

Climate Action for Economic Growth

An Economic Assessment of
California's Global Warming
Solutions Act

Executive Summary

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California's response to rising Greenhouse Gas (GHG) emissions has drawn the world's eighth largest economy into an unprecedented policy dialogue that will influence energy and environmental decisions around the world. Within the state, we know that policies already implemented and under consideration, including the path breaking Global Warming Solutions Act, will have far reaching economic consequences, yet the basis for evidence on these effects remains weak. In response to this, research economists are developing assessment tools to support more effective policy design, implementation, and assessment.

Table 1: Main Findings

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| <ol style="list-style-type: none"> 1. California can achieve its climate goals, reducing GHG emissions significantly, at negligible or negative net cost to the overall state economy. 2. Policies that achieve higher levels of energy efficiency permit resources to be reallocated within the state economy, reducing external energy dependence and increasing in-state value added and employment. 3. An alternative approach, the Carbon Use Tax, can offer the same mitigation and growth potential with less institutional complexity and significant state revenue potential. 4. While mitigating GHG emissions, AB32 also offers opportunities to reduce local criteria pollution and promote in-state innovation and technology, but offsets with Cap and Trade will undermine these benefits. |
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AB32 Assessment

One of the most advanced examples of this is the Berkeley Energy and Resource (BEAR) model. BEAR is a detailed and dynamic economic simulation model that traces the complex linkage effects across the California economy as these arise from changing policies and external conditions. The research summarize below is part of a larger effort to assess the long term implications of AB32 for the California economy.

As part of their advanced Scoping Plan and implementation activities, CARB and CalEPA organized a comparison project featuring the leading economic assessment tools applied to AB32 since its passage in 2006. These economic models, EDRAM from CARB, BEAR from UC Berkeley, and MRN/NEEM from CRA/EPRI, have been the most prominent sources of empirical evidence supporting policy dialogue on AB32 and its many design characteristics. The intent of this exercise was to identify salient similarities and differences between approaches, the results they obtain, and resulting insights/inferences.

In particular, the three models were re-calibrated to the latest available information on AB32 component policies (e.g. annex below). Implementing the three models in parallel then offers multiple perspectives on the costs and benefits of the Scoping plan components. The BEAR approach to this estimation exercise is fully documented elsewhere, but we summarize the main findings here.

Scoping Plan Policies Considered

For purposes of policy comparison, BEAR was used to evaluate two representative scenarios that take account of Scoping Plan policy recommendations. These generic scenarios are all for policies currently being evaluated for their potential to meet the state's 2020 target of 427 MMTCO2 equivalent overall emissions of

greenhouse gases, and are discussed in detail in the main body of the Plan. The salient policy components are combined in five different ways, described with supporting assumptions in Table 2 below.

Table 2: CARB Policy Cases

Policies	Case				
	1	2	3	4	5
	With Offsets	Without Offsets	Transport Policy	Electric/Natural Gas	Combined
LCFS	Full	Full	Full	Full	Full
Pavley II	Full	Full	Half	Full	Half
VMT Reduction	Full	Full	Excluded	Full	Excluded
Energy Efficiency	Full	Full	Full	Half	Half
33% RPS	Full	Full	Full	Excluded	Excluded
CHP	Full	Full	Full	Half	Half

Assumptions

	Component	Assumption
1	GHG Pollutants	CO2, CH4, N2O, SF6, PFC, and HFC
2	2020 Goal	15% below 2005 emissions
3	Covered Sectors	
	2012-2014	Electricity and Large Industrials
	2015-2020	Electricity and Large Industrial, transportation fuels, commercial and residential fuels and small industrial
4	Banking	Allowed without limitation
5	Cap Trajectory	Linear phase-in
6	Allocation	100% Auction
7	Offsets	No offsets
		With offsets at 49% of reduction

The five cases above represent the core policy packages assessed by all three models against a reference growth baseline for the period 2010-2020. In addition to these, we chose

independently to assess a very different type of policy for comparison.

Making the CUT – Delivering Public Goods by Taxing Private Bads

As a result of the global economic downturn and a legacy of deferred fiscal reforms, California’s public finances are in a state of crisis. This situation threatens to reduce availability of public goods and services and further the state’s long term economic potential. For example, the state now faces a prospect of spending more on prisons than university education, hardly a commitment to the knowledge-intensive growth that can secure our future.

Because of these economic difficulties, some have argued that we should defer climate action because it is too expensive. This perspective repeats the common misperception of a trade-off between environmental goals and economic growth. Such thinking is a fallacy, and in California we have proven this for decades. Adopting the right climate policies actually stimulates and sustains growth and job creation. By adopting three decades of unique standards for appliances, building, and utility regulation, California sharply reduced its energy dependence and created over a million more jobs.

Climate policy’s contribution to growth can be even greater now that the state is in trouble economically, but we need to change long held perceptions to promote understanding about this. Today we are threatened with the loss of public goods and services that we need to sustain our high living standards, while at the same time our energy use patterns threaten our long term future because of climate change and vulnerability to oil price uncertainty. To help secure our fiscal commitments, while at the same time promoting change in our fossil fuel dependency, we consider the prospect of a

Carbon Use Tax (CUT) that would be assessed on all carbon fuel use in the state. In the sample scenario considered here, all revenues from the CUT would be placed in the state's general fund.

The CUT version we consider corresponds approximately to a carbon permit price of \$30, but is assessed on carbon fuels directly. For gasoline, this means a \$.30/gal surcharge, or about 10% at today's prices. For natural gas, the CUT amounts to \$.30/Therm or about 5%. Because of our current reliance on natural gas for electricity generation, average rates would rise about 4%. Combining all sources with today's energy use patterns, California would collect about \$10B in the first year. This policy would not absolve the state from its responsibility to spend wisely, but it could make an important contribution to securing needed public goods and services.

What would be the impact of the CUT on the rest of the economy? We assess this in two ways, climate and growth objectives. From a climate perspective, the CUT is an attractive alternative to Cap and Trade, having similar effects on energy use behavior, but with less institutional overhead. Cap and Trade requires extensive up-front organizational design, including allocation, monitoring, and trading systems that lead have complex incentive and wealth transfer characteristics. The CUT would use a simple sales tax system already in place, but applied on a different (carbon content) basis. Pricing carbon permits, as we have learned, is based partly on science, partly on economics, and partly on politics. Pricing carbon content in fuels is based on science.

Because of this simplicity, the CUT would have more predictable effects on technology adoption and innovation. Without recourse to bargaining, allowance giveaways, etc., fuel users can easily assess their carbon liability and make the necessary decisions about investing in new technologies. Lower carbon fuels have lower taxes, tilting user choices

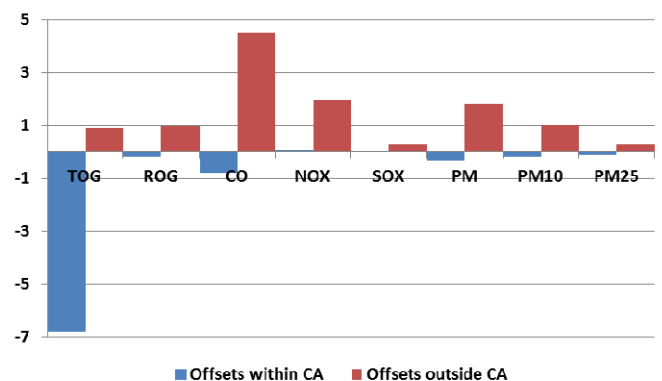
toward energy efficiency and lower carbon energy sources.

Offsets

The AB 32 Scoping Plan proposes that out-of-state offsets be allowed to substitute for up to 49 percent of the total global warming emission reductions in all of the capped sectors. Because direct sectoral policies are expected to account for roughly 80% of emission reductions in the capped sectors, cap and trade alone is expected to achieve the remaining 20 percent of needed emission reductions. By allowing offsets equivalent to 49 percent of total reductions (as opposed to cap and trade reductions), this could mean that all of the emission reductions expected to be achieved in California by the cap and trade program could come from offsets.

Figure 1: Criteria Emissions from Offsets

(metric kiloton change from 2020 baseline)



The results of this study show that if out-of-state offsets are permitted to substitute for 50% or more of the cap and trade emission reductions, criteria pollution rises as compared to the baseline. This means that, in cases where AB 32 reduces criteria pollutants, these reductions will be undermined. In cases where the economic stimulus aspects of AB 32 cause

pollution increases in some sectors, like transportation and construction, these pollution increases will be exacerbated.

Offsets also forsake the opportunity for innovation, and for the higher income, technology intensive economies like California, this may be their most serious drawback. The primary drivers of California’s superior growth experience over the last two generations have been education and innovation, which have gone hand in hand to make the state a knowledge-intensive leader in the global economy. First in information and communication technology (ICT), then in biotech, the state’s R&D supply chain has delivered solutions for the most dynamic and profitable sectors of modern times.

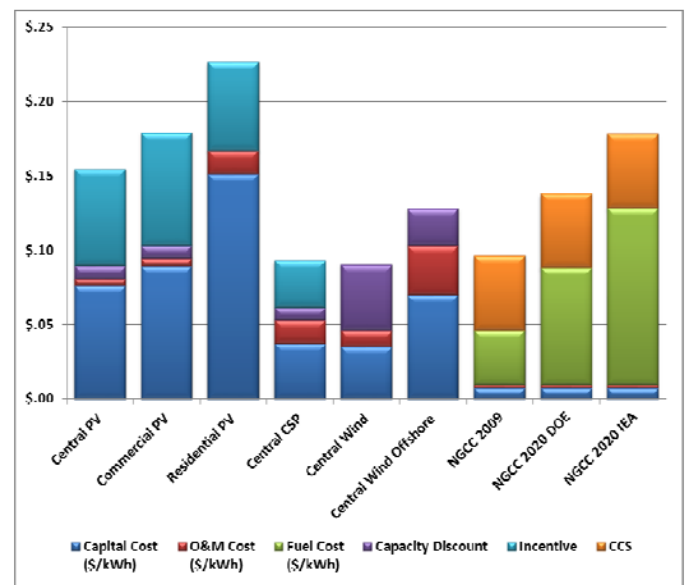
Renewables Deployment

Renewable energy is playing an increasingly important role in climate policy, and California has set an ambitious 33% Renewable Portfolio Standard as part of its AB32 initiative. A large part of the renewable energy mix, solar, wind, and geothermal, represent a fundamentally new energy supply paradigm. Fossil fuel supply and price are determined by scarcity, but these renewables represent essentially boundless resources relative to today’s energy requirements. Instead, the constraint in this energy supply is not scarcity, but technological change. Recent trends in renewable technology suggest that these costs can be expected to fall over time. A clear commitment in the world’s eighth largest market will be a strong stimulus for investment and innovation, including scaling up that can significantly reduce unit costs.

To calibrate the BEAR model with respect to renewable energy sources, we developed our own detailed estimates from the more recent sources available. We then combine this information with other data and assumptions regarding renewable and conventional energy

alternatives, presented in Figure 26 in terms of total cost per kWh of electricity, comparing the main intermittent renewable sources with a state-of-the-art Natural Gas Combined Cycle (NGCC) generation technology. Because fuel costs are an essential determinant of conventional costs, we present estimates under three LNG price scenarios, today’s prices, DOE Reference 2020, and IEA Reference 2020.

Figure 2: Renewable and Conventional Energy Cost Estimates



Source: Roland-Holst, David “Energy Prices and California’s Economic Security,” Next10.org, October, 2009

Aggregate Economic Impacts

When the BEAR model was applied to the five Scoping Plan cases, aggregate economic impacts were consistent with findings of a similar exercise in 2007. Although BEAR has been updated to 2008 data for the California, from 2003, and the state economy has weathered significant adversity in the meanwhile, we still find that the overall economic costs of AB32 are negligible or even negative.

Table 3 summarizes the BEAR results, including a sixth case representing the Carbon Use Tax. The most arresting feature of these results is the negative aggregate cost results for cases 1, 2, and 6. The overarching reason for this is energy efficiency, which results directly from standards in the policies and indirectly from imposing costs on carbon fuels. As California learned from three decades of experience, saving money on energy shifts expenditure from the carbon fuel supply to more conventional spending patterns. The latter are much more employment intensive, leading to net job creation and indirect multiplier benefits that outweigh direct adoption and adjustment costs.

Table 3: Macroeconomic Impacts

(percent change from 2020 Baseline unless otherwise noted)

	Case 1	2	3	4	5	6
Total GHG	-28	-28	-15	-28	-14	-32
Household GHG	-28	-28	-10	-27	-8	-32
Industry GHG	-28	-28	-28	-28	-28	-31
Annual GSP Growth	0.1	0.0	0.0	-0.3	-0.4	1.2
Employment	0.1	0.1	0.0	-0.1	-0.2	0.7
Jobs (thousands)	21	21	-5	-19	-45	136
Percent GHG Target	100	100	52	98	50	112

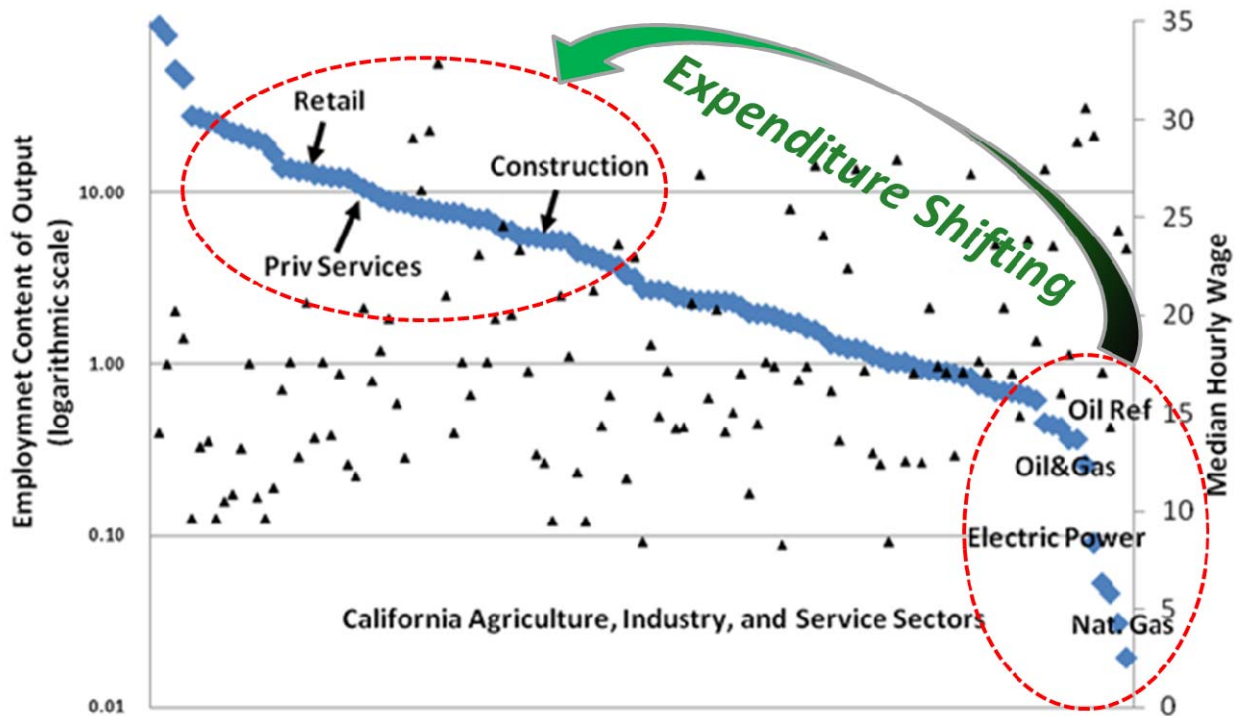
Even in cases where aggregate impacts (GSP) are growth negative, the magnitude is so small that it represents less than three months of average baseline GSP growth. In other words, even in the worst case considered California can achieve a decade of climate objectives and realize the same aggregate wealth only 12 weeks later.

The presence of offsets in Scoping Plan policies has an ambiguous effect. In cases of more extensive and determined policy packages (1 and 6) Cap and Trade is rendered superfluous or offsets are more expensive than permit prices. In other cases with weaker emission standards (3, 4, and 5) offsets can outsource half of California's the mitigation potential. This flexibility may seem attractive,

but it denies the state mitigation potential for other co-pollutants, including criteria toxics. Furthermore, extensive recourse to offsets averts innovation opportunities for California entrepreneurs, locally and, with technologies incubated in California, in the next break-out knowledge intensive industry. Energy is by revenue the world's largest industry, and energy efficiency can be to that industry what IT was to management, revolutionizing traditional practices around the world. One of the primary benefits of AB32 could be induced innovation, allowing California businesses to capture the momentum of an explosive emerging global market.

Finally, the CUT approach to mitigation is not only the most direct, but also the most pro-growth. The reason for this is again expenditure shifting and multiplier effects, but this time coming from two sources. A carbon tax provides a direct and transparent incentive to reduce carbon fuel expenditures, and to change expenditure patterns in ways that promote innovation. If users pay the tax as part of carbon fuel expenditure, the revenues go toward public goods and services that are more employment intensive than would be higher fuel spending. Those who avoid the CUT by investing in energy efficiency will save money in the long run, spending it on more conventional and generally more job intensive alternatives. This pattern of direct and indirect expenditure shifting has for a generation helped California to ever higher environmental and living standards. The future holds the same promise for positive, innovation based synergy between environmental values and livelihoods, and forward looking policies like AB32 can help to realize this potential, securing prosperity for another generation.

Figure 3: Why Energy Efficiency Creates Jobs



Source: Roland-Holst, David "Energy Efficiency, Innovation, and Job Creation in California," Next10.org, October, 2008

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