An Estimate of the Economic Impact of

A Cap-and-Trade Auction Tax

On California

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Introduction

Thomas Tanton, Principal of T^2 & Associates, has undertaken a preliminary analysis of the economic impacts of a cap-and-trade auction tax on California.

This preliminary Report provides my analysis of four critical aspects based on current and available information on the proposed tax, with respect to:

1. Direct employment loss created by adoption and implementation of the tax
2. Annual costs to typical family of four
3. Net loss in economic activity at the state level and
4. Qualitative impacts to state budget

The findings and conclusions presented in this report are based on the best available information and data to date. To the extent that precise formulation and market clearing prices for auctioned permits varies, and decisions that are made regarding distribution of auction revenues and their impacts may change going forward, the results presented here should be viewed as indicative and not predictive; they are order of magnitude correct in scalar and correct in direction.

The analysis, findings and conclusions contained herein are true and complete to the best of my knowledge and belief, and based upon my professional experience.

Summary

We have estimated the following impacts:

⟶ An annual effective cost increase to the typical family of four to be $818 the first year growing to $2800 in 2020, if market clearing prices for permits are $60 dollars per ton. Those figures are $270 and $930 if permit prices are at $20 and as much as $2720 to over $9330 per family if prices clear at $200 per ton. Costs increase for most goods and services. These cost increases are average for the population, although some residents may be compensated through a partial return of auction revenues.

⟶ Annual job losses to the California Economy of 76,000 to 107,000 the first year growing to perhaps 485,000 jobs in 2020, assuming a market clearing price of $60 per ton. These are net jobs losses, accounting for lost jobs and for jobs created by redirecting revenues collected from the auctions.

⟶ Lost economic activity of nearly 2% of gross state product, or about $250 to 350 billion over ten years. Much of this derives from reductions in productivity across the economy, and negative trade implications due to reduced competitiveness.

Table 1
Summary Findings of Net Impact

Year and Permit Clearing Price	Impact on Family	Jobs Lost
2012 @$60	$818	76,000-107,000
@$20	$270	25,500-35,700
@$200	$2720	255,000
2020 @$60	$2800	485,000
@$20	$930	162,000
@$200	$9330	1,617,000

There is uncertainty about how auction revenues would be re-distributed in the economy. To the extent the revenue is captured in a special fund under the control of CARB, the legislature would have limited state budget authority and flexibility. This is a significant concern given the potentially large amount of revenue (collecting in 8 years, fully 120% of the single year 2009/2010 state budget[1]) to be raised by an auction tax.

[1] Assuming collection of revenues at auction price of $60/ton would total $143 billion, compared to California state 2009/10 budget total of $119.2 billion, as documented at http://www.osp.dgs.ca.gov/On-Line+Publications/FinalBudgetSummary.htm

Background

The AB 32 Scoping Plan identifies a cap-and-trade program as one of the main strategies California will employ to reduce greenhouse gas (GHG) emissions. The preliminary estimate of the cap on greenhouse gas emissions for sectors covered by the cap-and-trade program is 365 $MMtCO_2e$ in 2020, which includes about 85 percent of California's total greenhouse gas emissions. Under cap-and-trade, an overall limit on GHG emissions from capped sectors will be established by the cap-and-trade program and facilities subject to the cap will be able to trade permits (allowances) to emit GHGs. Consistent with AB 32, ARB must adopt the cap-and-trade regulation by January 1, 2011, and the program itself must begin in 2012.

In its most basic sense, cap-and-trade is a regulatory approach used to control pollution by setting a firm cap on allowed emissions while employing governmental controlled market mechanisms to achieve emissions reductions while driving costs down. In a cap-and-trade program, a limit, or *cap,* is put on the amount of pollutants (GHGs) that can be emitted. Each allowance equals one metric ton of carbon dioxide equivalent. The total number of allowances created is equal to the cap set for cumulative emissions from all the covered sectors. The cap is set for each compliance period, the first of which will begin on January 1, 2012.

Covered entities in a cap-and-trade program must have permits for GHGs they emit. Permits to emit are called allowances and are issued by the state to program participants. Every year, the number of allowances would decline and, as a result, fewer allowances would be auctioned. Limiting the number of allowances issued in this fashion is designed so that emissions continue to decline.

Entities that are initially required to participate in the cap-and-trade program include public agencies and companies that emit more than 25,000 metric tons a year of greenhouse gas emissions. These entities include public agencies such as ports, airports, universities, cities, counties, water agencies, and sanitation agencies. Private companies include electric power generators, refineries, breweries, wineries, glassmakers, forest products, biotech companies, food processors and just about every large manufacturing firm in the state.

Buying and selling allowances establishes a price for each ton of GHG emissions, which in turn should reflect the cost for facilities and entities in the program of reducing emissions per ton. The flexibility provided by trading is supposed to allow for continued growth by some individual sources while guaranteeing that there is no increase in total GHG emissions for capped sectors. An entity would buy an allowance if the market value of the allowance is less than the cost of reducing emissions on-site. Alternatively, if an entity believes that selling an allowance is cost-effective, it may sell the allowance to another entity at the current market price. If the price of allowance exceeds the marginal and appropriable price increase, the entity will reduce production and or shut down.

Cost of Allowances

In 2009, a 17-member Economic and Allocation Advisory Committee (EAAC) was appointed to advise ARB on the implementation of the proposed cap-and-trade program. The EAAC is comprised of economic, financial, and policy experts with various backgrounds and experiences. It provides advice to CARB on allocation of allowances and use of their value and has evaluated the implications of different allowance allocation strategies such as free allocation, auction or a combination of both.

According to the EAAC, a large number of factors influence the allowance price. The technological and behavioral factors include the ease of substitution by firms to low-GHG methods of production, the extent to which consumers shift to low-GHG products in response to changes in relative prices, and the pace of technological progress. A number of policy factors also apply. These include the stringency of the overall cap and the nature of complementary policies. Other important policy factors include the extent of output-based updated free allocation, linkages with other markets, CO_2 offsets, provisions for allowance banking and borrowing, and leakage[2].

EAAC reviewed a number of studies and reports that estimated allocation costs based on a number of different scenarios. These studies showed a large range of allowance prices of between $8 to $214 per ton. This large range reflects the great amount of uncertainty that exists in determining costs and of auction clearing prices[3]. Table 2, from the EAAC Report illustrates the range of auction prices reviewed under different scenarios.

[2] *Allocating Emissions Allowances Under California's Cap-and-Trade Program:* Recommendations to the California Air Resources Board From the Economic and Allocation Advisory Committee, March 2010, p.25
[3] Ibid, p.30

Table 2

Estimated Allowance Prices from Various Models under Different Policy Scenarios

Author / Region	Scenario	Additional Policies	Allowance Price in 2020[1]
CARB (EDRAM)			
California	Scoping Plan	Vehicle standards, 20% RPS, etc.	$10
WCI (Energy 2020)			
WCI	Stationary Sources	Limited amount of offsets, banking allowed, current RPSs	$71
WCI	Economy-wide		$24
WCI	Economy-wide - High Energy Prices		$18
WCI	Economy-wide - Low Energy Prices		$56
WCI	Economy-wide - High Natural Gas Prices		$20
WCI	Economy-wide - No Offsets	No offsets	$63
Electric Power Research Institute (MRN-NEEM)			
California	Binding Reductions[2]	No offsets, no banking	$60 - $103
California	Safety Valve	Safety valve[4]	$60
Roland-Holst (BEAR)			
California	Economy-wide[5]	No banking, no offsets, all CARB policies	$23 - $214
California	20% Cap-and –Trade[6]		$23 - $179
California	20% with Efficiency Innovation[6]		$8 - $161
Palmer et al. (Haiku - electricity sector only)[7]			
California	Auction	20% RPS, no offsets, no banking, first-deliverer compliance	$58
California	LDC Allocation		$127
WCI	Auction		$21
WCI	LDC Allocation		$26

EAAC also estimated the annual costs of these allocations in four scenarios at the lower end of the cost range, shown in Table 3[4].

[4] Ibid., p.32

Table 3

Year	Example Budget (MMTCO2e)	Illustrative 2020 Allowance Prices and Total Value of Allowances							
		$20.00		$35.00		$45.00		$60.00	
		Price ($/ton)	Value (mill. $)	Price ($/ton)	Value (mill. $)	Price ($/ton)	Value (mill. $)	Price ($/ton)	Value (mill. $)
2012	200	$12.54	$2,508	$21.96	$4,392	$28.23	$5,646	$37.65	$7,530
2013	195	$13.29	$2,592	$23.28	$4,540	$29.92	$5,834	$39.91	$7,782
2014	190	$14.09	$2,677	$24.68	$4,689	$31.72	$6,027	$42.30	$8,037
2015	405	$14.94	$6,051	$26.16	$10,595	$33.62	$13,616	$44.84	$18,160
2016	397	$15.84	$6,288	$27.73	$11,009	$35.64	$14,149	$47.53	$18,869
2017	389	$16.79	$6,531	$29.39	$11,433	$37.78	$14,696	$50.38	$19,598
2018	381	$17.80	$6,782	$31.15	$11,868	$40.05	$15,259	$53.40	$20,345
2019	373	$18.87	$7,039	$33.02	$12,316	$42.45	$15,834	$56.60	$21,112
2020	365	$20.00	$7,300	$35.00	$12,775	$45.00	$16,425	$60.00	$21,900

Budget: Illustrative California cap-and-trade program emission allowance budget in millions of metric tons of carbon dioxide equivalent ($MMTCO_2e$).

Price: Illustrative emission allowance price in each year in dollars per metric ton. The price trajectory is computed assuming a 6% annual price increase, resulting in the 2020 price noted in the table.

Value: Illustrative allowance value in millions of dollars, equal to the allowance price times the allowance budget.

At $60 per ton, the allocations costs would total $143 billion between the years 2012 to 2020.

Auctions or Free Allocation of Permits

One of the most important design features in a cap-and-trade program is the system chosen to allocate GHG emission permits. It appears the CARB Board is moving towards choosing a 100% auction system as its cap-and-trade allocation system. In an auction system for allocating GHG permits, CARB would hold an auction between cap-and-trade participants to determine the price of emission permits. Entities would then have to purchase permits equal to of GHG emissions they generate. In practice, these auction costs on companies and agencies would function much like a direct tax because, in order to operate, they would be forced to purchase these permits.

Here are a few examples of what individual companies and public agencies would have to pay under a cap-and-trade program using 100% auctions at a price of $60 per ton:

- A California winery would have to pay $2.6 million a year for these AB 32 Auction Taxes or more than $26 million over ten years in order to continue to produce wines in California.

- The Modesto Irrigation District would have to pay nearly $14.6 million a year, or more or $146 billion over ten years. The Los Angeles Department of Water and Power would have to pay $246 million a year for its electricity generation facilities in California alone.

- UCLA would have to pay nearly $11 million a year in AB 32 auction taxes.

- A food processing company in the central valley would have to pay $3.7 million a year or $37 million over a decade to continue processing central valley agricultural products.

- A dairy company with four plants in the valley would have to pay $8.3 million a year and $83 million over ten years, in order to continue to produce fresh milk and dairy products in California.

The companies and public agencies subject to the AB 32 Auction Tax employ thousands of California workers and provide important goods and services including food, electricity, fuel, higher education, transportation, building materials and more. The companies are also central to the supply side of our trade balance.

The industries subject to new regulations and/or cap-and-trade program, due to AB 32, account for about 20 percent of California Jobs, have higher than average wages and union density, and are largely filled by men and by Latinos[5].

The impact to various types of facilities, at different auction prices, is shown in Table 4.

[5] *Addressing The Employment Impacts Of AB 32, California's Global Warming Solutions Act,* Carol Zabin, Ph.D, Andrea Buffa, UC Berkeley Center for Labor Research and Education, February 2009

Table 4

Company/Public Agency	Tons of GHG Emissions	AB 32 Auction Tax $20 per ton	AB 32 Auction Tax at $60 per ton	AB 32 Auction Tax at $100 per ton
Port	360,556	$7,211,120	$21,633,360	$36,055,600
Forest Products	433,203	$8,664,060	$25,992,180	$43,320,300
Dairy	40,024	$800,480	$2,401,440	$4,002,400
Soup Maker	38,942	$778,840	$2,336,520	$3,894,200
Brewery	75,310	$1,506,200	$ 4,518,600	$ 7,531,000
Aeronautics	26,218	$524,360	$1,573,080	$2,621,800
Paper Manufacturer	116,842	$2,336,840	$7,010,520	$11,684,200
Winery	43,685	$873,700	$2,621,100	$4,368,500
Poultry Plant	42,318	$846,360	$2,539,080	$4,231,800
Glass Maker	98,844	$1,976,880	$5,930,640	$9,884,400
Biomedical	41,434	$828,680	$2,486,040	$4,143,400
UCLA	179,562	$3,591,240	$10,773,720	$17,956,200
UC San Diego	152,780	$ 3,055,600	$9,166,800	$15,278,000
Steel Plant	165,057	$3,301,140	$9,903,420	$16,505,700
Sugar Plant	100,426	$2,008,520	$6,025,560	$10,042,600
Silicon Valley Power	216,802	$4,336,040	$13,008,120	$21,680,200
Refinery	2,796,057	$55,921,140	$167,763,420	$279,605,700
Geothermal Power Plant	194,896	$3,897,920	$11,693,760	$19,489,600
Airplane Maintenance Facility	107,441	$2,148,820	$6,446,460	$10,744,100
Los Angeles Dept. of Water & Power (CA Facilities)	4,112,321	$82,246,420	$246,739,260	$411,232,100
Airport	44,333	$886,660	$2,659,980	$4,433,300
Packing Company	66,018	$1,320,360	$3,961,080	$6,601,800

Based on California Air Resources Board, Mandatory Greenhouse Gas Reporting Data for 2008

At an allocation price of $60 per ton with 100% auctioning, the total cost of allocations would be $143 billion based on the EAAC table on page 26 its report. To put that in perspective, in 2005, Californians spent $31 billion for electricity, $16 billion for natural gas, $39 billion for gasoline and $7.7 billion for diesel[6].

Cost to Consumers

The purpose of climate change policies such as cap-and-trade is to place a price on carbon and consequently to increase the price of energy and carbon emitting materials and processes. A cap-and-trade program with an auction will serve as a “cap and tax” and will increase the price of 85 percent of the energy we use in California. That is the

[6] http://www.energyalmanac.ca.gov/overview/index.html

point. For it to "work," cap-and-trade needs to increase the price of oil, natural gas and carbon emitting processes, and thereby induce consumers, through price differences, to use less emitting forms.

According to EAAC, AB 32 will cause California households to face higher prices both directly for electricity, natural gas, and gasoline, and indirectly as businesses pass costs for GHG reduction on to consumers[7], for everything from food to building materials.

Table 5

Impact on Carbon Pricing on California Households by Income Decile and Expenditure Category

income decile	income per capita	cost ($ per capita @ $20/metric ton CO2)						
		electricity	gasoline	natural gas	heating oil	other expen-ditures	total cost per capita	total (%)
1	3788	15.55	28.19	9.9	1.35	24.28	79.27	2.09
2	6545	19.32	43.07	13.2	1.71	36.86	114.16	1.74
3	9062	21.88	53.81	15.39	1.94	47.53	140.54	1.55
4	11752	24.09	63.27	17.23	2.13	58.4	165.12	1.41
5	14841	26.22	72.29	18.95	2.31	70.42	190.19	1.28
6	18603	28.41	81.37	20.63	2.49	84.58	217.49	1.17
7	23494	30.81	90.92	22.39	2.68	102.42	249.22	1.06
8	30469	33.65	101.52	24.32	2.89	127.07	289.45	0.95
9	42186	37.44	114.25	26.67	3.15	167.06	348.58	0.83
10	72895	44.43	132.59	30.24	3.57	267.14	477.98	0.66
Mean	**24889**	**28.18**	**78.13**	**19.89**	**2.42**	**98.57**	**227.2**	**1.27**
Median	**16616**	**27.32**	**76.83**	**19.79**	**2.4**	**77.5**	**203.84**	**1.23**

The results shown in Table 5 are based on analysis by Boyce and Riddle[8], and indicate that the higher prices resulting from placing a price on CO_2 could have a regressive impact. As indicated in the far-right column, as a percentage of their incomes, lower-income households will face larger cost increases than upper-income households. Note, Table 5 replicates impacts of auction prices of $20/ton. The impacts would be larger at higher prices and the regressive nature would be exacerbated.

[7] *Allocating Emissions Allowances Under California's Cap-and-Trade Program*, Op.Cit., p.33

[8] James K. Boyce and Matthew E. Riddle, "Cap and Dividend: A State-by-State Analysis," Political Economy Research Institute and Economics for Equity and the Environment Network, August 2009, http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/CAP_DIVIDEND_states.pdf

Spending AB 32 Auction Tax Revenues

EAAC recommends a full auction that could collect $143 billion over eight years (at auction prices of $60/ton) in new revenue. It should be noted that EAAC and others have identified a great deal of uncertainty whether CARB has the legal authority to collect or to spend that revenue.

The EAAC process identified a number of ways to spend the tax revenues raised under the AB 32 Auction. For example, EAAC recognized that energy prices would increase and that low-income families would be disproportionately impacted by these costs. In addition, according to the Congressional Budget Office, the costs of reducing carbon dioxide emissions would disproportionally harm the poor. A mere 15 percent decrease in carbon dioxide emissions would cost the lowest-income Americans 3.3 percent of their income, but only 1.7 percent of the income of higher income households[9]. In a California only cap and tax program, the disproportionate nature of impacts is likely to be even greater.

To mitigate these impacts on poor families, EAAC suggested that CARB consider establishing a subsidy program for low income families so that they could afford the higher costs that AB 32 would impose. However, this would negate the intent of cap/tax by reducing or eliminating the necessary price increases (see opening paragraph in the prior subsection), at least for those who receive the subsidy.

EAAC also recognized that AB 32 regulations will raise costs that will hurt employment in companies that become less competitive compared to other states and countries. . Climate policy also can negatively impact businesses, especially those whose products are highly energy intensive or that have difficulty passing cost increases on to customers. The impacts on business costs and profits can also prompt changes in employment[10].

To mitigate these job losses, EAAC suggested establishing a Worker Transition Program. According to EAAC, fairness considerations suggest possibly using allowance value to fund worker transition assistance (WTA) for any California firms' employees who might lose their jobs or their fulltime status due to the AB 32 greenhouse gas reduction program. The assistance would be designed to give these displaced workers the time and resources to carry out a job search and, if necessary, the training to find a new job in another industry.

A model for this type of program already exists. The federal Trade Adjustment Assistance (TAA) program provides such assistance to workers who lose their jobs or their fulltime status, either because the firm's customers switched to foreign suppliers or because the firm relocated the production facility to a foreign location. The federal

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[9] Congressional Budget Office, *Trade-Offs in Allocating Allowances for CO_2 Emissions*, Apr. 25, 2007, http://www.cbo.gov/ftpdocs/80xx/doc8027/04-25-Cap_Trade.pdf.

[10] *Allocating Emissions Allowances Under California's Cap-and-Trade Program* Op.Cit. p.33

process appears to be simple, though in practice it can take a good deal of time[11] and its effectiveness remains unclear.

In addition, the EAAC identified other ways CARB might spend this new revenue, assuming legal authority, including paying dividends to the general public or creating new spending programs.

Description Of Modeling, Analysis and Assumptions

The economic impacts from any new policy can be significant. We used a spreadsheet based model to quantify the impacts of the proposed cap and tax auction. The spreadsheet based model was developed in order to roughly estimate the net economic impacts associated with energy and environmental policies. The primary goal in developing this model was to provide a tool to identify, on a reconnaissance level, the economic impacts associated with implementing such policies.

Given basic information about a policy's cost the model calculates not only what the policy will cost (i.e., direct expenditures), but also the number of jobs, and economic activity. To evaluate these impacts, input-output or multiplier analysis is used. Input-output models were originally developed to trace supply linkages in the economy. For example, they show how purchases of equipment not only benefit the equipment manufacturers, but also the fabricated metal industries and others businesses supplying inputs to those manufacturers. Consistent with the spending pattern and specific economic structure, different expenditures support a different level of employment, income, and output. Input-output analysis can be thought of as a method of evaluating and summing the impacts of a series of effects generated by an expenditure (i.e., input). To determine the total effect, three separate impacts are examined for each expenditure. These include: direct effect, indirect effect and induced effect.

The changes in expenditures brought about by investments or expenditures by firms and individuals in complying with regulations are matched with their appropriate multipliers for each industry sector affected by the change in expenditure. The model accounts for both jobs lost directly from the auction tax as well as jobs created by spending the revenues collected, but the result is a net jobs lost due to losses in productivity and increased imports and outsourcing due to higher relative (to competitors) costs.

As with any analysis of this type and scope, assumptions used play an important role in influencing the results. Several important caveats should be noted at this point. First, the intent of the models is to construct a reasonable profile of expenditures (e.g., plant construction and operating costs, permit costs or taxes) and demonstrate the economic impacts that will result. Given future changes in technologies and productivity, costs and potential changes in industry and personal consumption patterns within the economy, the analysis is not intended to provide a precise forecast, but rather an approximate

[11] Ibid. p.47

estimate of overall impacts. Second, the model is considered a static model. As such, it relies on inter-industry relationships and personal consumption patterns existing at the time of the analysis. The analyses does not account for feedback through final demand, of increases or reductions that could result from price changes. Similarly, the model does not account for feedback from inflation, or potential constraints on labor and money supplies. The model does not automatically take into account industry productivity changes that may occur over time either from the policy itself or exogenously.

We do note, however, that several of the specific policies and regulations being implemented via AB 32 act to decrease productivity, and thus, except for jobs impacts, the lost economic activity estimated here can considered conservative. We further note, that jobs and wages do not necessarily move in tandem, and that changes in wage profiles (such as a net increase in low wages offsetting a net loss of high wages) are not included, nor are changes in income level-based expenditure patterns.

We assumed a range of permit clearing prices ($20-200/ton) (selecting $20, $60 and $200), based upon the range of permit prices in the EAAC report. We assumed those prices remain consistent throughout the time period, and ignored likely price volatility.

Significant levels of additional detail would be required before any more specific economic analysis (e.g. sectoral[12]) could be undertaken.

We have estimated the following impacts:

⟶ An annual effective cost increase to the typical family of four to be $818 the first year growing to $2800 in 2020, if market clearing prices for permits are $60 dollars per ton. Those figures are $270 and $930 if permit prices are at $20 and as much as $2720 to over $9330 per family if prices clear at $200 per ton. Costs increase for most goods and services. These cost increases are average for the population, although some residents may be compensated through a partial return of auction revenues.

⟶ Annual job losses to the California Economy of 76,000 to 107,000 the first year growing to perhaps 485,000 jobs in 2020, assuming a market clearing price of $60 per ton. These are net jobs losses, accounting for lost jobs and for jobs created by redirecting revenues collected from the auctions.

⟶ Lost economic activity of nearly 2% of gross state product, or about $250 to 350 billion over ten years. Much of this derives from reductions in productivity across the economy, and negative trade implications due to reduced competitiveness.

[12] While we did not undertake a sectoral analysis, we note that the proposed tax would disproportionately affect energy and materials intensive industry. One primary example of such would be the cement and cement dependent industries, including efforts to rebuild California's infrastructure, including transportation facilities. The cap and – trade with an auction will make building new and maintaining existing infrastructure much more expensive.

Table 6
Summary Findings of Net Impact

Year and Permit Clearing Price	Impact on Family	Jobs Lost
2012 @$60	$818	76,000-107,000
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There is uncertainty about how auction revenues would be re-distributed in the economy. To the extent the revenue is captured in a special fund under the control of CARB, the legislature would have limited state budget authority and flexibility. This is a significant concern given the potentially large amount of revenue (collecting in 8 years, fully 120% of the single year 2009/2010 state budget[13]) to be raised by an auction tax.

Comparison to Similar Studies on Cap and Tax Proposals

The fiscal and economic impacts of S. 2191, the Lieberman-Warner (L/W) Climate Security Act, have been studied by U.S. federal government agencies and independent organizations. The cap-and-trade provisions of that Bill are similar in nature, and consequently impacts, as a cap-and-trade process, except on a national level. As a frame of reference and scale, California contributed 13 percent of the total US gross domestic product in 2008, and had 12% of the population in 2009. Various research reports on the legislation's economic impacts are summarized below. (directly scaled, for order of magnitude comparison only, to a California number are shown parenthetically.)

The U.S. Energy Information Administration (EIA) core analysis of the economic impacts of Lieberman-Warner "assumes, among other things, that key low-emissions technologies – including nuclear and carbon capture and sequestration (CCS) – are developed and deployed in a timeframe consistent with the bill's emissions reduction requirements without encountering any major technical obstacles, even with rapidly growing use on a very large scale.

Even with this assumption, EIA concludes that S. 2191 "increases the cost of using energy, which reduces real economic output, reduces purchasing power, and lowers aggregate demand for goods and services." Specifically, EIA estimates that S. 2191 will

[13] Assuming collection of revenues at auction price of $60/ton would total $143 billion, compared to California state 2009/10 budget total of $119.2 billion, as documented at http://www.osp.dgs.ca.gov/On-Line+Publications/FinalBudgetSummary.htm

result in a $76 – $723 increase in average annual household energy bills (excluding transportation costs) and a $444 billion to $1.3 trillion loss ($57-169 Billion) in gross domestic product by 2030.

EIA also notes that the "potential for and the timing of the development, commercialization, and deployment of low-emissions electricity generating technologies such as nuclear power, coal with CCS, and dispatchable renewable power is a major determinant of the energy and economic impacts of S.2191. The absence of these technologies is estimated to significantly increase compliance costs."

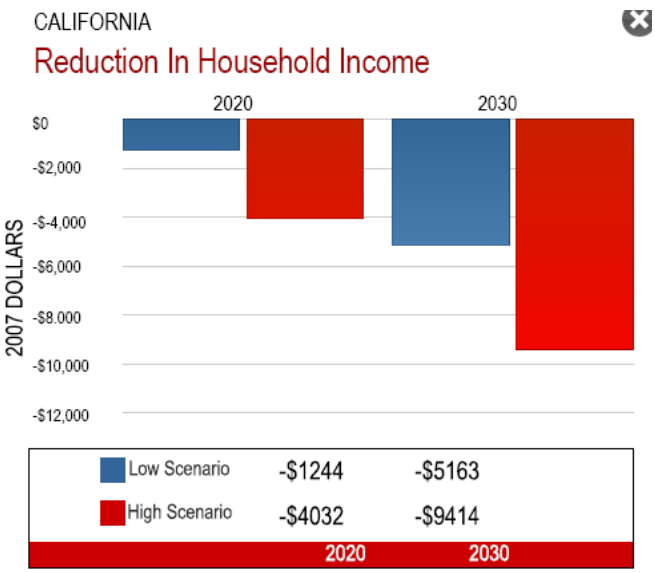
The U.S. Environmental Protection Agency (EPA) analysis of the economic impacts of Lieberman-Warner assumes that carbon capture and storage (CCS) technology is deployable at scale across the entire U.S. electricity sector, and that there is a 150 percent increase in U.S. nuclear power generation by 2050. The EPA analysis also assumes that the U.S. complies with the Kyoto Protocol, which it currently does not. Based on those assumptions, EPA concluded that Warner-Lieberman would result in annual reductions of U.S. gross domestic product (GDP) ranging from $238 billion to $983 billion ($31-128 billion) in 2030, and from roughly $1 trillion to more than $2.8 trillion ($130-364 billion) in 2050. Gasoline prices would increase by $0.53 per gallon in 2030 to $1.40 per gallon in 2050; and electricity prices are projected to increase 44 percent in 2030 and 26 percent in 2050.

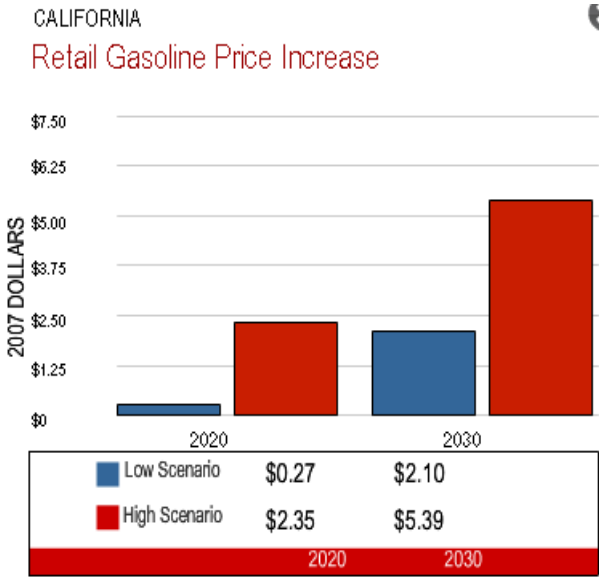
According to the non-partisan Congressional Budget Office (CBO), the Lieberman-Warner Climate Security Act will cost American taxpayers $1.21 trillion ($156 billion) during the 2009 – 2018 period and impose mandates on the private sector that would exceed $90 billion per year during the 2012-2016 period. CBO states that while covered facilities would be responsible for these initial costs, the bulk would be passed onto consumers in the form of higher prices for energy and energy-intensive goods and services.

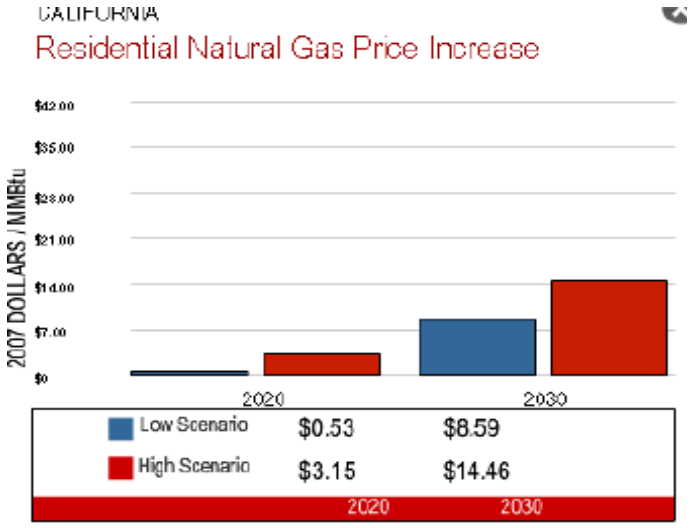
The CRA International study estimated the overall cost of the bill to the average household will exceed $2,300 annually in 2015, which approximates the amount households now spend annually on healthcare. The economy will suffer from large year-over-year losses in GDP through 2050 because of the high costs of compliance in the early years and the limited availability of zero carbon technologies throughout the economy in the later years when caps require near-zero emissions. By 2050, GDP losses accumulate to $5.3 trillion (present value 2007$) ($689 billion).

The ACCF/NAM study, conducted by the Science Applications International Corporation (SAIC), projects a 60 percent to 144 percent increase in the cost of gasoline and a 77 percent to 129% increase in the price of electricity, a loss of 3 to 4 million jobs, and a $4,022 to $6,752 loss in disposable income per household by 2030. The analysis states that the impacts of Lieberman-Warner will be felt especially by the poor, who spend more of their income on energy and other goods than other income brackets. By 2020, higher energy prices mean that low income families (with average incomes less than $18,500) will spend between 19% and 22% of their income on energy under L/W

compared to a projected 17% without L/W. Others on fixed incomes, such as the elderly will also suffer disproportionately. This analysis also includes a breakdown of S. 2191's impacts on the 50 states. California specific impacts are shown in the following series of graphs.







The Heritage Foundation's analysis of Lieberman-Warner assumes that all of the problems meeting currently enacted legislation are overcome, and that carbon capture and sequestration (CCS) technologies will be viable for full-scale commercial use in 10 years. Based on these assumptions, the Foundation projects that S. 2191 will result in $1.7 trillion to $4.8 trillion ($221-624 billion) in losses to gross domestic product (GDP) by 2030, annual job losses ranging from 500,000 to 1,000,000, and an increase of $467

per household each year for natural gas and electricity. The Heritage Foundation also conducted an analysis of the economic impacts of S. 2191 on each the 50 states.

The Massachusetts Institute of Technology (MIT) Joint Program on the Science and Policy of Global Change examined several Congressional proposals to limit carbon emissions using their Emissions Prediction and Policy Analysis (EPPA) model. For S.2191, MIT found that, by 2020, S.2191 will lower expected GDP by nearly 1% (range of estimates is -.69% – -.78) or by between $136 billion and $154 billion ($18-20 billion). They also found that cap-and-trade proposals "imply large-scale changes in the U.S. energy system. For example, even with strong growth in wind, solar and other renewable sources the required removal of CO_2 emissions from the electric sector would require on the order of 500 new no- or low-carbon power plants to be built by 2050. If all of these were nuclear power plants that would be a six-fold increase from the 100 now in place."

To the extent that California acts alone in cap-and-trade auctions, or with limited other-state participation, these impacts can be expected to increase, i.e. worsen, as economic activity moves to other states not imposing the tax.

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