LOS ANGELES COUNTY ECONOMIC DEVELOPMENT CORPORATION

The AB 32 Challenge: Reducing California's Greenhouse Gas Emissions

Los Angeles County Economic Development Corporation

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Response to CARB *Economic Analysis Supplement (EAS)* to the Draft Scoping Plan

The California Air Resources Board (CARB) has developed a Scoping Plan pursuant to AB32 requiring a statewide reduction of greenhouse gas emissions by 2020, with further reductions to follow by 2050. The draft plan outlines Preliminary Recommendations, key elements of which include: (i) the expansion and strengthening of energy efficiency programs; (ii) increasing the component of power generated in the state from renewable sources; (iii) development of a market-based cap-and-trade program; and (iv) implementation of new and existing state laws regarding emissions reductions in the transportation sector.

As required by AB32, CARB conducted an analysis of the economic impact of the measures proposed in the draft plan. The analysis broadly indicates that implementation will result in a non-negative impact on economic growth, personal income growth, per capita income and job growth in California in 2020 as compared to conditions in the absence of implementation.

Tackling policy related to greenhouse gas emissions is important and, while economics is only one facet to be considered in the evaluation of such policies, the LAEDC supports efforts to pursue the most cost-effective implementation strategy. We believe in particular that the best chance for addressing climate change and to solve the problems that prompted AB32 is to lead by successful example.

Technical, scientific, economic and social factors make evaluating the economic impact of AB32 implementation challenging. These challenges are magnified when forecasting into the future. CARB has done a commendable job with its evaluation. The LAEDC has no real reservations about the modeling techniques employed. We are concerned, however, about some of the assumptions underlying the analysis. Getting these assumptions right is crucial because so much hinges on the modeling results. In particular, implementing AB32 has the potential to dramatically alter economic conditions. Any legislation that requires a shift in public behavior will need conviction from leadership and public support, which will be undermined if the potential benefits are oversold and the expected costs are understated.

We are particularly concerned that a public expecting an economic windfall as this analysis promises will support efforts to repeal or extensively modify AB32 if they are blindsided by unexpected cost-of-living increases. Our concerns are focused on potential reference case selection bias, the dynamics of cost-benefit analysis and distributional issues.

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Scenario Selection Bias

Our most significant concern lies with the specification of the reference case to which outcomes due to the prospective policy changes are compared. Unbiased and objective selection is critical in protecting against unrealistic expectations. An especially austere reference case will not only overstate benefits but will concurrently underestimate costs. Public support may be compromised if actual costs realized are higher than were anticipated or promised.

The LAEDC concurs that the general methodology is valid. To evaluate the economic impact of implementation of AB32 measures, CARB compares expected outcomes in 2020 under full implementation to those that would have occurred *but for* the implementation. This but-for case is identified as "business as usual" (BAU). Outcomes under implementation are modeled through the E-DRAM computable general equilibrium model, while the BAU scenario is constructed from forecasts.

In the BAU reference case, from 2007 to 2020 real output in California is projected to experience average annual growth of 2.7 percent, income per capita is projected to grow at an average 2.8 percent annual rate, and employment will see an average annual growth rate of 1.6 percent.

Under full implementation of AB32, real output, per capita income and employment are projected to be slightly higher than under BAU. This favorable conclusion suggests that California will recoup all initial transition and implementation costs, reach its emissions targets and enjoy an improvement in economic welfare.

The positive impacts result from efficiency-driven savings that are redirected to other purchases. The LAEDC agrees in principle on the merits of this approach, which underpins much of our own work. Yet when applying a comparative-statics methodology, it is critical, especially when trying to estimate the actual costs and savings of AB32 implementation, that only those events and behavioral responses actually due to AB32 are included.

For example, the reference case estimates emissions to be 596 mmtCO2e in 2020 (compared to the target of 427) and assumes that none of the measures included in the draft Scoping Plan will be implemented, although several of those measures have already been adopted and as a result emissions will have been reduced by 2020.

Because a significant contribution to the emissions reduction is seen from the transportation sector, the assumptions underlying the reference case here are especially critical. The CARB analysis projects that emissions will increase in the BAU case from 179.3 to 225.4 mmtCO2e. The estimate uses fuel sales data from 2007 and projects this forward to 2020 based on the growth in projected vehicle miles traveled (VMT) derived from their model EMFAC2007, and assumes no change in vehicle fleet mix over time. This seems unrealistic given the behavioral responses already observed to significant increases in crude oil prices over the 2007-2008 period. Substitution effects have already been evident in increased use of public transportation and reduced vehicle miles.

Additionally, in response to increased gasoline prices there has been a measurable shift towards more fuel-efficient vehicles, a trend which is likely to continue. This increase in fuel efficiency is not reflected in the BAU reference case. Whatever savings consumer may reap from this shift would

occur in the absence of AB32 and should therefore be accounted for in the BAU reference case. Not doing so will overstate the savings and thus understate the costs of implementation.

Other increases in energy efficiency that would ordinarily be expected even in the absence of AB32 must similarly be accounted for in the trends going forward to 2020 under the BAU reference case.

We encourage CARB to redo the analysis with a more realistic BAU reference case.

Energy Efficiencies and Aggregation

Under current conditions, green energy is clearly more expensive than conventional energy, and unquestionably retail electricity prices will increase in California as investor-owned utilities and public-owned utilities meet higher renewable portfolio standards. Even those utilities currently operating with a larger renewable portfolio are expected to increase their rates to recover higher costs. For the City of Los Angeles, where half of the power is sourced from comparatively inexpensive coal-fired plants, ratepayers can expect utilities to become more expensive as alternative sources are mandated in lieu of coal.

CARB estimates that under full implementation of AB32, the retail price of electricity will be 11.1 percent higher than the BAU case, and natural gas will be 7.8 percent higher. The economic analysis then relies on a calculator provided by Energy and Environmental Economics (E3) to show that in spite of these increases, overall electricity expenditures will decline by 5 percent due to energy efficiencies, changes in practices, provider rate structure, etc. which together offset the increase in prices, and that the implementation will similarly cause a reduction in natural gas consumption by 18 percent, more than offsetting the increase in price.

This is certainly plausible, at least in the aggregate. LEED standards can indeed produce structures that are dramatically more energy efficient. An example of an energy-efficient home certified as LEED Platinum was featured in the September 6, 2008 edition of *The Economist,* boasting complete self-sufficiency in electricity generation and no fossil fuel consumption. But CARB's analysis overlooks several important factors: cost, uncertainties, upfront investment and distributional considerations.

First, the overall reductions in utility expenditures depend on reduced demand due to energy efficiencies to offset the expected increase in prices. This result is at odds with other analyses such as those conducted by EPRI (Electric Power Research Institute) which suggest that aggregate costs due to policy changes to reduce greenhouse gas emissions would require *higher* net expenditures on electricity. Hence policymakers will need to be made aware of how sensitive the results of CARB's analysis are to a range of expected utility prices.

Second, because energy efficiencies are claimed to be the driving force behind these economies, it is worthwhile to review the E3 calculator and its underlying methodology. In essence, energy efficiencies are simply subtracted from the producer-side load forecasts, so that increases in efficiencies lead to reduced need for generation to meet demand. But as E3 notes, quantification challenges loom large due to unpredictable adoption practices, making estimation of efficiencies subject to large margins of error.

Although the methodology is plausible the estimated energy efficiency forecasts are optimistic given the stated unknowns, and sensitivity analysis is required. The results shown in the CARB economic analysis are compelling in that businesses are shown to be better off under full implementation with regard to utility costs. For example, CARB demonstrates that a 5 percent decline in electricity bills for business can yield an improvement in competitiveness; hence presumably a 5 percent *increase* in electricity expenditures can work in the opposite direction.

Households are also shown to benefit from reduced electricity expenditures due to the increased energy efficiencies achieved at the producer level in the E3 calculator. Yet continued income growth and increasing consumer electronic technology demand in California may work in the opposite direction. The economic analysis states that measures under AB32 expect to improve end-use electricity efficiency, but the assumption of a decrease in household electricity expenditures is not supported by the producer efficiencies of the E3 calculator without further evidence.

Third, insofar as end-use electricity efficiencies require the replacement of current household appliances and electronics, and business plant and equipment, the transition costs can be significant. Although annualized costs have been employed throughout the economic analysis, business practices more often rely on present value determinations, and investment funds required up front may well exceed the discounted expected energy savings captured in the future. Indeed, large-scale energy efficient buildings either built from the ground up or retrofitted will require substantial up-front expenditures, and businesses without a long enough time frame into the future will be hesitant to pony up the necessary investment if alternatives are available, including relocation. Increased utility costs may be the final marginal increase that encourages business to seek lower-cost locations, taking California jobs out of state.

Consumers may be even more price sensitive than businesses. Consumers have been slow to adopt energy-efficient devices unless the initial outlay is small and/or the expected cost recovery period is very short.

Finally, and most important, the analysis omits distributional considerations. Given that utility prices will increase as renewable components increase, total expenditures fall only if overall demand declines due to investment. This means that those households and businesses which have not yet made the initial investment necessary to capture energy-efficiencies will face even higher energy costs, not lower. Even if energy expenditures fall in the aggregate (which may or may not happen) we would still see a sizeable portion of existing users facing higher energy costs for the foreseeable future.

Along the same vein, the policy measure under AB32 which yields the highest net savings is the Pavley I and II Light Duty GHG Standards. The savings are calculated as gasoline purchases avoided, net of increased costs attributed to purchasing fuel-efficient vehicles. While fuel purchases (or avoidances) are relatively smooth over time, vehicle purchases are lumpy. Again, the economic analysis annualizes capital costs, but consumers facing vehicle purchases, and in particular *new vehicle* purchases, can expect to need a sizeable down payment. The interim transition costs can have substantial negative impacts on household consumption possibilities.

Such dynamics, which have been overlooked by the aggregate analysis conducted by CARB, are crucial to the positive outcomes predicted for implementation. If sufficient businesses choose to relocate rather than capture long run benefits from short run investments, then the indirect

multiplier effects on which the redirected savings of the economic analysis depend upon will not occur. This is particularly important for the most energy intensive businesses. If such firms leave, then the cost of baseload power will be redistributed among the remaining power users.

Cost-Benefit Analysis

Given the proportion of the net economic impact of AB32 implementation delivered by measures applied in the transportation sector, the LAEDC reviewed the assumptions underlying the cost-benefit analysis of this sector. In particular, the Pavley I and Pavley II Light-Duty Vehicle Greenhouse Gas Standards together account for an estimated $13 billion in net annual savings in 2020 under implementation. CARB projects the net savings per metric ton of carbon dioxide equivalent (mtCO2e) to be $361 and $262 for Pavley I and Pavley II, respectively.

Yet Vattenfall, a Swedish utility company, and McKinsey & Company, a global consultancy, have independently estimated a global marginal cost curve for a variety of GHG abatement strategies. McKinsey has additionally produced such estimates for the United States alone. Both firms show the net marginal savings of fuel economy packages for vehicles to be in the range of $80 (per mtCO2e), substantially less than the estimates provided by CARB. Admittedly, fuel economy packages can differ but such a large difference should be carefully substantiated.

The measurement of the net savings in itself may be problematic. It is customary to calculate savings as the value of gasoline purchases saved given expected improved fuel efficiency. In this case, CARB extrapolates a reduction of approximately 3.1 billions gallons of gasoline in 2020 compared to the reference case, at a cost of $3.673 per gallon, which is taken to be expenditures that are not made by California consumers due to increased fuel efficiency of vehicles. The estimated cost per gallon of gasoline is taken from California Energy Commission Transportation Energy Forecasts. The assumption is that these significant excess savings are then redirected into other sectors of the economy, creating output growth and providing job creation to offset declines due to costs of implementation of AB32 in other sectors.

Provided the trend in gasoline prices remains as expected, such analysis may well hold. The difficulty lies in the lack of consideration of the dynamics of the economic environment adjusting to the new mandates. CARB notes that if gasoline prices are above trend in 2020, then the estimated net savings will exceed those presented in their analysis. Yet if prices are higher than those presented, then the reference case will have to adequately account for behavioral responses such as substitution away from fuel-inefficient vehicles in the absence of legislative action.

Furthermore, if the price increase offsets the savings due to fuel efficiency, the percentage of the household budget spent on transportation can conceivably increase, limiting or negating the savings responsible for producing the positive outcomes in the analysis.

A simple example will illustrate. Suppose a consumer in the reference case spends $100 to fuel his vehicle each month, purchasing 25 gallons for $4 each. Under the measures of AB32, this consumer is expected to have a fuel efficient vehicle in 2020, however, and will therefore need only 20 gallons of fuel during the month, an efficiency gain of 20 percent. If the fuel price is still $4, he now has $20 of surplus of funds per month to channel into other expenditures.

However, if the price of gasoline increases by 20 percent to $5.00, the consumer will still spend $100 on the 20 gallons for his fuel-efficient vehicle, yielding no excess savings to be redirected.

Given the volatility in the gasoline market, and the inherent uncertainty of price forecasts, it is not unreasonable to expect an even steeper increase in the price of gasoline, yielding an income effect which will *reduce* his consumption of other household goods.

The LAEDC thus recommends that CARB consider differential gasoline prices in comparing outcomes due to implementation against the reference case, in particular when reasonable price divergence leads to household budget offsets.

Green Technology Leadership

The LAEDC agrees that AB32 may be a solid opportunity for California if the state can export green technology that results from its implementation. Demonstrating these advantages through modeling job creation on a sector- or industry-specific basis would be more convincing than providing the type of global overview presented in the EAS, which appears overly optimistic and too broad to be persuasive.

For example: To what extent was the job creation modeled in the earlier analysis capturing new green industries (if at all)? How are "green businesses" defined? Given the stated estimate of $2.4 trillion in revenues from this sector, this implies that up to 10 percent of output in the national economy will be produced by green businesses in 2030. This seems implausibly large and suggests that the definition of "green business" is too broad to be useful.

Summary

The LAEDC recommends the following:

First, the recalibration of the BAU reference case to account for behavioral responses and consumption choices that would occur even in the absence of implementation in response to market signals that are currently underway or are expected. A reference case rooted more clearly in reality may moderate the expected excess savings but will forestall potential criticism for prematurely biasing the results by selecting a reference case so negative in its energy efficiency trends that implementation of any legislation would improve conditions.

Second, conduct sensitivity analysis surrounding the energy efficiency gains that are needed to offset increases in utility prices and yield a decline in utility expenditures by businesses and households. Since the analysis rests on the stimulative effects of net savings being redirected, policymakers will require an understanding of the confidence intervals within which the positive results fall and an estimate of expected job losses in the intervals within which negative results fall.

Third, address distributional considerations between those with enough resources and with investment horizons of sufficient length to recoup expenditures on energy efficiencies and those without the available investment pool or with higher discount rates that would face increased costs in the immediate future without the benefit of capturing efficiency savings.

Fourth, explain the wide discrepancy between the net savings per metric ton of emissions estimated for measures in the transportation sector as compared to those estimated by other consultants using similar assumptions.

Fifth, refine or omit the analysis of benefits from investing in green technology.

We hope these suggestions will yield a stronger, more nuanced appraisal of the likely savings and effects of AB32 implementation.