The Brattle Group

The Economic Impact of AB 32 on Small Businesses: An Update

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In 2006, California passed into law Assembly Bill 32 (AB 32), the Global Warming Solutions Act, which requires the state to reduce its global warming pollution approximately 12 percent below current levels by 2020. The California Air Resources Board (CARB) is designing a mix of policies to reach this target.

Neither AB 32 nor CARB will directly regulate or impose fees or taxes on any small business. The proposed policies for reaching the 2020 emissions target include:

- Renewable energy standards
- A requirement to lower global warming emissions from transportation fuels
- Stricter efficiency standards for buildings, appliances, and vehicles
- A carbon cap and pricing program that would limit emissions from the state's largest global warming pollution sources

In the December 2009 report *The Economic Impact of AB 32 on California Small Businesses*,* *The Brattle Group* found that potential changes in energy prices caused by AB 32 would have only a minor impact on California's small businesses, most of which are not energy-intensive—including those accounting for the most employment. On average, these 700,000+ small businesses currently spend only 1.4 percent of their revenues on energy. A detailed case study of an actual energy-intensive business, Santa Monica's Border Grill restaurant, found that the restaurant could compensate for the estimated increase in energy costs related to AB 32 by adding just three cents to an average $20 check in 2020.

Introducing Mercado International 2000

Mercado International 2000 is a mid-sized supermarket and tortilla production facility located in the greater San Diego area. The store is well established in its location, having been family-owned and operated since 1995, and sells ready-made Mexican food from a menu, along with groceries, tortillas, bakery items, and specialty products from Central America. Its owner, Gerardo Herrera, is a second-generation grocery store owner. Mercado meets the Small Business Administration (SBA) definition of a small business in terms of both size and sales: it employs 30 people and its annual revenues are below the SBA's $7 million threshold.

Food and beverage stores like Mercado employ 111,002 Californians, comprising about 1.5 percent of the state's total employment. These stores spend roughly 2.1 percent of their revenue on energy, compared with less than 1.4 percent for all California small businesses on average. We selected Mercado, a small business with above-average energy intensity in a highly competitive industry, to ensure our study would provide a conservative estimate of AB 32's potential economic effects.

New Study Findings

This update to our 2009 report incorporates newly available energy market data and a new small-business case study, which operates in a different economic sector and geographic area than the Border Grill. We deliberately chose the Mercado International 2000 grocery store in Chula Vista because of its higher-than-average energy intensity (see the text box below). And, to ensure a conservative estimate (or even overestimate) of AB 32's economic effect, we used price and cost inputs that, while plausible, reflect a relatively expensive and pessimistic set of outcomes.

We found that AB 32 will not significantly impact Mercado, despite the fact that grocery stores are a highly competitive sector. Even using pessimistic assumptions about energy price increases, the entire impact of AB 32 on the grocery store can be completely offset by retail price increases of, at most, 0.1 percent—so small as to be virtually unnoticeable to customers.

Crunching the Numbers

In making financial projections for Mercado, we used the business's financial records from 2007 to 2010 and publicly available data on energy prices and other relevant factors. We assumed that Mercado would invest in three cost-effective efficiency upgrades financed through zero-percent-interest loans or "on-bill financing" through the store's electric utility (with no up-front cost to the owner). All these upgrades would pay for themselves in less than five years (see the text box at left). The upgrades would cover:

- General lighting
- Cooler and freezer lighting, fans, and monitoring equipment
- Refrigeration (including three walk-in coolers, a walk-in freezer, and three 40-foot glass-front display cases)
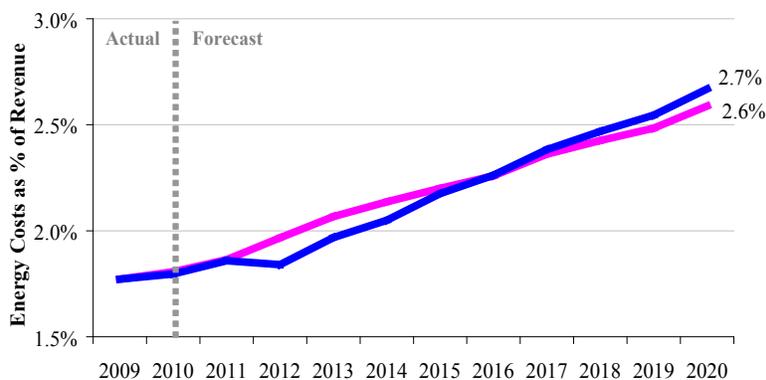
Mercado International's energy costs as a share of the store's revenue over time. The pink line shows energy cost without AB 32. The blue line shows costs with AB 32.

Next, we projected changes in energy costs resulting from AB 32 policies compared with business-as-usual (BAU) energy costs. Relative to BAU, we project AB 32 will increase electricity costs 2.46 cents per kilowatt-hour (12 percent) and natural gas costs 21 cents per therm (15 percent) by 2020. Gasoline costs are projected to increase 37 cents per gallon (9 percent) by 2020.

Finally, we assumed Mercado would pass these cost increases on to its customers via price increases.

Results

As stated above, we found that Mercado could completely offset the cost impact of AB 32 with a minor price increase. For example, Mercado currently sells a pound of tortillas (roughly 20) for 59 cents; customers who buy a pound each week therefore spend roughly $30 per year. Under AB 32, Mercado's customers would only have to spend an additional 3 cents per year. This increase pales in comparison to the effect of inflation over 10 years: a typical increase of 2 percent per year would add $6.57 to the average $30 bill.

The small price increase we project under AB 32, if perceptible at all, is very unlikely to lower Mercado's sales or adversely affect its customers, especially since its competitors will likely be affected by AB 32 in the same manner (and have to increase their own prices). This result is consistent with the case study in our 2009 report, which also showed that price increases required to offset the estimated cost of AB 32 are likely to be imperceptible or, more conservatively, rather small.

* This report is available online at *www.brattle.com/ Brattle_Economic_Impact_of_AB_32_Report*
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Energy Efficiency Measures—and How to Pay for Them

Like most store owners, Gerardo Herrera (right) is fully aware of the costs of his energy use, but uncertain about what efficiency measures are available and cost-effective, and what kinds of financing programs are available to implement them. Cash flow is a key barrier for most businesses, so financing offered at zero percent can mean the difference between a small business taking no action or investing in more-efficient equipment by using the energy cost savings to pay the monthly loan charges.

For this analysis, we assumed that Mr. Herrera would take advantage of "on-bill financing" (OBF) provided by his electric utility, SDG&E. OBF is a utility-based method of providing seamless, zero-percent-interest financing through the monthly power bill for business or government energy efficiency improvements. All the publicly owned utilities in California now offer OBF.

We also assumed that Mr. Herrera would take advantage of incentives and rebates offered by SDG&E for more-efficient lights and refrigeration units. Many utilities throughout the state offer similar incentives.

One of the most interesting efficiency measures Mr. Herrera could adopt creates savings through cooler- and freezer-door heater controls, evaporative fan speed controls and electronic fan motors, and an Internet-based real-time monitoring and control system called Remote Site Manager. This system allows coolers and freezers to be viewed via an Internet "dashboard" showing operating characteristics such as temperatures and run times of various refrigeration components. Alarms can be set that alert the user via cell phone when temperatures rise above a certain level.

With a 16,000-square-foot flat-roof surface, Mercado is in prime position to take advantage of rooftop solar photovoltaic (PV) panels. We did not include solar PV in this study, however, as Property Assessed Clean Energy (PACE) loans, net metering, and other policies that could assist with funding have yet to be finalized. Mercado may be a candidate for both renewable energy and other energy efficiency improvements once federal stimulus funds enable these programs to be developed in the San Diego area.

—Hank Ryan
Executive Director, Small Business California

INTRODUCTION

In December 2009, we released a report titled *The Economic Impact of AB 32 on California Small Businesses*. That report estimated a conservative range of the potential economic impacts on California small businesses from increased energy prices which may be caused by various measures under Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006. AB 32 established California's 2020 greenhouse gas emissions reduction target, requiring the state's emissions to return to 1990 levels by 2020, a reduction of approximately 12.5% from current levels and 40% from business-as-usual in 2020.

The report presented both a "conservative" and an "extreme" set of outcomes based on our energy price forecasts and the statistical distribution of California's small businesses and small business employment. The Conservative case was developed to illustrate a realistic albeit conservative (i.e., overestimated) potential AB 32 impact. The Extreme case was developed to illustrate an unrealistic outcome of AB 32 based on assumptions at the very limit of credibility or beyond. Since, as our original report showed, most of California's small businesses, and those accounting for the most employment, are not energy intensive, even sizeable changes in forecasted energy prices have only very minor impacts on small businesses. We confirmed this result by conducting a detailed case study of a particular small business, a Santa Monica restaurant called the Border Grill. We found that the Border Grill could compensate for the estimated increased costs of AB 32 by adding just 7 cents to an average $50 check.

This update to our original report incorporates newly-available energy market data and a new small business case study, but the overall result is unchanged: AB 32 will have little impact on California's small businesses. Since small businesses will not be directly regulated under AB 32, the primary impact of AB 32 on small business will be through potentially increasing energy expenditure. However, our original conclusions remain unchanged because, even with our updated assumptions: (1) energy expenditures are a relatively small percentage of overall business expenses, (2) most small businesses will be able to pass-through the increased energy cost, and (3) the energy cost increases we estimate are very small relative to typical price fluctuations small businesses already face.

Energy expenditures account for 7% of total income for California state-wide, and they account for less than 1.4% of total revenue for the average California small business.[1] It is important to note that even under business as usual (BAU)[2] without AB 32, energy prices are expected to increase between 2010 and 2020. BAU prices for electricity, transportation fuel, and natural gas are expected to increase by 43%, 58%, and 71%, respectively. With AB32, in our Conservative case, those energy costs increase by just an additional 0.1% of revenues for the specific business we analyze.[3] This additional cost can very likely be passed-through in most cases through price increases so small that they would likely not be noticed at all. Any such energy cost and associated price increases due to

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[1] In 2008, California's total energy expenditures were $136.5 billion, or 7.4% of the state's $1.85 trillion gross domestic product for the same year. (Source: EIA State Energy Data System and the Bureau of Economic Analysis GDP–by–State Statistics.) The small business statistics are discussed in Section III of our original report.

[2] BAU figures are based on the 2009 Integrated Energy Policy Report (IEPR) and hence do already take into account, at least to the extent reflected in the 2009 IEPR, the impact of the recent economic downturn.

[3] Even in our Extreme case, energy costs would increase by just 0.55% of revenues.

AB 32 will be well within the current range of cost variation due to changes already experienced, for example, in the prices of oil, natural gas, and transportation fuel.

In this updated report, we start by describing the changes we made to our Conservative and Extreme cases, based on the significant amount of additional modeling and policy discussion of AB 32's potential impact on energy costs since our original report. Then we explain why it is appropriate to focus on energy costs, rather than all costs. Finally, we apply the results of each scenario to the case study of a food and beverage market in the San Diego area, Mercado International 2000 located in Chula Vista. We conclude by summarizing the results of our analysis and case study, which confirms our original findings that even under extreme assumptions, AB 32 is likely to have a minimal economic impact on California's small businesses. Notably, we have not considered the fact that the BAU (*i.e.,* not lowering greenhouse gases in California over the next decade and beyond), may result in long-term consequences, for example at least in part due to climate change, that are more severe than under implementation of AB 32. If this occurs, then the costs to California under BAU may turn out to be higher than the cost of California of undertaking AB 32.

I. ENERGY COST INPUTS

In our 2009 report, we developed assumptions for potential changes in the cost to California's small businesses of electricity, natural gas, and transportation fuel as a result of: (1) AB 32's cap and trade program, (2) the 33% Renewable Energy Standard (RES) including the complementary energy efficiency (EE) measures, and (3) the Low-Carbon Fuel Standard (LCFS). We used the trajectory of energy costs under BAU and under our revised assumptions for the Conservative and Extreme cases to calculate the impact of AB 32 on a second small business that would result from these assumptions. In this section, we describe the changes we made to our modeling inputs for each of these three policies, based on new publicly-available information since our original report.

A. Cap and Trade

In our 2009 report, we assumed no CO_2 allowance prices under BAU, allowance prices reaching $42/ton (nominal) by 2020 in the Conservative case, and $60/ton in the Extreme case.[4] Since then, a number of additional estimates of 2020 allowance prices under AB 32 have been published. In its own "Updated Economic Analysis of AB 32 Scoping Plan", the California Air Resources Board (ARB) develops five scenarios, each with different assumptions about the mix of measures used to satisfy the overall 2020 emissions reduction target under AB 32. The cases, ARB-1 through ARB-5, result in estimated 2020 allowance prices of $21/ton to $102/ton ($2007) in ARB-1 and ARB-5, respectively.[5] We assume implementation of the 33% RES, and we estimate the RES impact separately. Therefore, two ARB cases (ARB-4 and ARB-5, which assume no RES) are not used in our analysis, since including them would effectively double-count the cost of achieving emissions reductions. The allowance prices under the remaining three ARB cases range from $25/ton to

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[4]   This allowance price is not a measure of the costs of the cap-and-trade program. It is simply the cost of the last (marginal) ton of CO_2 reduced. As we discuss later, the resulting revenues are a transfer payment in the economy and will be recycled, not lost to the economy.

[5]   Prices stated in $2007. Updated Economic Analysis of California's Climate Change Scoping Plan, March 24, 2010, Table 23, p. 51. Table 12, p. 35, describes the five cases. ARB-1 and ARB-2 assume all complementary measures achieve their full potential and differ only in the inclusion of offsets. Scenarios ARB-3 through ARB-5 assume complementary measures only partially achieve their intended emissions reductions.

$148/ton in ARB-1 and ARB-3, respectively. A recent report by Charles River Associates (CRA) prepared alternative allowance price estimates. For two scenarios CRA deems comparable to ARB scenarios, it assumes 2020 carbon prices of $53/ton (ARB-1) and $83/ton (ARB-5).[6] Again, we exclude from our analysis CRA's ARB-5 equivalent case since ARB-5 does not include any impact of the RES.

Collectively, these allowance price projections suggest possible allowance prices between $25/ton and $148/ton in 2020 under assumptions comparable to our modeling inputs (i.e. assuming a 33% RES is in place and helps lower carbon emissions). Even ARB-3, which results in the highest projected carbon price, makes some assumptions that would increase prices above those consistent with our inputs. In particular, it assumes only half of the LCFS will be met. Since we model the full impact of the LCFS, including both the full price impact of ARB-3 through a high carbon price, the direct price impact of the LCFS would essentially double-count some of the costs associated with meeting the objectives of AB 32.

Perhaps more importantly, the ARB modeling so far has not considered whether any ultimate cap and trade program design might seek to limit price movements on both the upside and the downside. A recent ARB workshop focused on cost containment.[7] While no specific price floor or price ceiling has been discussed,[8] allowance prices above $100 by 2020 appear to be politically infeasible. In light of these considerations, we maintained our original assumption about the allowance price path in the Conservative case, i.e. an allowance price that starts at $10 in 2012 and increases to $42.46 in 2020 (in nominal terms). For the Extreme case, we assumed the same $10 starting price, but assumed that allowance prices would reach a potential price cap of $100/ton in nominal terms by 2020.[9]

Allowance Allocation

Allowances will represent a significant value. For the electric sector alone, 2020 CO_2 emissions between 65 and 75 million tons (these estimates represent the Low Net Short and High Net Short cases of E3's RES calculator)[10] at an allowance price of $42.46, the value of allowances range from roughly $2.8 billion per year to almost $7.5 billion per year. Even though the value of allowances does not represent the cost of lowering greenhouse gas emissions under AB 32, but rather represents transfer payments, how allowance value is allocated can have a significant impact on energy costs. If allowances are allocated for free to emitters, allowance value can be used to either invest in energy

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[6]   CRA, "Analysis of the California ARB's Scoping Plan and Related Policy Insights" (March 24, 2010), p. 21.

[7]   http://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm#archive (June 2010)

[8]   See ARB, "Cost Containment Options in a California Cap-and-Trade Program", Public Meeting, June 22, 2010, which discusses the general approach of using a price collar, but does not discuss specific values for either a price floor or a price ceiling. We assume that allowance prices will start at $10/allowance in 2013 in both the Conservative and Extreme case. This assumption is equivalent to a $10 price floor. However, since our results focus on 2020, the assumption of a price floor has no impact on our results.

[9]   We ignore entirely the impact that a price ceiling might have on reaching the overall emissions reduction targets. Any such impact will depend on the details of ultimate cap and trade program design, which are unknown at the time of writing of this report.

[10]   E3_(Energy and Environmental Economics, www.ethree.com) is a consulting firm advising, among others, the California Public Utilities Commission on issues related to the RES. In this paper, we use a model developed by E3 to assess the impact of the 33% RES on rates, dated May 20, 2010, downloaded from http://www.arb.ca.gov/research/econprog/econmodels/econmodels.htm

efficiency or other emissions reducing measures, used to offset energy rates, or refunded to rate payers directly. If, on the other hand, allowances are auctioned, the resulting revenues can be used for direct refunds to tax payers, to offset other taxes, or to finance desirable programs (energy efficiency for example).

With respect to allowance allocation, discussions are ongoing about the extent to which allowances should be auctioned and/or allocated. The final recommendation of the Economic and Allocation Advisory Committee (EAAC) is 100% auction for all but a small number of trade-sensitive industries and no refunding of allowance value through electric or gas utilities which, the EAAC argues, would dilute desired price signals. Instead, the EAAC recommends returning approximately 75% of allowance value to taxpayers through a dividend or tax cut, and using the remaining 25% of the value for investment to further the objectives of AB 32.[11]

However, more recent ARB material suggests the majority of allowances are likely to be allocated to compliance entities, at least in the early years of the cap and trade program. It also appears likely that, to preserve the intended carbon price signal, the allocation process will not refund ratepayers in the form of lower (or less increased) rates.[12] A possible exception may be the use of allowance value to offset the impact of the 33% RES, which could implicitly embody a carbon price in excess of the likely allowance price under the cap and trade program.

The ARB is considering using some allowance value to reduce the difference in direct and implicit carbon prices.[13] In our Extreme case, we have not assumed that allowance value will be used to lower the RES rate impact, *i.e.* that rates will increase by the full amount of allowance costs as if allowances were fully auctioned. However, in our Conservative case, we assume that allowance value will be used to partially offset the "out of market" carbon price of the RES.[14] But rather than applying this adjustment to the carbon allowance price, we lower the cost of the RES by the percentage implied by this use of allowance value, equal to a little more than 60% of the cost of the RES estimated below.

B. 33% RES with EE

As of the writing of this report, the California State Legislature has not enacted a proposed 33% Renewable Energy Standard under Senate Bill 722. As a result, it is unclear to what extent the current governor's objective to increase the California renewable generation target from 20% by 2020 to 33% by 2020 will ultimately be met. In line with our overall approach to estimate the broad impact of AB 32 on a "conservative" (i.e. high) basis, we therefore decided to nonetheless include in

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[11] Allocating Emissions Allowances Under a California Cap-and-Trade Program; Recommendations to the California Air Resources Board and California Environmental Protection Agency from the Economic and Allocation Advisory Committee (March 2010), pp. 63ff. While the EAAC concedes the use of some funds to support efficiency investment by small businesses may be merited (pp. 66-67), we do not explicitly quantify this potential impact.

[12] There are several other ways in which allowance value could be used if allowances are distributed for free to utilities. For example, the value could fund energy efficiency measures or be refunded through non-variable portions of bills.

[13] See for example Sam Wade, "Current Staff Thinking on Allowance Allocation", presentation at the Public Workshop *Greenhouse Gas Cap-and-Trade Regulation Status Update*, CARB, May 17, 2000, pages 33-34.

[14] Concretely, we assume that allowance value will be used to offset half the out of market cost.

our analysis the assumption that California's electricity mix will be changed in a way that by 2020 33% of total electricity will be generated from renewable sources.[15]

We used the information contained in the updated analysis of the 33% RES prepared by E3 for the California Public Utilities Commission (CPUC). Its 33% case assumes average retail electricity rates in 2020 will be 17 cents/kWh, as opposed to 16 cents/kWh under the 20% RES reference case. E3's RES calculator models three different scenarios (low, mid, and high) with differing assumptions about how much additional demand reduction may be achieved with various complementary EE measures beyond those already embedded in the 2009 IEPR base case. Table 1 summarizes the assumptions made for the three scenarios in E3's RES Calculator.

Table 1: Assumptions in E3's RES Calculator

		High Net Short	Mid Net Short
2008 Average Retail Price	*2008 ¢/kWh*	13.3	13.3
2020 Average Retail Price (BAU)	*2008 ¢/kWh*	15.3	15.6
2020 Average Retail Price (33% RES)	*2008 ¢/kWh*	16.2	16.5
Impact of 33% RES	*2008 ¢/kWh*	**0.9**	**0.9**
2020 Average Retail Price (BAU)	*nominal ¢/kWh*	20.6	21.0
2020 Average Retail Price (33% RES)	*nominal ¢/kWh*	21.8	22.2
Increase 2008-2020 under BAU	*nominal ¢/kWh*	**7.3**	**7.7**
		55%	*58%*
Additional Impact of 33% RES	*nominal ¢/kWh*	**1.2**	**1.2**
		9%	*9%*
Incremental Investments in EE & DR	*$2008 MM*	$64.62	$523.12
Incremental Cost of CHP Feed-in Tariff	*$2008 MM*	$0.00	$653.75
Total Additional Investments	*$2008 MM*	$64.62	$1,176.88
Total 2020 Net Energy to Load	*GWh*	326,882	307,190
Total 2020 Retail Sales	*GWh*	287,828	269,626
Total Sector CO2 Emissions	*MM metric tons*	74.80	70.17

Source: E3_RES_Calculator_Final.zip

Several interesting observations emerge from the E3 analysis. Between 2008 and 2020, average retail rates are expected to increase significantly even in the absence of a 33% RES. In nominal terms, E3 expects average rates to increase from 13.3 cents in 2008 to between 20.6 cents/kWh and 21.8 cents/kWh by 2020 (in nominal terms assuming 2.5% inflation), i.e. an increase of 55% to 64%. E3 assumes that all three scenarios analyzed result in an additional average rate increase of 1.21 cents/kWh, or an additional increase of 9% relative to 2008 rates. In other words, BAU rate increases are likely to be six to seven times higher than the incremental impact of the 33% RES.

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[15] We did not alter the assumptions about the use of RECs made in the E3 RES calculator we used as a basis for developing our RES cost assumptions.

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E3 estimates the rate impact of the 33% RES to be very similar under all three scenarios it examines. Because we deliberately develop a Conservative and an Extreme case, we assume a more severe impact under our Extreme case with respect to the rate impact of the 33% RES. Finally, while we assume that additional EE expenditures have the effect of increasing rates relative to BAU for the purposes of our case study, it is important to note that this does not imply that EE expenditures only have a cost. Rather, in the lower total demand in cases with higher EE expenditures suggest that total energy expenditures may well be lower, even after including the cost of EE measures, as additional EE programs are implemented. For example, in E3's scenarios, total energy expenditures are lower in the Low Net Short case than in the Medium Net Short or High Net Short cases, even after subtracting the full amount of additional EE expenditures. The E3 results in Table 1 imply that each dollar spent on incremental EE lowers energy costs by approximately four dollars.[16]

Given these observations and since the actual amount of load reduction resulting from additional EE expenditure remains uncertain, we used the following input assumptions for load growth, EE and RES impacts on electricity rates:

Conservative Case

For our Conservative case, we used the assumptions of the Mid Net Short scenario, that an additional $654 million will be spent for combined heat and power (CHP) subsidies and $523 million for EE and DR measures,[17] and that final energy to meet load of 307,190 GWh will result in 269,626 GWh of retail sales, over which the EE project expenditure must be spread.[18] While the additional EE expenditures result in additional rate increases, the rate increase by itself is not a measure of the benefit or cost of this expenditure. Even though the RES Calculator assumes EE expenditures (including CHP expenditures) under each case will occur in both the BAU and the 33% RES case, we assume these costs are incremental to be conservative in our estimates.[19] Therefore, in the Conservative case, we forecast a total of $1,177 million will be spent on EE including CHP and will need to be spread over 269,626 GWh of retail sales, for an average additional EE related cost of 0.59 cents/kWh by 2020.

Extreme Case

For our Extreme case, we assume that additional EE efforts will cost more than in the Conservative case. This could occur because the incentive payments needed to achieve target penetration rates of certain energy efficiency measures are higher than assumed. We therefore assume the same

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[16] The incremental investment in EE in the Medium Net Short case ($523 million in $2008) is $703 million in nominal dollars. The total energy bill (retail sales times average retail price) divided by $703 million equals $4.09 in energy cost savings from EE investment.

[17] It is possible, given the ARB's statements about potential uses of GHG allowance value, that some of the EE costs could be financed with some of the GHG allowance value. To be conservative, we have not assumed any reductions in the cost of EE expenditures due to such a use.

[18] In the Mid-Net-Short scenario, the 1.177 billion ($2008) in additional EE and CHP costs result in total retail sales that are approximately $2.88 billion (in $2008) lower than in the High-Net-Short scenario, suggesting that in the aggregate CA energy bills decline in response to the additional EE and CHP measures.

[19] BAU for us is without AB32; for E3 it is just without 33% RES.

reductions in total energy use as in our Conservative case, but that the cost of achieving those gains is 50% higher, *i.e.* that EE and DR expenditures would be $784.7 million, equal to 150% of the $523.1 million assumed in our Conservative case. Since expenditures on CHP, which are assumed to be in the form of a feed-in tariff, will only materialize if CHP plants actually export power to the grid, we assume that the same CHP expenditures as in the conservative case would be made, i.e. $654 million, i.e. it is unreasonable to model a scenario of additional CHP subsidies without corresponding increases in CHP generation. We therefore assume final energy to meet load of 307,190 GWh would be needed to meet 269,626 GWh of retail sales (the difference being transmission and distribution losses), over which the costs of the additional EE measures must be spread. As in our conservative case and unlike the E3 calculator, we attribute the entire additional cost to AB 32. Spreading the resulting total of $1,438.4 million[20] over total retail sales of 269,626 GWh results in an additional cost of 0.72 cents/kWh by 2020 (in nominal terms), due to EE and CHP.

The CHP support is assumed to be in the form of a feed-in tariff. We are aware of the fact that FERC has recently challenged California's ability to offer feed-in tariffs.[21] However, since no ultimate decision has been made as to how CHP will be supported, we maintain the assumption that CHP support will take the form of feed-in tariffs.

C. Low-Carbon Fuel Standard

In our original report, we used Brazilian sugar cane ethanol, the most expensive alternative considered by the ARB, to proxy for low-carbon fuel. We priced that fuel at cost as long as it costs more than gasoline or, alternatively, is equal to the price of gasoline on a per gallon of gasoline equivalent basis (Conservative case) or on a straight per gallon basis (Extreme case).

For this report, we considered CRA's assumptions for calculating the cost of low-carbon fuels relative to conventional fuels,[22] but ultimately concluded that the CRA analysis does not provide a credible basis for modifying our original approach for developing assumptions about the impact of the LCFS on transportation fuel prices. CRA's presentation does not provide sufficient detail to assess the reasonableness of the estimated differences. For example, CRA assumes the same cost of low-carbon fuels assumed by the ARB (as do we), but the cost differences it reports do not directly reflect the ARB costs. Rather, CRA appears to assume that the cost ratio of low-carbon fuels to conventional fuels over time is driven only by changes in the cost of low-carbon fuel production. This ignores the fact that cost-based pricing of low-carbon fuels in the context of rising prices for conventional fuels would lower the ratio of prices of low-carbon to regular fuels over time.

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[20]   The $1,438.4 million are utility costs since the RES Calculator calculates revenue requirements. These costs are very close to ratepayer direct costs in the Calculator. They are the sum of 150% of the energy and incremental demand response expenditures ($784.7 million) and the CHP feed-in cost assumption ($653.8 million) of the "mid-net-short" scenario in the Final RES calculator developed by E3.

[21]   See for example the discussion of the FERC ruling in http://natlawreview.com/article/states-to-re-evaluate-feed-tariffs-after-recent-ferc-ruling and FERC's fact sheet on the issue (http://www.ferc.gov/industries/electric/indus-act/rto/caiso/07-15-10-fact-sheet.pdf)

[22]   CRA, "Analysis of the California ARB's Scoping Plan and Related Policy Insights" (March 24, 2010) identifies two scenarios (CRA8c and CRA10), which account for the likely higher costs of low-carbon fuels (pp. 12-13), but it does not describe how the scenarios were developed.

Therefore, in this report, we maintain the approach for developing transportation fuel price forecasts developed in our original report, but updated our gasoline price forecast to the forecast used in the 2010 Annual Energy Outlook. In short, we assumed that the most-expensive currently available low carbon fuel alternative would set the price of low carbon fuel. We assumed, using the ARB's analysis, that Brazilian sugar cane ethanol will be this fuel. For the Conservative case, we assumed that low carbon fuel would be priced at the higher of cost and the price of gasoline on a $/gge basis. For the Extreme case we assumed that low carbon fuel would be priced at the higher of cost and the price of gasoline on a $/gallon basis.

D. Our Resulting Inputs

Table 2 summarizes the resulting updated inputs we used to estimate the impact of AB 32 on electricity, natural gas, and transportation fuel prices in the case study we present below.

Table 2: AB 32 2020 Impacts Relative to BAU (nominal dollars)

Commodity		Policy	Energy Price Increase from AB32 relative to BAU				Weight*
			Conservative Case		Extreme Case		
			$	%	$	%	
Electricity	$/kWh	RES	$ 0.0076	4%	$ 0.0242	12%	
	$/kWh	Cap and Trade	$ 0.0111	5%	$ 0.0260	13%	
	$/kWh	Energy Efficiency&CHP	$ 0.0059	3%	$ 0.0072	3%	
		Total	**$ 0.0246**	**12%**	**$ 0.0574**	**28%**	*26%*
Natural Gas	$/therm	Cap and Trade	**$ 0.2123**	**15%**	**$ 0.5000**	**34%**	*24%*
Transport Fuel	$/gallon	Cap and Trade	$ 0.3741	9%	$ 0.8810	22%	
	$/gallon	LCFS	$ -	0%	$ 0.8467	21%	
		Total	**$ 0.3741**	**9%**	**$ 1.7277**	**42%**	*51%*
		Overall (weighted)		**11%**		**37%**	*100%*

* Weights based on relative energy expenditures per EIA State Energy Data System (6/30/10).

II. NON-ENERGY COSTS

In this section, we briefly discuss how much of the AB 32's potential impact is captured by an analysis limited to increased energy costs, rather than also considering possible increases in non-energy costs which may result as higher energy costs are passed through in the form of higher prices more broadly.

Indeed, AB 32 will have secondary economic effects beyond energy prices alone. Virtually all sectors of the economy use energy and hence will be affected to some degree by potential increases in energy costs. In our original report, we explained why most California small businesses will be able to offset this higher cost largely or fully by passing through some or substantially all of it in the prices they charge their customers. However, that also means at least some of the higher energy costs resulting from AB 32 may result in higher input prices for all businesses, not just higher *energy* prices and not just for *small* businesses. While we acknowledge this secondary effect, we emphasize that it is unlikely to be material. Instead, the direct impacts we estimate here capture the majority of AB 32's potential impact.

Just like the universe of small businesses we profiled in our original report, most California businesses are not very energy intensive. Our original report showed that only a few sectors in California are energy intensive (*i.e.,* have high energy costs relative to revenue). For most sectors, energy costs represent less than 10% of revenue. The few exceptions include agriculture and transportation-related businesses, such as air transport and trucking. For example, energy costs are 12% of revenue in the agricultural sector. Assume, for the sake of argument, that energy costs for a supplier to a small business are 10% of total cost and that by 2020, as a result of AB 32, those costs increase by 20% (which is significantly above our estimate).

To fully compensate for such an increase in energy cost, the supplier would have to increase prices by 2% (20% times 10%) over the next ten years. So the average annual increase would be just one-tenth of that increase, or 0.2%. This annual increase in costs is very small when compared to other factors assumed to affect costs, such as overall inflation, which averages about 2.5% per year. Hence, the price increases that might result from suppliers even in the most energy intensive sectors would be a small fraction of the types of cost increases businesses already internalize on a routine basis. Of course, this assumes the energy cost increases can be passed through in full, whereas the ability to do so actually may be limited in some cases.

It also is important to note that some of the higher energy costs reflect the purchases of greenhouse gas allowances. The value of allowances is significantly higher than the actual costs of reducing greenhouse gases and substantial amounts of this allowance value will ultimately flow back to consumers, in the form of lower expenditures for energy efficiency measures, lower energy rates, reductions in other taxes, direct refunds, etc. Hence, at least some of the costs that would need to be passed on are recovered by consumers as the allowance value flows back to consumers.

Likewise, a typical small business will have many inputs, only some of which are even moderately energy intensive and even fewer, on average, are very energy intensive. Consequently, averaged over all inputs, any potential impact of non-energy price increases are likely to be small. Therefore, our analysis of the impact of AB 32 on small businesses through increased energy costs alone captures the essence of the likely total impact.

V. A NEW CASE STUDY: MERCADO INTERNATIONAL 2000

In this section, we illustrate how AB 32 might affect energy-related costs, energy use, and the resulting performance of an actual small business in California under the Conservative case and Extreme case described above.

A. Selecting a Small Business

For this case study, we deliberately selected a small business from a sector with above-average energy intensity, from a different sector than our original case study (the restaurant sector). These selection criteria make the case study both conservative and relevant. It conservatively estimates AB 32's cost impact on most small businesses (i.e., it overstates the cost impact) because the target business, by virtue of having above-average energy intensity, will be more affected by energy-related price increases than will the average California small business.

The case study focuses on a small business in the sector called Food and Beverage Stores, which is a sector with notoriously thin margins and therefore might be particularly at risk from any increases in energy costs under AB 32. Figure 17 of our original report lists all of the small business categories in California with energy intensities of approximately 1.5% (just above the statewide average) to 3% (twice the average). Food and Beverage Stores is on the list, with average energy-related costs at 2.1% of revenue.

Within this sector, we identified and selected a mid-sized supermarket and tortilla production facility located in the greater San Diego area, Mercado International 2000 (Mercado) in Chula Vista. Mercado is an authentic Mexican food and beverage store. It sells meat, produce, and other products to prepare Mexican food, as well as serving Mexican food from a menu of prepared foods. Mercado is very well-established in its location, having been family owned and operated for two generations and over fifty years. It meets the SBA definition of a small business on both the size and sales dimensions: it employs approximately 30 people and its annual revenues are below $7 million.

Mercado provided us with detailed proprietary data on its building, equipment and lighting, energy use and cost, and financial performance. Below, we report the changes which result from applying the energy costs from our Conservative and Extreme cases relative to a BAU baseline case for the business. We first developed a simple cash flow model to project Mercado's revenues and expenses through 2020 under BAU conditions. Specifically, we projected Mercado's expected future cash flows, which we calculated for each year as total revenue less operating expenses and taxes, adjusted for depreciation and capital expenditures.

B. The BAU Baseline

We base the BAU baseline mostly on Mercado's actual financials from 2006 through year-to-date 2010. Mercado's financials reflect the highly-competitive nature of a small, independently-owned business in its sector. Its revenues vary as its business mix shifts over time between the grocery store, tortilla production, and restaurant. Its overall revenues are down significantly over the last four years, reflecting a scaling-down of the business due to both the overall economy and new competition for its tortilla production business. Over the same period, Mercado's costs also have decreased, but less than revenues, and its energy-related costs (i.e., electricity, natural gas, transportation fuel, and water) have decreased significantly less (*i.e.,* Mercado's costs now consume a larger share of its revenue) than revenues. As a result, Mercado's margins – like those of many small businesses – are down relative to the recent past. This presents a practical challenge for forecasting forward-looking margins. It also means any increase in Mercado's energy-related cost due to AB 32 could further erode its margins, but we do not think that will be the case because Mercado will be able to fully pass through the cost increases, and those increases will be well within the range of price variation Mercado and similar businesses already face.

To estimate the potential impact of AB 32 on Mercado, we separately project its energy-related costs, which include electricity, natural gas, transportation fuels and capital expenditures on, and cost savings from, EE measures. In the BAU case, we assume:

- No EE.
- Electricity use increases by 2.5%/year.
- Electricity costs escalate at the BAU rate assumed in the CPUC High Net Short Scenario.
- Natural gas costs escalate based on the Mercado's actual rates inflated by the escalation of prices for natural gas forward contracts.

- Natural gas use is constant (despite a slight downward trend in past usage), at constant natural gas prices.
- Transportation fuel used for a delivery van increases proportionately with revenue.

Based on this set of inputs, Mercado's energy costs increase from 1.9% of revenues in 2009 to 2.7% in 2020, reflecting higher inflation in energy costs, in particular of gasoline and electricity, even in the absence of AB 32.

C. Conservative Case AB 32 Impacts

Using the same cash flow model as for the BAU baseline, we develop cash flow projections for the Conservative case and Extreme case by applying the respective estimated increases in the costs of electricity, natural gas, and transportation fuel (as discussed above and summarized in Table 1) for each year of the forecast period from 2010 to 2020.

We assume Mercado will take some steps to mitigate energy cost increases resulting from AB 32. In the Conservative case, we assume it invests in certain EE measures based on analyzing its existing energy use and calculating the net cost (i.e., replacement cost net of energy cost savings) of replacing existing equipment with more energy efficient versions. In particular, we assume Mercado International will make three energy efficiency upgrades to: (1) general lighting, (2) cooler and freezer lighting, fans, and monitoring equipment, and (3) refrigeration, including three walk-in coolers, a walk-in freezer, and three 40-foot glass-front case display units.[23] In the Conservative case, we assume Mercado replaces half of its current lighting with more efficient fluorescent lighting in year one and the other half in year two (2010 and 2011). We assume it will upgrade the coolers, freezers, and refrigerators in year three (2012), financed over a five-year period at no interest cost.[24] In each instance, the Conservative case deviated from the BAU baseline by the amounts of the corresponding EE capital expenditures, reduced electricity usage, and corresponding cost savings.

We considered whether it also makes sense for Mercado to replace its delivery van with a more fuel-efficient vehicle. According to Mercado's financials, gasoline accounts for most (75%) of the total costs for the delivery van. However, the costs for the van account for less than 1% of Mercado's total expenses. Given the low cost of the delivery van both relative to Mercado's total costs and relative to the cost of a new, more fuel-efficient van, we assume Mercado does not replace the van to save gasoline costs during the forecast period through 2020. Rather, we forecast its gasoline use according to its historical use in relation to overall sales at the average gasoline prices reported for California by the EIA.[25] We estimate the resulting cost by multiplying this gasoline use (in gallons/year) by the per-gallon price we estimate for the compliance mix under the LCFS in the Conservative case.

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[23] Many of our inputs regarding EE rely on a detailed EE audit of Mercado performed by Hank Ryan, Executive Director of Small Business California.

[24] This assumption reflects the ARB's stated objective to use some of the allowance value to subsidize small businesses investment in EE. Zero-interest is conservative; it is essentially equivalent to assuming that the EE investments qualify for some form of subsidized on-bill financing. We do not assume additional rebates will be available, although such rebates likely will exist and will result in a more positive cash flow impact of EE investments.

[25] http://www.eia.gov/oil_gas/petroleum/data_publications/wrgp/mogas_history.html

Table 3 summarizes the cost to Mercado of making its projected EE investments and the resulting savings in its energy cost, both stated on a net present value (NPV) basis. The cost of making the EE measures over the entire forecast period, stated in today's dollars, is less than 1% of Mercado's revenues, and the resulting energy cost savings are almost 10% of its energy costs through 2020. Most of the EE costs and energy cost savings (60%) are for/from refrigeration, which accounts for much of Mercado's electricity use. Its EE investments pay off within 5 years, or roughly in the middle of the forecast period.

Table 3: Mercado EE Costs and Energy Cost Savings

EE Measures	EE Cost as % Revenue	% Energy Cost Savings	Cost Savings Shares	Payoff Period (years)
Lighting	0.05%	0.9%	*9%*	1.41
Cooler	0.31%	2.9%	*31%*	4.97
Refridgeration	0.58%	5.7%	*60%*	5.05
Total	0.95%	9.4%	*100%*	4.71

Next, we apply the AB 32 price impacts to the BAU energy prices. By our estimates, AB 32 will increase electricity rates in the Conservative case over the BAU rates by an estimated 0.16 cents per kWh (1.07%) in 2011 (the first year of the RES) and by 2.46 cents per kWh (11.9%) by 2020 due to the costs of cap and trade, RES, and EE. Gas rates in the Conservative case will increase by 21 cents per therm (14.6%) by 2020. Gasoline costs in this case will increase by 37 cents per gallon (9.1%) by 2020.

We assume Mercado fully passes-through this cost increase to its customers via price increases. The associated price increases are so small as to be virtually unnoticeable to customers. The entire cost impact of AB 32 by 2020 can be completely offset by price increases of between just 1 cent and 5 cents in a given year, or at most 0.1% of a typical $30 customer bill. Such a small price increase, if perceptible at all, is very unlikely to lower Mercado's sales. It is less than a rounding error and unlikely to be a hardship for Mercado or its customers. This result is consistent with the result of our prior case study: price increases required to offset the estimated cost of AB 32 are likely to be imperceptible or, more conservatively, rather small. Specifically, under BAU total energy expenditures increase from an initial 1.8% of revenues in 2009 to 2.59% by 2020. In the conservative case, they increase to 2.67%, i.e. an additional increase of only 0.08%.

D. Extreme Case AB 32 Impacts

The only difference between the Conservative case and the Extreme is the projected energy price impacts we apply in each case. In the Extreme case, we apply the higher AB 32 energy price impacts to the BAU energy prices. We estimate AB 32 will increase electricity rates in the Extreme case over the BAU rates by an estimated 5.7 cents per kWh (28%), gas rates by 50 cents per therm (34%), and gasoline costs by $1.73 per gallon (42%) by 2020. We forecast the same EE investments as in the Conservative case, since at even higher energy prices Mercado would have an even greater financial

incentive to make those investments.[26]   Also, as in the Conservative case, we calculate the amount by which Mercado would have to increase its prices in order to pass through this incremental cost via price increases. In the Extreme case, the entire cost impact of AB 32 by 2020 can be fully offset by an average price increase of 9 cents per year, and less than 18 cents in any year, or at most 0.4% of the average customer bill. Again, therefore, Mercado likely can avoid any cost impact of AB 32 by raising its prices imperceptibly.

E. Case Study Results

Figure 4 shows Mercado's projected energy-related costs (electricity, natural gas, transportation fuel, and water) as a percentage of revenue in the BAU Case, Conservative case, and Extreme case.

Mercado's energy-related costs in both the Conservative and Extreme cases increase as a result of AB 32. But the increase is not large enough to attract much attention from the business or its customers. The energy cost increases, even in the Extreme case are quite small. From a 2009 baseline of 1.8% of revenue, energy-related costs increase to 2.59% in 2020 under BAU, with an additional 0.08% to 2.67% in the Conservative case; and an additional 0.55% to 3.14% in the Extreme case. As we also observed in the statistical analysis in our original paper, even extreme estimates of energy costs under AB 32 remain very small in relation to revenue. Since, as we discussed in our original report, the vast majority of small businesses in California including businesses like Mercado operate in sectors where essentially all businesses are subject to the same AB 32 regulations and that consequently all competitors will face the same cost increases, we suspect Mercado, and most California small businesses, will actually be able to pass-through most or all of its increased energy costs with little or no difficulty.

Figure 1: Mercado's Energy-Related Costs as % of Revenue

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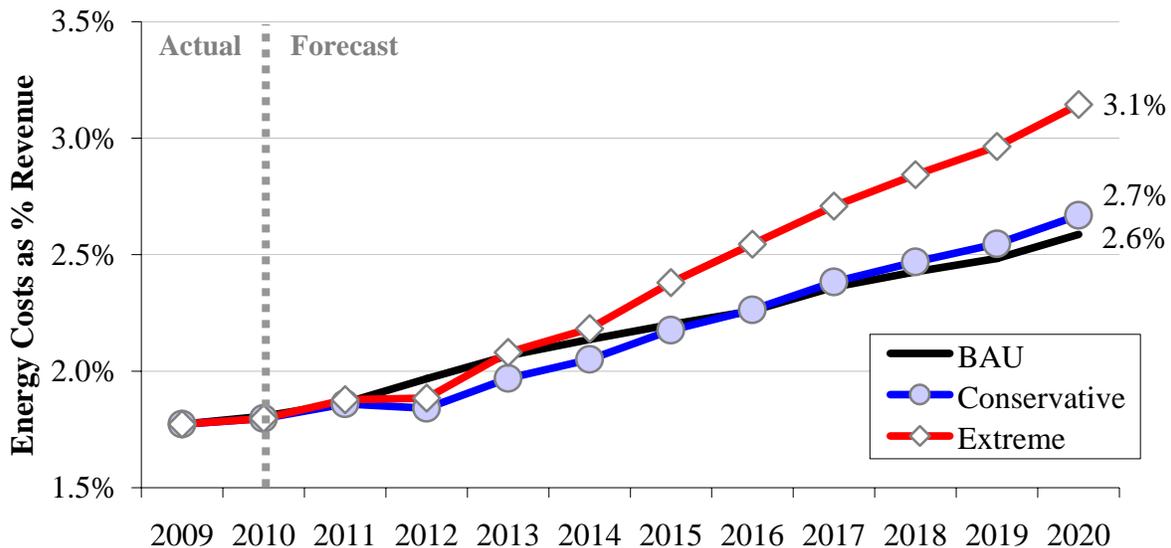
[26]   We have not modeled any additional energy efficiency investments, which might become cost effective in our Extreme case, since energy price increase more than in the Conservative case. Such additional energy efficiency investments would further mitigate the cost impact of AB 32.

As we also saw in our original case study, the potential cost impact of AB 32, even in the Extreme case, is well within the range of year-to-year variation in historic energy costs. The increases we forecast in Mercado's annual energy costs are similar to, or smaller than, the year-to-year swings in energy costs Mercado already internalizes. For example, Mercado's monthly bills show a 29% decrease between 2008 and 2009 in the average rate Mercado pays for natural gas, which contributed to a 16.5% drop in its energy costs in 2009. Its electricity rates increased by as much as 10%, in the same year, but that increase was more than offset by the decrease in natural gas rates. To imagine the smaller estimated cost impact of AB 32 would have a material detrimental effect on Mercado assumes the business will be unable to meet future cost increases far less than those it already faces.

VI. CONCLUSIONS

In this follow-up to our original report on the likely small-business impact of AB 32, we have updated our inputs for the major energy costs, notably the prices of electricity, natural gas and transportation fuels, and we have applied these updated inputs to a second case study, for Mercado International 2000.

Once again, we find that even making extreme assumptions about the range of possible energy price increases that might result from AB 32 – including more aggressive assumptions than in our original report – the impact on a typical California small business remains negligible. This observation should not diminish the real possibility that for some small businesses already on the margin, any cost increase may be difficult to internalize. But such businesses will be the rare exception, rather than the rule. Our updated case study shows that AB 32 will not significantly impact even a business in a highly competitive sector and facing decreased margins, such as Mercado International 2000. The increases we forecast in Mercado's annual energy costs are similar to, or smaller than, the year-to-year swings in energy costs Mercado already internalizes. We expect most small businesses likewise will be able to internalize and/or pass through the estimated cost increases at no hardship.

While still quite conservative in the sense of assuming energy price increases that are likely higher than an unbiased estimate of the impact of AB 32 on energy prices would yield, our Conservative case represents a more realistic view of the potential impact of AB 32 on Mercado. As we have shown, AB 32 would only result in higher energy costs representing an additional 0.1% of revenues. Put differently, an increase in prices of roughly 0.1% would suffice to fully offset the effect of AB 32 on Mercado's energy costs. Given that the vast majority of small businesses, including Mercado, largely face competition from firms also subject to the same changes in energy costs, it is difficult to imagine that such small increases in costs could not be passed on through miniscule price increases without materially affecting sales.