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# Getting the Job Done Right: Employment Growth And California's Global Warming Solutions Act

**Summary for Policymakers**

A number of studies have been conducted to examine the potential economic consequences of CARB's *Climate Change Proposed Scoping Plan*. CARB's own analyses indicate that AB 32 will have positive economic benefits due principally to savings from improved energy efficiency and development of petroleum alternatives that will result in net cost reductions for businesses and other consumers. M.Cubed examined existing analyses to assess the potential for positive changes in California's investment patterns and employment in response to AB 32 policies. The study found that well-crafted policies are likely to result in positive employment growth and will reinforce beneficial changes that have already emerged from existing state energy policies. Key findings include:

- **California is well positioned to lead the nation's transition to a clean energy economy because of changes that have occurred over the past three decades.** High energy prices combined with other factors such as housing costs, make relatively low-value activities financially unattractive in California. Consequently, Over the past decades, a significant share of the state's manufacturing sector has relocated while California has grown more competitive in the industrial design and advanced fabrication, health, education and professional services sectors and in its other place-based industries – agriculture and tourism. As a result, California is well positioned to take advantage of the opportunities created by reducing greenhouse gas emissions and to avoid employment dislocations.

  Employment spurred by AB 32 implementation is likely to be in the following sectors or market segments, as well as their associated supply chains:

  - Biofuels production to power transportation and generate electricity.
  - Construction of renewable energy installations and transmission infrastructure, weatherizing buildings, and upgrading heating, ventilation, and air conditioning.
  - (Clean) Technology associated with energy efficiency, advanced materials and nanotechnology, high efficiency vehicles, photovoltaics, and related software.
  - Environmental engineering services for testing and compliance.
  - Consumer products, particularly biodegradable packaging and plastic ware and nontoxic household cleaners.
  - Information technologies, such as software to monitor and improve the environmental performance of buildings, equipment and production systems.
  - Transportation and logistics in the areas of fuel cells, diesel retrofits, and planning.
  - Waste and water purification and conservation and efficiency measures.

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- **The adoption of similar efforts to reduce emissions by nearby states – and anticipated federal action from a new U.S. Administration – can protect California jobs and give California a competitive advantage in the low carbon economy.** Several Western states and Canadian provinces have pledged to reduce greenhouse gas emissions as part of the Western Climate Initiative and President-elect Obama has committed to a national cap on GHG emissions. These actions will reduce both jobs and emissions leakage from California and give our state a competitive advantage as a result of our trailblazing efforts to transition to a low carbon economy.

- **Existing public policies and economic conditions are already acting to transform the state's economy in the direction of AB 32.** Current law and public policies, including the Renewable Portfolio Standard, and subsidies for energy efficiency investments and solar installations, are already transforming the state's economy. Already, California has among the lowest emissions per dollar of production in the U.S. and the world. Also, transportation costs are encouraging businesses to locate closer to California's massive markets, while existing policies are attracting "cleantech" industry clusters in California.

- **Expenditures for energy and transportation can be lowered by AB32 measures.** Similar to the productivity enhancements of telecommunications and computers, AB 32 implementation will prompt higher energy productivity – greater output per unit of energy input. Household and business spending for electricity, fuels and vehicles will be lowered by implementing AB32. Furthermore, experience shows that energy efficient buildings are not significantly more costly to build, return savings from lower energy bills, and employ workers using existing skills for high wages.

- **AB 32's emphasis on renewable technologies will create jobs.** The influx of investment in electric power generation using renewable technologies, as well as the general increased reliance on these generating sources, will result in more employment gains than building fossil fuel-based power plants.

- **AB 32 will attract energy research and development (R&D) investment into the state.** Five of the top investors in "clean" technology (e.g., solar, biofuels, smart grid systems) are located in California already. A long-term commitment to market-based and technology-inducing policies, such as those proposed in the Scoping Plan, will maintain R&D momentum for California.

- **Market-based policies that bridge economic transitions and that expand access to financing will reduce adverse consequences on particularly vulnerable populations.** For example, allowing homes and businesses to aggregate their emission reductions as a way to participate in carbon trading markets would enable them to benefit economically while reducing their emissions. The additional revenue would provide the necessary capital to make further energy-saving investments. Likewise, implementing a comprehensive trading regime which enables cost-effective trades to be flexibly made across all sectors would help lower AB 32's transition costs and more rapidly lead to productive outcomes. Further, the development of new financing mechanisms such as on-bill and property tax financing and power purchase arrangements would provide greater access to capital that will lead to additional jobs.

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# Challenges of Modeling Prescriptive and Market-Based Measures: What's Missing from CARB's Economic Analysis?

## Summary for Policymakers

The AB 32 Scoping Plan lays out a set of economy-wide measures to meet a cap on greenhouse gas emissions by 2020 that will involve investments to fundamentally change California's energy systems. Such ambition is not new to California. In the 1950s, the state expanded its highways, water supplies and education systems, and few would dispute that these investments have paid off handsomely. Yet economic computer models have great difficulty analyzing in a quantitative fashion the behaviors of producers and consumers that lead to economically beneficial outcomes.

CARB has used two models to evaluate the economic implications of the Scoping Plan. CARB acknowledges the models' limits, using them to provide only a directional sense of economic effects (i.e. positive or negative) in a year 2020 snapshot. Though the initial intent was to conduct a comparison of the consequences of different policy approaches for AB 32, any such comparison is not supportable by the state-of-the-science models, nor are sufficiently precise and robust data available to drive the models.

Given the state-of-the-science of economic modeling, policymakers are better served by focusing on lessons from other programs and the economic literature that highlight (a) inadequacies of prescriptive or "command and control" (CAC) measures, and (b) the relative merits of incentive-based or market-based (MB) measures. Most notably, cap-and-trade programs have several characteristics that suggest they will deliver effective, efficient, and lowest-cost emissions reductions and results that are superior to CAC measures.

The myriad advantages of MB measures are nonetheless very difficult to elicit with modeling comparisons. These benefits and associated modeling limitations are:

| Cap-and-Trade Advantage | Difficulty in Modeling this Advantage |
|---|---|
| *Lowers compliance costs:* By acknowledging existing differences among firms and increasing compliance options (e.g., fuel switching versus installing a specific technology), MB measures use trading among firms to lower compliance costs. | Economic models do not effectively capture the differences among firms nor a regulator's inability to fully know these differences. Comparative advantages are what create the incentive to trade among firms, so the models do not represent this benefit of MB measures. |
| *Encourages technological innovation:* MB measures encourage both increased R&D and wider, more rapid adoption of new technologies. Innovators are able to profit from introducing technological solutions and face less risk that these technologies will be rendered obsolete by regulatory fiat. | Technological innovation and diffusion is a complex, dynamic process that is self-reinforcing, adaptive and cannot be represented explicitly in models. Economic models tend to capture a snapshot of technologies but not changes in the underlying conditions over time. |

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| Cap-and-Trade Advantage | Difficulty in Modeling this Advantage |
|---|---|
| *More readily adaptable:* MB measures are more adaptable to changing conditions and understanding because they decentralize decision-making and bypass the need to revisit detailed regulatory rulemakings. | The adaptability and robustness of a policy cannot be evaluated using models. Typically only one or two future scenarios are modeled, so it is hard to represent the full range of possible futures thereby displacing the advantage of decentralized decision-making and adaptation with static assumptions. |
| *Relieves regulatory burden on agencies:* MB measures relieve regulators of the need to specify regulations beyond an overall objective. Regulators can set a sector-wide emission target or performance standard and then leave it to firms to decide among themselves how best to comply. | The economic modeling ignores the costs to firms when regulations change. Regulatory certainty is very valuable to firms, helping to plan strategies that minimize compliance costs. Models fail to account for the delays and compliance costs of revising CAC regulations continually. |

The successes of market-based policies, including cap-and-trade, are now well documented:

- Trading in SOx allowances under the Federal Acid Rain Program enabled utilities to choose among a wide range of compliance strategies, led to management innovations and reduced the burdens of excessive investments in control equipment;
- Trading programs accelerated the removal of lead from gasoline and inspired refining innovations that led to other regulatory requirements such as reformulated gasoline;
- Market mechanisms successfully addressed critical constraints during California's severe drought from 1991 to 1994 and led farmers to realize that investing in efficient irrigation methods could lead to higher profits.

Perhaps the best example of the potential gains from using a MB approach comes from the schism and reunification of Germany. At the end of World War II, the nation was split – one managed under a centrally-planned economy while the other relied on a market economy. When reunited in 1990, West Germany had outperformed East Germany by doubling the latter's economic output. More importantly, West Germany had become one of the most technologically advanced and environmentally benign economies while East Germany was still reliant on dirty, 50-year-old technologies.

Using MB measures does not mean "declaring a market exists" and walking away (which is what happened in Eastern Europe in the early 1990s). A number of market design issues must be addressed such as ensuring compliance, establishing how buyers and sellers find each other, setting guidelines for price negotiation and trade settlement, and prescribing how to overcome anticipated market barriers, inefficiencies and inequities. These concerns can be resolved in ways that still leverage the incentive and innovation advantages of cap-and-trade policy. With approval of the *Proposed Scoping Plan*, California will embark on a discussion of cap-and-trade design details that can avoid unwanted opacity, market manipulation or windfall profits without imposing costly mandates on economic sectors or individual firms.