The Climate Reality Project
SILICON VALLEY CHAPTER

December 14, 2023

Dr. Mark Sippola
Branch Chief, Cap-and-Trade Program
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Economic Modeling

Dear Dr. Sippola,

The UC Davis statistical economic model of the Cap-and-Trade market cannot be expected to accurately forecast future economic conditions, but could provide invaluable policy guidance by identifying major trends and tradeoffs between policy choices. We offer the following recommendations relating to the modeling effort to ensure its relevance and applicability to California's greenhouse gas policy objectives. (Some of these recommendations might be beyond the scope or capabilities of the UC Davis model, but could perhaps be addressed in a broader modeling program.)

(1) Translate the graphical probability histograms into succinct statistical metrics, e.g., mean expectation values and 1-sigma confidence intervals for allowance prices and emissions. Quantify the model results and conclusions in terms of statistical metrics.

(2) Calculate cumulative probability distributions for statewide emission rates in capped sectors (e.g., annual emissions in 2030 and 2045), and estimate the probability of achieving the 40%, 48%, and 55% targets in 2030 and the net-zero target in 2045. Also calculate cumulative emissions (time-integrated rates) in 2045, which are more relevant than annual emissions to climate impacts and long-term decarbonization costs.

(3) In addition to the alternative 2030 emissions targets, include price ceiling alternatives in the modeling scenarios. (As noted by CARB staff in the workshop Q&A session, the current price ceiling is based on an outdated social-cost-of-carbon estimate.)

(4) Calculate economic indicators such as household income that are more relevant than allowance prices to the “impacts on resident households, businesses, and the state’s economy” per HSC §38562(c)(2)(A)(i). Define a useful cost comparison metric for rating policy alternatives, and reconcile any gross discrepancies with the Scoping Plan's cost projections. (CARB staff stated in the workshop Q&A that the UC Davis modeling “does not reflect what we expect or what we're forecasting prices to be in the real world.” However, the Scoping Plan does not forecast allowance prices. The discrepancy should be resolved.)

(5) The modeling should extend to 2045. There can be a tradeoff between short-term and long-term costs, and a short-term simulation will not capture these tradeoffs. For example, CCS might be pursued as a strategy for accelerating decarbonization and meeting near-term emission reduction goals without requiring early retirement of vehicles, appliances, and industrial equipment. But if CCS is deployed at a scale sufficient to materially influence allowance prices (as suggested by CARB staff in the workshop Q&A), the strategy could later result in overcapacity and stranded assets as renewable energy becomes progressively more economical than fossil fuels with CCS.[1,2]

(6) Calculate an estimated post-2045 residual cost based on cumulative statewide emissions through 2045. The SC-CO2 can be used for comparing the residual cost of cumulative emissions under alternative policy scenarios. Policies that incentivize accelerated decarbonization will result in lower cumulative emissions and a lower residual cost in 2045.

(7) In addition to calculating probability statistics for emissions and costs under multiple alternative policy scenarios, apply the model to determine a policy alternative that minimizes the expected long-term cost of achieving the 2045 net-zero goal (including the post-2045 residual cost).

(8) Evaluate and, if possible, model cost containment via allocation of allowance revenue (including GGRF expenditures).

(9) Regarding the "Mean Elasticity" values tabulated in slide 24, two types of elasticity should be distinguished: energy consumption elasticity, and the elasticity of substitution of zero-carbon energy and products for carbon-intense energy and products. Evaluate

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[1] Bacilieri, A., Black, R., & Way, R. (2023). Assessing the relative costs of high-CCS and low-CCS pathways to 1.5 degrees.

[2] Grubert, E., & Sawyer, F. (2023). US power sector carbon capture and storage under the Inflation Reduction Act could be costly with limited or negative abatement potential. *Environmental Research: Infrastructure and Sustainability*, 3(1), 015008.

and, if possible, model the relative efficacy of and tradeoffs between consumption-restrictive and technology-forcing policy alternatives. For example, allocation of auction revenue to consumers or businesses can diminish consumption-reduction incentives, but can enable a higher price ceiling and commensurately higher technology-forcing incentives. (The reduced disincentive for using fossil-fuel energy is offset by a much greater incentive for renewable energy.)

(10) Evaluate and model the potential impact on statewide emissions of additional climate actions outside the scope of state mandates and regulations. This includes individual actions (e.g., energy conservation, electrification, residential solar and storage, overcompliance with ZEV sales targets, Voluntary Renewable Electricity purchases), local government initiatives (e.g., Climate Action Plans), and federal action (the Inflation Reduction Act). This analysis would help inform unregulated actors on the effectiveness of their actions, and could help guide CARB in adapting its policies to maximize the effectiveness of such actions.

The economic modeling effort is not an academic exercise; it could provide very practical and timely guidance to California's climate policies. We recommend that this work continue to be supported and expanded to inform ongoing legislative and regulatory climate actions, bearing in mind the immediacy of the 2030 target.

Sincerely,

Kenneth Johnson, Legislation and Public Policy Committee
The Climate Reality Project: Silicon Valley Chapter