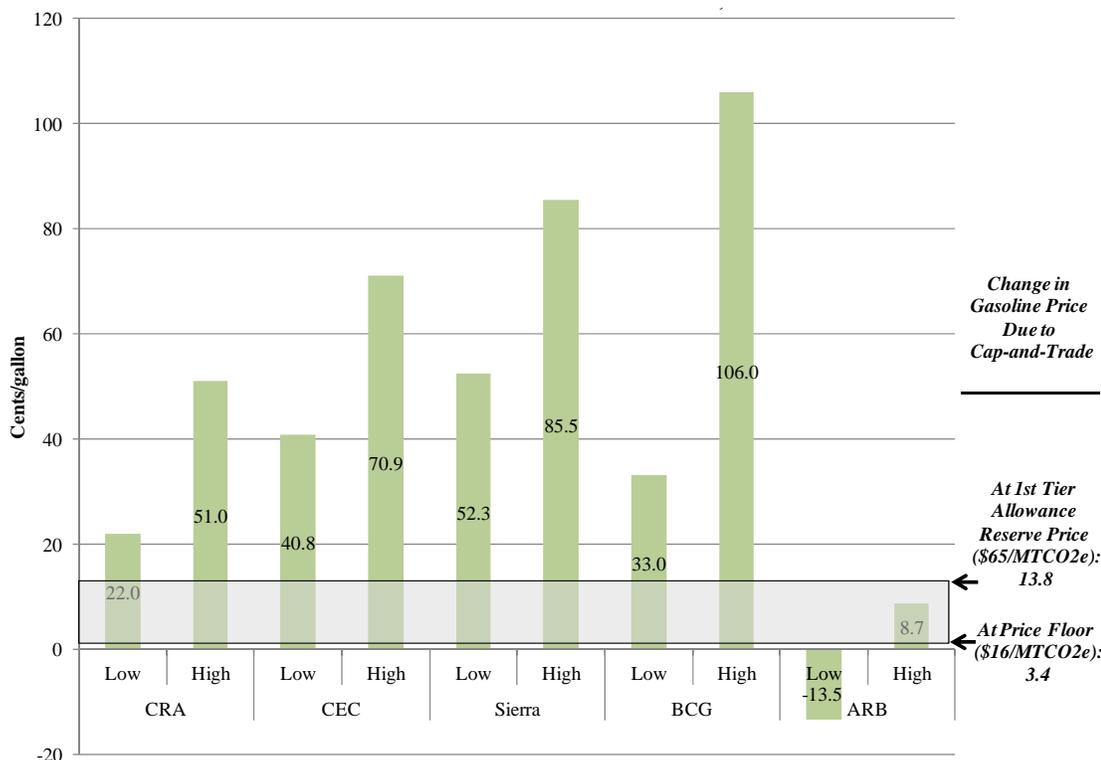
However, allowance allocation can indirectly affect costs in important ways. Leakage can raise costs if production shifts from California to otherwise less efficient or more-distant producers (with higher transportation costs) simply to avoid carbon costs. While updating output-based allocations may lower costs by mitigating leakage, they can also dampen consumer's incentives to shift to less-GHG intensive goods and services; consequently, costs may increase by leading to over-reliance on reductions

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in the GHG-intensity of production, rather than reductions in output of GHG-intensive industry. This effect may be counteracted if other AB 32 policies lead to price increases that reduce demand for GHG-intensive goods. For example, prices for transportation fuels may increase as a consequence of the Low Carbon Fuel Standard (LCFS). As shown in **Figure ES-1**, such increases may be larger than the price increases that would occur if cap-and-trade allowances costs to petroleum refineries were passed through in gasoline prices. Consequently, along with improving environmental effectiveness by addressing emission leakage, updating output-based allowances can be welfare improving under many market conditions, particularly for industries subject to multiple regulations that would increase product output prices.

Another important factor affecting the economic consequences of allocation choices is how auction revenues are used. ARB’s current rule includes fixed allocations for Electric Distribution Companies (for the benefit of their customers) and updating output-based allocations for industries covered by cap-and-trade. ARB has proposed to auction all allowances that remain after these allocations. As shown in **Figure ES-2**, starting in 2015, when fuels are added to the cap, these revenues will be significant. Thus, there is much debate about how such revenues should be used.

Figure ES-1. Comparison of Price Increases under the Low Carbon Fuel Standard and From Cap-and-Trade Regulation of Petroleum Refineries (Assuming 100% Pass Through)



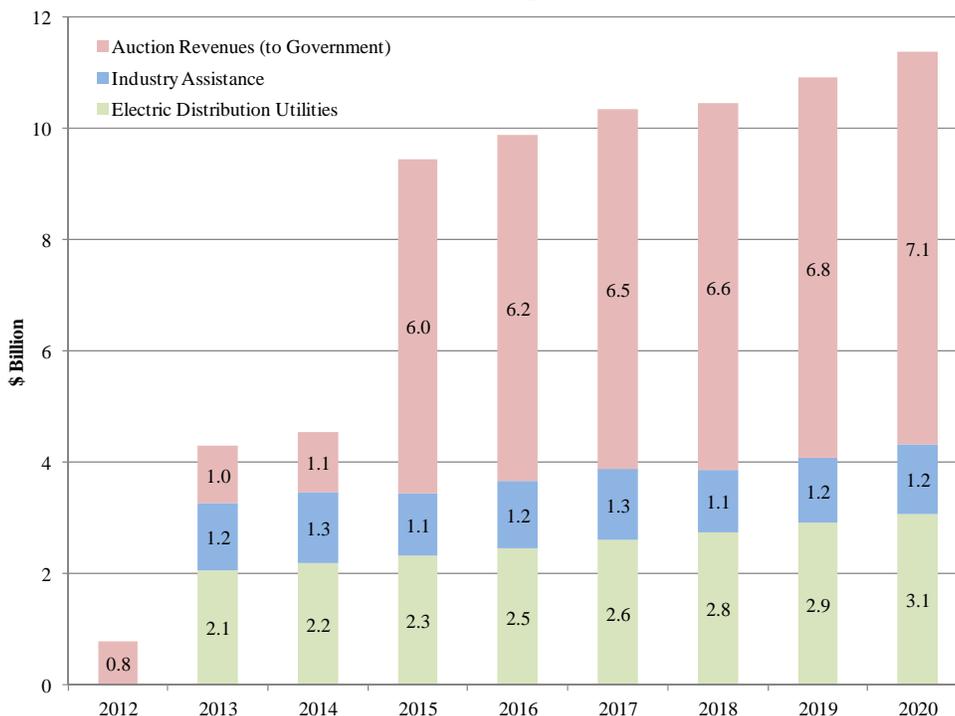
Legal restrictions appear to create significant limits on policymaker’s ability to direct auction revenues to the highest and best uses. From an economic and policy standpoint, government policies and programs should be adopted based on their merits, not based on the availability of funds. However, legal restrictions may limit the use of auction revenues to uses that directly support AB 32’s goals of reducing GHG emissions. This restriction creates challenges for policymakers because direct funding of GHG

emission reductions risks inadvertently funding costly emission reductions activities that would raise program costs, or simply subsidizing activities that would have happened anyways as a consequence of the many AB 32 Scoping Plan policies.

Several types of policies, if carefully executed, may be desirable uses of auction revenues:

- There are strong economic arguments to use auction revenues to offset other taxes, so that the cap-and-trade auction is revenue-neutral. When auction revenues are used to reduce *marginal* tax rates, such as personal or corporate income taxes, or capital gains taxes, this can increase economic output by reducing tax distortions that provide disincentives to work or invest. Using this approach, auction revenues can offset some of the costs of the cap-and-trade program by shifting taxes from distortionary taxes on desirable activities (labor and investment) to Pigouvian taxes on environmental “bads.” By contrast, recycling auction revenues through fixed tax rebates would not produce the same economy-wide benefits, although they could support distributional goals (or foster political support for the program.)
- ARB has proposed to phase out allocations for industry assistance that would mitigate emission and economic leakage in future compliance periods. However, the economic motivation for reducing the magnitude of the free updating output-based allocations is unclear; absent policy changes outside of California, the economic conditions that call for the use of updating output-based allocations to mitigate the effects of leakage will not change over time. Of course, if other states and countries adopt climate policies, such as cap-and-trade, then allocations for industry assistance would be less necessary; however, if this does not occur, particularly as California enters the Second and Third Compliance Periods of the cap-and-trade program, regulators may want to revisit these issues.

Figure ES-2. Estimated Use of AB 32 GHG Cap-and-Trade Allowance Value



- Auction revenues may also be used to mitigate local environmental impacts that may emerge as a consequence of AB 32 policies, particularly in disadvantaged communities. While such impacts are unlikely, this use of revenues could address these environmental justice concerns by funding programs beneficial to local communities. While programs might be related to AB 32 objectives, this may not be the most cost-effective approach to improving living conditions in disadvantaged communities. This use of funding would also avoid other undesirable responses to local impacts, such as modifications to the entire cap-and-trade program.
- Finally, auction revenues could fund programs related to AB 32's goals. Research and development (R&D) into low-GHG technologies may be underprovided by the private sector due to the limits to innovators' abilities to capture the full value of new technologies, because of information spillovers. Consequently, funding the development of low-GHG technologies represents a potentially valuable use for auction revenues, although care must be taken in directing such funding in the most productive fashion. Another frequently proposed use is funding programs to promote energy efficiency. California is already a leader in the implementation of ratepayer funded energy efficiency programs. Many of these programs target particular market failures related to principal-agent and information problems, and behavioral biases. However, further program expansion must consider the fact that not all program's will provide positive net benefits (even when they target these market failures) and potential decreasing returns, particularly given the state's long history in pursuing these programs. Finally, certain types of public infrastructure may be underprovided, particularly when they supply widely used public goods, such as public transportation; however, such investments should be undertaken carefully to ensure they clearly provide positive net benefits.

While there appear to be some opportunities for ARB to use auction revenues to support beneficial policies, the revenues available from auctions may far exceed the funds needed to pursue these policies. Given potential legal constraints on the use of auction revenues, policymakers may wish to consider other options, including new legislation to broaden potential uses for auction revenue to include offsetting reductions in tax rates or rebates, as well as other economically and socially beneficial purposes not directly related to climate policy.

Using the Value of Allowances From California's GHG Cap-and-Trade System

Todd Schatzki and Robert N. Stavins²

August 2012

The GHG cap-and-trade system is a key element of the Scoping Plan designed to reduce California's GHG emissions to 1990 levels by the year 2020 under Assembly Bill 32 (AB 32). To internalize the cost of GHG emissions in consumer and producer decisions, the program creates allowances that become valuable because of their limited supply. An important part of cap-and-trade design is the mechanism used to allocate allowances.

This paper examines the key consequences of these decisions in regard to three evaluation criteria: environmental effectiveness, economic performance, and distribution of impacts. Although the current cap-and-trade rule already includes mechanisms to allocate allowances, it is important to review allocation options, partly because these decisions may be revisited in the future. We begin with an examination of these options. We then consider issues related to alternative uses of revenues derived from the auction of allowances. The State is in the midst of deciding how best to use auction revenue, and these discussions are likely to be undertaken annually, particularly as revenues increase when fuels are added to the cap-and-trade system.

1. Options For Initial Allowance Allocation

There are three basic options for initially distributing cap-and-trade allowances:

1. *Auction.* A predetermined and fixed quantity of allowances is sold to market participants via auction, with revenue used by the government for designated purposes.
2. *Fixed Allocation.* A predetermined and fixed quantity of allowances is allocated for free to market participants. The quantity received is typically based on a pre-determined formula that reflects historical operations (for example, emissions) and/or other factors.

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3. *Updating Output-Based Allocations.* Allowances are allocated for free to market participants based on a formula that reflects actual production output in a recent period (for example, the prior year.)³

Cap-and-trade allowances can be allocated based one or a combination of these approaches. Under current rules, allowances for the AB 32 cap-and-trade program will be allocated using a combination of these options:

1. Emission-Intensive Trade-Exposed (EITE) industries will receive free allowances through updating output-based allocations. These allocations will be reduced over time for certain industries, depending on their “Leakage Risk Classification.”⁴
2. Electric distribution utilities (EDUs) will receive allowances through free fixed, utility-specific allocations. However, having received the allowances, utilities are then required to sell the allowances in ARB auctions, with revenues then “used exclusively for the benefit of retail ratepayers.”⁵
3. The remaining allowances will be auctioned in ARB auctions, with revenues going to the State government.

Each of these allocation alternatives has implications for environmental outcomes, economic efficiency, and distribution.

a. Environmental Outcomes

The choice between allocation alternatives does not directly affect environmental performance. Regardless of the choice of allocation method, aggregate emissions are limited by the emissions cap. However, allocation choices may indirectly affect emissions through emissions leakage when the cap-and-trade program only partially covers competing sources. Emissions leakage arises with partial coverage because economic activity may shift to unregulated sources to avoid regulatory costs. In the context of California’s GHG cap-and-trade program, leakage may occur if economic activity shifts from California to neighboring states or other countries to avoid allowance costs. This may occur if California or out-of-state consumers shift purchases to out-of-state producers, or if in-state producers move production out of California.

With an auction or fixed allocation, leakage can be a problem because partial coverage of the cap-and-trade system places in-state producers at a competitive disadvantage relative to out-of-state producers. Even though fixed allocations may provide producers with free allowances, producers still

³ In principle, an updating allocation could be based on other metrics, such as production inputs or emissions.

⁴ CARB, Article 5: California Cap on Greenhouse Gas Emissions and Market-based Compliance Mechanisms, §95870(e), Table 8-1.

⁵ Publicly owned utilities and cooperatives have the flexibility to retain free allowances to cover emissions from power generation facilities they own instead of offering the allowances into auction. CARB, Article 5: California Cap on Greenhouse Gas Emissions and Market-based Compliance Mechanisms, §95892.

have the incentive to shift production out-of-state to avoid incurring abatement or allowance costs (or raise prices to cover such costs.) By contrast, updating output-based allocations can offset this competitive disadvantage – with each additional unit of output, producers receive free allowances that offset their compliance costs. Thus, by offsetting this competitive disadvantage, emission leakage can be reduced or even eliminated.

b. Economic Efficiency Outcomes

The choice among allowance allocation options does not directly affect the cost-effectiveness of actions taken by emission sources to reduce emissions. Under most circumstances, allowance trading provides incentives for the most cost-effective actions to be taken to meet the emissions cap regardless of whether allowances are auctioned or distributed through fixed or updating output-based allocations.⁶ However, allowance allocation approach can affect costs indirectly through a number of channels. There are several issues to consider.

One issue is leakage. As described above, implementation of a cap-and-trade system in one region without comparable regulatory commitments in other regions can lead to leakage, in which economic output shifts to the unregulated region where there is no price on GHG emissions. Leakage reduces economic efficiency because it leads to an inefficient geographic distribution of production – that is, output shifts to otherwise less efficient producers or more-distant producers (with higher transportation costs) simply to avoid carbon costs.⁷ Thus, leakage can affect the efficient allocation of production between California and other states. Leakage can occur with either fixed allocations or auctions, but can be mitigated (fully or partially) by updating output-based allocations that are designed to offset the program's impact.

A second issue relates to the effect of updating output-based allocations on economic output from EITE industries receiving allowances. Updating output-based allocations, by eliminating the competitive disadvantage faced by EITE industries, can also reduce consumer's incentives to change their consumption of these industries' outputs. Consequently, emission targets are achieved by greater reliance on reductions in the carbon-intensity of production, which may raise aggregate costs.⁸ When cap-and-trade only partially covers competing economic activity, leakage limits the magnitude of this effect; that is, even with fixed allocations or auctioning, out-of-state businesses, which do not face the carbon cost, will support continued consumption of these EITE goods and services by displacing production provided by in-state producers.

⁶ Hahn, Robert W. and Robert N. Stavins, "The Effect of Allowance Allocations on Cap-and-Trade System Performance," *The Journal of Law and Economics* 54(2): S267-S294, November 2011.

⁷ This assumes that the externality being addressed by the regulation is still generated, but in a different location. This is the case with AB-32. Bernard, Alain, Carolyn Fischer and Alan Fox, "Is There a Rationale for Output-Based Rebating of Environmental Levies?" *Resource and Energy Economics* 29(1): 83-101, May 2007; Fischer, Carolyn and Alan Fox, "On the Scope for Output-Based Rebating in Climate Policy, When Revenue Recycling Isn't Enough (or Isn't Possible),"

⁸ Fischer, Carolyn, "Rebating Environmental Policy Revenues: Output-Based Allocations and Tradable Performance Standards," Resources for the Future Discussion Paper 01-22, July 2001.

Within the context of AB 32, the net impact of these two effects is ambiguous and likely varies across industries depending on their particular supply and demand characteristics. However, in this context, it is important to consider the impact of other elements of the AB 32 Scoping Plan. In particular, for industries targeted by AB 32 complementary policies (primarily the energy and transportation sectors), these additional policies may lead to price increases that offset (or more than offset) any reductions in product prices arising from updating output-based allocations.⁹

Figure 1 considers the Low Carbon Fuel Standard (LCFS), which is likely to raise transportation fuel costs by mandating fuel substitution to achieve reductions in the carbon intensity of fuels. **Figure 1** compares estimates of changes in energy prices arising from the LCFS with price increases from cap-and-trade; cap-and-trade price changes assuming 100% pass-through of allowances prices to consumers, although actual pass-through would be less in the presence of leakage. The figure illustrates that, while updating output-based allocations to the refinery sector may limit the pass-through of allowance costs associated with refinery process emissions into fuel prices, the LCFS may lead to fuel price increase that more than compensate for this effect.

Similarly, the Renewable Portfolio Standard (RPS) may raise electricity rates by requiring a larger share of power to be supplied by renewable energy. One consideration in on-going debates regarding how to use the revenues from auctioning of EDU allowances is the implications of alternative uses for consumers' incentives to reduce their electricity use. Fixed rebates could preserve incentives created by cap-and-trade, while reductions in rates would surely reduce those incentives.

Figures 2 and 3 compare the average rate impacts of the RPS with cap-and-trade impacts, assuming full pass-through in rates; **Figure 2** estimates RPS benefits against a baseline in which all growth in future demand is met through natural-gas fired generation, while **Figure 3** assumes a baseline in which the 20% RPS is met, which requires some additional renewable capacity before 2020. These figures illustrate that the RPS has rate impacts of the same order of magnitude as cap-and-trade. Accounting for the impact of other electricity sector programs, such as policies to expand combined heat and power (CHP), suggests that the rate impact of complementary policies could be much greater than that arising from cap-and-trade alone.

Finally, one other important issue relates to how auction revenues would be used, if the government auctions a portion of allowances. Some uses will be more efficient than others, and these uses may be more or less efficient than returning allowance value to tax payers or business. In particular, choices between whether the government "recycles" revenue through tax rate reductions that make the program revenue neutral, or use the auction revenues to fund new activities, will have important consequences for economic efficiency. These alternative uses of auction revenue are discussed later in the paper.

⁹ Of course, present energy prices may reflect other distortions (for example, non-carbon emission impacts and energy taxes), such that the level of energy use is above or below socially optimal levels. Greenstone, Michael and Adam Looney, "Paying Too Much for Energy? The True Cost of Our Energy Choices," *Daedalus* 141(2):10-30, Spring 2012; National Research Council, "Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use," October 2009.

c. Distributional Outcomes

Independent of these effects on economic efficiency, the distributional consequences of the cap-and-trade program will vary across allocation alternatives. With auctions, there are two primary effects. First, auctions are a transfer of wealth from the consumers and businesses to the public sector. The eventual distribution impact will depend on the particular uses for auction revenue chosen by policymakers, and who directly (and/or indirectly) benefits from those uses. Second, in-state economic activity will adjust as consumers shift away from carbon-intensive goods and services and as output from in-state producers shifts to out-of-state producers, not subject to cap-and-trade. These adjustments will result in some losses to labor and to business owners (including shareholders) in adversely affected industries, while some less GHG-intensive industries may benefit.

Fixed allocations – whether via auction or free allocation -- will result in similar effects, because the economy-wide impact of cap-and-trade remains the same under the two policies. However, there are very important differences. First, with auctions, there is a transfer of wealth in the form of auction revenue from the private sector to the public sector. With free allocations, the allowance recipients retain their full value.¹⁰ Because these allocations are a pre-determined “lump sum”, they are, in effect, a one-time wealth transfer that does not affect subsequent incentives. Second, with auctions, economic benefits go to those benefiting from particular auction revenue uses.

On the other hand, updating output-based allocations have qualitatively different distributional consequences. These represent a production subsidy to affected firms. And because allowance value is used to avoid impacts due to leakage effects, the economy-wide impacts of the cap-and-trade system will not include adjustments for substitution of out-of-state for in-state production. Thus, labor and business owners in these industries will be less affected by cap-and-trade than they would be under fixed allocations or auctions.

2. Uses of AB 32 Auction Revenues

Under current rules, all allowances remaining after free allocations to EDU's and EITE industries will be auctioned, with revenues retained by California's state government. Because the magnitude of revenues will be great, particularly when fuels are brought under the cap, there is considerable debate about how these revenues should be used.

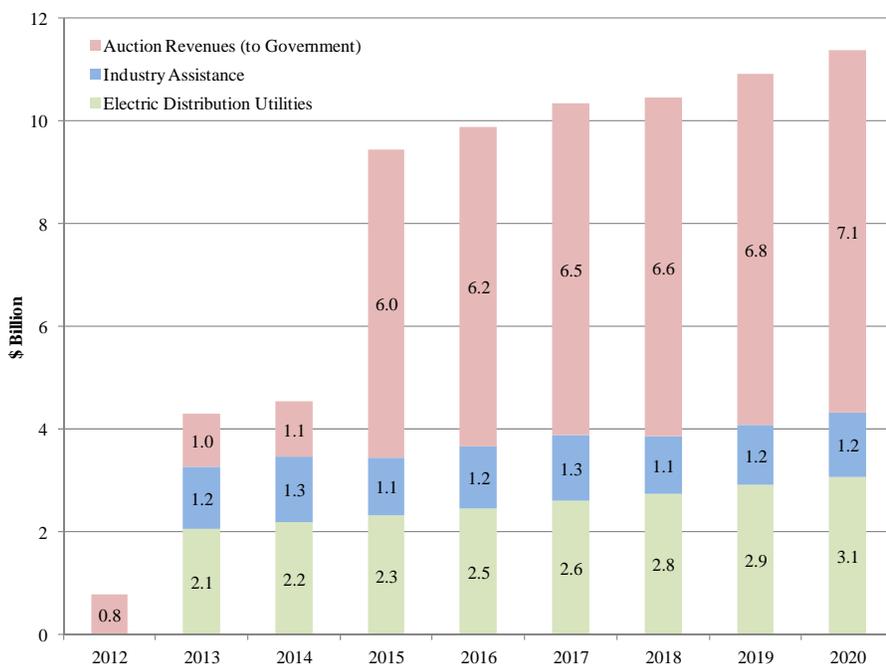
a. Anticipated Level of Auction Revenues

Figure 4 illustrates the distribution of allowance value among EDU's (on behalf of customers), EITE industries, and government. While government auction revenues will be about \$1 billion annually before fuels are placed under the cap, they will increase to over \$6 billion after fuels are added, based on

¹⁰ Free allowances to regulated utilities present a special case because regulators can account for their value when determining rates the utilities are permitted to charge.

current prices.¹¹ However, there is substantial uncertainty about future market prices. **Figure 5** illustrates how these revenues will vary under different assumptions. If allowances remain at the price floor (\$10 per MTCO_{2e} in 2013), the revenues will be \$3.1 billion in 2020; however, if allowances rise to trigger prices for the 1st tier of the Allowance Reserve by 2020 (\$64 per MTCO_{2e} assuming 2 percent inflation), revenues would be over \$12 billion in 2020.

Figure 4: Estimated Use of AB 32 GHG Cap-and-Trade Allowance Value



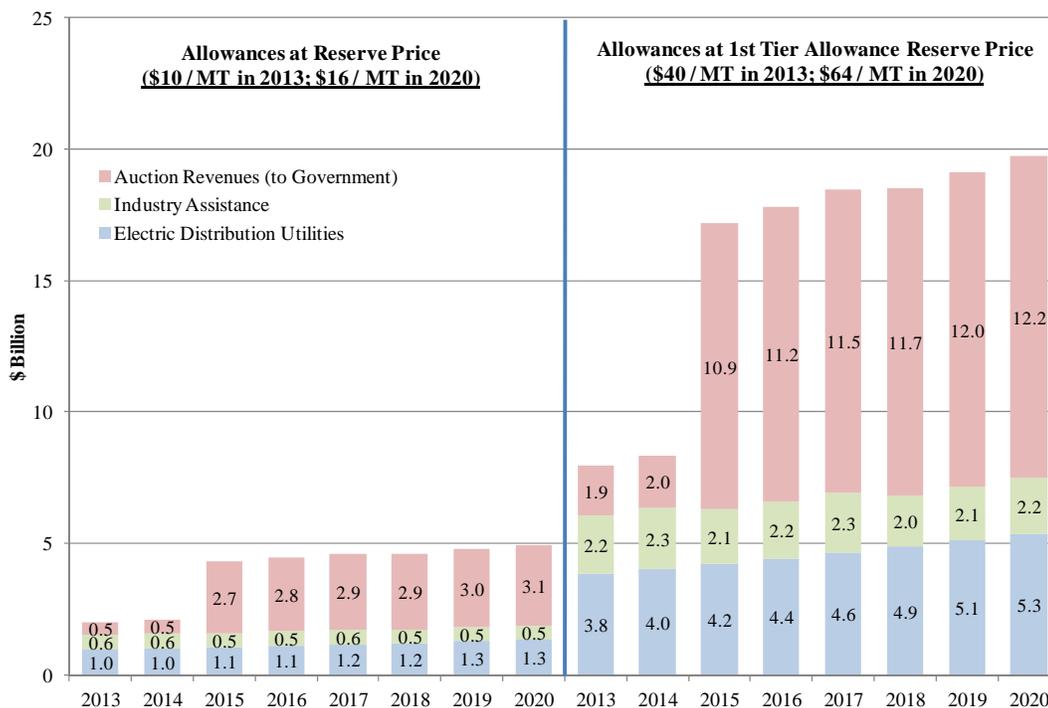
Note: Assumes (1) allowance price of \$20 per MTCO_{2e} in 2012, rising at 8% annually, (2) advanced auction of future year allowances beyond 2020; (3) industry allocations reflect 2008 emissions with no adjustment for economic growth.

These revenues are potentially substantial relative to California’s overall fiscal budget. The Governor’s proposed budget for 2012-13 was \$137 billion.¹² Thus, assuming modest growth in the state’s budget, auction revenues could be more than 5 percent of the entire budget under many allowance markets outcomes.

¹¹ These estimates assume an allowance price of \$20 per MTCO_{2e} in 2012, escalating at 8% annually. Note that auctions will include both government allowances and allowances allocated to IOUs, with the revenues used on behalf of their customers.

¹² Public Policy Institute of California, “California State Budget: The Governor’s Proposal,” January 2012.

Figure 5: Estimated Use of AB 32 GHG Cap-and-Trade Allowance Value,



b. Considerations for Use of Auction Revenue

From an economic and policy standpoint, the scope of government activity should be premised on a wide range of potential social objectives, as well as determination of whether there are policies that can meet those objectives with positive net benefits. In this context, benefits may be broadly construed to reflect many underlying values and objectives; for example, policies may be designed to address market failures, such as funding agencies that regulate environmental externalities or supply public goods (for example, transportation infrastructure, recreational spaces, and fire protection); policies may be designed to provide social insurance, including income support programs (Social Security and welfare programs) and medical care (Medicaid and Medicare); and agencies may be funded to enforce laws.

In principle, the policies chosen to pursue these goals should be those that provide the greatest net benefits (benefits minus costs). Costs reflect not only the resource costs of implementing policies, but other consequences of raising tax revenues from citizens and corporations, such as distortions introduced through raising revenues (for example, income taxes that discourage earning income), and public investment crowding out private investment. Decisions about which policies and programs are pursued should reflect the merits of those programs, not simply the availability of funds. In particular, the

availability of new revenue should not be viewed as an opportunity to undertake new activities that were not previously justified based on their merits.¹³

Along with these economic and policy considerations, legal constraints may pose practical limits on the use of funds in particular circumstances. In the context of AB 32, there is widespread agreement that legal considerations are an important factor affecting the choice of options for auction revenue use. Prior voter propositions (Proposition 13 as modified by Proposition 26) and judicial interpretations of those propositions (the *Sinclair Paint* ruling) may create legal limits on certain uses of auction revenues.¹⁴ Due to these legal considerations, certain revenue uses face the risk that they will be legally challenged and subsequently ruled invalid.

At issue is whether auction revenues are a tax “enacted for the purpose of increasing revenues” or a “regulatory fee.”¹⁵ If the auction were considered a tax, it would be invalid, because AB 32 did not receive two-thirds approval, a requirement for a “tax” under Proposition 13. However, auction revenues can be considered a regulatory fee and not a tax under certain conditions, including that the funds be used to mitigate adverse affects targeted by the legislation. In the case of AB 32, revenues would need to be used to support the goals of mitigating climate change.

Consequently, revenue uses that support AB 32 as a primary goal are generally viewed as facing a lower legal risk.¹⁶ These activities could include programs that support energy efficiency, renewable energy, advanced technology vehicles, and financial support for integrated land use, housing, and transportation planning under the Sustainable Communities and Climate Protection Act of 2008 (SB 375). Funding programs that support other policy goals, but achieve climate policy goals as a secondary purpose (for example, high speed rail) would face a greater legal risk. Rebates to taxpayers or reductions in marginal tax rates would face the greatest legal risk.

While the *Sinclair Paint* ruling makes the nexus between the purpose for collecting revenues and the use of revenues legally relevant, this legal nexus does not necessary make for good public policy, at least from an economic perspective. As discussed earlier, policies should be selected based on the merits, not because there are revenues that need to be used. Moreover, in light of the many policies undertaken as a part of the AB 32 Scoping Plan, use of auction revenues to support emission reductions may be utterly redundant. As we discuss in another white paper, such redundancies in the context of quantity-based policies, such as the cap-and-trade program, may create no additional environmental benefits, while

¹³ Revenues available to fund socially desirable programs may vary over time, given changes in the underlying social cost of funds.

¹⁴ Lambe, Deborah, Daniel Farber, “California’s Cap-and-Trade Auction Proceeds: Taxes, Fees, or Something Else?” Berkeley Law, Center for Law, Energy & the Environment, May 2012.

¹⁵ This distinction was made in the *Sinclair Paint* ruling, which interpreted requirements under Proposition 13.

¹⁶ Taylor, Mac, “The 2012-13 Budget: Cap-and-Trade Auction Revenues,” California Legislative Analyst’s Office, February 16, 2013; Horowitz, Cara, et al., “Spending California’s Cap-and-Trade Auction Revenue: Understanding the *Sinclair Paint* Risk spectrum,” March 2012; Lambe, Deborah, Daniel Farber, “California’s Cap-and-Trade Auction Proceeds: Taxes, Fees, or Something Else?” Berkeley Law, Center for Law, Energy & the Environment, May 2012.

raising the cost of achieving AB 32 goals. We return to this issue below when discussing particular uses of auction revenues.

c. Proposals Under Consideration

Within the context of policy debates and stakeholder discussions, a large number of proposals have been made for potential use of revenue. These can be considered within several categories.

Fiscal Options, including Marginal Tax Rate Reductions, Tax Rebates, and Supplements to General Funds

There are strong economic arguments to use auction revenues to offset other taxes, so that the cap-and-trade auction is revenue-neutral. When auction revenues are used to reduce *marginal* taxes, such as personal or corporate income taxes, or capital gains taxes, this can reduce tax distortions that provide disincentives to work or invest. By reducing such distortions, economic output increases, thus partially offsetting the costs of the cap-and-trade program. In effect, reducing these distortionary taxes would enhance economy-wide efficiency by shifting taxes from distortionary taxes on desirable activities (labor and investment) to Pigouvian taxes on environmental “bads.”¹⁷

This approach has been implemented in British Columbia, where a revenue-neutral carbon tax is implemented by combining an increasing carbon tax with annual tax adjustments based on actual tax revenues to achieve revenue neutrality. These adjustments have reduced distortionary taxes, including personal income taxes,¹⁸ corporate income taxes,¹⁹ and industrial property taxes.²⁰

Within the context of California's on-going budgetary problems, auction revenues have also been proposed as a source of funds to help fill persistent budget gaps. Used in this way, auction revenues could help avoid some combination of new taxes and cuts in government activity that would be needed to close budget gaps.²¹

Another alternative is to recycle auction revenues to taxpayers through fixed (“lump sum”) rebates. Because fixed rebates do not affect individual's (marginal) decisions to work or invest, this option does not create the same economic benefits as using revenues to reduce distortionary taxes (tax rates).

¹⁷ Goulder, Lawrence H., ed. *Environmental Policy Making in Economies with Prior Tax Distortions*, Northampton, MA: Edward Elgar, 2002.

¹⁸ Personal income tax rates were reduced from 5.35% to 5.06% for the lowest bracket (\$0 to \$37,013), and from 8.15% to 7.70% for the next lowest bracket (\$37,013 to \$74,028).

¹⁹ Corporate income taxes were reduced from 12% prior to the program to 11% in 2008, 10.5% in 2010 and 10% in 2011. Corporate income taxes to small business were reduced from 4.5% to 2.5% in 2008, and the threshold for the small-business tax rate was raised from \$400,000 to \$500,000.

²⁰ An Industrial Property Tax Credit was implemented to reduce the portion of property taxes collected for schools by 60% for industrial users.

²¹ In this context, the economic benefits depend upon whether, on the margin, the auction revenues are avoiding tax increases or avoiding spending cuts (and the particular benefits provided by that spending.)

Mitigating Emissions and Economic Leakage

Allowance value can be used to offset some or all of the cost disadvantage faced by California businesses as a result of the cap-and-trade system that leads to emissions and economic leakage. As discussed earlier, updating output-based allocations to EITE industries can mitigate such leakage. Current rules provide “industry assistance” to EITE industries in California through this approach.

Assistance starts at 100% of expected emissions in the First Compliance Period, less a 10% reduction to reflect “best practices” or a “best in class” facility and a 2% reduction to reflect the declining cap. However, this assistance will decline over time depending on how ARB assesses each industry’s “Leakage Risk”, which, in principle, reflects multiple factors including their emission intensity and trade exposure. Table 6 reports the percent of full allocation provided to industry for each year and on average for each compliance period. By the Third Compliance Period, assistance declines to 84% or 78% for industries ARB determines have High Leakage Risk,²² 39% for industries with Medium Leakage Risk, and 23% for industries with Low Leakage Risk.²³

Table 6. Updating Output-based Allocations to Energy-Intensive Trade-Exposed Industry (Percent of Full Allocation)

<u>Year</u>	<u>Leakage Risk Category</u>			
	<u>High (> 50%)</u>	<u>High (Other)</u>	<u>Medium</u>	<u>Low</u>
2013	88%	88%	88%	88%
2014	88%	87%	87%	87%
2015	87%	85%	64%	42%
2016	87%	83%	62%	42%
2017	86%	82%	61%	41%
2018	85%	80%	40%	24%
2019	84%	78%	39%	23%
2020	83%	77%	38%	23%
<u>Average, by Compliance Period</u>				
1st (2013-2014)	88%	87%	87%	87%
2nd (2015-2017)	87%	83%	62%	42%
3rd (2018-2020)	84%	78%	39%	23%

Note: Percent of full allocation reflects the actual allocation relative to an allocation reflecting industries’ historical average industry emission rate (that is, the industry benchmark.) Adjustments from the full allocation are made to reflect:

²² The level of assistance is higher for three high-emission industries: cement, lime and nitrogenous fertilizer manufacturing.

²³ These estimates of assistance reflect the industry assistance factor, cap adjustment factor and a benchmark set at 90% of historic emissions rate. CARB, Article 5: California Cap on Greenhouse Gas Emissions and Market-based Compliance Mechanisms, §95891.

a best-practices industry benchmark, the declining cap, and declining assistance to industries with lower “leakage risk”.

The economic motivation for reducing the magnitude of the free updating output-based allocations is unclear. While ARB has proposed to phase out allocations for industry assistance, absent policy or other specific changes outside of California, the economic conditions that call for the use of updating output-based allocations to mitigate the effects of leakage will not change over time. Of course, if other states and countries adopt climate policies, such as cap-and-trade, then allocations for industry assistance would be less necessary; however, if this does not occur, particularly as California enters the Second and Third Compliance Periods of the cap-and-trade program, regulators may want to revisit these issues.

Mitigating Impacts on Disadvantaged Communities

Throughout the development of AB 32 policies, significant attention has been given to issues related to adverse environmental conditions in disadvantaged communities. These “environmental justice” issues have included: whether AB 32 policies will worsen environmental conditions in these communities, and, if so, how to mitigate such impacts; and whether to use AB 32 policies to improve environmental conditions in disadvantaged communities.

Environmental justice issues are legitimate and important concerns for California's policy makers, and ARB has wisely avoided adoption of policies aimed at addressing these concerns that would have simultaneously undermined the effective and efficient operation of AB 32 policies, particularly the cap-and-trade program. In lieu of such modifications, some have proposed to use auction revenues to address environmental justice concerns. Revenues could be used to help improve living conditions in disadvantaged communities; such improvements could target adverse environmental conditions, help manage household energy use (and expenses) in disadvantaged households, or provide other community services (for example, education and health care.) Some – but not all -- of these uses would likely face a lower legal risk due to a clearer nexus with AB 32 climate change objectives, although such uses may not be the most cost-effective approach for improving living conditions in disadvantaged communities.

Revenues may also be used to mitigate environmental impacts that may emerge as a consequence of AB 32 policies. While AB 32 policies are expected to improve air quality throughout California by reducing co-pollutant emissions, the possibility remains (however unlikely) that some communities may experience an adverse effect. Within the context of the cap-and-trade program, ARB has proposed to manage this risk through “adaptive management.” Under adaptive management, ARB would gather information about local air quality, assess whether adverse outcomes have occurred as a result of the program, and develop mitigation plans in the event that such adverse outcomes occur.²⁴ If ARB finds

²⁴ ARB appears to recognize that determining that the cap-and-trade program caused increases in localized air emissions will be very challenging. The Rule notes that:

While the program provides flexibility that could allow increased production due to economic growth, such increases would not be caused by the cap-and-trade program. Only in very limited circumstances would a localized emissions increase be the actual result of the incentives created by the cap-and-trade program – e.g. shifting of production within a company from an inefficient facility with higher compliance costs to a more

deterioration in local air quality due to the cap-and-trade program, it has stated that potential responses could include: “the adoption of additional regulatory requirements, using funds obtained from the sale of allowances to support local mitigation projects, coordination with other agencies to provide additional incentives for energy efficiency or other emission reduction activities within the community, or modifications to the Regulation.”²⁵ Some of these options create potential problems.

ARB suggests that it may adopt “additional regulatory requirements” as a response to changes in environmental conditions in particular communities. This raises several issues. First, it is important to keep in mind that all new and existing facilities will need to comply with existing environmental regulations of criteria air pollutants, irrespective of AB 32 policies. Thus, the existing regulatory framework is designed to create limitations on activities that degrade environmental conditions. Second, this traditional regulatory framework aims to achieve certain standards for environmental conditions, rather than focusing on changes from pre-existing conditions. Thus, while regulation aiming to achieve and maintain certain standards or conditions may be justified, imposing additional regulatory requirements in response to selective changes in environmental conditions could lead to arbitrary differences in regulatory standards across the state.

Modifications to the cap-and-trade regulation affecting the entire state for the purpose of addressing isolated circumstances in particular communities would be exceptionally imprudent. ARB has avoided adopting proposals, such as facility-level GHG emission limits, that would have limited effectiveness at addressing local environmental conditions, but would risk adding cost and complication to the cap-and-trade system. There seems little reason to re-visit these decisions, particularly since the most significant impact California can have on the climate problem is demonstrating the feasibility of climate policies that achieve environmental objectives with minimum economic risk. Modifying the cap-and-trade program to address local co-pollutant impacts would seriously compromise this objective.

To the extent that auction revenues can be used to avoid these less desirable alternatives, this would seem to be a reasonable use of revenues. One such use could be to fund activities that improve local air quality. Alternatively, revenues could be used to fund other local services or projects that would provide other value to the affected communities.

Programs Supporting AB 32 Goals

Many proposals for use of auction revenues involve funding programs or activities that reduce GHG emissions, including energy efficiency, renewable energy, and regional planning initiatives (in support of compliance with SB 375). One rationale for such proposals is that they face less risk of being

efficient facility that results in higher emissions at the more efficient facility. (Air Resources Board, Cap-and-Trade Regulation, Appendix O, p. 50.)

Thus, while ARB may be able to determine whether local air quality (i.e., ambient concentrations) has been degraded over the time when the cap-and-trade system has been implemented, it will be exceptionally difficult to determine whether these increases were caused by the cap-and-trade system or by other factors, such as economic growth or other regulatory changes. Moreover, even if the cap-and-trade system were identified as the causal factor, determining which sources led to such degradation raises additional challenges.

²⁵ ARB “Adaptive Management Plan for the Cap-and-Trade Regulation,” October 10, 2011.

invalidated through legal challenges. However, use of auction revenues to achieve AB 32 goals of reducing GHG emissions risks fostering policies and programs that overlap with existing elements of the AB 32 Scoping Plan, particularly the GHG cap-and-trade system.²⁶ Such policies will likely do little if anything to improve environmental effectiveness, because, under the fixed emissions cap, any emission reductions from funded activities would simply relax the emission constraint on other sources under the cap. Such policies will also raise costs if they fund activities that are less cost-effective than those that would otherwise be undertaken by the market under cap-and-trade. Even if programs can successfully target low-cost emission reductions that do not raise costs, revenues may then only subsidize activities that would have been undertaken anyways due to the incentives from cap-and-trade.

Thus, legal requirements that limit use of auction revenues to fund activities directly related to AB 32 goals pose an undesirable policy threat that raises social costs. This suggests that the legislature may wish to consider new legislation that allows use of allowance auction revenues to achieve broader social objectives, particularly given the size of these revenues once fuels are added to the cap. Absent such changes, ARB can strive to use auction revenues most efficiently by targeting market failures unrelated to those addressed by cap-and-trade (i.e., other GHG emission externalities), but also contribute achieving AB 32's climate change goals (thus meeting the legal standard.)

One such use of funds would be to support research and development (R&D) of advanced low-GHG technologies. Because of information spillovers and the resulting limits on innovator's ability to capture the full value of their investments in developing innovations, the market may provide insufficient levels of R&D. While a cap-and-trade program creates incentives to undertake R&D in low-GHG technologies, these incentives internalize the GHG externality, but do not fully address this underinvestment.

Government funding of R&D initiatives can address this market failure by raising R&D activities to efficient levels. Because such funding addresses a different market failure than the cap-and-trade program and other AB 32 policies, these programs potentially fund activities that would otherwise not occur and may lead to innovations that lower the cost of achieving GHG emission targets. Such innovations may be particularly important to achieving technological transformation needed to meet AB 32's longer-term climate policy goals. Developments in transportation (for example, electric vehicles and second-generation biofuels, such as cellulosic ethanol) and electric power generation (for example, carbon capture and sequestration) require technological advancements before they can become viable options for materially reducing GHG emissions.

Another potential use receiving significant attention is expansion of programs to promote energy efficiency. Many programs already exist to promote energy efficiency, largely implemented through electric utilities. Many of these programs target particular market failures, such as principal-agent problems when those making up-front investments in energy-efficiency cannot reap the subsequent benefits of reduced energy use (for example, owner-renters, and home builders and buyers.) Other programs may target information limits and behavioral biases, which may be more relevant for certain

²⁶ For more on the implications of such interactions between policies, see Schatzki, Todd and Robert N. Stavins, "Implications of Policy Interactions for California's Climate Policy," Analysis Group White Paper, July 12, 2012.

types of energy users (for example, households) compared with others (industry). However, even when programs target these market failures, they do not necessarily generate positive net benefits. There is still much work to be done to test program effectiveness to identify those programs most likely to yield positive net benefits; such research represents one potentially valuable use of auction revenues.²⁷

To the extent they generate positive net benefits by addressing such market failures, these programs should be pursued.²⁸ However, the scope of these activities is subject to several limitations. First, such programs will eventually begin to yield diminishing returns. California has been aggressively supporting energy efficiency investments for many decades, and it is unclear whether additional investments are warranted. Second, from the standpoint of implementation, there may be limits on the extent to which additional energy efficiency programs can be quickly expanded without compromising the effectiveness of their operations (for example, due to limits on availability of trained personnel.)

In 2010, California spent \$1.16 billion on rate-payer funded electricity efficiency programs, the third highest spending among the 50 states (as a percent of revenues.) Spending on natural gas efficiency programs was \$0.34 billion in 2010, the eighth highest such spending in the country.²⁹ Some propose using a portion of the revenues from the sale of allowances allocated to electric utilities to directly fund energy efficiency programs; if acted on, this would further increase spending. However, starting in 2015, auction revenues could exceed \$5 billion under many reasonable market outcomes; this suggests that opportunities for cost-effectively expanding the state's energy efficiency programs could sensibly absorb only a modest portion of GHG auction revenues.

Another potential revenue use would be funding of public infrastructure projects that support GHG emission reductions. Infrastructure spending by the private sector may be below efficient levels if infrastructure provides public goods, the benefits of which it is difficult for private parties to capture. For example, public transportation systems would be undersupplied by private companies that cannot reap the benefits of reduced emissions and congestion. That said, such infrastructure investment should be undertaken with great care, to ensure that chosen investments achieve positive net benefits and provide significant public goods. Non-GHG externalities have long been the focus of public infrastructure investment; while increased support for existing infrastructure, including public transportation, may be warranted if fiscal limits have allowed systems to deteriorate, spending on new public infrastructure projects that would provide public goods should only be undertaken if they provide clear positive net benefits to society.

²⁷ Alcott, Hunt and Michael Greenstone, "Is there an Energy Efficiency Gap?," *Journal of Economic Perspectives* 26(1): 3-28, Winter 2012.

²⁸ However, there is substantial debate about the net benefits created by such programs. Gillingham, Kenneth, Richard Newell, and Karen Palmer. 2006. "Energy Efficiency Policies: A Retrospective Examination." *Annual Review of Environment and Resources* 31: 161-92.

²⁹ American Council for an Energy Efficient-Economy, "The 2011 State Energy Efficiency Scorecard," Report Number E115, October 2011.

3. Conclusion

Allocating allowances for the AB 32 GHG cap-and-trade system presents both challenges and opportunities for California. Options exist that can address certain policy outcomes. The State has already pursued some of these, including allocations to EITE industries to mitigate leakage. But other economically sensible uses may face legal constraints, such as using revenues to reduce pre-existing distortionary taxes.

Given these limits, the State may find itself with significant auction revenues that can only be directed toward a restricted set of uses. While some of these potential uses may improve policy outcomes (for example, public funding of research and development on low-GHG technologies), the magnitude of auction revenues may well exceed the availability of options that provide positive net benefits. Given these constraints, policymakers may wish to consider other options, including new legislation to broaden potential uses for auction revenue to include offsetting reductions in tax rates or rebates, as well as other economically and socially beneficial purposes.

Figure 1. Change in Retail Gasoline Price from LCFS

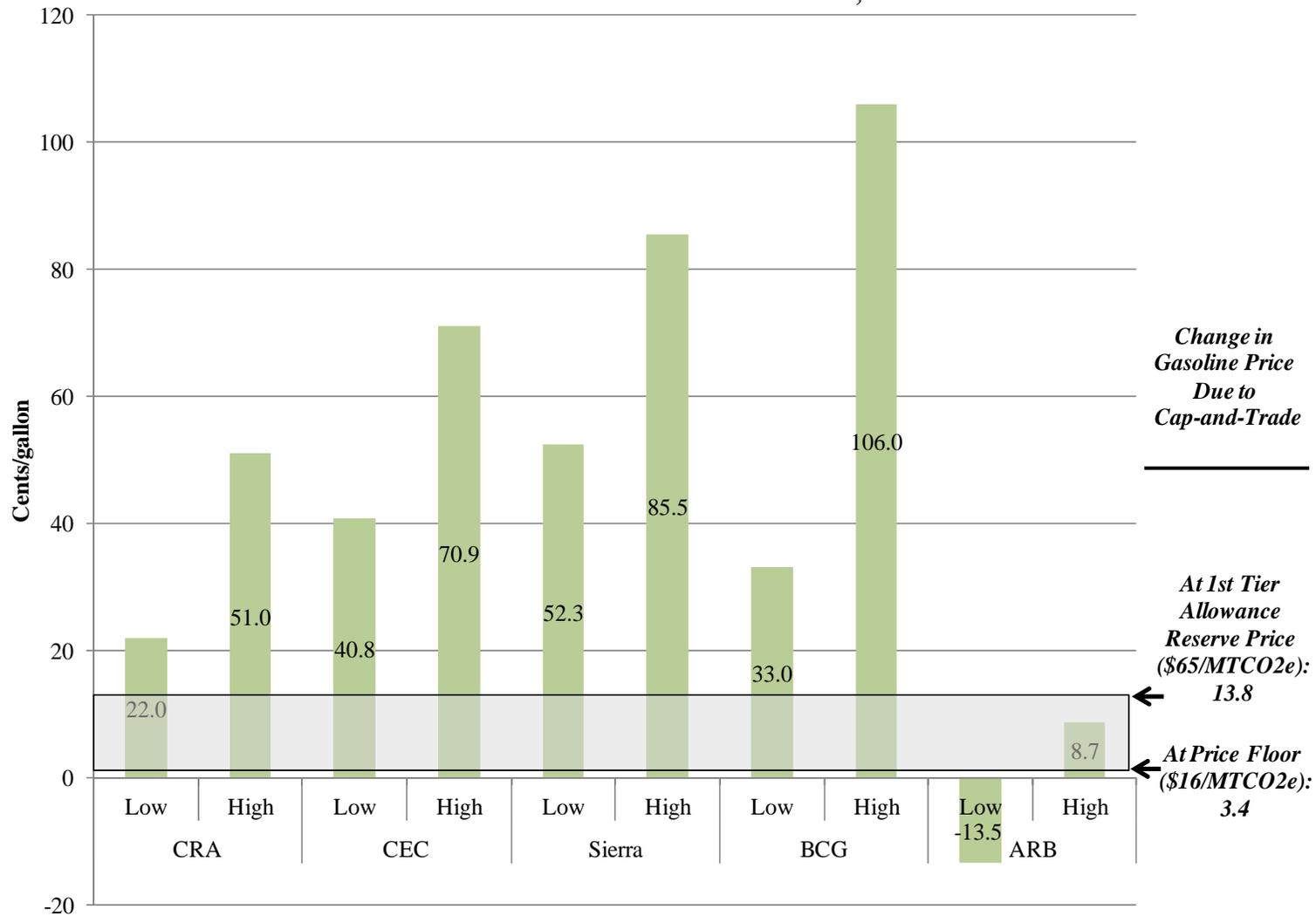


Figure 2. Change in Retail Electricity Price from 33% RPS (Relative to Baseline with No New Renewables)

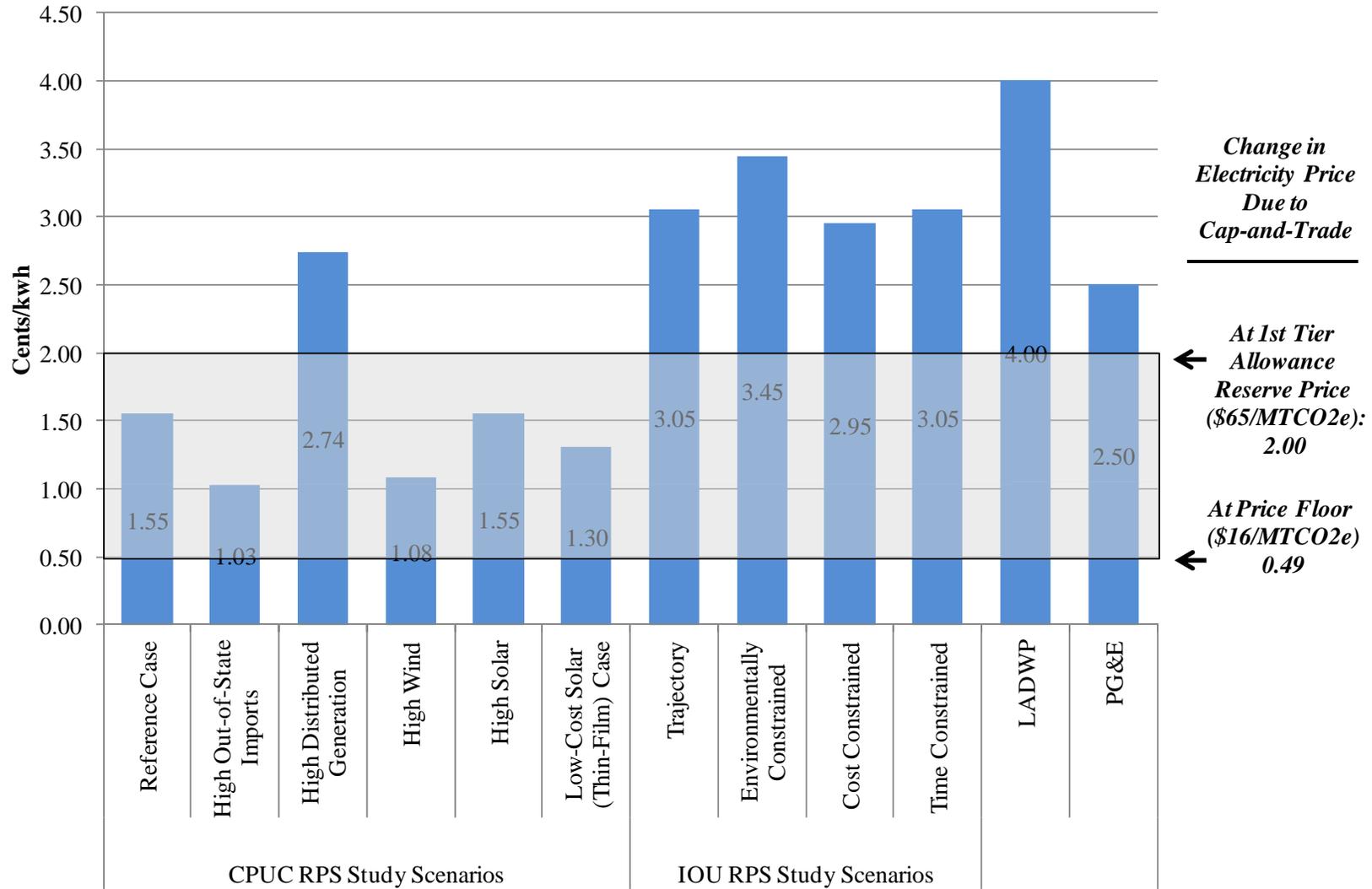
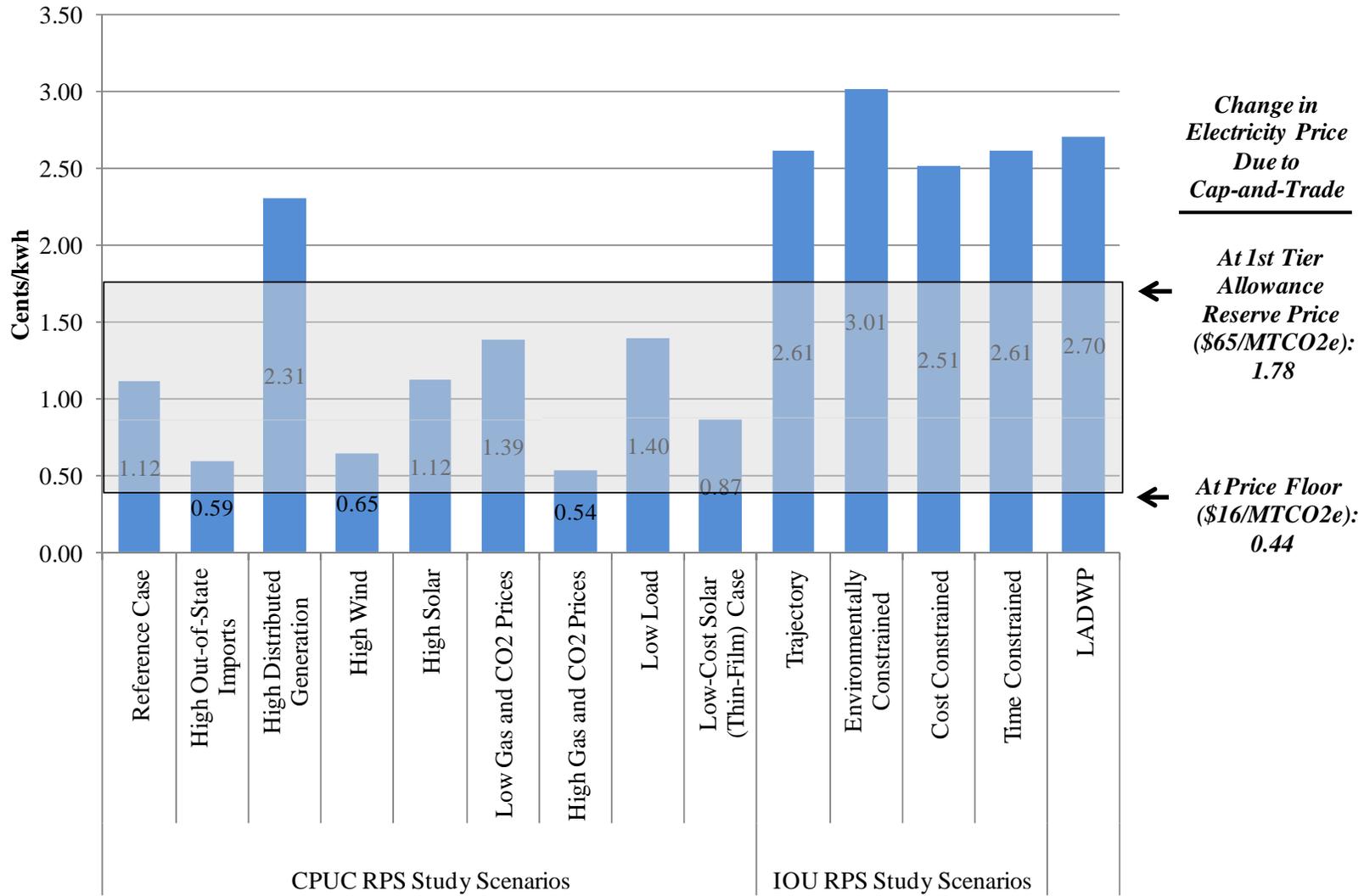


Figure 3. Change in Retail Electricity Price from 33% RPS (Relative to 20% RPS)



Notes to Figures 1, 2 and 3:

1. All values in Figure 1 reflect changes in costs, but do not reflect any change in price due wholesale or retail markups.
2. Low and high values in Figure 1 represent optimistic and pessimistic cost forecasts from each source. For CRA, low and high values represent optimistic and pessimistic assumptions regarding both costs and carbon intensities.
3. The baseline in Figure 2 reflects the "All Gas Buildout" scenario in the "33PercentRPSCalculator.xls", which assumes that all additional capacity will be gas-fired generation.
4. In Figures 2 and 3, the carbon intensity of electricity production assumed when calculating cap-and-trade costs reflects the baseline mix of production (i.e., 20% RPS or All Gas Buildout scenarios.)

Figure 1 Sources:

1. Boston Consulting Group, "Understanding the Impact of AB 32," June 19, 2012.
2. California Energy Commission (CEC), "Biofuel Values." November 2011. Updated version provided through personal communication.
3. Charles River Associates, "Economic and Energy Impacts Resulting from a National Low-Carbon Fuel Standard," June 2010.
4. Sierra Research, Inc., "Preliminary Review of the ARB Staff Analysis of "Illustrative" Low Carbon Fuel Standard (LCFS) Compliance Scenarios," Dec. 2011.

Figure 2 and 3 Sources:

1. California Public Utilities Commission, "33% Renewables Portfolio Standard: Implementation Analysis Preliminary Results," and attached spreadsheet "33PercentRPSCalculator.xls," June 2009.
2. City of Los Angeles, Department of Water and Power, "Comments from the Los Angeles Department of Water and Power to the Lead Commissioner, Workshop on Renewable Energy Costs," California Energy Commission Docket No. 12-IEP-1D, June 5, 2012.
3. Pacific Gas & Electric, "2012 Integrated Energy Policy Report Update/Renewables: Comments of Pacific Gas and Electric Company," CEC Docket 12-IEP-1D, June 5, 2012.
4. Pacific Gas & Electric/Southern California Edison/San Diego Gas & Electric/California Independent System Operator, "2010 Long-Term Procurement Plan, System Analysis Preliminary Results," April 29, 2011.