2022 SCOPING PLAN COMMENTS BASED ON SEPT. 30, 2021 PRESENTATION BY CARB

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https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/scoping-plan-meetings-workshops?utm_medium=email&utm_source=govdelivery

Preface

Thank you for crafting astute rulemaking for recent legislation, e.g., smog-checks for big rigs and Advanced Clean Truck Rule. The informative Workshops you have designed on the Scoping Plan 2022 focus on important issues and suggest an array of promising solutions.

Please advance solutions that decelerate climate change, decrease toxic airborne pollutants including criteria pollutants, improve air quality, and improve public health. Some of the proposed "solutions" degrade air quality and public health. Solutions recommended herein do not compromise these.

Research on the cost to benefit ratio of climate change mitigation policies shows that the economic value significantly exceeds the costs (1, 2). Please include only mitigation solutions, not adaptation adjustments. Conduct Health Impact Assessments as part of the cost benefit analysis for each proposed solution (3, 4, 5).

In 2018, 8.7 million people suffered premature mortality from fossil fuel industry emissions. A 2021 study estimated 10.2 million (6, 7). (Note that the studies calculated mortality only from PM. Combustion of FF emits about one dozen toxics. These two studies did not estimate mortality from the other toxic co-pollutants.) Estimates of the number of annual premature deaths from fossil fuel PM in the US range from 335,000 and 350,000. Using 340,000 and dividing this by the population of the US in 2018 (327 million) equals 0.1%. The CA population in 2018 was 39 million. 0.1% of 39 million is 39,000. The value of a statistical life in the US is $10,000,000 (8, 9,10). 39,000 times ten million is $ 390 billion.

The Scenarios do not include many policies that have been proven to drive decarbonization. Develop solutions to accelerate efficiency, sequestration by natural and working lands and coastal oceans, conservation of all resources including energy, schedules of progressively more stringent regulation of emissions, taxation, and active transport (e.g., biking). Solutions that promote decreased resource use and emissions should be prioritized over solutions that involve scaling technologies that are far from cost-effective and prolong emissions of either GHGs or toxic and criteria pollutants (e.g., smokestack carbon capture).

A policy that could be revised to significantly diminish both GHGs and toxics plus criteria airborne emissions is Cap & Trade. The following revisions would have little cost for taxpayers and entail little labor on the part of CARB. Please include the following modifications in the Scoping Plan.

- Discontinue offering free allowances at once and sunset allowances by 2024
- Raise the auction floor price of allowances to the cost of CO2 capture (currently $150 - $300/MT excluding mining, manufacturing, transport and storage costs)
- Require polluting businesses of all sizes to buy allowances (not merely the top 10%)

- Allocate all auction proceeds to GGRF only for GHG mitigation (Because housing increases emissions, funds should not be used for such. Housing should be subsidized from other revenue sources)

Set interim targets for all policies in advance, for at least every 2 years. Some of the following recommendations may require collaboration with other agencies or with the Legislature. The term renewable herein conforms to the definition in SB 100 except that it excludes any form of biomass or biofuel energy. Add more kinds of ZE energy generation technologies as they become commercially available, as long as their lifecycle carbon intensity is less than or equal to PV solar.

The generation technologies labelled Zero-carbon, in the table at the end of the 4 Scenarios, should be omitted from the Scenarios and table because they are not zero carbon. Lifecycle analyses of these indicate that there are significant GHG and toxic emissions from each over their lifecycle.

SCENARIO PATHWAYS

Of the four Alternatives, Alternative 1 is most likely to be effective. However, there are technologic, political, and economic constraints that limit the potential speed and scalability of some solutions. In those cases, the solution in Alternative 2 or a novel solution is recommended.

SMART GROWTH SECTOR

Decrease of VMT provides health and financial benefits for businesses as well as staff. All vehicles, including those with zero operating emissions from their propulsion source, emit particulate matter. The friction of tires with the road and of braking each emit PM.

The Scope 1 emissions (mining, manufacture, transport) and Scope 2 emissions (dirty electricity used in Scope 1) of producing zero-emission vehicles is about 40% of their lifecycle emissions. In contrast, Scope 1 and 2 emissions for the production of internal-combustion-engine (ICE) vehicles is about 20% of their total lifecycle emissions. Thus, the grid should be decarbonized more swiftly than the scaling of ZE transport.

Decreasing VMT diminishes traffic accidents and injuries. It also decreases traffic congestion and commute duration. This decreases exposure to vehicle emissions. As per capita VMT declines, morbidity and mortality will fall, decreasing medical care costs for nearly all residents in CA. For every 100 staff that work remotely half time, the employer saves $1 million annually compared to having staff work on site each workday.

Incentivize decreased VMT by taxing mileage added since the last transfer of title. Impose a tax of $100 for the first thousand miles, $200 for the second thousand etc. until the next transfer. This would be the rate for ZE vehicles. Double the rate for ICE vehicles. Use the proceeds to fund rebates for purchase of used and new ZE vehicles.

LIGHT DUTY VEHICLE SECTOR

Improve fuel economy equivalent for ZE as well as ICE vehicles by decreasing average weight of vehicles sold. Rapidly phase out production of ICE vehicles whether powered by fossil fuels

or biofuels. Combustion of all of these fuels generates GHGs and toxic co-pollutants. All of these fuels have unhealthy lifecycle emissions profiles. Lifecycle emissions of biofuels has not been proven to be less than that of fossil fuels.

Set an annual limit of new ICE vehicle sales that is 5% less than the prior year sales total. Increase costs of purchase, lease, subscriptions, and rental of ICE vehicles. Increase sales taxes and annual registration fees for ICE vehicles while decreasing these fees for ZE vehicles. Annually increase sales taxes on all forms of biofuels and fossil petrol.

To qualify as ZE, hydrogen fuel cell vehicles must use only H2 that has a lifecycle carbon intensity equal to or lower than electrolytic H2 generated with 100% renewable energy (11). This also applies to trucks, aviation, and marine vessels. Ensure this by permitting only this quality of clean H2 to be sold in CA by 2024. This will rapidly decrease the cost of renewable electrolytic H2. (Using blends of dirty and renewable H2 will delay cost contraction.)

TRUCK ZEV SECTOR, AVIATION, OGV, CHE, and RAIL SECTORS

Target a result closer to the Alternative 1 date than the Alternative 2 date.

OIL AND GAS SECTOR

Phase out extraction and refining by 2035. Halt the issuance of well permits for unconventional extraction by 2024. This includes water-intensive, chemical-intensive, and carbon-intensive extraction. Prohibit exports of fossil fuels by 2025. Exports export emissions to other states or nations. Such leakage is to be avoided in all solutions. Phase out NG pipelines and other fossil infrastructure by 2045. Perform site remediation for phased-out infrastructure by 2045, e.g., capping recently active wells. (Wells that have been idle for at least 5 years should be capped at once.) All costs of dismantling and remediation are to be borne by the owners of the infrastructure (and insurance companies which cover their liability).

PETROLEUM REFINING

Smokestack CCS, with few exceptions, should not be used until this unproven technology has been proven to achieve net lifecycle capture (NLC). NLC includes emissions from Scope 1 (mining, manufacture, transport, installation, delivery, maintenance), Scope 2 (dirty electricity used in Scope 1), and Scope 3 (operation of the equipment). It should also incorporate emissions from dismantling, site remediation, and recycling. Whether the captured CO2 is stored and delivered via CO2 pipelines or by trucks, part of the lifecycle emissions from the delivery system should be factored in. Finally, if the CO2 is stored, part of the lifecycle emissions from locating, evaluating, injecting, sealing, and monitoring the site for centuries should be factored in. See the final section re. evaluation of capture technologies. Other capture technologies have higher efficacy and lower side effects.

Because the useful life of CCS equipment is about ten years, operators will be reluctant to install such less than ten years prior to the target closure date for a refinery. Thus, give at least ten-year advance notice to operators.

ELECTRICITY GENERATION

Please use Scenario 1, but restrict H2 to electrolytic H2 generated with 100% renewable energy. Complement this, in some locations, with another 24/7 firm power source - e.g., geothermal electricity, to ensure grid reliability. Decarbonization of the grid should proceed more swiftly than decarbonization of other sectors. This will minimize the continued consumption of dirty electricity.

A version of the Clean Electricity Performance Program, the Build Back Better bill introduced in Congress, should be enacted in CA. In order to meet the goal of 85% clean energy by 2035, we need to increase the amount of clean energy generated by over 5% per year.
The CEPP accounts for about 35% of the GHG and toxic emissions reduction in the bill (12).

To fortify the granular 24/7 reliability of our grid, storage is needed. There are many effective energy storage technologies and the cost of batteries is plummeting swiftly. Additional reliability may be provided by constructing more high-voltage transmission lines between CA and the 14 Western States. Flexible, smart microgrids enable efficient utilization of Distributed Renewable Energy. These should be built in all urban areas.

BUILDING ENERGY EFFICIENCY

Please use Mid-Hi all-electric Scenario for existing and new buildings.

NEW….. BUILDINGS

Please use Scenario 1 target date. This should include government buildings.

EXISTING….BUILDINGS

Please use Scenario 1 targets. Provide retrofit incentives using funds from annual taxes on buildings with NG infrastructure.

FOOD

Please use Scenario 1. Facilitate the transition from carbon-emitting to carbon-storing organic regenerative agriculture. Downsize livestock agriculture, especially cattle, and replace some of it with organic regenerative agriculture. Encourage use of ZE off-road and agricultural equipment.

CONSTRUCTION

Please use Scenario 1, powered by H2 or electricity. SORE equipment used in construction, agriculture, and landscaping is mostly combustion-powered. However, ZE versions are becoming more popular. More cost-effective ZE generators, portable and fixed, are needed. I have not heard of generators powered by renewable electrolytic H2 fuel cells, but this is probably easy to invent. Also, manufacturers plan to include multiple outlets in their electric trucks starting next year. These can power electric equipment using electricity from the vehicle battery. Incentives for using such trucks is called for. See AB 1346 which passed this month.

CHEMICALS AND PAPER

Use the most cost-effective, readily available renewable electrolytic H2 and renewable electricity to target Scenario 1.

STONE, etc.

Technologies are being developed that have significantly lower carbon footprints for these industries. Successful demonstration projects have been built for steel and concrete that are more efficient and are powered by renewable electrolytic H2. Because smokestack CCS has not been proven effective, it should be considered only if all else fails. Industries, especially if located in urban areas, should be given emissions reduction credits if they build DAC plants in rural areas that are powered by 100% renewable energy (e.g., geothermal) and immediately store CO2 in proximal sites. Because DAC has fewer side effects than CCS, this should be used instead of CCS.

MANUFACTURING

Use renewables best suited for the site of each to target Scenario 1.

COMBINED HEAT AND POWER

Target Scenario 1 timeline.

AGRICULTURE

Target Scenario 1 using any kinds of cost-effective renewables that are readily available. Because organic regenerative agriculture has more environmental benefits than synthetic regenerative agriculture, incentivize only the former.

FUELS FOR TRANSPORTATION

Target Scenario 1. The LCFS should be revised to include emissions from the entire 3-Scope lifecycle. ICE engines should be rapidly replaced with ZE powered transport and equipment. Biofuels and biomass should not be used for fuels or energy after the earliest achievable date.

FUELS FOR BUILDINGS

Establish new building codes to ban all forms of NG, RNG, H2, and blends as soon as possible. New codes should permit only all-electric buildings. Incentivize retrofits of existing buildings to convert from NG to all-electric for residential as soon as possible. Industry should be incentivized to convert from NG to either all-electric or renewable electrolytic H2. Construct dedicated H2 pipelines only for some large industry sites, but none for residential.

NON-COMBUSTION METHANE

Follow Scenario 1, with the following exceptions. CH4 capture from landfills and livestock farms is a dirty business. There are significant lifecycle GHG emissions from capture and digesters, in part due to fugitive emissions. If the efficacy of this technology is not improved, consider burial of biomass waste in landfills and downsizing for livestock operations. Also explore boiling

biowaste and then using it for landscaping, tree farms, and agriculture. For the latter, establish incentives to decrease the scale of such farms, e.g., by 5% every 2 years. Simultaneously offer incentives to convert land use to organic, regenerative agriculture. Fund the incentives by taxing livestock operations that fail to decrease their scale. Re-evaluate the downsizing program after ten years. Livestock farming on the scale we presently have is unsustainable in many ways, violates EJ, and threatens public health. Mandate the inclusion of plant-based diets in the public-school curriculum starting in elementary school and require plant-based cafeteria menu options in K - 12.

HIGH GWP HFCs

Follow Scenario 2 for new buildings and retrofits as soon as possible. Consider ammonia and CO2.

Require that the use of high GWP general anesthetics be replaced with lower GWP anesthetics. The highest, desflurane, is nearly 2500. The lowest commonly used anesthetic, N2O, is 500.

CDR

Follow Scenario 2.
CARBON CAPTURE DECISION TREE - Google Docs
See the above link for further information about CDR technologies.
Instead of installing CCS equipment on fossil power plants, they should be replaced by renewable electricity generation plants. Smokestack CCS, though unproven and primitive, may be useful in the future for difficult to decarbonize industries like glass, steel, concrete, plastics. Further research is needed. CCS does not extract toxic and criteria pollutants. Smokestack CCS may prolong the longevity of the fossil fuel industry and thus prolong emission of toxic and criteria co-pollutants for additional years. Nearly all of the use of smokestack CCUS worldwide is for EOR. CARB should not provide emissions reduction credits for CCUS because the net effect is probably to increase GHG emissions.

Research on DAC is promising because DAC does not have many of the disadvantages of smokestack CCS and CCUS. DAC powered by 100% renewable energy (e.g., proximal geothermal) that immediately stores CO2 in proximal geo-sites is one of most climate-friendly engineered capture methods.
Industry, including the fossil fuel sector, should be given emissions reduction credits for constructing and maintaining, at their expense, renewable DAC in rural areas. This is likely to be more verifiable and effective than carbon offset programs. As other sequestration technologies with low side effects are proven (e.g., mineralization on mafic rock or concrete, upwelling/downwelling), CARB may provide emissions credits to industry for building and operating these.

WRAP

On the CARB website, graphs show trajectories of decreasing rates of GHG emissions increase paralleling robust economic growth curves. These are useful. The mission of CARB is to improve air quality and public health, not to accelerate economic expansion. Thus, multiple graphs should portray the curves of GHG and toxic emissions along with measures of public health. One way to decrease emissions is to retard economic growth to zero or less. At some

point this may be necessary to solve climate change. In the near future it would help to decrease the growth rate to 1% and transition from an infinite growth paradigm to a sustainability paradigm. Using voluntary educational and financial incentives, the population of CA should be stabilized at its present level or less. These economic and population stabilization goals are two of the many proven policies that are necessary if one adheres to the precautionary principle of managing the climate crisis (13).

Please model Net Negative scenarios, after you have finished rulemaking for Scoping Plan 2022, and engage the Legislature in this objective.

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