

August 4, 2014

Hon. Henry Perea  
Assembly Member, 31<sup>st</sup> District  
Room 3120, State Capitol  
Sacramento, California 95814

Dear Assembly Member Perea:

Your staff asked us about some of the effects of including transportation fuels in California's cap-and-trade program. In particular, they asked us to summarize and comment on estimates of the effects of that action on the retail price of gasoline. As we discuss in this letter, the studies we reviewed suggest that, by 2020, the resulting price increase likely will be about 13 cents to 20 cents per gallon, but the price increase could exceed 50 cents per gallon. The actual price increase will depend on a wide variety of economic, technological, and regulatory factors that are difficult to predict. We note that if transportation fuels were not part of the cap-and-trade program, alternative policies to meet the AB 32 emissions targets might be adopted that also have the effect of increasing gasoline prices.

Below, we provide background information on gasoline prices and on the cap-and-trade program, describe the studies we reviewed, and highlight the studies' major findings.

Appendix A lists the studies that we reviewed. Appendix B provides brief comments on the different studies.

## Background

**Gasoline Prices Are Volatile.** Gasoline is the most widely used transportation fuel in California. Large fluctuations in the price of gasoline are common. For example, in 2012, the statewide average weekly retail price of gasoline ranged from \$3.55 per gallon to \$4.71 per gallon. In 2013, this price ranged from \$3.60 per gallon to \$4.26 per gallon.

**Overview of AB 32.** The Global Warming Solutions Act of 2006 (Chapter 488, Statutes of 2006 [AB 32, Núñez/Pavley]), commonly referred to as AB 32, established the goal of reducing greenhouse gas (GHG) emissions statewide to 1990 levels by 2020. The legislation charged the Air Resources Board (ARB) with monitoring and regulating the state's sources of GHGs and directed it to develop a Climate Change Scoping Plan encompassing a set of measures that would achieve the state's 2020 GHG target. Assembly Bill 32 also authorized (but did not require) ARB to include, as part of the Scoping Plan, a market-based mechanism to reduce the state's GHG emissions. The legislation defined a market-based mechanism as a system that includes an annually declining limit on GHG emissions, as well as a trading component whereby sources of GHG emissions may buy and sell carbon allowances in order to comply with the regulation. Such a system is commonly called a cap-and-trade program.

***ARB's Scoping Plan Includes a Cap-and-Trade Program.*** The cap-and-trade regulation places a cap on aggregate GHG emissions from businesses that emit at least 25,000 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) per year. This cap applies to three distinct “compliance periods:” calendar years 2013-2014, 2015-2017, and 2018-2020. In order to comply with the regulation, a covered entity must obtain one allowance (or equivalent thereof) for every metric ton of CO<sub>2</sub>e that it emits during a given compliance period. Covered entities can obtain allowances by receiving them for free from ARB, purchasing them at quarterly auctions, or purchasing them in the secondary market. Through May 2014, the auctions have sold current and future allowances at prices close to the auction reserve price, a minimum price set by ARB. (The auction reserve price is currently \$11.34 per ton. It grows by 5 percent plus inflation every year.) ARB allows covered entities to fulfill up to 8 percent of their compliance obligations by acquiring offsets, which represent verified emissions reductions outside of the cap-and-trade program. Transportation fuels—which account for roughly 40 percent of California’s GHG emissions—will become part of the cap-and-trade program when the second compliance period begins in 2015. Additional details on the cap-and-trade program are available in our 2014 report, *The 2014-15 Budget: Cap-and-Trade Auction Revenue Expenditure Plan* and in our 2012 report, *Evaluating the Policy Trade-Offs in ARB’s Cap-and-Trade Program*.

## **Overview of Studies and Review**

***Identified Eight Studies.*** Our review includes all studies that we could find that contain original estimates of the effects of California’s cap-and-trade program on transportation fuel prices. In addition, because it is possible to use allowance prices to generate estimates of these effects, our review also includes studies that estimate allowance prices but do not explicitly estimate fuel price effects. We limited our review to studies dated in or after 2010 because ARB issued the regulation establishing the cap-and-trade program in 2010 and earlier studies could not account for the details of the program. All but one of the studies that we reviewed are at least two years old, and half of them are four years old. The studies made projections based on the economic, technological, and regulatory conditions that prevailed when they were written, so they do not reflect all currently available information.

***Reviewed Studies.*** For each study, we identified the relevant estimates, considered their implications for gasoline prices, and developed a basic understanding of the methods used to generate the estimates. We also attempted to contact the authors of each study to discuss the studies’ findings and seek clarification. Overall, we found some studies more informative and persuasive than others, and our summary reflects this assessment.

Although our review focuses specifically on fuel price effects of including transportation fuels in cap-and-trade, the studies address other questions as well. Some of the studies estimate the fuel price effects of other Scoping Plan policies, such as the Low Carbon Fuel Standard. Others estimate the effects of cap-and-trade on the economic performance of certain industries or on the state’s overall economy. Our review does not cover these aspects of the included studies.

***Used Allowance Prices to Estimate Gasoline Price Increases.*** Because many of the studies we reviewed do not estimate gasoline price increases directly, we used a method for inferring projected gasoline price increases from estimated allowance prices. This method assumes that

retail gasoline prices will increase by roughly 8 cents to 9 cents per gallon for every \$10 per ton that an allowance costs. The foundation for this calculation is the carbon content of gasoline, which drives compliance costs, and the assumption that the burden of additional fuel costs will fall completely on consumers. This number incorporates some other minor adjustments and assumes that the program does not affect fuel prices through other channels.

***Focused on Price Effects in 2020.*** Some studies present estimates for the entire 2015-2020 period, but others—including some of the most credible studies—focus on 2020. To facilitate apples-to-apples comparisons across all studies, our review focuses on 2020 and expresses all monetary figures in projected 2020 dollars. (Where necessary, these calculations incorporate our inflation forecast from May 2014, which projects annual inflation of 1.5 percent to 2.2 percent between 2014 and 2020.)

A second reason for focusing on 2020 is that gas prices prior to this date likely will reflect suppliers' uncertainty regarding cap-and-trade compliance costs. As 2020 approaches, this uncertainty likely will diminish, as will market participants' ability to bank allowances and ARB's ability to accelerate the sale of allowances. These and other factors make estimation of 2020 fuel price effects easier than estimation of 2015 fuel price effects.

***Noted Potential Effects of Alternative Policies.*** The estimates we summarize consider what will happen to the prices of transportation fuels—in particular, gasoline—as a result of being included in the cap-and-trade program. We cannot say what would happen to these prices if, instead of including transportation fuels in cap-and-trade, alternative policies were adopted to meet the AB 32 emissions targets. Such hypothetical alternatives also could affect fuel prices—increasing them more or less than cap-and-trade would.

## **Summary of Major Findings**

Below, we summarize the studies' major findings related to the effect of the cap-and-trade program on gasoline prices. In cases where the studies' findings differ, we rely more heavily on studies with more recent information and stronger methodologies. Most notably, our summary of gasoline price effects reflects a June 2014 report by the Market Simulation Group, a group of academic experts established by ARB. Many other studies' findings fall within the range of price increases that we report. These reports are discussed in Appendix B.

***Gasoline Price Increase Likely Will Be Roughly 13 Cents to 20 Cents Per Gallon, but Could Be Higher.*** Our review indicates widespread agreement that including transportation fuels in the cap-and-trade program will increase the retail price of gasoline. The magnitude of this price increase is uncertain. Under the most likely outcome, the price increase will be 13 cents to 20 cents per gallon by 2020. However, the price increase could exceed 50 cents per gallon by 2020. The actual magnitude of the price increase will depend on a wide variety of economic, technological, and regulatory factors that are very difficult to predict.

***Price Increase Will Be Difficult to Infer From Observed Prices.*** As discussed above, gasoline prices fluctuate over time for many reasons. As a result, a casual observer might not be able to disentangle the effects of a particular policy, like cap-and-trade, from the many other determinants of gasoline prices. That is, we could observe large increases in gasoline prices even if the program itself has a small effect. On the other hand, even if cap-and-trade leads to a large

price increase, it might be difficult to distinguish this increase from other fluctuations in gasoline prices. For example, a price increase of 60 cents per gallon of gasoline—an increase larger than many of the estimates we reviewed—would be smaller than the difference between the highest and lowest weekly gasoline prices observed in 2013.

For more information, please feel free to contact Seth Kerstein at (916-319-8365 or [Seth.Kerstein@lao.ca.gov](mailto:Seth.Kerstein@lao.ca.gov)) of my staff.

Sincerely,

Mac Taylor  
Legislative Analyst  
Enclosures

## **Appendix A**

### **List of Studies Reviewed:**

Air Resources Board (ARB), 2010. "Staff Report: Initial Statement of Reasons." *Proposed Regulation to Implement the California Cap-and-Trade Program, Part I, Volume I.* <http://www.arb.ca.gov/regact/2010/capandtrade10/capisor.pdf>

Boston Consulting Group (BCG), 2012. *Understanding the Impact of AB 32*. Prepared for the Western States Petroleum Association. [http://cafelfacts.com/wp-content/uploads/2012/07/BCG\\_report.pdf](http://cafelfacts.com/wp-content/uploads/2012/07/BCG_report.pdf)

Charles River Associates (CRA), 2010. *Analysis of the California ARB's Scoping Plan and Related Policy Insights*. Prepared for ARB. <http://www.crai.com/uploadedFiles/analysis-of-ab32-scoping-plan.pdf>

Market Simulation Group (MSG), 2014. *Report of the Market Simulation Group on Competitive Supply/Demand Balance in the California Allowance Market and the Potential for Market Manipulation*. Prepared for ARB.

[http://www.arb.ca.gov/cc/capandtrade/simulationgroup/msg\\_final\\_v25.pdf](http://www.arb.ca.gov/cc/capandtrade/simulationgroup/msg_final_v25.pdf)

Roland-Holst, David, 2010. *Real Incomes, Employment, and California Climate Policy*. Prepared for Next 10. [http://next10.org/sites/next10.org/files/Roland\\_Holst\\_Final.pdf](http://next10.org/sites/next10.org/files/Roland_Holst_Final.pdf)

Stonebridge Associates, Inc., 2012. *The Impact of the Low Carbon Fuel Standard and Cap and Trade Programs on California Retail Diesel Prices*. Prepared for the California Trucking Association. <http://caltrux.org/sites/default/files/CTALCFS.pdf>

Weiss, Jurgen and Mark Sarro, 2010. *The Economic Impact of AB 32 on Small Businesses: An Update*. Prepared for the Union of Concerned Scientists. [http://www.ucsusa.org/assets/documents/global\\_warming/AB-32-Small-Biz-Study-San-Diego-Report.pdf](http://www.ucsusa.org/assets/documents/global_warming/AB-32-Small-Biz-Study-San-Diego-Report.pdf)

Western Climate Initiative (WCI), 2012. *Discussion Draft Economic Analysis Supporting the Cap-and-Trade Program*. <http://www.westernclimateinitiative.org/document-archives/Economic-Modeling-Team-Documents/Discussion-Draft-Economic-Analysis-Supporting-CA-and-QC-Linking/>

## Appendix B

### Comments on Studies:

**Market Simulation Group.** This 2014 report forecasts 2020 allowance prices in nine different scenarios. Each scenario incorporates one of three different assumptions about vehicle emissions intensity and one of three different assumptions about availability of emissions abatement opportunities. Eight of the nine scenarios suggest that 2020 allowance prices likely will be at or near the auction reserve price—expected to be roughly \$17 per ton in 2020. These allowance prices imply gasoline price increases of roughly 13 cents to 20 cents per gallon by 2020. All nine scenarios also suggest, however, that 2020 allowance prices could be in or above the Allowance Price Containment Reserve (APCR)—a range of allowance prices expected to be roughly \$63 to \$79 per ton in 2020. Allowance prices within or above the APCR imply gasoline price increases exceeding 50 cents per gallon. This study’s scope is narrower than the others we reviewed, but our summary places very heavy weight on it due to its timing and methodological credibility.

**Studies That Use Large-Scale Economic Models.** This category includes those by the Western Climate Initiative, the Air Resources Board (ARB), Charles River Associates, and Roland-Holst. These four studies estimate allowance prices and other energy prices using large-scale economic models that are specifically designed to address energy policy questions. We have not conducted a detailed evaluation of these particular models. We generally view large-scale economic models as useful tools because they explicitly account for interactions among many different parts of the economy. However, we regard estimates produced by them with skepticism because some of their assumptions are difficult to justify empirically.

The Western Climate Initiative, study estimates 2020 allowance prices ranging from \$37 to \$66 per ton, depending on the availability of offsets. This range of allowance prices implies that including fuels in cap-and-trade will likely increase 2020 gasoline prices by 30 cents to 60 cents per gallon. We regard this study as the most useful of these four because it is the most recent.

The ARB study estimates that cap-and-trade will increase gasoline prices in 2020 by 4 percent to 8 percent and will increase diesel prices in 2020 by 2 percent to 4 percent.

Charles River Associates estimates that the set of all AB 32 policies will increase transportation fuel prices in 2020 by as much as 50 percent. However, non-cap-and-trade components of AB 32 appear to account for most of this effect. The report’s estimates of allowance prices imply that including fuels in cap-and-trade will increase 2020 gasoline prices by roughly 50 cents to 60 cents per gallon.

Roland-Holst estimates the combined economic effects of the set of all AB 32 policies in six different scenarios. The range of point estimates in these scenarios imply that the set of all AB 32 policies will lead to changes in 2020 gasoline prices ranging from a 2 percent reduction to a 4 percent increase. The report’s estimates of allowance prices imply that including fuels in cap and-trade will increase 2020 gasoline prices by 18 cents to 49 cents per gallon.

**Other Studies.** This category includes the 2012 report prepared by the Boston Consulting Group for the Western States Petroleum Association, the 2012 report prepared by Stonebridge Associates, Inc. for the California Trucking Association, and the 2010 report prepared by Weiss and Sarro of the Brattle Group for the Union of Concerned Scientists. These studies estimate fuel

price effects that are reasonable given their assumptions about allowance prices. However, they do not present detailed justifications for those allowance price assumptions.

The Boston Consulting Group does not explicitly estimate the effects of cap-and-trade on fuel prices, but it does present “cost recovery” estimates ranging from 15 cents to 77 cents per gallon in 2020. (These estimates appear to be in 2013 dollars. In projected 2020 dollars, they would be \$0.17 to \$0.87 per gallon.) If we assume that fuel suppliers pass through 100 percent of marginal cost increases to retail prices, we can interpret the Boston Consulting Group’s cost recovery estimates as estimates of price increases. The implied price increase estimates are reasonable given the assumed range of 2020 allowance prices, \$14 to \$70 per ton.

Stonebridge Associates estimates that cap-and-trade will increase retail diesel prices by \$0.49 per gallon in 2020.

Weiss and Sarro estimate that cap-and-trade will increase transportation fuel prices in 2020 by \$0.37 per gallon in a “conservative case” and by \$0.88 per gallon in an “extreme case.”