November 21, 2016

California Air Resources Board (CARB)
1001 I Street
Sacramento, CA 95814

Re: Public Workshop on the 2030 Target Scoping Plan (November 7, 2016)

Dear CARB staff and stakeholders,

Thank you for the opportunity to comment on the recent CARB Workshop presentations concerning the 2030 Target Scoping Plan.[1]

For context, we are longtime academic observers of California's energy and climate policies. Each of us has spent over a decade conducting research on state, federal, and international climate policy with a particular focus on the design and implementation of emissions trading systems and their impact on the electricity sector. We have also worked extensively on legal issues that affect the application of state climate policies to interstate markets for electricity and transportation fuels.

We are grateful for the staff presentations made at CARB's November 7, 2016 Scoping Plan Workshop. Our comments today focus on two elements of the public workshop: CARB staff's presentation of the Draft Scoping Plan Policy Scenarios and CARB staff's Preliminary Economic Analyses.

Overall, while we believe that the workshop represents an important step in articulating how CARB's Scoping Plan will achieve the statewide 2030 emissions limit required by SB 32, CARB still lacks critical information necessary for stakeholders—and even CARB—to perform a reasonably informed evaluation and comparison of the Scoping Plan Scenario and its Alternatives.

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[1] CARB, Public Workshop on the 2030 Target Scoping Plan (Nov. 7, 2016) (hereinafter "CARB Presentation"), *available at* https://www.arb.ca.gov/cc/scopingplan/meetings/meetings.htm.

Significant new analysis is needed to properly inform California's ambitious climate policy strategy. Moreover, this analysis analysis needs to be performed prior to moving forward to a Draft Scoping Plan.

We describe what we believe is necessary for a full evaluation in our comments below. We highlight five major issues in this letter:

- **Improved Transparency.** In order for stakeholders to evaluate the alternatives presented, CARB should disclose all model inputs, assumptions, and outputs. CARB should also provide additional time for stakeholders to review and evaluate these disclosures.

- **Policy Specificity.** CARB refers to a number of policies that are estimated to have major impacts on simulated emissions, but provides little or no explanation for how these policies would be designed or achieved. For example, CARB states that the refining sector can reduce its emissions 20 to 30% without any discussion as to how these requirements would be imposed or realized. Much more information needs to be provided on how CARB plans to achieve the reductions forecast in order to evaluate the proposed alternatives.

- **Policy robustness.** CARB's initial scoping plan relied on what turned out to be a very inaccurate forecast of key drivers of California GHG emissions—most notably with respect to the trajectory of state economic growth, a notoriously difficult variable to accurately predict. One consequence of the earlier forecast error is the present oversupply in the state's cap-and-trade market and hence, limited revenue for the Greenhouse Gas Reduction Fund (GGRF). At the November workshop, staff once again relied upon a single reference emissions scenario; however, the use of a single reference scenario falls short of best practice in long-term policy analysis. We strongly recommend developing multiple reference scenarios that incorporate both low and high electricity load growth, transportation fuel demand growth, population growth, and overall economic growth. Only an analysis that considers multiple baseline scenarios can ensure that the selected Scoping Plan strategy is capable of achieving California's policy goals.

- **Energy-economic modeling.** CARB's analysis relies on two models: PATHWAYS, an engineering model that does not take into account interactions between economic sectors, and REMI, an economic model that does not simulate energy or greenhouse gas emissions. As a result, CARB must assume carbon prices, rather than estimate them endogenously. This means that CARB cannot endogenously estimate the macroeconomic impacts of the Draft Scoping Plan Scenario. Similarly, CARB cannot use these models to estimate carbon market prices (Draft Scoping Plan Scenario) or design a carbon tax (Alternative 2) that would achieve the 2030 Target. CARB's assumptions about carbon pricing under a cap-and-trade program (Draft Scoping Plan Scenario) and under a carbon tax (Alternative 2) are inconsistent and frustrate an even-handed comparison of these two policy mechanisms.

- **Quantity Certainty.** The design of the current cap-and-trade system allows for unlimited banking. Given the ambition of the 2030 Target and the current oversupply in the carbon market, it is very likely that market participants will over-comply in the early 2020s, bank allowances, and under-comply in the second half of the 2020s (using banked allowances to satisfy program requirements in these years). This strategy appears inconsistent with SB 32, however, because the statutory target requires statewide emissions to be at 40% below 1990 levels in 2030—not that the integral of emissions over 2021-2030 equal some fixed quantity. Staff should explain how the Draft Scoping Plan Scenario (cap-and-trade with allowance banking) will comply with the legally mandated 2030 emissions target. An explanation is particularly important given the criticism in the staff presentation regarding lack of an emissions limitation for Alternative 2 (Carbon Tax).

1. Improved Transparency

We believe that a transparent and open process will facilitate broad stakeholder agreement on the best path forward for achievement of California's GHG reduction goals. In turn, this requires CARB to provide more information about the Draft Scoping Plan and Alternative Scenarios,

including the assumptions and modeling data behind each of the measures considered in the staff presentation.

It is clear that staff have undertaken significant modeling efforts using both the PATHWAYS and REMI models in the course of developing the Scoping Plan Scenario and Alternatives 1 and 2. We strongly believe that the inputs and assumptions from these model runs should be made available to interested stakeholders for analysis and evaluation, along with the complete model output files. Absent full disclosure of these technical details, it is impossible to properly evaluate the feasibility and impacts of the strategies articulated in CARB's scenarios.

Disclosure will also help improve the quality of analysis in the final 2030 Scoping Plan. CARB's use of an engineering model that does not include interaction between economic sectors (PATHWAYS) with an economic model that does not incorporate energy or GHG emissions (REMI) means that modeling assumptions (including interactions between assumptions made in PATHWAYS and REMI) are a critical determinant of CARB's Scenarios. A full public review and evaluation of these assumptions is therefore essential for evaluating the plausibility of each scenario, as well as for comparing the attributes of the policies proposed in the Draft Scoping Plan Scenario and its Alternatives. Without providing these data, CARB is asking the stakeholder community to take the agency's word.

We note that for major complex EPA air pollution related rulemakings, all Integrated Planning Model baseline and scenario results are released for external review as common practice.[2] EPA maintains this practice for politically controversial rulemakings, such as the Clean Power Plan.[3] We think this approach represents the best practice in public policy analysis, and believe CARB staff can and should achieve this standard in its 2030 Scoping Plan process. In addition to being the right way to pursue public

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[2] EPA, Clean Air Markets, Power Sector Modeling, *available at* https://www.epa.gov/airmarkets/clean-air-markets-power-sector-modeling.

[3] EPA, Analysis of the Clean Power Plan, *available at* https://www.epa.gov/airmarkets/analysis-clean-power-plan.

policy, transparent disclosure will also benefit CARB by increasing confidence and stakeholder buy-in with respect to the analysis that underlies staff proposals and the final 2030 Scoping Plan.

2. Policy Specificity

A number of the policy measures outlined in the CARB Presentation lack specificity. The two most striking examples of this are the proposed "refinery measure" and the "industrial sector measures." Both have significant impacts on statewide GHG emissions, not to mention potential impacts to in-state GDP, fuel costs, and industrial productivity. We address each in turn.

The CARB Presentation explains only that the "Refinery Measure" will result in either a 20 or 30 percent reduction in energy demand by 2030 from the refinery sector, with associated emissions reductions.[4] One is left to wonder whether emissions reductions will be achieved by reduction in energy intensity or by reduction in output. CARB does not present sufficient information to distinguish between these two alternatives, but their consequences are significant for stakeholders and public policy goals alike: if it is not possible to reduce the energy intensity of refining in line with CARB's proposed targets, will production merely shift to refineries in unregulated jurisdictions and cause CO_2 emissions to leak?[5] Given that the Refinery Measure was simulated in PATHWAYS, one might assume that CARB has greater specificity regarding its approach and expected consequences.

Similarly, the "Industrial Sector Measures" proposed under Alternative 1 are supposed to achieve a 25% reduction in industrial energy demand by 2030, with an equivalent reduction in emissions.[6] Given the much greater

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[4] CARB Presentation at slide 24.

[5] *See* Cal. Health & Safety Code §§ 38562(b), (b)(8) (requiring CARB to minimize leakage "to the extent feasible" in the design of its climate regulations).

[6] CARB Presentation at slide 24.

diversity of firms and technologies covered by the oil and gas and industrial sectors in California, this description is even less informative than the proposed "Refinery Measure." Which industries does CARB expect will reduce emissions? How does CARB propose to handle trade exposure for these industries? How will industrial output be affected in California due to the measures? How do these expectations change across reference scenarios that incorporate different views of future economic growth? Once again, given the detail of the PATHWAYS model, it is reasonable to assume that there is more policy specificity to be had here, including assumptions about what is common practice in various industries in California and how energy efficiency might be improved upon.

Policy specificity for these new measures is important because it also concerns the balance of CARB's reliance on so-called complementary measures and carbon pricing policies. CARB has indicated a strong preference for using complementary measures as the dominant tool to reduce emissions.[7] If there isn't sufficient detail yet to be confident that these large reductions are achievable, then this uncertainty should be forthrightly indicated in CARB staff's estimates of reductions provided by these new complimentary policies.

By implication, any such uncertainty could potentially increase the role that a carbon pricing mechanism plays in achieving the 2030 Target—assuming post-2020 carbon pricing is implemented. All of this information should be shared with stakeholders so that all parties can have confidence in the degree of effort expected of different aspects of the program and of different economic sectors. If for some reason it does not yet exist—perhaps because CARB staff are still developing their thinking on these

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[7] *See generally* CARB, 2030 Target Scoping Plan Update Concept Paper (June 17, 2016); CARB, Public Hearing to Consider the Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, Staff Report: Initial Statement of Reasons (Aug. 2, 2016)313 (citing the PATHWAYS modeling results projecting cumulative emission reduction requirements over 2021 to 2030 of ~900 mmtCO_2e—700 to 800 mmtCO_2e of which are discussed as coming from complementary policies, leaving 100 to 200 mmtCO_2e from the cap-and-trade program); Staff Presentation at slide 24.

measures—then CARB staff should be much more circumspect about these new measures' ability to achieve the reductions with which they are credited.

3. Policy Robustness

A policy is robust if it is can be expected to perform well under a range of future conditions. The best way to design robust carbon policy is to test its performance and effects against a wide range of possible future scenarios. In contrast, the worst way to design robust carbon policy is to test its performance and effects against a single baseline scenarios because this information cannot speak to how the policy portfolio will operate as future conditions depart from the policymaker's point forecast. These risks are especially significant when trying to forecast the trajectory of an entire economy over a period of more than ten years.[8]

In contrast to best practice in public policy analysis, CARB's Presentation compares the Draft Scoping Plan Scenario and the Alternatives against a single reference scenario. Until CARB (or outside stakeholders) analyze the performance of these scenarios against a range of plausible futures, it is impossible to form a reasoned judgment of any Scoping Plan Scenario's robustness to future conditions.

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[8] Vaclav Smil, Perils of Long Range Forecasting: Reflections on Looking Far Ahead, *Technological Forecasting & Social Change* 65: 251-64 (2000); Michael Wara, Instrument Choice, Carbon Emissions, and Information, *Michigan Environmental and Energy Law Review* 4(2): 261–301 (2015); Michael Wara, Danny Cullenward, and Rachel Teitelbaum, Peak Electricity and the Clean Power Plan, *The Electricity Journal* 28(4): 18–27 (2015); Lesley K. McAllister, The Overallocation Problem in Cap and Trade: Moving Towards Stringency, *Columbia Journal of Environmental Law* 43: 426-442 (2009); Severin Borenstein, James Bushnell, Frank Wolak, and Matthew Zaragoza-Watkins, Report of the Market Simulation Group on Competitive Supply/Demand Balance in the California Allowance Market and the Potential for Market Manipulation, Energy Institute at Haas Working Paper #251 (July 2014); Severin Borenstein, James Bushnell, Frank Wolak, and Matthew Zaragoza-Watkins, Expecting the Unexpected: Emissions Uncertainty and Environmental Market Design, Energy Institute at Haas Working Paper #274 (August 2016).

We note that the first scoping plan also relied on a single reference case scenario. This scenario turned out to be incorrect in a number of respects that have had important consequences for the performance of California's climate policies. In particular, the reference case scenario assumed average electricity load growth, liquid fuel demand growth, and economic growth for the period to 2020 based on estimates developed in 2007.[9] Of course, as we all know, the Great Recession and subsequent recovery undermined most of these assumptions to a substantial degree. So did more-rapid-than-anticipated deployment of various energy efficiency technologies that acted to reduce load growth. As a consequence of the combination of these unforeseen outcomes, achieving the 2020 target has turned out to be easier than initially forecast by CARB staff. As a result, there has been low demand for allowances within the cap-and-trade program; demand has been so low that allowance auctions have fallen far short of revenue projections, resulting in reduced GGRF program funding.

The point here is not that CARB staff should somehow have anticipated all of these changes in a single reference scenario. How could they, or anyone else? Rather, the point is that policy planning should assume a wide range of values for key variables precisely because they are inherently difficult to predict. Evaluating major economic regulations against a single baseline scenario is the surest way to make incorrect analytical assumptions.

We urge CARB staff to consider developing low and high electricity load, liquid fuel demand, and economic growth baseline scenarios for the state. These baseline scenarios can then be used to estimate the range of potential outcomes attributable to the Scoping Plan Scenario and Alternatives 1 and 2. By doing this, CARB and stakeholders will be better able to compare the range of reasonably likely outcomes that may occur under the three alternatives. As UCLA Professor Donald Shoup has

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[9] CARB, Climate Change Scoping Plan and Appendices, Volume II, Analysis and Documentation, *at* G-11 (December 2008).

argued in another model-based forecasting context, it is better to be "roughly right than precisely wrong."[10]

4. Energy-Economic Modeling

The staff presentation makes clear that the current CARB modeling approach is similar to the one taken for the original scoping plan in 2008. That is, it relies on an engineering model (PATHWAYS) to estimate the possible size of GHG reductions and a macroeconomic model (REMI) to estimate the size of the California economy and changes to various related economic indicators if the changes produced by the engineering model take place.

As was identified in 2008 in the original Scoping Plan, however, this approach has a serious weakness: it cannot evaluate the cost or impact of the "unplanned" reductions produced by market based emission reduction programs.[11] For the pre-2020 period, this was perhaps not such a serious defect. After all, the market-based programs were not intended to do very much work in meeting the AB 32 target for 2020. Further, because of unforeseen circumstances, the state's climate goals have been even easier to achieve than anticipated, resulting in reduced role for the cap-and-trade program in ensuring the state meets its 2020 target.

But any comfort one takes in the relative ease of achieving California's 2020 climate goals is a dangerous sentiment to carry over into the 2030 planning period. True, it now appears that the state's broader portfolio of complementary policies appear capable of achieving the 2020 target without much of a role for the backstop cap-and-trade program. But the same cannot be said about the relative roles of complimentary and market-based mechanisms in achieving the 2030 target.

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[10] Donald Shoup, Roughly Right or Precisely Wrong, Access No. 20, *at* 20 (Spring 2002), *at* http://shoup.bol.ucla.edu/RoughlyRightOrPreciselyWrong.pdf.

[11] CARB, Climate Change Scoping Plan and Appendices, Volume II, Analysis and Documentation, *at* G-4 – G-7 (December 2008).

We note that CARB appears poised to make the same policy choice—relying on regulations above market-based instruments—despite the very different challenge the agency now faces with a much deep target for 2030 reductions. Under CARB's Scoping Plan Scenario, a post-2020 cap-and-trade program is expected achieve 88 to 98 $MMtCO_2e$ out of 671 $MMtCO_2e$ in cumulative reductions during the 2021 to 2030 period—about 13 to 15% of total effort.[12] Yet absent the use of carbon pricing, the staff presentation indicates difficulty in reaching the 2030 Target.[13]

In our view, this policy strategy amplifies the risks CARB (and California) avoided because of recession and unforeseeable changes in clean energy costs in the pre-2020 period. We think the chance of having similar luck is much smaller in the post-2020 period, if for no other reason than the much larger climate policy ambition in the 2030 target relative to the 2020 target.

We also note that CARB's calculations once again highlight the problem of using a single reference scenario to describe the future. Planning towards a cumulative reduction of 671 $MMtCO_2e$ from 2021 to 2030 requires CARB to precisely estimate (1) the business-as-usual reference scenario for the state economy over this time period against which reductions are measured, (2) the specific drivers of economic activity and GHG emissions in each regulated sector, and (3) the expected emission reductions from state policy in each regulated sector. In practice no one has a crystal ball this clear—not even for a single one of these forecasting applications, let alone the complex interactions between all three.[14]

Again, the level of estimated reductions from complementary policies depends on the difference between the reference scenario and the target. If the actual baseline emissions turn out higher than the reference scenario—

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[12] *Compare* CARB Presentation slide 16 *with* CARB Presentation slide 25.

[13] *Id*. at slides 28, 33 (showing a 39% reduction below 1990 GHG emissions in 2030 for Alternative 1).

[14] *See* references and discussion in note 8.

which, assuming an unbiased forecast, has a 50% likelihood—then the required reductions will be even greater.

Our point is that the magnitude of any error introduced by the lack of appropriate modeling increases with the scale of the reductions required to meet the 2030 target. These errors error directly affect the balance of complementary policies and carbon pricing required to reach the 2030 Target. As a result, the risk of forecast error in determining the appropriate use of complementary policies and carbon pricing is much higher in the 2030 planning period relative to the 2020 target.

We urge CARB to take these risks more seriously, as they are fundamental to choosing a robust climate policy strategy. The good news is that there are solutions to this problem. Several tools are available that can adequately simulate market based environmental policies. They are widely used to evaluate cap-and-trade programs for pollutants or the imposition of emissions taxes. They range from relatively simple models that can explicitly represent reference case uncertainty[15] to more complex partial equilibrium macroeconomic models with significant detail in the energy sectors of the economy that can represent uncertainty using high and low growth scenarios.[16]

In order to estimate the economic costs and environmental benefits of market-based environmental policies in the Scoping Plan Scenario and Alternative 2, CARB needs to contract with one or more experts in the energy modeling community to actually estimate the impacts of these market based environmental policies. CARB's current approach may have been appropriate for the first Scoping Plan, when these policies did very little work in achieving mandated targets. But given the importance of market-based policies for achieving the 2030 target, the current analytical framework is unlikely to produce trustworthy results. We strongly urge

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[15] *See* Borenstein et al. (2014), *supra* note 8; *see also* Borenstein et al. (2016), *supra* note 8.

[16] *See*, *e.g.*, NERA Economic Consulting, NewERA Model, *at* http://www.nera.com/practice-areas/environmental-economics/newera-model.html.

CARB to deploy better analytics, including by contracting with outside experts if necessary. This should not be delayed until further into the Scoping Plan process—it should be part and parcel of developing the alternatives under consideration to achieve the 2030 Target.

5. Quantity Certainty

The proposed regulatory amendments to the cap-and-trade program leave unchanged the rules providing for banking of allowances. This enables regulated firms to over-comply with the cap during the pre-2020 period and bank allowances for future use. These banked allowances can then be used such that regulated firms under-comply in later years when they surrender banked allowances. CARB needs to acknowledge that this has the impact of injecting quantity uncertainty into a cap-and-trade system for any given year. In other words, CARB should acknowledge the cap in a cap-and-trade system that allows for banking is really the sum of the allowed emissions for all years of the program plus offsets—and not a strict limit on reported emissions in any one year.

Inter-temporal flexibility on emissions is a feature of cap-and-trade systems, not a bug. In a well-designed system, it allows regulated parties to minimize compliance costs while achieving an overall programmatic goal. In an oversupplied market, however, the risk is not that companies allow their emissions to fluctuate from year to year while remaining consistent with an overall trajectory. Rather, the risk is that oversupplied allowances with unlimited banking will put the cap-and-trade system on a fundamentally higher emissions trajectory that is inconsistent with the goals of SB 32. Indeed, this is exactly what CARB's presentation shows.[17]

We note that CARB has expressed concern about quantity uncertainty in criticizing carbon taxes under Alternative 2.[18] Our point is that this concern applies equally to CARB's preferred Draft Scoping Plan Scenario,

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[17] CARB Presentation at slide 25 (showing 2030 emissions significantly higher than the 2030 target for the Draft Scoping Plan and Alternative 2 scenarios).

[18] *Id*. at slide 37.

which assumes that regulated firms in the cap-and-trade over-comply with program requirements in the early years of the program, resulting in significantly higher emissions in 2030.[19] As a result of banking in an oversupplied market, CARB's Draft Scoping Plan Scenario creates a similar risk that the state will be unable to achieve its 2030 target—just as would be the case for a comparable carbon tax as modeled under Alternative 2.

As we have previously noted, CARB's proposal to extend the cap-and-trade system while retaining unlimited banking is designed to create a buffer of oversupplied allowances to keep prices low.[20] Indeed, the specific proposal to place allowances that remain unsold at auction into the Allowance Price Containment Reserve (APCR) while simultaneously raising the APCR Reserve Price to \$60/tCO_2 above the minimum auction floor price is designed to encourage firms to purchase allowances that are not needed in the pre-2020 compliance phase for banked use in the post-2020 compliance phase.[21] These incentives are consistent with CARB's projection that a post-2020 cap-and-trade program would likely lead to early over-compliance and later under-compliance with the formal cap levels, leading to higher-than-scheduled emissions in 2030.

In its cap-and-trade regulatory amendments package, CARB projects that emissions from capped sectors in 2020 will be below the cap for that year.[22] We note that this is a common pattern observed in cap-and-trade programs implemented to date: emissions in early years are frequently less than the cap while emissions in later years are in excess of it.[23] Because this

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19 *Id*. at slide 25.

20 *See generally*, Michael Wara and Danny Cullenward, Comment letter to CARB re: post-2020 cap-and-trade proposal (Sept. 20, 2016), *available at* http://www.ghgpolicy.org/law-and-policy/2016/9/20/carbs-post-2020-cap-and-trade-proposal-policy-comment.

21 CARB ISOR, *supra* note 7 at 16-17.

22 *Id*. at 12-13.

23 This compliance behavior was observed in both the Acid Rain Trading Program and is currently underway in the Low Carbon Fuel Standard market. Juha Siikamai, Dallas Burtraw, Jospeph Maher, and Clayton Munnings, The

pattern is common with past emissions trading programs, consistent with the economic incentives CARB has proposed for the post-2020 period, and reflected in CARB's workshop presentation, we believe that under-compliance in the cap-and-trade program should be analyzed in light of the overall goal of reaching the 2030 target in 2030.

On a related point, we believe that uncertainty about reaching the 2030 target under a cap-and-trade program with banking and expected under-compliance in the later years should be more fairly compared to the emissions uncertainty for the same year under a carbon tax regime. Thus far CARB has unfairly framed the comparison, suggesting that a carbon tax "does not include an explicit emissions restraint mechanism" and that "if reductions aren't realized, additional measures need to be implemented quickly to make up unrealized reductions."[24] These effects are real, but in our view apply equally well to the proposed cap-and-trade program considered in the Draft Scoping Plan scenario as they do to the carbon tax considered in Alternative 2.

Furthermore, we suggest that an appropriately designed carbon tax with an automatic price escalator—*i.e.*, one with a price that escalates at a rate tied to observed progress on emissions reductions with the goal of achieving the desired level of emissions in 2030—should provide a similar if not superior level of emissions certainty to cap-and-trade than is implied by the CARB presentation. If CARB believes otherwise, we respectfully ask for an explanation.

Overall, we call for a more balanced discussion of the pros- and cons- of both market-based mechanisms in the context that they are expected encounter. It may well be that a cap-and-trade was and is the best approach for CARB to achieve the 2030 Target. It might also be that a mechanism that was appropriate for the more modest 2020 Target may be less desirable for achieving the deeper reductions required for 2030. Absent an

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U.S. Environmental Protection Agency's Acid Rain Program, Resources for the Future Backgrounder, 4-5 (Nov. 2012).

[24] CARB Presentation at slide 37.

even-handed comparison of the instruments as they would actually be implemented, the choice of one over the other cannot be justified.

6. Additional Comments

Here we provide additional comments, presented in the order in which they appear in the CARB Presentation Slides.

- **Slide 20.** What is the basis for believing that refineries can maintain output while cutting energy demand and emissions by 20 to 30%? Is CCS assumed in the model and if so at what cost? Alternatively, does this assume that refinery output declines by roughly the same percentage as fuel use declines? If so, what assumptions in other sectors would have to be true for this to occur—for example in electric vehicle deployment, heavy duty vehicle biodiesel consumption, aircraft fuel demand, and marine fuel demand?

- **Slide 21.** What assumptions about gas pipeline infrastructure are being made in CARB's consideration of a renewable gas standard? Can existing infrastructure take a 5% H_2 blend without retrofit?

- **Slide 22.** Why include the proposed refinery measure in addition to a carbon tax or cap-and-trade? An appropriate cap-and-trade program, cap-and-trade with a hard price ceiling, or price trajectory for a carbon tax will have the same incentives to reduce emissions in covered sectors that this measure will. We recommend that CARB remove the refinery measure from all alternatives that contain a carbon price sufficient to achieve the 2030 target.

- **Slide 24.** What is the basis for assuming that 18 to 28 GW of new rooftop solar is possible on the California grid given current deployed utility-scale and distributed solar capacity as well as utility-scale solar capacity in the interconnection queue? What curtailment assumptions underlie CARB's assessment? Does the rooftop solar deployment assume CAISO regionalization, and how does the question of CAISO regionalization affect rooftop solar deployment? What energy storage assumptions are required for these aggressive targets?

- **Slide 27.** Please provide additional documentation including PATHWAYS Modeling assumptions, inputs, and outputs for this figure. Please estimate uncertainties in performance of the programs detailed in this figure. One simple approach to doing this would be to look retrospectively at forecasts made in first scoping plan in order to estimate forecast error.

- **Slide 29.** Please provide some justification for the 30% uncertainty factor here. What is the basis for this uncertainty factor? Is it regulatory performance? Is it economic or population growth? Is it technology risk? More explanation would be helpful.

- **Slide 29.** Please explain how this analysis is or is not consistent with the cap-setting done for the post-2020 cap-and-trade regulatory amendments package. In particular, is the PATHWAYS modeling here consistent with the assumption in the proposed cap-and-trade regulation that emissions in uncapped sectors fall by the same percentage (40%) as in capped sectors?[25] Is the assumption here that agricultural sector emissions fall by 1% consistent with the way the cap was set in the regulatory amendments package? Or does this require lowering the cap further in order to achieve the 2030 Target?

- **Slide 34.** Consider using a Border Tax Adjustment rather than free allocation in light of the *Rocky Mountain Farmers Union* case.[26] Please explain how the recent Presidential election result does or does not change linkage considerations, particularly with subnational jurisdictions in other countries. Is there increased preemption risk due to Foreign Affairs Power issues?[27] In general, please explain your thinking about the continued relevance of the Clean Power Plan at this point.

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[25] ISOR *at* 12-13.

[26] Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070 (9th Cir. 2013), *cert denied* 134 S. Ct. 2875 (2014).

[27] *See, e.g.,* American Insurance Ass'n v. Garamendi, 539 U.S. 396 (2003).

- **Slide 38.** We disagree with staff's pessimistic assessment of the potential to coordinate climate policy with other jurisdictions under a carbon tax. In particular, direct cooperation would still be possible with Canadian provinces (British Columbia and Alberta) as well as with national governments in Canada and Mexico by coordinating future carbon prices. This is much simpler to do in practice than linking cap-and-trade systems, as there is no requirement for coordinated auction, mutual recognition of allowances, and other procedural requirements under SB 1018. Perhaps most important in light of the incoming Trump Administration, coordination via carbon price harmonization has lower legal risks under the Foreign Affairs doctrine.[28] Finally, we note that EPA has made clear that States may use a carbon tax as an element of a State Measures Plan to comply with its Clean Power Plan obligations.[29]

Thank you again for the opportunity to comment on the staff presentations at the November 2016 scoping plan workshop. We would be happy to discuss any of our comments with CARB Staff or Board Members and look forward to the next iteration of the 2030 scoping plan process.

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[28] *Id.*

[29] EPA, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Generating Units, 80 FR 64,661, 64,835-64,837 (Oct. 23, 2015).

Sincerely,

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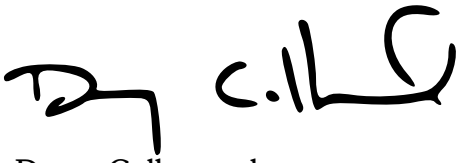

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