Monday, May 11, 2009

CRA Comments on ARB's Emissions Leakage Proposal

Introduction and Summary

We at CRA, International ("CRA") appreciate the opportunity to submit our comments on the Air Resource Boards ("ARB's") initial plan to address emissions leakage in a cap-and-trade program. ARB's initial framework was presented at an April 13, 2009 workshop and our comments address the questions raised at the workshop. CRA is a worldwide management, economics and financial consulting firm. We have been analyzing the economic impacts of alternative designs for California's climate policies since Governor Schwarzenegger issued Executive Order S-3-05.[1]

Our two primary suggestions are, first, that the ARB needs to expand the quantitative economic analysis it has proposed to conduct by incorporating Computable General Equilibrium ("CGE") modeling. AB 32 is likely to lead to significant shifts in California's economy and hence changes in the state's industrial output. CGE models are designed to capture these shifts and all the spillover and feedback effects from these shifts; whereas partial equilibrium or bottom-up models fail to account for the impacts of one sector on another sector. Thus the partial equilibrium and bottom-up models do not correctly capture all the trade interactions and substitution possibilities of the policy and hence cannot fully account for leakage. CGE modeling can more accurately quantify the impact of proposed emissions regulations for the industries that are likely to be significantly impacted (which we understand that ARB has already largely defined). In addition, CGE modeling can also evaluate secondary impacts and incorporate the dynamic aspects of the emission's program. Second, we believe ARB's framework for determining the competitiveness of the industries that will be impacted should include more explicit guidelines like those developed by the Department of Justice/Federal Trade Commission for antitrust purposes (referred to herein as the "DOJ/FTC Guidelines"). We believe that by providing additional information and analytical structure, our proposed modifications will help ARB to produce a more effective and efficient regulatory program design that will mitigate emissions leakage.

We also want to emphasize that program design is critical to minimizing leakage concerns because as the costs of compliance increase, leakage will also increase. Absent adopting CGE modeling and a more robust framework for considering emissions leakage, we are concerned that the end result will be regulations that are based on more *ad hoc* assumptions, such as the perceived ability for an

[1] See, *e.g.,* "Program on Technology Innovation: Economic Analysis of California Climate Initiatives: An Integrated Approach," March, 2007, http://www.crai.com/Publications/listingdetails.aspx?id=4804&pubtype=Reports); and "An Updated Macroeconomic Analysis of Recent California Climate Action Team Strategies," October, 2007, www.epri.com

industry to pay for emissions compliance, and that the regulations therefore will not result in efficient emissions reductions nor minimize the associated leakage concerns.

After first summarizing our understanding of ARBs proposed framework to address emissions leakage, we provide more specific details on our two primary suggestions and address the specific questions posed by ARB at the April 13, 2009 workshop.

ARBs Proposed Framework

According to the material provided at the April 13, 2009 workshop, AB32 requires minimization of emissions leakage to the extent feasible (both for programs arising from a cap-and-trade regime, as well as more general AB32 related regulations). ARB has defined "leakage" as a reduction in emissions of greenhouse gases (GHGs) within California that is offset by an increase in emissions of GHGs outside of California. Emission leakage can arise when economic production that previously occurred within California moves to other geographic regions in response to AB32's regulations. ARB has further proposed to consider whether economic production is transferred to a jurisdiction without a GHG emissions cap when considering emissions leakage concerns, although it was not clear how this review would actually be implemented.

In order to analyze emissions leakage, ARB has proposed a framework with three basic steps: (1) Define the potentially exposed sources (*i.e.*, which industries are at risk of having significantly increased production costs due to the new regulations); (2) Identify methods to estimate the potential compliance costs for the identified industries (*i.e.*, what steps can producers take to comply with the new regulations); and (3) Identify methods to assess the ability to pass-through the increased costs of regulatory compliance.

Given this framework, ARB's analysis will consist largely of evaluating the competitiveness of the industries that are assumed to be significantly impacted by the new regulations, termed "Emissions Intensive, Trade Exposed Industries." ARB's proposal notes certain metrics that can be used to estimate the competitiveness of each impacted sector, such as market shares, market concentration, and transportation costs. Presumably, the outcome of this analysis is to incorporate mitigating features in regulatory program design that will minimize emissions leakage, although we understand that the specifics of any mitigation plan will be determined in a future proceeding. In addition, the issue of whether ARB considers emissions leakage concerns to be a transitional concern or one that is assumed to continue in the future was noted, but not resolved, at the workshop. Obviously this determination should play a significant part in determining how to address emissions leakage.

Computable General Equilibrium Modeling

In short, we believe that the methodology proposed by ARB in its concept paper for reviewing leakage issues is too narrowly focused. The framework will likely produce a series of "bottoms-up" analyses on the competitiveness of each industry and will fail to account for general equilibrium interactions of (1) the different regulatory climate change related programs applied on a sector by

sector basis and (2) the existing regulatory restrictions related to implementing AB32. The very nature of partial equilibrium and bottom-up models means that they concentrate on one sector and assume no changes in other sectors. These models will miss out on the changes in relative prices among the different sectors. Furthermore, these models have difficulty correctly accounting for the behavior of capital markets and therefore how the costs of switching to new technologies or processes in response to climate change policies would evolve over time. As discussed by many participants at the workshop, the dynamic aspects for how the new emissions-related regulations impact specific industries as well as the overall economic conditions in the state are likely to be very important. We do not believe that these items are well addressed within the proposed framework and, therefore, recommend that ARB should incorporate CGE modeling in its ongoing review process.

Assessments of leakage should be based on comprehensive economic modeling and analysis and should be forward looking, addressing key questions such as how new investment decisions will be effected. CGE models require specifying a baseline of expected conditions, absent the proposed new regulations. This baseline can incorporate the impact of existing regulations on emissions and leakage. This ability of CGE models to capture dynamic impacts and the entire supply chain (instead of specific pre-designated sectors) makes it critical in the design and evaluation of proposed regulatory programs, such as cap-and-trade.

To estimate the likely leakage that will result from implementing AB 32, one needs a multi-region economic model that is fully dynamic. In addition, the best suited model would be one that links a CGE macroeconomic model with various detailed bottom-up industry models. A fully dynamic, multi-year model is needed to account for new investment decisions, such as will companies build new facilities in-state or out of state. To capture the costs of industries locating facilities out-of-state requires representing costs in these regions. Therefore, a model must represent California and California's major trading partners. Specifically, one needs a model that represents at a minimum California, the rest of the U.S., and the rest of the world. The model needs to have a CGE macroeconomic module to account for all the economy-wide interactions. Finally, to better understand impacts on specific industries, the model should be linked to bottom-up models of the most vulnerable sectors.

The following bullet points provide more supporting points why a multi-region, fully dynamic model that links a CGE macroeconomic model with bottom-up industry models is the proper framework in which to assess leakage that would likely occur under AB 32.

- The other programs summarized by ARB in its concept paper largely focus on existing carbon emissions. This appears to also be the focus of ARB's proposed methodology. But, the current or existing carbon emission at a facility or industry is not necessarily a useful metric in determining the economic cost and impacts of a cap-and-trade program and its associated impact on emissions leakage. For example, an existing entity with large carbon emissions may be able to significantly reduce its emissions at a relatively

low cost and not be significantly impacted by a cap-and-trade program, while another existing entity that currently has smaller emissions could be dramatically impacted by a cap-and-trade program if it is unable to efficiently comply with the new regulations. This dynamic would be missed in a proposed review that focuses only on major existing emission facilities.

- Costs of compliance with direct regulatory measures also matter. An industry that is already incurring high costs to comply with mandatory regulations to reduce emissions may be pushed over the edge by a requirement to pay for allowances for its remaining emissions, particularly if the regulatory programs leaves it with few options for reducing emissions further.
- The complexity of upstream and downstream impacts of carbon policy, including the costs of regulatory compliance by suppliers and impacts of regulatory compliance on demand by downstream customers, requires modeling the entire value chain and markets. It is not feasible to estimate indirect CO2 emissions accurately on a case by case basis, because of the imprecision of such techniques, the duplication of effort, and the impossibility of identifying interactive effects among changes in different industries. For example, the loss of one industry in California that is obviously trade vulnerable may make it uneconomic for its suppliers or key customers to remain in the state.
- The CGE model can address other factors that are important to estimating leakage:
  - Ability to represent shifts in position on industry supply curves
  - Homogeneity of products
  - Changes in customer demand driven by regulations and costs affecting customers
  - Direct and indirect changes in all input costs
- Looking at carbon intensity and trade exposure alone is only a starting point, and will fail to identify industries or facilities likely to leave the state. Therefore, bottom-up models of the most vulnerable sectors are needed. These models must be able to capture the following issues.
  - First, industries do not decide to close plants or make new investments outside California rather than in California. Individual companies do. Thus the position of a particular facility on the industry supply curve relative to its competitors, and how (a) its position is shifted and (b) demand for the industry's output is shifted by climate policy will determine whether or not a plant closes. We found in studies of how increased electricity costs would affect individual pulp and paper mills that it was not necessarily the most electricity intensive or inefficient plants that were likely to close.
  - Second, the most important form of leakage will not be closing of existing facilities but decisions to locate new facilities outside California that would have been located in California without added carbon costs or regulatory burden. To assess this form of leakage it is necessary to use an adequate CGE model to project a <u>baseline</u> in the absence of AB32 regulations and cap and trade programs and then implementation scenarios with different forms of protection against outside competition.

- Cap and trade is not the only source of cost that can cause leakage. Regulatory programs, including those already developed, will also increase California industries cost and cause leakage. A realistic assessment of these regulations is required to avoid overly optimistic conclusions about leakage. A CGE model is needed to represent these policies in a consistent framework.
- Some forms of leakage will be caused by the design of regulations and not specific to industries with large carbon footprints. The most obvious example is when California adopts standards more stringent than those in the rest of the United States (for example LCFS and CAFE), thereby giving manufacturers an opportunity to divert shipments of low carbon products to California and sell their high carbon products in the rest of the United States, thus complying with both California and US regulations, increasing profits, and making no change in emissions. Therefore, a multi-region model is needed to correctly represent how industries will comply with AB 32.
- It is only possible to identify vulnerable industries and the likely amount of leakage with a full CGE model of the U.S. economy that is fully linked in international trade.

Incorporating Lessons from DOJ/FTC Guidelines

We recommend considering more explicitly the existing guidelines developed by other regulatory bodies to review market structure and competition issues, specifically, the DOJ/FTC Guidelines that are used to define relevant product and geographic markets.[2] The basic concepts of these guidelines are already included to some degree in ARB's proposed indicators and in the two programs reviewed in ARB's concept paper and ARB Staff noted at the workshop that they were aware of the DOJ/FTC Guidelines. But we believe that ARB's framework should draw more explicitly on the guidelines that are the output of a long history of reviewing industry competitiveness. While the DOJ/FTC Guidelines were developed for antitrust purposes and not all aspects of the DOJ/FTC Guidelines may be applicable in this context, the basic analytical methodology and concepts could largely be applied in ARB's regulatory program, given that in both instances the analysis is focused on the "competitiveness" of an industry and how the market is impacted by a change. For antitrust analysis, the hypothesized change is from combining what were previously competing firms, while in the context of emissions regulation, the change is the impact of increased cost from the new regulatory program. Still, the basic analysis is to understand and quantify, to the extent possible, the impact of one group of producers charging a higher price for their goods or services.

2 Note that other regulatory agencies have adopted the DOJ/FTC Guidelines to assist them with addressing competition issues. For example, the Federal Energy Regulatory Commission ("FERC") has adopted the guidelines and made certain modifications as part of the agency's responsibility to review mergers and acquisitions under its regulatory authority.

The DOJ/FTC Guidelines for defining geographic and product markets in particular could be valuable to ARB in considering the competiveness of markets impacted by its regulations. A short description, provided below, summarizes the basic framework of the DOJ/FTC Guidelines:[3]

> *The Guidelines define a market as "a product or group of products and a geographic area in which it is produced or sold such that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future producer or seller of those products in that area likely would impose at least a 'small but significant and nontransitory' increase in price, assuming the terms of sale of all other products are held constant." Guidelines § 1.0.*
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> *This approach to market definition is referred to as the "hypothetical monopolist" test. To determine the effects of this "'small but significant and nontransitory' increase in price" (commonly referred to as a "SSNIP"), the Agencies generally use a price increase of five percent. This test identifies which product(s) in which geographic locations significantly constrain the price of the merging firms' products.*
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> *The Guidelines' method for implementing the hypothetical monopolist test starts by identifying each product produced or sold by each of the merging firms. Then, for each product, it iteratively broadens the candidate market by adding the next-best substitute. A relevant product market emerges as the smallest group of products that satisfies the hypothetical monopolist test. Product market definition depends critically upon demand-side substitution--i.e., consumers' willingness to switch from one product to another in reaction to price changes. The Guidelines' approach to market definition reflects the separation of demand substitutability from supply substitutability--i.e., the ability and willingness, given existing capacity, of firms to substitute from making one product to producing another in reaction to a price change. Under this approach, demand substitutability is the concern of market delineation, while supply substitutability and entry are concerned with current and future market participants.*
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> *Definition of the relevant geographic market is undertaken in much the same way as product market definition--by identifying the narrowest possible market and then broadening it by iteratively adding the next-best substitutes. Thus, for geographic market definition, the Agencies begin with the area(s) in which the merging firms compete respecting each relevant product, and extend the boundaries of those areas until an area is determined within which a hypothetical monopolist would raise prices by at least a small but significant and non-transitory amount.*

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3 From DOJ/FTC's *Commentary on the Horizontal Guidelines*, available at: http://www.ftc.gov/os/2006/03/CommentaryontheHorizontalMergerGuidelinesMarch2006.pdf This document has links and citations to all of the DOJ/FTC Guidelines.

Using these principals to determine, for example, the relevant geographic market would directly shed light on emissions leakage (*i.e.*, if the geographic market is estimated to be broader than the zone in which cap-and-trade of other emissions related regulations will be applied, then clearly leakage is a significant concern). Similarly, using the DOJ/FTC Guidelines would help to highlight other potential impacts of emissions regulations that could impact emissions leakage and the overall effectiveness of any regulatory program, such as changes in consumer demand, but which may not be evident in a more *ad hoc* review.

Specific Questions Posed by ARB

ARB posed a number of specific questions in the documents provided at the workshop. Our responses to each are provided below.

1. Should potentially exposed sources be defined by sector or subsector? By an activity as a set of processes?

See response above on the value of using DOJ/FTC Guidelines that provide for exactly this review and asks these types of "market definition" questions, which may vary sector by sector.

With respect to specific data used in the analysis, our experience in modeling leakage for energy intensive industries is that very misleading results can be obtained using standard economic statistics, even in a full CGE model that incorporates global competition and all the direct and indirect consequences of carbon costs. For example, using even disaggregated NAICS or IMPLAN data on the iron and steel industry shows relatively little harm from overseas competition. We learned on further examination that this is because the highly energy intensive portion of the industry, primary steelmaking in basic oxygen and electric arc furnaces, is mixed into less intensive operations in NAICS data. When we disaggregated further based on industry data and treated iron and steel as a homogeneous good in international trade, we found that the impacts could be devastating. This suggests that any determination of vulnerability must be facility and process specific, and understand the trade relationships and competitive conditions for the most carbon intensive segments of an industry.

2. Should potential exposed sources be defined in the context of trade market? How to incorporate industry market trends.

See above comments on incorporating CGE and DOJ/FTC Guidelines.

3. Identify methods to estimate potential compliance costs? What information on reductions ability, reporting, and financial data is available?

A CGE model is the correct tool to estimate economy-wide compliance costs because it represents the entire economy.

4. Identify methods to assess ability to pass-through costs (import and export prices, share of trade in the market, price elasticity).

See above comments on incorporating CGE and DOJ/FTC Guidelines.

5. Identify other relevant quantitative/qualitative information.

See above comments on incorporating CGE and DOJ/FTC Guidelines.

Conclusion

We appreciate the opportunity to provide these initial comments. CRA is an expert in CGE modeling and an industry leader in applying the DOJ/FTC Guidelines in a variety of forums. We would be happy to work with ARB as it finalizes its framework for evaluating emissions leakage.

Thank you again for the opportunity to provide these comments.

Sincerely yours,

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