For the Benefit of California Electricity Ratepayers

Electricity sector options for the use of allowance value created under California's cap-and-trade program

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1. Overview

The State of California has enacted bold policies to reduce its emissions of greenhouse gases that contribute to disruption of the climate and acidification of the oceans. Part of this initiative is a market-based cap-and-trade program that will limit emissions from the electricity sector beginning in 2013. Emitters of carbon dioxide will be required to surrender emissions allowances to match their levels of pollution. Emitters have the flexibility to trade allowances. This introduces a price on allowances, which will become a valuable asset worth over a billion dollars per year in the electricity sector alone.

The California Public Utility Commission regulates private, investor-owned electric utilities; similar responsibilities rest with elected and appointed bodies that regulate publicly owned utilities. Under special consideration for all of these regulators, and the focus of this paper, is: Who will receive the allowance value associated with the electricity sector?

The California's Air Resources Board has directed electricity regulators to ensure this allowance value is used *for the benefit of electricity ratepayers*. This paper surveys three options to achieve this objective: 1) to reduce electricity bills; 2) to send payments directly to households; or 3) to make investments to improve the electricity system and help reduce emissions. This decision will affect the distribution of costs of the cap-and-trade program and could affect the achievement of long-run program goals.

The **main findings** are the following:

- Allowance value directed back to ratepayers could offset all of the costs introduced by cap and trade for electricity consumers.
- How the allowance value is directed to ratepayers will affect the distribution of costs among customers, and it could affect the efficiency of the cap-and-trade program.

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- If allowance value is returned on electricity bills, consumers will perceive that electricity is relatively less expensive. If it is returned in a separate envelope, consumers will perceive higher electricity bills but household budgets would be compensated. This decision will affect the political perception of the program.
- Rate increases resulting from other AB 32 policies, such as the Renewable Portfolio Standard may be substantial and will occur independently of cap and trade.

2. How Does Electricity Fit Into the Cap-and-Trade Program?

Motivated to avoid the potential damages climate disruption could bring to the economy, public health, and the environment, California enacted the Global Warming Solutions Act of 2006, also known as AB 32. This legislation requires the state to reduce climate-disrupting greenhouse gases (GHGs) to 1990 levels by 2020 and directs the California Air Resources Board (CARB) to outline policies to meet this target. In its Scoping Plan, the CARB drafted a suite of emissions reduction measures including a low-carbon fuel standard, energy efficiency and conservation measures, a renewable portfolio standard (RPS) for electricity generation, and a market-based emissions cap-and-trade program, set to take effect in 2013.

a. Cap-and-Trade under AB 32

The cap-and-trade program will cover 85 percent of GHGs emitted from sources across California, from which 80 million metric tons of carbon dioxide equivalents ($MMTCO_2e$) will need to be cut in order to meet the AB 32 target.[1] Of these GHGs, CO_2 is the most important in the way it affects climate change, and the combustion of fossil fuel is the most important source for CO_2 emissions.[2]

The economic impact of the cap-and-trade program is attracting a great deal of attention. Cap and trade has two parts. The first is the limit placed on GHGs and the corresponding combustion of fossil fuels that are embodied ubiquitously in the goods and services of California's economy. To emit one ton of CO_2, a facility must surrender to regulators one emissions allowance. The second is the ability to trade allowances, which means they will have a price that will be reflected in the price of energy and other goods and services. Ultimately, consumers and some businesses will pay the costs through higher prices. However, the allowance revenue generated by the trading of emissions allowances does not disappear—this value will cycle through the economy. Estimates of the allowance value generated by

[1] Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document (p. 6) http://www.arb.ca.gov/cc/scopingplan/document/final_supplement_to_sp_fed.pdf

[2] CO_2 is found in much greater concentrations in the atmosphere than other GHGs. CO_2 has a longer residence time (about 100 years) in the atmosphere than some GHGs like methane (about 12 years), but does not persist as long as N_2O or HFCs. Luckily, those GHGs are found in extremely small concentrations in the atmosphere.

the program in the first year alone range from roughly $2.6 to $7.8 billion, and will grow substantially over time.[3] A pressing question for the state is: Who gets this value?

In their final regulation order of the AB 32 cap-and-trade program, the CARB stated that

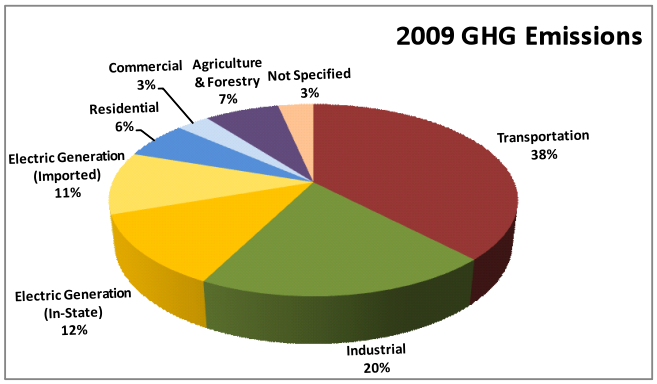
> "…any allowance allocated to electrical distribution utilities must be used exclusively for the benefit of retail ratepayers of each such electrical distribution utility, consistent with the goals of AB 32."[4]

This broad objective could be met a number of ways in practice. The CARB issued Resolution 10-42 and appointed the California Public Utility Commission (CPUC) to hold a review process and rulemaking proceeding to help specify how to achieve this objective. The ultimate decision of how to return allowance value to ratepayers is expected in the next few months, and should be of great interest to all Californians.

b. The Electricity Sector's Share of Emissions and Allowances

Behind transportation, the electricity sector is the biggest contributor of GHG emissions in California (See Figure 1). The most recent California GHG inventory is for 2009 and was released by the CARB in April 2012. It shows that electricity generation was responsible for 103.6 $MMTCO_2e$, or 23 percent of total GHGs generated by the California economy in 2009. Of these, 55.5 $MMTCO_2e$ were generated from in-state sources (12 percent of total statewide GHGs) and 48.1 from out-of-state sources (11 percent of total statewide GHGs).[5]

Figure 1: California's Greenhouse Gas Emissions by Source (2009)



Source: GHG Inventory by CARB, April 6, 2012: http://www.arb.ca.gov/cc/inventory/data/graph/graph.htm

[3] Estimates are in 2007 dollars and are listed by the Economic and Allocation Advisory Committee to the CARB and California Environmental Protection Agency in their March 2010 report, "Allocating Emission Allowances Under a California Cap-and-Trade Program."

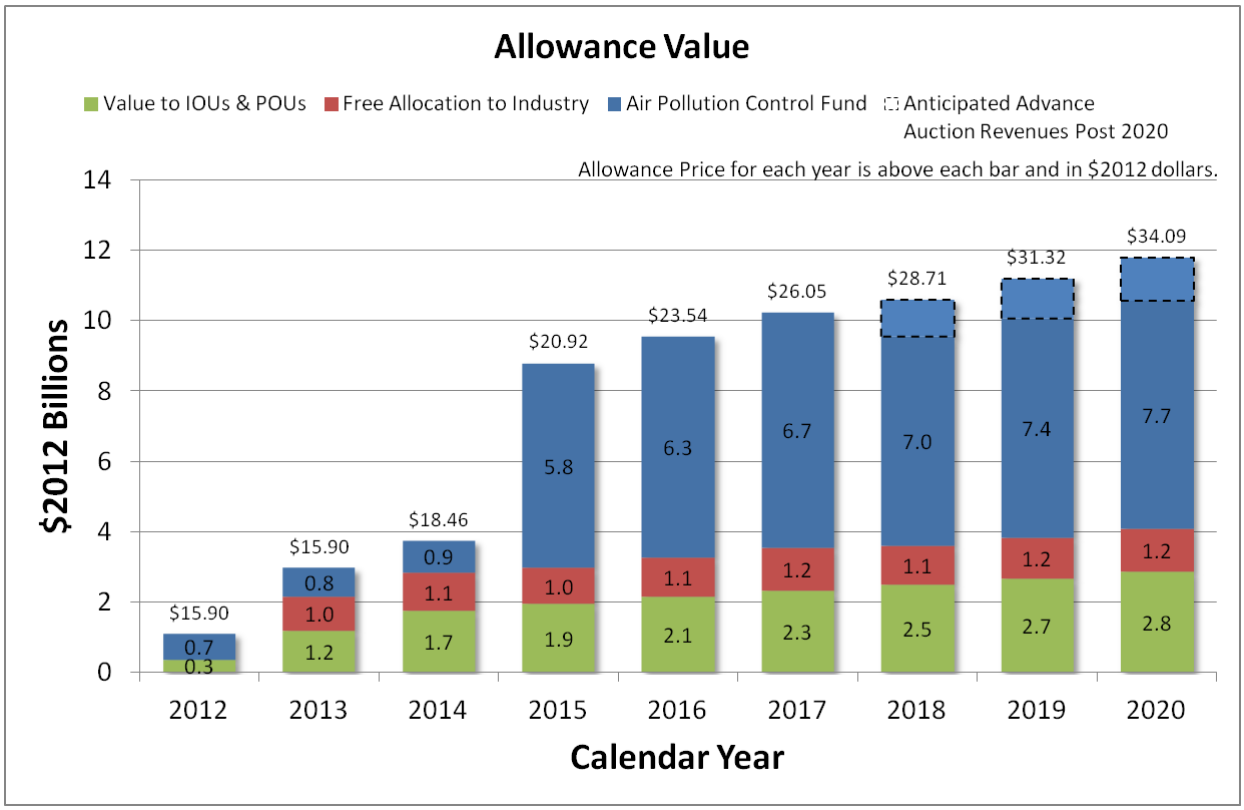
[4] ARB Final Regulation Order, *California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms*, (§ 95892.(a) p.119) available at http://www.arb.ca.gov/cc/capandtrade/finalregorder.pdf.

[5] The imported emissions in 2009 were 11.7 $MMTCO_2e$ below the average for the years 2000 – 2008 because of the economic downturn.

The industry and electricity sectors will come under the cap in the first phase of the program (2013-2014). AB 32 requires compliance by all entities delivering electricity to the California grid. In 2020, in-state and imported electricity generation is expected to drop to 44.8 and 53.5 $MMTCO_2e$ respectively.[6] These reductions will result from the implementation of the state's 33 percent renewable portfolio standard (RPS), the solar initiative, energy efficiency measures, transportation and land use initiatives and the cap-and-trade program, all outlined in the ARB's Scoping Plan to meet AB 32's GHG target.

As illustrated in Figure 2, the electricity sector will be issued 42 percent of the total value of allowances used for compliance in the first phase of the program (vintage 2013–2014 allowances). In the second (2015-2017) and third (2017-2020) phases, when transportation and natural gas are included in the program, electricity's share of the total value of allowances will fall to 22 percent (see the green bar in Figure 2 below).

Figure 2. Estimated Allowance Revenues Under Cap-and-Trade[7]



[6] See the CARB's Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document, August 19, 2011.
[7] Values for this graph were taken from allowance allocations listed in CARB's Final Regulation Order and allowance prices from the 2011 Market Price Referent, which uses 2009 CO_2 price forecast from a report by Synapse Energy Economics. Prices have been converted to 2012 dollars and emissions to metric tons of CO_2.

Under the cap-and-trade program, electric utilities including both investor-owned and publicly owned utilities will receive a free allocation of allowances totaling 97.7 $MMTCO_2e$ in 2013, declining to 84.9 $MMTCO_2e$ in 2020.[8] These allocations do not match perfectly the emissions projected for the electricity sector. The free allowances are apportioned based on the utility's expected customer cost burden, projected energy efficiency savings, and early investment in renewables. Approximately, 94 percent of the allowances are allocated to mitigate customer cost burden, 1 percent to acknowledge cumulative energy efficiency gains, and about 5 percent are allocated in recognition of early action.[9] The CARB has intentionally allocated at least enough allowances to utilities to cover their customers' total projected cost burden.[10]

3. The Public Utility Commission's Proceeding on Returning Allowance Value to Ratepayers

a. IOUs and POUs

Utilities are classified as investor- or publicly-owned, and each type is regulated differently and has been given different directives for the use of allowance value under the AB 32 cap-and-trade program.

Firstly, an investor-owned utility (IOU) is a private corporation regulated by the CPUC. The California legislature enacts policies that direct the CPUC, and the Governor appoints the five CPUC Commissioners. In turn, the CPUC approves rate structures and other policy decisions for the IOUs. In contrast, publicly-owned utilities (POUs) are non-profit agencies, frequently government run and are not regulated by the CPUC. Policies on POU activities and rates are created by locally-elected boards or governing bodies, such as city councils.

Secondly, all utilities will receive a free allocation based on the formula described in Section 1b above. The utilities provide retail services and deliver power directly to customers, but a large share of entities with a compliance responsibility (e.g. emitting power plants) are not owned by the utilities. The IOUs are required to liquidate (sell) their allowance allocation at quarterly cap-and-trade auctions, the first of which is expected in November 2012. To meet their own compliance obligation they would need to purchase allowances in the auction or in the secondary market. This provision requiring the IOUs to sell their allocation in an auction and buy back what they need for compliance is intended to guarantee liquidity in the allowance market and to help identify a market-clearing allowance price. On the other hand, POUs are allowed to use their free allocation directly for compliance. About two-thirds of electricity allowances will go to the state's four IOUs, which include Pacific Gas and Electric (PG&E),

[8] CARB Final Regulation Order, *California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms*,(§95870(d) p.97) available at http://www.arb.ca.gov/cc/capandtrade/finalregorder.pdf.
[9] Appendix A: Staff Proposal for Allocating Allowances to the Electric Sector (pp.4-11) http://www.arb.ca.gov/regact/2010/capandtrade10/candtappa2.pdf
[10] Appendix A: Staff Proposal for Allocating Allowances to the Electric Sector (p.11) http://www.arb.ca.gov/regact/2010/capandtrade10/candtappa2.pdf

PacifiCorp, San Diego Gas and Electric (SDG&E) and Southern California Edison (SCE). Together the IOUs provide about 75 percent of California's electric power. The other one-third of allowances will go to the thirty-nine POUs, the largest of which is the Los Angeles Department of Water and Power.

Figures 3 and 4 below illustrate the different customer classes to which each type of utility provides power.

Figure 3. 2010 IOU Electricity Consumption by Customer Class

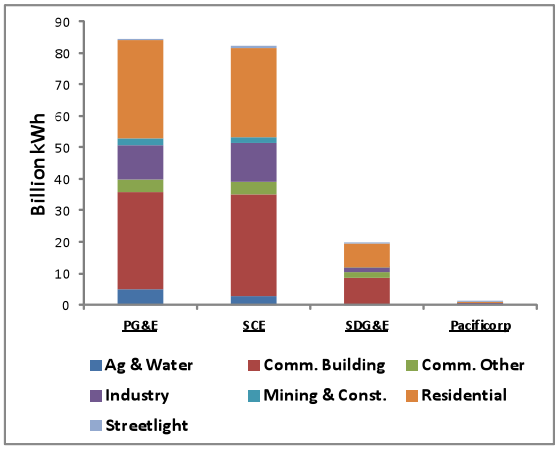
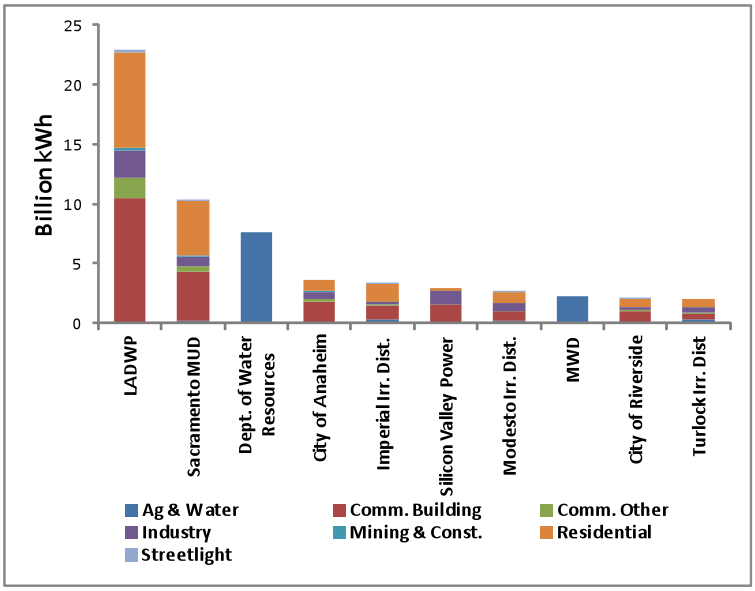


Figure 4. 2010 Electricity Consumption of 10 Largest POUs by Customer Class



b. The Public Utility Commission's Solicitation of Proposals

In December 2010, the CARB issued Resolution 10-42 that directs CARB's Executive Officer to work with the CPUC to ensure that the allowance value from IOUs is used for the benefit of ratepayers. This was further outlined in the CARB's final regulation order on the cap-and-trade program. In March 2011, the

CPUC issued its Order Instituting Rulemaking (R1103012) that opened the proceeding for parties to propose and discuss how to use IOU allowance revenue from quarterly auctions to achieve this goal. Specifically, CPUC Commissioner Peevey and two Administrative Law Judges solicited proposals to address: 1) how much, if any, allowance value should be directed back to ratepayers; 2) the form of any return to ratepayers; and 3) how much should be used to benefit ratepayers through energy system improvements, such as investment in energy efficiency or renewable fuels. The CPUC outlined seven policy objectives for consideration and allowed parties to contribute additional objectives.[11] By January 6, several parties had submitted proposals. A final decision on how to return electricity allowance value is expected in June.

The Seven Policy Objectives Outlined by the CPUC[12]

1) Preserve the Carbon Price Signal
2) Prevent Economic Leakage (Leakage, as defined by AB 32, is the reduction in emissions within the state that is offset by an increase in emissions outside the state.)
3) Distribute Revenues Equitably Recognizing the Public Asset Nature of the Atmospheric Carbon Sink
4) Reduce Adverse Impacts on Low-Income Households
5) Correct for Market Failures that Lead to Underinvestment in Carbon Mitigation Activities and Technologies
6) Maintain Competitive Neutrality Across Load Serving Entities
7) Achieve Administrative Simplicity and Understandability

4. Conceptual Options for the Use of Allowance Revenues

In practice, these policy objectives can be achieved in numerous ways. Four general options for the use of allowance revenues are before the CPUC. One approach would be to direct allowance value to the benefit of ratepayers by reducing electricity bills. A second would return equivalent revenues directly to ratepayers in an envelope or electronic fund transfer separate from their electricity bill. A third approach would return value on an equal basis per customer account. A fourth would make investments in the electricity system that benefit ratepayers. We consider each of these possibilities. The ultimate decision for how to direct allowance value to IOU ratepayers will be finalized by the CPUC in June and is likely to incorporate more than one of the general options discussed here.

a. Reducing Electricity Bills

One way to direct allowance value to ratepayers would be to use it to mitigate the increase in electricity bills from cap-and-trade. This approach has an advantage, at least when viewed by decision makers, as it will mask the cost of the program to customers. Low-income and low-volume customers would see no

[11] Administrative Law Judge Ruling before the CPUC's Order Instituting Rulemaking 11-03-012 (Filed March 24, 2011) available: http://docs.cpuc.ca.gov/efile/RULINGS/139883.pdf.
[12] Assigned Commissioner and Administrative Law Judges' Joint Scoping Memo and Ruling, September, 2011, before the CPUC's Order Instituting Rulemaking 11-03-012 (Filed March 24, 2011).

change in their bills due to cap and trade because they are insulated against increases in their electricity rates by regulation and state law. For other customers the change will be small because the value of the allowances would nearly offset the increase in wholesale electricity prices created by the cap-and-trade program. Decision makers might also like this approach as it preempts a debate about advantaging one customer over another. If the allowance value were used to reduce the total costs paid by customers, then the benefits would be shared among customers according to the same formula that is used to share costs. Avoiding electricity bill increases and conflicts about who should benefit from the use of allowance value would help to avoid political controversy that could affect the success of the program.

However, market-based pollution control policies such as cap and trade rely on having a clear and consistent price signal on pollutants to both producers and consumers. Masking the cost of the program by limiting changes in electricity rates would muddy the price signal for consumers. This is be especially important in the long run when consumers make decisions about whether or not to purchase energy efficient appliances and durable goods that use electricity. Effectively, suppressing the price signal constitutes a subsidy to electricity consumption compared to other uses of energy, especially transportation, where prices are likely to rise to fully reflect the allowance cost.

One proposed remedy would be to apply the allowance value as a credit against the total bill rather than use it to reduce rates. This approach would allow rates to rise with wholesale power prices, allowing customers to see the cost of allowances reflected in their bill. The allowance value would be returned to ratepayers as a reduction in the fixed portion of the bill that includes transmission and distribution charges and administrative fees. In principle, this would preserve the signal to consumers about the value of reducing electricity consumption. At the same time, customer bills would increase by very little because the allowance value would be subtracted from the total bill.

Unfortunately, in practice, this proposed remedy of preserving the price signal for consumers is not likely to be effective because the vast majority of ratepayers pay little attention to the line items in their bills. If consumers see a lower total bill, they are likely to think that electricity is relatively less expensive and behave accordingly, even if incremental electricity rates are high.[13] With more experimental work on how to effectively deliver this information, consumers might recognize the cost of carbon in their bill and adjust their behavior accordingly. However, today, the expected consumer response would be limited.

b. Return Revenues Directly

A more effective remedy might be to return allowance value in a separate envelope, so that when paying their electricity bill, ratepayers see rates and a total bill that reflect the real cost to the utility. This would preserve the full price signal giving customers an incentive to reduce consumption. The

[13] See Ito, Koichiro, 2010, Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing, University of California, Berkeley; and Borenstein, Severin, 2009, To What Electricity Price Do Consumers Respond? Residential Demand Elasticity under Increasing-Block Pricing, University of California, Berkeley.

payment in a separate envelope could balance household finances, offsetting most of the cost increase associated with the higher electricity rates.

This approach is likely to be somewhat less popular with utilities than applying the allowance value on the customer's bill because it places the utility in the position of delivering the bad news that electricity bills are going up. It is unclear who would assume the more enviable position of delivering a check in a separate envelope; it could also come from the utility and it might bring substantial good will. It is unclear whether a separate mailing from the utility would preserve the price signal as desired, or if customers would associate the mailing with the net cost of their electricity use. Also, a separate mailing or electronic fund transfer will incur additional administrative costs, which is a consideration.

A separate mailing or electronic communication could be a useful vehicle to advertise voluntary opportunities for customers to direct funds toward investments in energy efficiency. Customers might be invited to voluntarily accumulate funds in an interest-bearing account and to take advantage of tax benefits or rebate programs promoting energy efficiency. They might be able to use expected future payments as collateral to take advantage of low-interest loans for efficiency measures or even for the purchase of an electric vehicle. This type of program design might help reduce energy consumption and help the state achieve the goals of AB 32.

c. Severing the Connection between Payments and Consumption

Sending payments in separate envelopes raises the issue of whether or not the payments to each customer should be based on the volume of electricity consumed or some other measure. On the one hand, it might seem that those who see the biggest increase should see the biggest share of benefits from the distribution of allowance value. However, one might question the fairness of basing the payments on the volume of a customer's energy use, because they are in fact responsible for a greater share of carbon emissions. To avoid this, payments could be made independent of electricity consumption, which some call dividends. The justification for returning value directly to customers would be to compensate them for the damage to the environment from CO_2 emissions. Support for this stems from the idea that the atmosphere is a common property resource, owned by the general public, and that the allowance value is payment for its use by emitters.

In principle, this reasoning would conclude that each individual should receive equal compensation, perhaps through direct payments or dividends, as occurs in Alaska in the form of royalties from oil and gas development. In practice, neither the utility or CPUC has the information or the authority to direct dividend payments to individuals, but equal payments to customer accounts would reflect this principle and could approximate this type of approach. As suggested above, the disbursement of payments could provide an opportunity to educate customers about energy efficiency investment options. Equal payments to customers would presumably apply only to residential class customers and might involve only the proportion of allowance value associated the residential customers.

d. Investments in the Electricity System

A different way to direct allowance value to ratepayers would be to invest in the improvement of the electricity system and in opportunities that would reduce emissions or energy costs. Several possibilities for these kinds of investments have been identified.[14] Increasing use of renewable technology may require substantial investments to make improvements to the electricity grid. For example, expanded use of electric vehicles may require new infrastructure for charging batteries and billing customers. In addition, utilities or other groups could use investment funds to continue to act on opportunities to reduce emissions through energy efficiency improvements throughout the electricity system.

Utilities have in fact already made large investments to reduce GHG emissions. Notwithstanding the many advantages of renewable technologies, the cost of attaining the RPS is expected to have a substantially larger impact on electricity bills than will the cap-and-trade program. This leads to the suggestion that further increases in electricity rates and electricity bills might be perceived as excessive by the public, and points back to the idea that allowance value be used to abate further increases in rates or bills. Whether that or other approaches are preferable to further investments in the electricity system depends on the merits of further investments and on the ability to find other sources of revenues for those investments. The availability of allowance value might be a rare opportunity to make investments that are worthwhile but otherwise would be difficult or impossible to fund.

[14] See Economic and Technology Advancement Advisory Committee, 2008, *Recommendation of the Economic and Technology Advancement Advisory Committee*, http://www.arb.ca.gov/cc/etaac/ETAACFinalReport2-11-08.pdf; and, Economic and Allocation Advisory Committee, March 2010, *Allocating Emissions Allowances Under a California Cap-and-Trade Program*, http://www.arb.ca.gov/cc/scopingplan/economics-sp/updated-analysis/updated_sp_analysis.pdf.

Box 1: Other Decisions Affecting the Impact of AB 32 on Ratepayers

A few other GHG reduction measures have been outlined for the electricity sector and will affect emissions and electricity prices.[15] Some examples are the following.

The **Renewable Portfolio Standard (RPS).** Authorized by Senate Bill 1X2, the RPS requires that 33 percent of electricity generated for consumption in California be generated from renewable sources. This bill builds on the existing 20 percent RPS goal, which is estimated to achieve a reduction of 12.0 MMTCO2. The 33 percent RPS is expected to cut another 11.4 MMTCO2 in 2020.16 Because POUs are regulated differently, they are encouraged (but not required) to meet this mandate. Many have established their own RPS goals with similar targets.

The **California Solar Initiative (CSI).** Senate Bill 1 directed the CPUC to create the CSI in 2006. Launched in 2007, the CSI consists of four major programs: 1) rebates to encourage the building of new solar photovoltaic capacity; 2) investment in solar thermal systems to heat water; 3) grants to solar research and development; and 4) providing solar incentives to low income multifamily housing. The program is funded by both electric and gas ratepayers from the investor-owned utilities. The rebate program has a lifetime budget of $2.2 billion between 2007 and 2016 to install 1.94 GW of new solar capacity, and the solar hot water rebate program is allocated $250 million in funding between 2010 and 2017. The programs could save California 1.1 $MMTCO_2$ by 2020.

Energy Efficiency Programs. There are several energy efficiency programs run by utilities and state agencies and proposals to expand these programs. The 2008 Scoping Plan estimated that in the electricity sector by 2020 California could save 15.2 $MMTCO_2$ from increased utility energy efficiency programs, more stringent building and appliance standards, and additional efficiency and conservation programs and another 6.7 $MMTCO_2$ from increased use of combined heat and power.

The **Low Carbon Fuel Standard (LCFS)** and **Electric Vehicles (EV).** In April 2010 the CARB put into effect the LCFS, which requires a 10 percent reduction in the carbon content of transportation fuels by 2020 (a goal envisioned by Governor Schwarzenegger in Executive Order S-01-07). Suppliers of transportation fuels can meet this requirement with any combination of fuels they supply or from LCFS credits they purchase. The standard also allows EVs to receive LCFS credits from the CARB for electricity used to power low-carbon transportation.[17] The CPUC is deciding what IOUs would be able to do with the revenue generated from the sale of LCFS credits in the proceeding discussed at length in this paper. It's estimated that the LCFS will cut emissions by 15 $MMTCO_2e$ by 2020. Court proceedings are addressing whether the LCFS violates the commerce clause of the U.S. Constitution as it assigns a higher carbon

[15] Numerous measures also exist that aim to reduce GHG emissions from other sources, such as transportation and can be read about in the ARB's Climate Change Scoping Plan (2008), available: http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf

[16] CARB, August, 2011. Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document.

[17] CPUC, 2011. Order Instituting Rulemaking 11-03-012.

intensity level to out-of-state ethanol than in-state ethanol. The CARB continues to develop and enforce the program while the case is on appeal.

5. Proposals on the Docket

a. The Involved Parties

There are nearly 50 parties involved in the CPUC proceeding for the rulemaking on how to use allowance value for the benefit of ratepayers. Some parties have collaborated and 14 total proposals have been filed. They are summarized in Table 1 below.

Table 1: Proposals Submitted to the CPUC on Distributing Electricity Allowance Value

Party	Description
Joint IOUs	Three largest investor-owned utilities in California.
Division of Ratepayer Advocates (DRA)	Independent consumer advocacy division of California Public Utilities Commission.
Joint Environmental Parties	Group of nonprofit organizations representing environmental, science, economics, law, and consumer protection interests.
PacifiCorp	Investor owned multijurisdictional utility with less than 2 percent of customers in California.
Solar Energy Industries Association	National trade association for solar energy industry.
Green Power Institute	Renewable energy program of Pacific Institute (environmental research nonprofit).
The Utility Reform Network (TURN)	Nonprofit electricity consumer advocacy group.
City and County of San Francisco	Publicly owned load-serving entity.
Marin Energy Authority	Community choice aggregator in California.
The Direct Access Customer Coalition	Group representing direct-access customers, which purchase energy directly from third-party energy service providers.
Tesoro Refining and Marketing Company	Independent refinery in California.
California Cogeneration Council	Association of natural gas cogenerators in California representing about 1.3 GW.
Large Users	Group representing large industrial electric customers, manufacturing, end-use generators, and customer generation interests.
Agricultural Parties	Group representing agricultural interests in California.

Most parties addressed the seven policy objectives (listed in Section 2b) by assigning importance to each objective explicitly or by detailing a proposal encompassing them. Table 2 contains a summary of the importance each party assigned to each policy objective. Dark green boxes (++) indicate that a party considered a policy objective of utmost importance. Light green boxes (+) indicate that a policy objective was considered important. Blank boxes indicate where policies were not addressed and pink boxes (-) indicate where a party deemed a policy unimportant or difficult or impossible to achieve. Parties showed the greatest disagreement on Objectives 1 and 3, the importance of the preservation of the carbon price signal and the equitable distribution of the "public asset" (allowance value).

Table 2: Proposals by Interested Parties Indicating the Importance of 7 Policy Objectives in the Return of Electricity Allowance Value to Ratepayers

Proposals	Objectives						
	1	2	3	4	5	6	7
	Preserve the Carbon Price Signal	Prevent Economic Leakage	Distribute Revenues Equitably /Carbon Sink as "Public Asset"	Reduce Adverse Outcomes to Low Income Households	Correct for Market Failures	Maintain Competitive Neutrality Across Load Serving Entities	Achieve Administrative Simplicity
Joint IOUs	-	+	-	++	-	+	+
DRA	++	+	+	+	+	+	+
Joint Parties	++	+	++	+	+	+	+
Agricultural Parties	-	++	-	-	+	+	++
Solar Energy Industries Association	+	+	-	+	++	-	+
Pacificorp	-		-	++	++		++
Green Power Institute	+		+		+		+
California Cogeneration Council	+	++	-		+	+	
City and County of San Francisco	+		+	++		++	+
Marin Energy Authority	-		+				+
The Direct Access Customer Coalition						++	++
Large Users		++					
Tesoro		++					
TURN	++						

In addition to the objectives suggested by the CPUC, the Joint IOUs proposal suggested that other policy objectives were worth consideration: 1) mitigating cost increases for all customers and ensuring the cost-effectiveness of emissions reduction measures (while reducing adverse impacts on low income households); and 2) returning allowance revenues to customers in proportion to the costs they incur to achieve the fairest outcome. In addition, the DRA and Joint Environmental Parties assert that educating customers about the rate impact of the cap-and-trade program and how they might mitigate it is also important.

b. Three Main Proposals

Three proposals were presented with particular completeness and gave clarity to the scenarios they presented. We summarize those proposals here, and then proceed to model their short-run impacts on residential customers in the next section.

Scenario 1: Joint Investor Owned Utilities (Joint IOUs)

The Joint IOUs advocate a 100 percent return of allowance revenues from the electricity sector to ratepayers in all sectors. However, because low-income customers enrolled in the CARE program and low-consumption customers are protected from rate increases, they would not receive any allowance value under this proposal. Revenue would be returned on a customer's electricity bill each month as a line-item reduction. This approach draws on the first conceptual option listed in Section 3. The refund to customers as part of their electricity bill over the course of the year would add up to $28 to $56 in the PG&E region, $26 to $76 in the SCE region and $27 to $47 in the SDG&E region.

Scenario 2: Division of Ratepayer Advocates

The California State Division of Ratepayer Advocates (DRA) calls for a return of 90 percent of allowance revenues to ratepayers in all customer classes through an off-the-bill rebate check on an annual basis. The size of the check would vary by region. For the household with average consumption in its region the annual payment would range from $25 to $51 in the PG&E region, $23 to $69 in the SCE region and $24 to $42 in the SDG&E region.

The DRA proposal would divert ten percent of the revenue to finance long-term investments in energy efficiency through a Consolidated Financing Program and to pay for administrative expenses related to bill relief. In 2013, the value allocated to this program would be roughly $102 million.[18] The DRA proposes the California Alternative Energy and Advanced Transportation Financing Authority could head this Consolidated Financing Program.

Scenario 3: Joint Environmental Parties

The Joint Environmental Parties propose that allowance revenues from the electricity sector be used for three purposes: 1) to invest in energy efficiency and carbon mitigation technologies; 2) to protect industries from leakage (the emissions reductions in the state that are offset by an increase in emissions outside the state); and 3) to mitigate residential rate increases.

First, the allocation of allowance revenues to investment would be 75 percent of the product of the Allowance Reserve Price in the auction multiplied by the number of allowances sold in the auction each year. [19] In 2013 the value would be $483 million.[20] By linking this revenue to the reserve price it would provide a predictable and stable level of funding. Second, the emissions-intensive, trade-exposed industries would receive revenues through a calculation involving historic consumption, leakage risk and the incremental increase in generation related costs from cap and trade. Finally, remaining revenues would be returned to residential retail ratepayers in a separate, off-the-bill rebate check. The revenue

[18] See footnote 10.
[19] The Allowance Reserve Price is $10/MT in 2013, and rises by 5 percent plus inflation per year thereafter.
[20] $483 million = 0.75 * ($10/ton) * 64.5 million tons.

would be returned in equal payments per customer account, but payments would vary based on geography and if household heats with electricity. The proposal does not specify whether those payments should occur on an annual basis or more often.

6. How will the Various Proposals Affect Households around the State?

The decision by the CPUC about how the IOUs should return allowance value to the benefit of ratepayers is expected by June. Proposals filed before the CPUC would each yield quite different effects on ratepayers and households. This section demonstrates the effects on customers of the three major proposals using the rate impact model provided to the CPUC by the Joint IOUs.[21]

a. Geographic and Demographic Diversity and Rate Structures for Customers across the State

California has a complex electricity rate structure; not every kWh of electricity costs the same everywhere at every time. However, the rate structure is built on the simple concept of a baseline quantity of electricity consumption. The baseline quantity varies across regions of the state due to climatic differences, across summer and winter months and across categories of customers, differentiating between basic or full electric service. Among the three major IOUs, there are ten baseline territories in the PG&E service region, nine in the SCE region, and four in the SDG&E region. The baseline rates for the baseline territories for the three major IOUs are listed in Table 3.

[21] The CPUC and Administrative Law Judges' Scoping Ruling ordered the development of a rate impact model to better understand how the return of allowance revenue would affect rates by baseline region and customer class. The rate impact model uses input information on GHG compliance costs and allowance revenues by IOU, and yields estimated rate impacts by customer classes for different revenue return scenarios. This analysis utilizes the rate impact model in conjunction with current electricity rates, baseline quantities for each territory, allowance allocations, allowance prices, and estimated GHG compliance costs for each IOU.

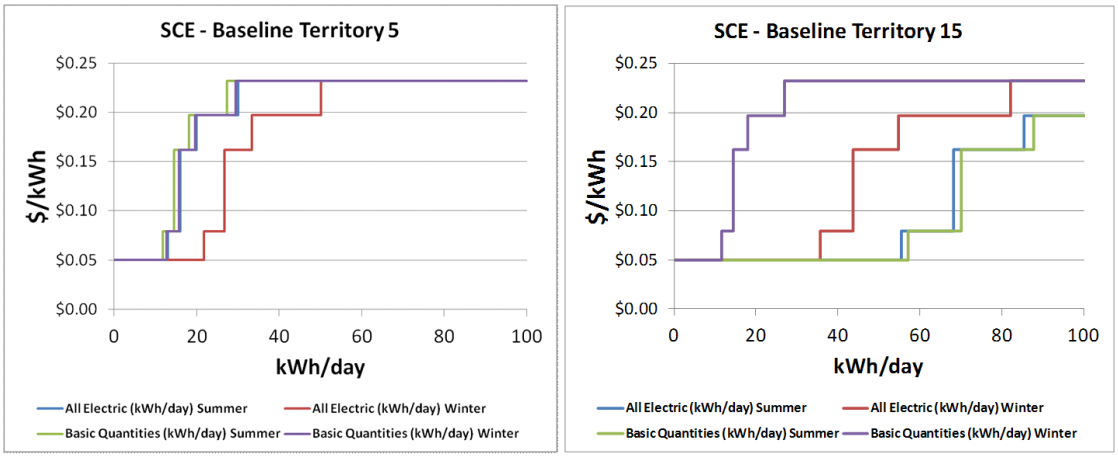
Table 3. Estimated Average Monthly Residential Usage by IOU in each Baseline Territory for 2013[22]

	Average Monthly Use (kWh)				
	Region	Basic Service		All- Electric	
		Summer	Winter	Summer	Winter
PG&E	P	847	703	996	1587
	Q	415	647	504	904
	R	946	647	1157	1414
	S	847	664	996	1339
	T	415	504	504	787
	V	664	753	1074	1564
	W	1024	603	1301	1068
	X	609	647	570	904
	Y	647	731	780	1438
	Z	437	587	620	1054
SCE	5	504	542	553	782
	6	509	531	553	759
	8	564	509	553	759
	9	769	581	935	1129
	10	885	581	963	1129
	13	1029	609	1605	1536
	14	891	587	1123	1381
	15	2429	498	2363	1283
	16	636	603	791	1335
SDG&E	Coastal	531	559	542	777
	Inland	620	598	609	857
	Mountain	819	764	957	1335
	Desert	908	620	1079	1030

The baseline quantity defines the first Tier in the electricity rate structure. Each kWh consumed up to the baseline quantity has the same price, which is the Tier 1 rate. Above Tier 1 is Tier 2, which is defined as between 101 and 130 percent of the baseline quantity and has a higher price than Tier 1. Consumers in Tier 2 pay the Tier 1 rate for the baseline level of consumption and pay the Tier 2 rate for consumption beyond the baseline. Similarly, Tiers 3, 4, and 5 are defined as 131 to 200 percent, 200 to 300 percent, and over 300 percent of baseline quantities respectively, and each tier has a higher price than the last. Figure 5 provides an example of the rate structure in the "5" and "15" baseline territories in the SCE service area, which are the territories with the lowest and highest summer baseline quantities for basic service.

[22] Average Monthly Use was imputed by dividing baseline quantities by 0.55 for basic service customers in the summer and winter and for all-electric customers in the summer and 0.65 for all-electric customers in the winter.

Figure 5. SCE Residential Rate Structures for Baseline Territories "5" and "15"



An important aspect of the rate structure is that state law restricts electricity rate increases for consumption in the Tier 1 and Tier 2 categories, while prices are allowed to rise for higher tiers.[23] This policy is intended to promote energy conservation. In addition, it reflects the idea that incremental units of electricity consumption are the most expensive for the system and raise the average costs for other customers. In addition it reflects an equity goal by protecting baseline levels of consumption from rate increases.

A second important feature of the IOU's rate structure is the California Alternative Rates for Energy (CARE) Program, which protects low-income households from rate increases. The CARE program provides a monthly discount on energy bills for income-qualified households and housing facilities. Qualifications are based on the number of people living in the home and the total annual household income.[24]

These two features, the tiered rate structure and the CARE program, provide a backdrop for understanding how electricity customers might be affected by the cap-and-trade program. Customers with low levels of consumption or low income will not carry the costs of the program; customers with high levels of consumption who are responsible for relatively more emissions will bear most of the costs.

b. Results under Each of the Proposals

Results from the Rate Impact Model can be divided into the costs of the cap-and-trade program and the benefits coming from the use of the allowance value. The cost of the program varies across IOUs

[23] The California Public Utilities Code Section 739.9 limits the increase in rates charged to residential customers for usage up to 130 percent of baseline quantities (Tier 1 and Tier 2) to the annual percentage change in the CPI plus 1 percent, but not less than 3 percent and not greater than 5 percent.
http://law.onecle.com/california/utilities/739.9.html

[24] Informational pages for PG&E and SCE are available at:
http://www.pge.com/en/myhome/customerservice/financialassistance/care/index.page and
http://www.sce.com/residential/income-qualified/CAREFERA/care-fera-rate-programs.htm

depending on the emissions intensity (tons CO_2/MWh) of electricity consumed, the baseline territory in which customers reside and their level of electricity use. Table 4 presents the costs for summer and winter for an average residential customer in each of the IOU regions.[25]

Table 4: The Cost of Cap-and-Trade for Residential Customers before Accounting for Allowance Value

	Utility	Summer			Winter		
		Average Monthly Use (kWh)	Average Bill ($/month)	Estimated Gross Cost of C&T ($/month)	Average Monthly Use (kWh)	Average Bill ($/month)	Estimated Gross Cost of C&T ($/month)
Basic Service	PG&E	415 to 1024	$77 to $189	$2.24 to $5.52	504 to 753	$93 to $139	$2.71 to $4.06
	SCE	504 to 2429	$46 to $221	$2.28 to $10.98	498 to 609	$45 to $55	$2.25 to $2.75
	SDG&E	531 to 908	$96 to $165	$2.43 to $4.15	559 to 764	$99 to $135	$2.56 to $3.49
All-Electric	PG&E	504 to 1301	$93 to $240	$2.71 to $7.01	787 to 1587	$125 to $251	$2.31 to $4.65
	SCE	553 to 2363	$50 to $215	$2.50 to $10.68	759 to 1536	$55 to $112	$1.86 to $3.78
	SDG&E	542 to 1079	$99 to $196	$2.48 to $4.94	777 to 1335	$126 to $217	$1.93 to $3.32

This analysis assumes the costs of the program, before accounting for allowance value, will be the same under each of the proposals.[26] However, the net effect on each residential customer could differ in big ways depending on how allowance value is returned or used. To illustrate these differences we utilize the rate impact model from the rulemaking proceeding to estimate the bill impacts of the Joint IOU, DRA, and Joint Environmental Parties proposals. The allowance price used in this analysis is from the 2011 Market Price Referent, and is assumed to be $15.90 (current year dollars) in 2013. [27]

Table 5 presents our estimated impact of the proposals on residential customers across the state. A range of estimates is presented, representing the range of impacts on the average residential customer account in each baseline territory for summer and winter.

[25] The estimated cost impacts are calculated for the average household in each baseline territory for each IOU. The table reports estimated average monthly residential electricity usage in each baseline territory and by season. The CPUC mandates that the baseline quantity for each territory for *Basic Service* customers in the summer and winter, and *All-Electric* customers in the summer be set at between 50 and 60 percent of average usage for those customer groups. Baseline quantities for All-Electric customers in the winter are set at between 60 and 70 percent of average usage. The average usages were imputed using the assumption that the baseline quantity for each territory was 55 percent (65 percent for all-electric winter).

[26] The estimated costs of the cap-and-trade program were calculated using the Rate Impact Model from the CPUC's Proceeding R1103012. The costs are estimated as total revenue multiplied by bundled sales divided by total sales and total roughly $903 million in 2013. See Rate Impact Model for PG&E, SCE, and SDG&E submitted on Dec. 1, 2011 available at http://docs.cpuc.ca.gov/efile/MISC/155681.pdf. Additionally, we assume that baseline quantities and electric rates in 2013 will be the same as those in 2012.

[27] See footnote 10.

The first block of results describes the value of the credit to each customer account under the three main proposals. The proposals differ with regard to whether this credit would be received by reducing electricity bills or through payments in a separate envelope, but this is not illustrated in the table below. However, the estimates in the table do illustrate the consequence of withholding 10 percent of allowance value for investment in efficiency under the DRA proposal and a larger amount under the Joint Environmental Parties proposal (see Figure 6 below that illustrates the relative proposed investments in energy efficiency by each proposal).

Table 5. Net Cost of Cap and Trade for Average Residential Customers across Territories after Accounting for Allowance Value

		Summer					
		Credit (Benefit from Auction Revenues) per Customer ($/month)			Net Change in Customer Costs After Credit (%)		
Service Type	Utility	Joint IOU	DRA	Joint Enviro. Parties	Joint IOU	DRA	Joint Enviro. Parties
Basic Service	PG&E	$2.25 to $5.56	$2.03 to $5.00	$1.19 to $2.94	0.0%	0.3%	1.4%
	SCE	$2.31 to $11.13	$2.08 to $10.01	$1.22 to $5.88	-0.1%	0.4%	2.3%
	SDG&E	$2.41 to $4.11	$2.17 to $3.70	$1.27 to $2.17	0.0%	0.3%	1.2%
All-Electric	PG&E	$2.32 to $4.69	$2.09 to $4.22	$1.23 to $2.48	0.0%	0.2%	0.9%
	SCE	$2.53 to $10.82	$2.28 to $9.74	$1.34 to $5.72	-0.1%	0.4%	2.3%
	SDG&E	$2.46 to $4.89	$2.21 to $4.40	$1.30 to $2.58	0.0%	0.3%	1.2%
		Winter					
Basic Service	PG&E	$2.73 to $4.09	$2.46 to $3.68	$1.44 to $2.16	0.0%	0.3%	1.4%
	SCE	$2.28 to $2.79	$2.05 to $2.51	$1.20 to $1.47	-0.1%	0.4%	2.3%
	SDG&E	$2.53 to $3.46	$2.28 to $3.12	$1.34 to $1.83	0.0%	0.3%	1.2%
All-Electric	PG&E	$2.32 to $4.69	$2.09 to $4.22	$1.23 to $2.48	0.0%	0.2%	0.9%
	SCE	$1.89 to $3.83	$1.70 to $3.44	$1.00 to $2.02	0.0%	0.3%	1.6%
	SDG&E	$1.92 to $3.29	$1.72 to $2.96	$1.01 to $1.74	0.0%	0.2%	0.7%

The second block of results in Table 5 reports the percent net change in the customer's spending on electricity after accounting for allowance value. The payments are proportional to costs incurred under the Joint IOU and DRA proposals; in contrast, they vary for each customer account under the JEP proposal based on geography and if household heats with electricity.

It is noteworthy that if all of the allowance value were returned (e.g. the Joint IOU proposal) the average customer would break even. This is the conscious result of CARB's approach to allocation that recognizes measures to promote energy efficiency and early action among the IOUs and POUs. "As a matter of policy the approach to allocating allowances to the electric sector has been to ensure that each utilities allocation is at least equal to their customers' total expected cost burden in each year"[28] If 90 percent of it were returned (e.g. the DRA proposal) the average customer would realize a small net increase in electricity payments due to the cap-and-trade program, at least until the benefits of investment choices with the remaining 10 percent of allowance value came to fruition.

Table 6. Net Cost of Cap and Trade for Average Residential Customers

		Summer					
		Dividend (Average Benefit from Auction Revenues) per Customer ($/month)			Net Change in Customer Costs After Monthly Dividend (%)		
Service Type	Utility	Joint IOU	DRA	Joint Enviro. Parties	Joint IOU	DRA	Joint Enviro. Parties
Basic Service	PG&E	$2.51	$2.26	$1.33	-0.4% to 1.6%	0.0% to 1.7%	1.2% to 2.2%
	SCE	$3.64	$3.28	$1.92	-3.0% to 3.3%	-2.2% to 3.5%	0.8% to 4.1%
	SDG&E	$2.67	$2.40	$1.41	-0.2% to 0.9%	0.0% to 1.1%	1.1% to 1.7%
All-Electric	PG&E	$2.51	$2.26	$1.33	-0.2% to 0.9%	0.0% to 1.0%	0.8% to 1.3%
	SCE	$3.64	$3.28	$1.92	-2.3% to 3.3%	-1.5% to 3.5%	1.2% to 4.1%
	SDG&E	$2.67	$2.40	$1.41	-0.2% to 1.2%	0.1% to 1.3%	1.1% to 1.8%
		Winter					
Basic Service	PG&E	$2.51	$2.26	$1.33	0.2% to 1.1%	0.5% to 1.3%	1.5% to 2.0%
	SCE	$3.64	$3.28	$1.92	-3.1% to -1.6%	-2.3% to -1.0%	0.7% to 1.5%
	SDG&E	$2.67	$2.40	$1.41	-0.1% to 0.6%	0.2% to 0.8%	1.2% to 1.5%
All-Electric	PG&E	$2.51	$2.26	$1.33	-0.2% to 0.9%	0.0% to 1.0%	0.8% to 1.3%
	SCE	$3.64	$3.28	$1.92	-3.2% to 0.1%	-2.6% to 0.4%	-0.1% to 1.7%
	SDG&E	$2.67	$2.40	$1.41	-0.6% to 0.3%	-0.4% to 0.4%	0.4% to 0.9%

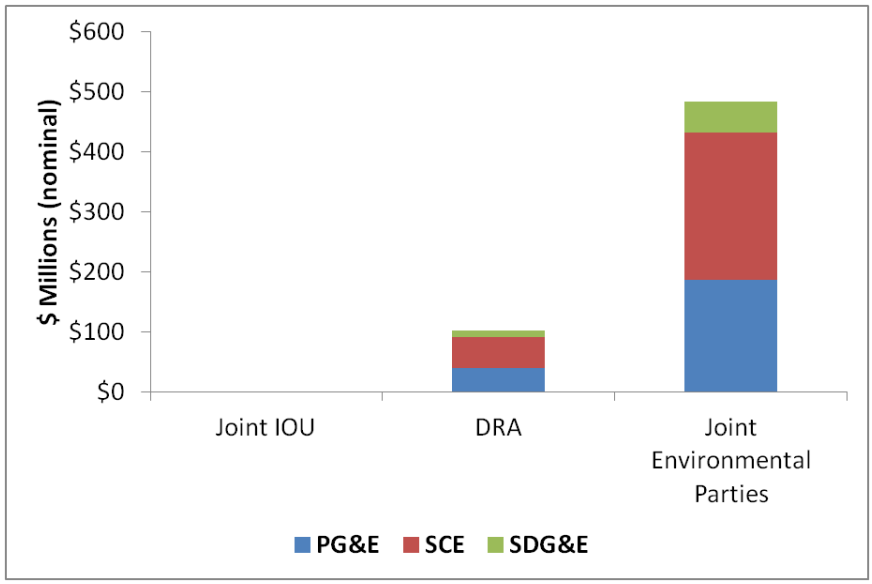
[28] CARB, 2011. Cap-and-Trade Regulation, Appendix A: Staff Proposal for Allocating Allowances to Electricity Distribution Utilities, p. 6.

The idea of an equal payment per customer account is embodied in the proposal from the Joint Environmental Parties but only in an approximate way. Table 6 reports the outcome of a strictly equal payment (dividend) per customer account under each of the proposals.[29] These payments differ across IOUs because the CARB has already implemented a formula determining the allowance value returned to IOUs. Though this approach resembles the payment of dividends, these payments would accrue to customers without regard to the number of individuals living at each household account.

The first block of results in Table 6 reports the monthly value of equal payments per customer account under each of the three main proposals. The second block of results lists the percent net change in customer costs when the equal monthly dividends are used to offset the costs of cap and trade. From Tables 3 and 4 one can see that the costs vary substantially across baseline territories, but the payment reported in Table 6 does not, so the percent net change can range from negative to positive values.

Tables 5 and 6 also highlight a broader set of tradeoffs. To return all of the allowance value to customers through reductions in their bill would not make any revenue available for investments. The DRA proposal calls for 10 percent of estimated allowance revenues to be spent on investments, and the Joint Environmental Parties calls for substantially more. Figure 6 illustrates the amount of revenue that would be available at the IOUs for investment under each of these three proposals.

Figure 6. Estimates of Proposed Energy System Investment



7. Conclusion

California is leading the nation in implementing policies to address climate-disrupting GHGs. The decisions that still loom large deal with how to use allowance value from the cap-and-trade program.

[29] Advocates of a dividend approach might suggest that the payments should not be distinguished by IOU service territory.

In proceedings before the CPUC, several parties have proposed approaches to accomplishing this goal. Three ideas emerge as most prominent. The utilities propose using allowance value to reduce electricity bills. California's Division of Ratepayer Advocates proposes spending a small amount on investments and would direct the rest to customers in proportion to their costs in an annual check. A third approach suggested by environmental parties would make investments in energy efficiency and other measures the top priority, protect industrial customers from unfair competition from out of state, and return the rest of the value to customers as equal payments per customer account, adjusted for geography and whether the house is heated with electricity, in an off-the-bill rebate.

The use of allowance value under cap and trade is arguably the most important feature in determining the distributional outcome of the program. In the absence of allowance value, the gross change in electricity costs for the average customer (before accounting for allowance revenue) across territories could range from $25 to nearly $80 in 2013. This range reflects the diversity of electricity use in different climate conditions and the different carbon intensity across utilities. Low-income customers and those who consume less than average will carry no or few costs under the program. On the other hand, customers who consume more than average will carry most of the program costs.

The allowance value assigned to the electricity sector under this program can offset all of the changes in electricity costs due to cap and trade. However, how this allowance value is used for the benefit of ratepayers or returned directly to ratepayers is an important issue in the program design. Insulating customer bills from the costs of cap and trade might be politically safe in the short run but might help to prevent the achievement of program goals and introduce economic inefficiency in the long run, especially if households perceive different costs to be associated with energy use in different sectors of the economy. Facing these tradeoffs is an important issue that should be of concern to all Californians and will be closely observed by political leaders across the globe.