

June 23, 2022
Ms. Liane Randolph
Chair, California Air Resources Board
1001 I street
Sacramento, CA 95814

Dear Chair Randolph,

On behalf of our more than 44,000 supporters in California, The Union of Concerned Scientists (UCS) is pleased to provide comments to the California Air Resources Board (CARB) related to the 2022 Scoping Plan Update. We want to thank staff, board members, and the environmental justice advisory committee for their hard work over the last year in carrying out the extensive scoping plan process.

UCS has several comments and subsequent recommendations on the draft 2022 climate change scoping plan:

The draft plan relies too heavily on carbon dioxide removal.

The draft scoping plan's proposed scenario (alternative 3) includes a risky overreliance on carbon dioxide removal (CDR) to achieve California's carbon neutrality goal. The proposed scenario explicitly includes 80 million metric tons (MMT) of CDR in 2045,¹ but due to incorrect modeling assumptions about emissions from natural and working lands, the proposed scenario will actually require 103 MMT of CDR in 2045 to achieve carbon neutrality.² This represents only a 76% reduction in emissions from 1990 levels.³

The reliance on CDR, particularly direct air capture (DAC), to offset 24% of California's emissions is a far too risky choice that could put the achievement of California's climate goals in jeopardy. In comparison, the IPCC's sixth assessment report examines numerous scenarios that, on average, include a much more limited role for DAC in achieving carbon neutrality and eventually net-negative emissions.⁴ Globally, a pathway that is over-reliant on CDR raises the risk of a temperature overshoot scenario and all the climate impacts, some irreversible, that would come with that.

In an earlier report prepared for CARB, consultants at E3 studied three scenarios for achieving carbon neutrality in California. One of the scenarios, named the "High CDR" scenario, required 80 MMT of CDR in 2045. However, the authors of the report cautioned against pursuing this CDR-dependent scenario:

[The High CDR] scenario represents the highest risk scenario, from a climate mitigation perspective, because it has the highest remaining direct GHG emissions, and relies on relatively untested CDR strategies which are not widely commercialized... Both the climate risks and the technology adoption and implementation risks of relying so significantly on CDR are high. Continuing to emit such a large share of gross emissions into the atmosphere through 2045 could result in an overshoot of emissions, with a risk of missing the state's climate goals if CDR options are not implemented early on. Furthermore, many CDR options rely on a significant amount of land and energy resources, rendering the implementation of CDR at scale uncertain.⁵

At present, the proposed scenario in CARB's draft scoping plan relies *even more heavily* on nascent CDR technologies, and UCS agrees that such heavy reliance on CDR technologies poses a significant risk if these technologies are not successfully implemented at scale.

UCS recognizes that limiting global temperature increase to 1.5°C above pre-industrial levels will require CDR strategies, but CDR is not a substitute for deep, absolute emissions reductions. California should pursue policies that prevent emitting industries from exploiting the expansion of CDR as a loophole that allows them to avoid making all practicable and necessary cuts in their direct and indirect emissions. In that vein, CARB's draft scoping plan should be revised to include much deeper direct reductions in emissions and a reduced role for CDR.

The plan should incorporate further emissions reductions, especially in the electricity sector.

To reduce the scoping plan's overreliance on CDR, the plan should be updated to incorporate more ambitious emissions reductions, particularly in the electricity sector. The draft scoping plan assumes that the state's electricity sector will continue to emit roughly 30 MMT in 2045. However, numerous studies have shown that deeper levels of decarbonization are achievable in the electric sector.

For example, *Achieving Carbon Neutrality in California*, a study prepared for CARB in 2020, examined three scenarios, two of which completely eliminated electric sector emissions by 2045.⁶ The Joint Agency SB 100 Report includes study scenarios that reduce emissions to just over 10 MMT in 2045.⁷ Finally, in the Integrated Resource Planning process at the California Public Utilities Commission, the Commission's modeling has historically included an assumption that electric sector emissions must be reduced to 15 MMT in 2045, and the Commission recently decided to continue using the 15 MMT target.⁸

These studies have shown, and existing planning processes have assumed, that electric sector emissions can and should be reduced to levels much lower than 30 MMT by 2045. Emissions reductions should be California's first and foremost strategy to address climate change, and there is simply no reason for electric sector emissions to remain so high when mitigation measures are feasible and readily available. UCS believes that the scoping plan should incorporate a reduction in electric sector emissions as close to 0 MMT as possible by 2045. However, UCS also recognizes that completely eliminating emissions from the electric sector may end up being technologically challenging and/or economically inefficient.⁹ With that in mind, UCS recommends that, at an *absolute maximum*, electric sector emissions should be no more than 10-15 MMT in 2045. This level of emissions may still result in an overreliance on CDR technologies, but if California is to pursue all feasible and cost-effective emissions reduction strategies, there is no reason for electric sector emissions to exceed 10-15 MMT in 2045.

The scoping plan should not include any new gas power plants.

Alarmingly, CARB's draft scoping plan calls for a 10-gigawatt buildout of new gas power plants by 2045 in addition to the retention of all existing gas plants.¹⁰ This large-scale buildout of new fossil-fueled resources in a state-wide carbon neutrality plan is a dangerous choice that deserves much further scrutiny.

UCS believes that, because the scoping plan modeling fails to reduce electric sector emissions below 30 MMT, this very high emissions cap allows the RESOLVE model to select a large amount of new gas capacity. However, if CARB were to drastically reduce its electric sector emissions target as recommended by UCS, it is unlikely that so much new gas capacity would be selected by the RESOLVE model (if any).

Even if the adoption of a lower electric sector emissions target does not completely eliminate the selection of new gas capacity in the scoping plan modeling, UCS recommends that CARB study and pursue alternatives to new gas capacity. The transition to clean electricity should not include the construction of additional polluting facilities in California communities, which are already heavily impacted by poor air quality. Alternatives exist, and California's plan for economy-wide carbon neutrality should not serve to expand the fossil fuel industries it aims to shrink.

Investments in costly CO2 emissions mitigation in the liquid fuel supply chain should be guided by and at a scale consistent with a petroleum phaseout plan

Replacing petroleum with renewable power in California's transportation sector as quickly as possible is central to vision laid out in the scoping plan. This implies a phaseout of the petroleum sector that requires careful planning and thoughtful policy.

The scoping plan relies too heavily on unrealistic and counterproductive mitigation strategies within existing oil refineries and within the combustion fuel supply chain. The scoping plan should prioritize options that unlock deeper and more certain reductions by expanding cross-sectoral opportunities.

Moreover, climate mitigation investments California makes or supports through performance-based policies like the LCFS are appropriate and aligned with both near-term and long-term climate targets.

Reliance on CCS from oil refineries should be eliminated or at a minimum scaled back by at least 75%

The current scoping plan includes extremely unrealistic assumptions about how quickly CCS can be implemented at scale in oil refineries. Putting aside the obvious mistake that CCS implementation at oil refineries is assumed to have begun at a scale of 2 MMT CO₂ in 2021 and the dubious wisdom of investing huge sums to capture emissions at facilities that will increasingly be rendered obsolete by transportation electrification (see further discussion below), it is extremely unlikely that CCS at any significant scale can be implemented before 2030.

There are several time-consuming processes that must be completed before substantial CO₂ capture can proceed. Implementing CCS at an existing oil refinery is complex and costly, and before such projects can be undertaken the policy mechanisms required to make the projects economically feasible must be sufficiently clear to motivate a private business to seek internal or external financing. For example, to the extent that LCFS credits are important in the economics of the project, some clarity about the long-term trajectory of the program must be settled in the rulemaking process anticipated for 2023. Meanwhile, the design and engineering of CCS implementation at a specific facility will take time and must be sufficiently complete to begin a permitting process. Once the financing, design and permitting is complete, the actual construction work can only move forward when the refinery has temporarily shut down its operations. And once the construction is complete, the startup, validation and testing will take time. Each of these steps is likely to take many months or even several years, so it seems very unlikely that substantial CO₂ capture will commence significantly before 2030.

CO₂ pipeline safety issues must be addressed to ensure public safety prior to large scale CCS deployment

All of the preceding describes only the capture part of the CCS projects. Moving CO₂ at the scale anticipated to suitable sequestration sites will require construction of extensive pipelines connecting CO₂ sources to sequestration sites. A recent report from the Pipeline Safety Trust¹¹ highlights serious deficiencies in the federal regulations governing CO₂ pipelines that must be addressed to allow for the safe transportation of CO₂ through pipelines. Given that refinery clusters in California are close to major population centers, the risks to communities living near pipelines are substantial and must be addressed before construction of new pipelines or conversion of existing pipelines can proceed.

All of these steps would be time consuming even if all the actual work were straightforward. However, implementing CCS at oil refineries is not well-established, and unique circumstances associated with the design and layout of each specific refinery, risks to adjacent communities, and external factors including vulnerability to earthquakes and sea level rise make it unclear whether, how and at what scale the required equipment and internal plumbing can be safely integrated into complex and space constrained facilities. Even without a detailed analysis, it is clear that the share of emissions that can be safely and realistically captured is much lower than the scoping plan assumes. Much more detailed analysis is required before any projects can prudently move forward.

Even if CCS at oil refineries were safe and technically and economically feasible, it would still be a bad idea to invest in costly mitigation at facilities that are rapidly headed to obsolescence because EV implementation is phasing out demand for liquid transportation fuels.

The “CCS by Fuel” tab of the AB 32 GHG Inventory Sectors Modeling Data Spreadsheet shows CCS from refineries in Alt 3 growing from 2 MMT in 2021 to a peak of 13.5 MMT in 2030 before rapidly declining, falling by 29 percent, 57 percent and 76 percent in 2035, 2040 and 2045 respectively versus the 2030 peak. Given the expense incurred by refineries, presumably passed along to fuel consumers, and the commitment of resources by CARB to implement this mitigation, it would be foolish to build CCS capacity that would only have a useful life of a few years. The scale of investment in mitigation of emissions from oil refining, or even refining alternative liquid fuels at retrofitted refineries, should be limited to a level of liquid fuel production consistent with California’s demand in 2045 or later to ensure there is a reasonable useful life to expensive mitigation investments.

The particular issues surrounding CCS at oil refineries are symptomatic of a larger problem arising from the absence of a clear petroleum phaseout plan.

The transition to electric vehicles has profound implications for the petroleum industry in California. Based on the “Energy Demand” tab of the AB 32 GHG Inventory Sectors Modeling Data Spreadsheet, liquid fuel demand for transportation under alternative 3 is expected to be cut in half by 2034 versus 2021 and cut by three quarters by 2041, less than 20 years from now and 85% by 2045. Strategies to decarbonize the liquid fuel supply chain must take into consideration this dynamic and support investment in technology and infrastructure that will serve California through mid-century and beyond. To accomplish this requires a more detailed petroleum phaseout plan, to provide greater clarity to the many stakeholders who will be profoundly affected by the transition to renewable energy as the main source of California’s transportation energy.

A more detailed petroleum phaseout plan should also shape implementation of policies such as the Low Carbon Fuel Standard. While the flexibility of the LCFS can be an asset, it is prudent to ensure that investments supported by the policy are aligned with California’s long-term needs. It would be a mistake for the LCFS to support the buildout of costly mitigation of petroleum fuel refining at a level that exceeds California’s anticipated demand for petroleum-based fuels. For this reason, there should be ceilings on the share of LCFS compliance that can be derived from technology pathways at a level consistent with long-term needs under the scoping plan and other factors, including the sustainably available feedstocks. The costs associated with LCFS credits, while not appearing on the California budget, are ultimately borne by California fuel consumers.

It is important that the design of the LCFS ensures that these costs are not excessively burdensome and that the benefits are distributed equitably. It would not be appropriate to burden California fuel consumers with LCFS compliance costs associated with the buildout of CCS infrastructure that will not be required to decarbonize California transportation fuels and may end up stranded or serving export markets. Equitable distribution of benefits will require departure from simple market-based policy design to include mechanisms to prioritize the needs of communities most impacted transportation pollution and underserved populations in general.

Thank you for the consideration of these comments. We look forward to continuing to work with you as this planning process continues this summer. Please reach out to us if you have any follow-up questions or concerns.

Sincerely,
Jeremy Martin
Director of Fuels Policy & Senior Scientists

Mark Specht
Senior Energy Analyst