

August 15, 2015



Mr. Dave Cogdill
President/CEO
California Building Industry Association
1215 K Street, Ste. 1200
Sacramento, CA 95814

Dear Mr. Cogdill:

You have requested that we analyze the impacts of Senate Bill 32 (Pavley) on California's residential construction and rental housing markets. SB 32 would require the California Air Resources Board to set a statewide greenhouse gas emissions limit of 40 percent below 1990 levels by the year 2030 and 80 percent below the 1990 levels for 2050.

The attached document contains our analysis. We conclude that such a requirement would likely have significant negative impacts on the housing markets, as well as the broader California economy. The effects would be most pronounced in the inland regions of the state.

We would be pleased to respond to any questions you may have regarding our analysis and conclusions.

Sincerely,

A handwritten signature in black ink, appearing to read 'Michael Genest', written in a cursive style.

Michael Genest
Founding Partner
Capitol Matrix Consulting

A handwritten signature in black ink, appearing to read 'Brad Williams', written in a cursive style.

Brad Williams
Chief Economist
Capitol Matrix Consulting

IMPACTS OF SB 32 ON CALIFORNIA'S HOUSING MARKET AND THE ECONOMY

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Summary of Findings

Interaction between SB 32 and CEQA would likely, at a minimum, result in the immediate imposition of a Zero Net Energy (ZNE) standard on new construction in California. The initial effect would be a sharp reduction in new construction activity, which would persist until developers and contractors acquired a sufficient level of expertise and capacity to satisfy the stringent new ZNE requirements. Such a slowdown would have ripple effects throughout the entire economy, potentially reducing gross state product by \$18 billion, and employment by 285,000 jobs.

After the initial adjustment period, construction activity would partially rebound, and purchasers of new homes meeting the ZNE standards would experience monthly reductions in utility bills. However, the overall effect would be decidedly negative. By raising the cost of a median priced home by over 12 percent, the ZNE requirements would have major ongoing impacts on California's economy, including:

- ▶ Approximately 683,000 households being priced out of the real estate market;
- ▶ An annual 10,450 unit reduction in single-family housing construction;
- ▶ An annual loss of \$9.7 billion in gross state product and about 95,000 jobs in the California economy;
- ▶ An increase of 436,000 in the number of people living below the poverty line, due mainly to the negative effects of further housing shortages on shelter costs and household budgets.

The impacts of SB 32 would be felt most acutely in the inland counties of the state. This is because (1) real estate construction activity represents a relatively larger share of total economic output and jobs in the inland region as compared to the coastal region, and (2) average household income and home prices are relatively lower in the inland counties, meaning that the added costs will have a greater proportional effect on home prices and affordability in those jurisdictions.

Analysis

SB 32 — A De Facto ZNE Mandate

Pursuant to Chapter 488 of the Statutes of 2006 (Assembly Bill 32, Nunez), the California Air Resources Board (CARB) has adopted a statewide limitation on greenhouse gas emissions for 2020 equivalent to 1990 levels. Pending legislation, Senate Bill 32 (Pavley), proposes to amend state law to require CARB to set a statewide greenhouse gas emissions limit of 40 percent below 1990 levels by the year 2030 and 80 percent

below the 1990 levels for 2050.¹

The California Environmental Quality Act (CEQA) requires state and local agencies within California to follow a protocol of analysis and public disclosure of environmental impacts of proposed projects and adopt all feasible measures to mitigate those impacts. It is common for community and environmental groups to use the CEQA process to substantially change or even halt construction projects in California, including proposed housing projects.

Enshrining an 80-percent reduction goal for 2050 in statute could allow opponents to argue as part of the CEQA process that projects to be built today must adhere to the 2050 goal. As a practical matter, a first step in achieving this goal would be to build all new residential development — both rental and for sale — to Zero Net Energy (ZNE) standards.² Therefore, we conclude that, in effect, SB 32 would create a de facto mandate that all residential construction after its enactment be constructed to a minimum standard of Zero Net Energy, regardless of whether it is cost-effective for the consumer.

ZNE homes produce at least as much on-site energy as they consume over the course of a year. This will require the combination of leading-edge energy efficient design coupled with a significant amount of on-site energy production. With regard to energy efficiency, a ZNE home must incorporate high levels of insulation in the walls and ceiling, highly efficient windows, and very efficient water heating, lighting, heating and air-conditioning systems. In addition to the energy efficiency measures, the typical home will also need a large array of solar photovoltaic energy panels on the roof.

Immediate Impact: Sharp Reduction In New Residential Construction

Under the “California Long Term Energy Efficiency Strategic Plan” adopted by the California Public Utilities Commission (CPUC), California has an “aspirational goal” (i.e., not legally binding) for all newly constructed homes to meet ZNE standards by 2020 and all newly constructed commercial buildings to meet them by 2030. An independent study has concluded that, “there is a virtual consensus among stakeholders that California is not currently on the correct trajectory to meet the 2020 and 2030 ZNE goals.”³

Another study found that, “ZNE homes ... are in the innovator stage of market adoption,” and that “the market is not currently poised to achieve a ZNE homes 2020 aspirational goal, including a lack of consumer demand ... and a lack of qualified building professionals.”⁴

The de facto ZNE mandate would, of course, spur the construction industry in California to speed up its process of adapting to ZNE building standards. However, even the most optimistic scenario would be a major decline in new construction for a year or more before new construction at the ZNE standards could resume at levels even remotely approaching the current rate of new construction.⁵

To provide a general indication of the impact of such a reduction, we estimate that a 50-percent decline in new construction activity for one year would result in a decline of about \$18 billion in gross state product and a loss of 285,000 jobs.

¹ The bill also allows, but does not require the Board to set an interim limit for 2040.

² Even with the construction of ZNE buildings, a project may be challenged under CEQA due to its potential effects on transportation-related greenhouse gas emissions.

³ “Mapping Pathways to ZNE Buildings in California, Main Report”, Hescong Mahone Group, Inc., December 2012. The study notes that, “Regulatory agencies are bound by their respective rules of cost-effectiveness to balance a given policy’s potential benefits against its potential costs and unintended consequences. The ZNE goals are no exception to these rules.”

⁴ “Residential ZNE Market Characterization, Final Report,” February 27, 2015, by TRC Energy Services. The study also noted that, “current efforts are insufficient to reach the goal of all ZNE residential new construction by 2020. To achieve this goal (government and industry) will need to expand activities, significantly increase financial incentives, design assistance and workforce education efforts.”

⁵ Ideally, the state should build about 240,000 new residences each year. Since the Great Recession, however, new residences have been built at a pace of about 60,000 annually.

Longer-Term Impacts: Lower Construction, Higher Home Prices and Rents

Table 1 shows the incremental construction costs of meeting ZNE standards for a new California home. The estimate was prepared by ConSol, Inc.⁶ ConSol estimates that a new 2,700 square foot home in the Sacramento region would require an 8.7 kilowatt photovoltaic system in order to generate enough electricity to offset the power provided by the grid. The additional costs are for upgrading the insulation and appliances and installing energy saving devices. While the costs would differ somewhat for houses of different sizes and locations and would probably be substantially higher for multi-family dwellings, ConSol advises that its estimate represents a reasonable approximation of what the average new residential construction costs will be if SB 32 is enacted and results in mandating ZNE. This figure equates to approximately a 12-percent increase in the costs of constructing new residence in California. A purchaser of a new ZNE home would receive some offsetting benefits in the form of lower monthly utility payments. However, even in the best of circumstances, these savings (which are included in our modeling of various effects below) will only offset one-third of the added mortgage related payments needed to amortize the ZNE-related construction costs.

Table 1 Incremental ZNE Construction Costs	
8.7 kW photovoltaic system	\$44,022
18 SEER air conditioner	1,407
95% AFUE furnace	1,075
Tight duct system (<4% leakage)	342
Tight envelop (<2.5 Air Changes per Hour)	962
Balanced Energy Recovery Ventilators	1,055
Tankless water heater (EF = 95%)	1,217
R-21 walls, 2x6 24 IOC plus R-5 foam sheathing	1,675
R-38 High Performance Unvented Attic	2,675
High efficiency windows (0.25 u-value; 0.25 Solar Heat Gain Co-efficient)	2,773
100% LED lighting	854
Energy Star appliances (dishwasher, refrigerator)	224
Total =	\$58,281

Californians Already Suffer From High Housing Costs

California’s housing markets already face enormous challenges. In March 2015, the Legislative Analyst’s Office released a report examining the causes and implications of California’s high housing costs, which found:⁷

- ▶ **“California’s Home Prices and Rents Higher Than Just About Anywhere Else.”**
Specifically, the report found that the average single family home in California costs \$440,000, which is 2.5 times the national average and the average rent in California is \$1,240, which is 50 percent higher than the national average. While noting that there is considerable regional variation in these costs, the report found that even in the areas of the state considered least expensive by California standards (e.g., Riverside/San Bernardino,

⁶ ConSol is an energy consulting firm which specializes in energy consumption and energy efficiency analysis in the residential sector. It has been providing cost-impact analysis of the various changes to California’s energy efficiency building standards for the past 30 years.

⁷ “California’s High Housing Costs Causes and Consequences,” Legislative Analyst’s Office, March 17, 2015.

Sacramento, Bakersfield, Fresno) single family home prices were near, or slightly above the national average, and rents were about at the national average.

- ▶ **“High Housing Costs Problematic for Households and the State’s Economy.”**
 These high housing costs mean that Californians spend more of their income on housing and therefore less on other essentials. This is particularly problematic for renters and low-income Californians. When housing costs are taken into account, California’s poverty rate increases from 16 percent to 23.4 percent, as compared to the national poverty rate of 14.8 percent. The LAO also noted that high costs contribute to overcrowding (e.g., Latino households in California are more than twice as likely to live in overcrowded housing than Latino households in the rest of the nation), lower home ownership rates (California has the lowest rate of home ownership in the nation), longer commutes to work and slower overall economic growth in the state.

The LAO acknowledged that there are a variety of reasons why California has such high housing costs, including the fact that California remains an attractive place to live. However, the major driver is that the state builds too little housing, especially in the coastal areas. Clearly, by imposing a de facto ZNE mandate, SB 32 would exacerbate the current housing market dysfunction in the state.

Impact of SB 32 on California Housing Costs

An increase in new residential construction costs would quickly drive a general increase in housing prices and rents market-wide, not just for new construction. In the housing market, prices are driven by a variety of factors, but it comes down to supply and demand. With new households forming or moving into the state and some (albeit small) portion of existing homes becoming uninhabitable, production of new homes is needed to maintain equilibrium between total demand and total supply. An increase in construction costs would drive an increase in new home prices, which would reduce final demand and, in turn, the number of new homes brought on to the market.

Over time, this process would raise the prices on all homes, as the combination of population growth and limited new supply causes prices on existing homes to move upward toward the new-home price level. Higher home prices would also spill over into rental markets, as the migration of renters into the entry level housing market is slowed by higher single-family home prices. In combination with population growth, the lack of migration out of rental markets would boost demand for rental units. At the same time, ZNE-related construction costs would limit new supply of apartment units. The result would be excess demand, which would drive up rental prices.

Capitol Matrix Consulting Estimates

To measure the potential magnitude of these effects, we obtained industry and Census data on home construction, employment, home prices, rents, and the distribution of household incomes. We then applied various financial, statistical, and input-output modeling tools to these data in order to develop quantitative estimates of the impacts of the ZNE requirements.

The key steps in our analysis were as follows:

- ▶ We first estimated the impact of ZNE costs on mortgage and related expenses for median priced homes. We also estimated offsetting savings in utility bills for those purchasing ZNE homes, which on average would offset roughly one-third of the added annual mortgage costs.
- ▶ We then evaluated the effects of the added costs on affordability, taking into account their impact on a typical mortgage, and comparing the results to the distribution of households by income level (obtained from the American Community Survey) in each of the counties examined.

- ▶ We then estimated the impact of the reduction in home price affordability on new construction activity, using statistical relationships derived from historical county level data. We also estimated the net impact of reduced construction activity and other factors on California employment and economic output, using the IMPLAN input-output modeling system⁸.
- ▶ We then estimated the impact of the increased price and reduced supply of new homes on the existing home market, and on rents.⁹
- ▶ We then estimated the impacts a variety of factors, including higher rents, lower construction activity, and offsetting utility savings for owners of new ZNE homes,¹⁰ using the IMPLAN input-output modeling system.
- ▶ Lastly, we measured the impacts of reduced employment and higher rental costs on the California supplemental poverty rate.

We made these estimates for California as a whole as well as 21 inland and 11 coastal counties. Table 2 shows our estimates of key impacts, which we highlight below.

Reduced affordability. As noted above, the ZNE standards would raise building costs by \$58,281 for a typical new home. Assuming these costs were passed along to buyers, an increase of this magnitude would increase mortgage and related costs (i.e., insurance and property tax) on a new home by \$3,836 per year. Based on general lending industry standards regarding the maximum percentage of annual income that should be devoted to mortgage payments, property taxes, and homeowner’s insurance, an increase of this magnitude would reduce the number of California households that could afford a median priced home by 683,000.¹¹ While in some cases, households would be able purchase smaller or lower-quality homes, such an option would leave those buyers worse off, and it would not even be available for entry-level buyers. Some in this latter group would be pushed out of the new home market altogether.

A drop in new construction. The decline in home affordability would translate into a reduction in home sales and new construction activity in the state. Based on our estimate of the long-term relationship between affordability and home building (holding other factors constant), we estimate that annual construction of

⁸ IMPLAN is a widely used input-output modeling system that describes the interrelationships between purchases and sales of detailed industries in the U.S. and regional economies. It uses government data from the economic census and other sources to produce “social accounting matrices” for economic regions at the national, state, county, and MSA levels. From these accounting matrices, it is possible to develop job, output, and income multipliers that can be used to estimate the direct, indirect, and induced effects of an initial change in new building construction and household spending on the overall economy.

⁹ Our estimate of the impact of home prices on rents is based on a “user cost of housing” equation. The equation is used to estimate a price-rent ratio based on a variety of financial and economic variables, such as the real interest rate, property tax rates, marginal income tax rates, annual maintenance costs, and expected capital gains. For a description, see “To Buy or Not to Buy? The Changing Relationship Between Manhattan Rents and Home Prices,” in *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, Volume 18, Number 9, 2012.

¹⁰ Our estimates include the offsetting benefit of increased expenditures for production and installation of the ZNE equipment (though much of the production of solar systems and related equipment takes place outside of the state), as well as the positive effects of reduced utility bills for owners of newly constructed ZNE homes. We would note, however, that the net impact of SB 32 policies on utility costs would be complex, with savings to owners of ZNE homes potentially offset by rising utility rates for other customers as utilities shift toward non-carbon sources of energy.

¹¹ Calculations are based on a methodology used by the National Association of Realtors to measure affordability in various housing regions throughout the country. We specifically calculated the annual costs for mortgage payments, insurance, and property taxes on a median priced home (using data from the California Association of Realtors and DataQuick) in California and each of 31 counties (comprising 92 percent of the state’s population). We then used distributional data on household income from the American Community Survey to calculate the percentage of households in each county for which annual mortgage payments, taxes, and insurance on a median priced home in that county would represent less than 30 percent of the household’s annual income (a typical mortgage industry benchmark for purposes of determining loan qualification). We made these calculations before and after the addition of \$58,281 in ZNE-related costs to the median priced home to arrive at the estimate of the reduction in in number of households that would qualify for a the mortgage as a result of the added costs. For purposes of these estimates, we assumed that the ZNE costs are 100 percent financed and amortized over 30 years.

single family homes would fall by 10,452 units per year, representing a statewide decline of 15 percent.¹²

Higher existing home prices and rents. As noted previously, higher new home costs will spill over into the existing home resale market, as the lack of new construction, combined with continued population growth, results in a shortage of existing homes for sale. This in turn drives up the price of existing homes toward the cost of the new homes on the market. For purposes of these estimates we assume that existing home prices rise by an average of about \$40,000, or 70 percent of the ZNE-related increase in new home prices. The reason for the price differential is primarily that owners of new ZNE homes receive a benefit, in the form of reduced month utility bills, that is not available on most existing homes.

Tightening conditions in the owner-occupied market will also put upward pressure on rents, as fewer people move out of rental units into owner-occupied homes, and new supplies of multi-family homes are curtailed by ZNE-related cost increases. We estimate that the higher home prices in the owner-occupied market will boost the median rent paid by California renters by about \$1,610 per year.¹³

Loss of economic output and jobs. We estimate that ZNE-related cost increases for new construction would result in an annual loss of about \$9.7 billion in gross state product and 95,000 jobs statewide. This is a net figure that takes into account reduced construction, higher rents, utility savings, and other factors. Overall, about 60 percent of the output and job losses is related to reduced home construction. The other 40 percent is related to the net impact of higher rents and other factors on spending in the economy. The higher rent payments, in particular, reduce discretionary incomes that renters have available for purchases of other goods and services by about \$8 billion annually.

Increase in poverty. California has the highest poverty rate in the nation, with over 8 million people (or 23.4 percent of households) living below the poverty line.¹⁴ We estimate that the enactment of SB 32 would increase the number of Californians in poverty by 436,000. The increase is partly related to the direct and indirect job losses stemming from reduced home construction activity, but is primarily due to the negative effects of higher rents on household budgets.¹⁵ Obviously, the higher poverty rates would put additional pressure on the state's various safety net programs.

Effects Would Be Felt Most Intensely In Inland Counties

The impacts of SB 32 would fall most heavily on the inland counties. As indicated in Table 2, the percentage of households priced out of the market in inland counties would be about triple the rate in the coastal counties. The percentage declines in homebuilding and employment, and the percentage increase in

¹² Calculations are based on the long-term statistical relationship between the affordability index levels (described in footnote 11) and the construction of new single family homes in 21 California counties from 1991 through 2014.

¹³ Our estimate of the impact of home prices on rents is based on a "user cost of housing" equation. The equation is used to estimate a price-rent ratio for properties based a variety of financial and economic variables, such as the real interest rate, property tax rates, marginal income tax rates, annual maintenance costs, and expected capital gains. For a description, see "To Buy or Not to Buy? The Changing Relationship Between Manhattan Rents and Home Prices," in *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, Volume 18, Number 9, 2012.

¹⁴ Estimates based the U.S. Census Bureau's Supplemental Poverty Measure (SPM). This measure, which has been published by the U.S. Census for the past several years, is considered to be a more accurate measure of regional poverty rates than the official poverty measure, mainly because the SPM takes into account differences in shelter costs between states. By raising rents, SB 32 would result in an increase in the SPM poverty threshold for California, thereby recognizing the negative impacts of higher shelter costs on income available to cover other basic necessities, such as food, clothing, and medical care. The measure would also reduce incomes of people in households affected by reductions of jobs and hours worked.

¹⁵ Our estimates take into account the specific formula used in the SPM for measuring poverty thresholds in specific jurisdictions based on differences in median rents. (See, "Supplemental Poverty Measure: A Comparison of Geographic Adjustments with Regional Price Parities vs. Median Rents from the American Community Survey," *SEHSD Working Paper No. 2014-22*, U.S. Census Bureau, March 2014). Using this formula, we calculated the effects that rent increases stemming from SB 32 would have on the calculation of the poverty thresholds in California and in each of the counties examined. We then compared the changes in poverty threshold to the distribution of household income in each jurisdiction based on the American Community Survey to determine the number of households that would fall below the poverty thresholds due to the impacts of SB 32 on rents.

households in poverty, are similarly much larger in the inland counties than along the coast.

Table 2 SB 32's Housing Impacts on California's Households and Economy			
Baseline Amounts	California	Inland Region	Major Coastal Counties
Number of households (Thousands)	12,466	3,577	7,938
Employment (Thousands)	17,878	4,864	11,645
Single family home construction (Units)	67,970	29,150	26,940
Median income	\$61,400	\$48,349	\$75,566
Median home price	\$489,560	\$230,660	\$672,615
IMPACTS			
Impact On Typical Household			
Increased annual cost for mortgage, taxes, insurance	\$3,836	\$3,836	\$3,836
Increase annual rental costs	\$1,610	\$1,815	\$1,136
Impact on Economy			
Households priced out of real estate market:			
Number	-683,000	-322,820	-305,560
Percent	-8.1%	-17.3%	-5.4%
Reduced single family home construction permits:			
Number	-10,452	-7,019	-2,596
Percent	-15.4%	-24.1%	-9.6%
Impact On Broader Economy:			
Reduced output (billions)	-\$9.7	-\$3.6	-\$5.3
Reduced jobs	-94,859	-39,066	-48,204
Increase in unemployment rate	0.5%	0.7%	0.4%
Impact on Poverty			
Additional households falling below poverty threshold	145,375	60,972	72,773
Additional people falling below poverty threshold	436,367	188,686	212,771
Increase in poverty rate	1.2%	1.7%	0.9%

The inland counties consist of Riverside, San Bernardino, Kern, Tulare, Kings, Fresno, Madera, San Joaquin, Merced, Stanislaus, Sacramento, Placer, Yolo, Solano, Yuba, Sutter, Colusa, Tehama, Glenn, Butte, and Shasta. The coastal counties consist of San Diego, Orange, Los Angeles, Ventura, San Luis Obispo, Santa Clara, San Mateo, San Francisco, Marin, Contra Costa, and Alameda.

Factors responsible for the disparate impacts. One key reason for the disproportionate impact on inland counties is that construction activity represents a comparatively larger share of total economic activity in those areas. As shown in Table 2, the number of building permits issued for the inland counties is projected to exceed the number issued in coastal region by about 8 percent, even though the number of households in the inland region is less than one-half that of the coastal region.

A second factor is that home prices are lower in the inland regions. The median price for the 21 inland counties examined is \$231,000 compare to the \$673,000 median for the 11 coastal counties, and the ratio of

construction costs to final price is higher. As a consequence, the added costs to meet the ZNE mandate would have a proportionately larger percentage impact on the price of a home in the inland region than a home on the coast.

The third, and related, factor is that household incomes are lower in the inland region. According to the American Community Survey for 2008-2012, the median household incomes for the 21 inland counties was \$48,000, compared to \$76,000 for the 11 coastal counties. There are proportionally more low- and moderate income households in the inland counties, representing a larger share of the potential first time homebuyers that would be priced out of the market altogether.

Assumptions and Caveats To Our Estimates

This analysis focuses on the impacts of higher construction costs that would result from a de facto ZNE mandate on new construction. The full impacts of SB 32 would be greater than shown in this analysis if (1) the costs were scaled up by builders to fully maintain profit margins or (2) otherwise economically viable projects (even after considering the added ZNE costs) were halted or delayed because of other factors, such as such as legal challenges related to the impact of new projects on transportation-related carbon emissions. They could be somewhat less if ZNE related technology costs fell sharply or if the higher building costs were offset by declining land values (though the latter development would have other negative consequences for the economy).