

2023 Carbon Capture, Use, and Storage (CCUS) Platform

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INTRODUCTION

Engineered carbon capture, use, and storage (CCUS) is being used to delay meaningful climate action and increases our investments in fossil fuel and other hydrocarbon infrastructure at a time when we should be investing in zero emission energy and phasing out fuels that continue to drive the climate crisis and poison frontline communities. So far, CCUS projects worldwide have failed to live up to promised climate benefits, and many have been net carbon emitters in a lifecycle analysis that considers upstream and downstream emissions. Further, engineered carbon capture can even increase air pollution, water pollution, and other harms for frontline communities. The risks of transporting and storing concentrated carbon dioxide include explosive releases of suffocating plumes that threaten immediate death and hospitalization, spoiling aquifers, degrading soil, and increasing seismicity. As we weigh the risks and benefits of technologies, we must implement a precautionary approach that prevents new harms, uses inherently safer systems and does not add to the cumulative pollution load.

We are part of a growing chorus of advocates and communities around the United States and across the globe condemning CCUS as an obstacle, not a vehicle, to a climate-safe planet, one that perpetuates fossil fuel dominance and exacerbates harms to frontline communities. While we urge policy makers to change course away from CCUS altogether and to pursue bolder, more justice-oriented direct emissions reductions, we feel simultaneously compelled to limit the harms and risks of CCUS to the communities we represent as long as CCUS remains on the table. In April 2022, the

Central Valley Air Quality Coalition (CVAQ) circulated our first [Engineered Carbon Capture, Use, and Storage \(CCUS\) Policy Platform](#) collaboratively developed by San Joaquin Valley based environmental justice organizations as a response to interest in the region for initial CCUS projects and its capacity for carbon storage. Over the next few months, environmental health and justice groups across the state published a [Collective Environmental Justice Statement on Engineered Carbon Capture, Use, and Storage \(CCUS\) in California](#) along with several other documents communicating the various CCUS concerns and recommended pathways for decision makers.

The 2022 legislative session realized several of our platform's policy protections, principally the passing of CVAQ's sponsored bill SB 1314 (Limón) to prohibit the use of captured carbon in enhanced oil recovery operations. Others include a moratorium on carbon pipelines, project transparency through a statewide public database, minimizing full project co-pollutant emissions to the extent technologically feasible, and a minimum 100 year oversight of long-term leak, emission, and seismic risks, among others. However, there are many additional protections and considerations needed to protect California communities from the harms and risks of CCUS.

Environmental justice groups across the state reconvened in the wake of SB 905, which, while providing some important policy protections, also initiated reforms to speed investment in CCUS. Given the clear and substantial evidence that CCUS has a track record of failure as a GHG reduction strategy and presents significant risk to the health and safety of Californians, especially already pollution-burdened communities, we urge any state agency overseeing the deployment of CCUS in California to use its discretion to reject project applications outright. Where state agencies are compelled to consider project applications, we urge that this list of common-sense policy protections necessary for CCUS be first met.

OVERALL

CCUS projects cannot proceed if they threaten groundwater and drinking water supplies or threaten to increase water pollution, soil pollution, truck or barge traffic, light pollution, noise pollution, or other nuisances to the community, defined as within a community designated radius from the project location. Any CCUS project cannot proceed if it threatens to negatively impact a source of drinking water by either degrading water quality or depleting surface water or groundwater supplies. Any CCUS project cannot proceed if it threatens to increase any local or regional criteria air pollutant or toxic air contaminant. Projects must include both baseline and fence-line monitoring for air pollution, and must have a pollution reduction plan to actually reduce local air pollution. All projects must demonstrate before construction and during the environmental analysis and review process that they will not increase pollution, and they must have a pollution reduction plan before the project proceeds.

CCUS infrastructure (e.g., capture infrastructure, pipelines, storage) should not be sited in or near overburdened EJ communities. We recommend a minimum

buffer distance of 10 miles from all capture, storage, and pipelines, unless a further distance is shown by scientific modeling to be necessary to conform with the prohibition on pollution articulated in the previous point. Ruptures of pipelines carrying compressed carbon dioxide can lead to severe short- and long-term health impacts to surrounding communities. The 2020 pipeline rupture in Satartia, Mississippi, is a clear example of the dangers of living near carbon dioxide pipelines. Further, carbon dioxide from the Cameroon Lake Nyos incident suffocated 1,746 people up to 15 miles away. Carbon storage can threaten groundwater and drinking water sources for communities. Carbon storage sites should not be situated near any overburdened EJ community or a drinking water source of any overburdened EJ community. Carbon capture risks extending the life of polluting sources and exacerbating local pollution. Carbon capture equipment should not be added to any facility near an overburdened EJ community.

CCUS projects must be powered by excess clean, renewable energy. Energy sources such as biomethane or hydrogen that aren't truly clean and renewable must not be allowed to power CCUS projects. Electrolytic hydrogen powered by wind and solar is clean and renewable, but it should be reserved for those rare circumstances where wind and solar with storage are not suitable to avoid the significant efficiency loss from using hydrogen. Relatedly, hydrogen should only ever be generated by electrolysis powered by clean, renewable energy, never from fossil fuels or biomethane. Additionally, CCUS should not be used as a mechanism to reduce potential hydrogen project CO₂ emissions.

The state must require notification for any residents or schools within the set buffer distance near a planned site for any CCUS at least 6 months before a permit application. Notification must occur by direct mailing to owners and occupants. The agency or agencies coordinating the public process should connect with and compensate community based organizations to develop a comprehensive, transparent approach tailored to the community involved. Notification must be multilingual.

Once notification occurs, there must be at least 3 workshops or community meetings with the opportunity for residents to raise concerns with the project moving forward and require community benefits as a condition of the project proceeding. The public must be involved in the review of the project with workshops or community meetings at accessible times and locations, with interpretation services and translated materials provided, for residents to learn about the project, raise concerns, reject any project from moving forward, and require conditions providing community benefits before any project proceeds.

A full Environmental Impact Report (EIR) must be required for all proposed capture, transport, and storage projects. Each capture project, pipeline, and sequestration site must have its own EIR, and each EIR must also consider the upstream and downstream impacts from the project. An EIR cannot tier off of local EIRs for approval; it must be a specific, targeted review for each individual project. No CCUS project should receive a California Environmental Quality Act (CEQA) exemption.

The state must require research on potential adverse impacts, informed by impacted communities and community-based organizations, including worst-case scenario modeling, at local and statewide scales. Potential impacts should be studied at all stages, from capture and transportation to utilization and storage, and include impacts to air, water, soil, and public health.

Financial assurances should only be satisfied by measures that do not count on a company maintaining strong fiscal health for over a century, such as bonds and strong third-party insurance. Long-term accountability means that there must be financial guarantees to maintain CCUS projects for at least 100 years, but it is impossible to predict if an individual company will remain solvent so far into the future. As a result, it is imperative that measures such as bonds and strong third-party insurance are used as mechanisms for financial guarantees, so that if an individual company goes out of business, there is still consistent financial responsibility for the ongoing maintenance of a project.

Financial assurances should be responsive to continuous reevaluation of costs of closure, remediation, and leaks or other harms. Unexpected costs could arise and should be planned for. Financial assurances must include a reasonable contingency cost allocation as well as a timeline for periodic reevaluations to see if additional assurances are required.

Within the California Air Resources Board (CARB), the Office of Community Air Protection (OCAP) or the Air Quality Planning and Science Division (AQPSD) should oversee carbon management work. These divisions are uniquely suited to manage CCUS projects because of their expertise in air quality science, and one of them should oversee CCUS projects to ensure that no individual project threatens to worsen air quality or increase air pollution, to ensure that projects have realistic pollution reduction plans in place, and to shut down any projects that fail to follow their pollution reduction plans or otherwise end up worsening air quality in practice. The office that oversees these projects should be adequately resourced to conduct field audits, and should have an established protocol for how to address any credits generated or compliance gained from projects that are deemed ineligible due to lack of compliance with the protocols established.

CCUS financing must not result in increased rates for utility customers. The additional cost of constructing and maintaining CCUS infrastructure should not have the unintended consequence of raising rates for utility customers, and any project that moves forward must come with legally-binding guarantees that financing will not come from increased rates.

CARB must amend the CCUS Protocol in the Low Carbon Fuel Standard (LCFS) to include all protections and must place a moratorium on LCFS applications for CCUS projects until in place. It is not enough for CARB to protect communities in California, but rather CARB must also ensure that its programs do not exacerbate local harms in other states. Since the LCFS crosses state lines, it must be brought into

alignment with in-state protections, including the prohibition on the use of captured carbon for enhanced oil recovery provided by SB 1314 (Limón) and SB 905 (Caballero). However, the LCFS is not sufficient to protect communities because many CCUS projects will not be eligible for LCFS and because LCFS is an insufficient enforcement mechanism, particularly given the abundant federal funding available. Thus, while the LCFS must offer all of the protections in this platform, as well as the protections offered by other relevant laws, including these protections in the LCFS is not sufficient. Further, the LCFS must not incentivize projects to proceed without these protections, so CARB must pause the LCFS CCS Protocol, which currently lacks sufficient community protections.

CARB must include a multi-criteria lifecycle assessment in the LCFS CCS Protocol, and that multi-criteria lifecycle assessment must include construction, transport, and power generation. Assumptions about power generation must reflect actual plans and accurately reflect intentions to connect to the grid. Further, CARB must verify its analysis with real world monitoring performed in-house, not by third party verifiers hired by companies with perverse incentives. That is, projects cannot be provided credits for promised or paper reductions in carbon intensity, only for actual, observed, and verified ones. A full life cycle assessment must include true alternatives including no build alternatives.

No offsets can be generated by planning, constructing, or operating CCUS projects. CCUS is profoundly untested as a climate strategy. Insofar as it has been applied, it has been a tremendous failure. Given the likelihood of projects to fail to provide climate benefits at all or at least to underdeliver significantly, they should not be incentivized through state market mechanisms like cap-and-trade or Low Carbon Fuel Standard. CARB should not adopt or amend any offset protocols that would allow for CCUS projects to generate credits that can be traded or bought.

CARB should take steps to ensure additionality with CCUS projects. A foundational premise of AB 32 is “additionality,” or the assurance that reductions are in addition to actions that would have otherwise been achieved. Another way to frame this question is to ensure that credits generated or compliance gained by CCUS projects should not count twice. CARB’s regulations should take care to ensure that additionality is achieved by building robust oversight to ensure that compliance entities aren’t double-counting “reductions” achieved by generating credits as well as compliance with other regulations.

CAPTURE

CARB should seriously consider omitting CCUS from its climate plans because it is a boondoggle with dubious climate impacts and grave local harms in even the best of circumstances. Insofar as CARB decides to allow and rely on CCUS, CARB must confine deployment to truly hard-to-decarbonize sectors in order to limit harm to climate and communities. Extending billions of dollars in taxpayer subsidies to infrastructure we need to phase out in the next 10-20 years would be a bad choice that would lock in

emissions, preventing us from reaching our climate goals while also ensuring continued pollution in disadvantaged communities, exacerbating environmental injustice, limiting our ability to attain NAAQS, and harming public health. CARB must at all times consider the holistic impact of CCUS and not take a narrow mathematical view toward carbon accounting that over-relies on faulty assumptions and ignores connected issues like public health and environmental justice. As such, carbon capture should only be considered a candidate technology for truly hard-to-decarbonize sectors, and even in those sectors, CARB should prioritize other mitigation strategies.

Sectors that should never be candidates for CCUS, and thus for which CCUS should be prohibited in order to reach our climate and air quality goals, include:

Refineries

CARB's 2022 Scoping Plan relies heavily on deployment of CCUS on refineries despite significant concerns with feasibility. As Dr. Jennifer Wilcox, Principal Deputy Assistant Secretary in the Office of Fossil Energy and Carbon Management at U.S. DOE and CARB's keynote speaker said at the 2022 CCUS Symposium in Stockton, CCUS is "not a good idea for refineries" and "not the right solution" because "refineries are very complicated systems. They have many, many units that emit CO2...not economic." Dr. Wilcox said that refinery CCUS only made economic sense on one refinery unit— the fluid catalytic cracker, which emits a more concentrated carbon dioxide stream, but concluded that adding CCUS to one unit only reduces a small fraction of refinery emissions: "one unit out of many doesn't help us with pollution at all of the other units." Furthermore, because oil refineries are old, complex, hundreds to thousands of acres, and space-constrained, other regulatory proceedings determined that widespread pollution control equipment installation would compromise maintenance and safety.

CARB must phase out fossil fuel infrastructure instead of funneling billions of public and private equity into it, investments which must be amortized over decades and thus require that infrastructure to remain for decades, if not longer. Thus, CARB must prohibit the use of CCUS on refineries. Refinery carbon capture is a climate dead end.

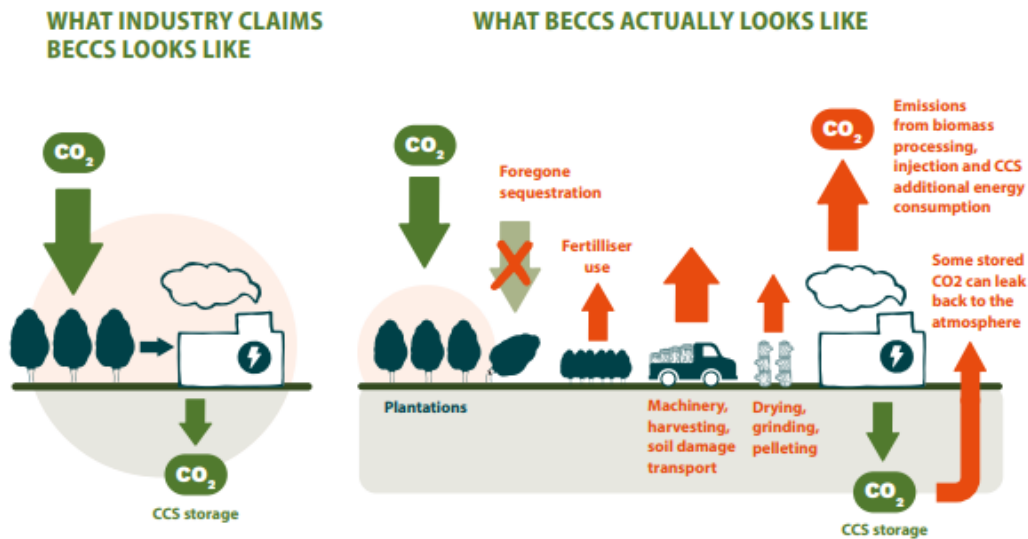
Natural gas power plants

As discussed above, CARB must not pour billions of taxpayer dollars into fossil fuel infrastructure that we must phase out to meet our climate targets. We simply need to stop burning natural gas for electricity, instead of wasting taxpayer money on massive new infrastructure projects to perpetuate the obsolete technology. Further, it would take decades to amortize billions of dollars in new public and private investment in gas power plants, even as we need to phase out the power plants in the short- to medium-term. If there is any sector that is relatively easy to decarbonize, it is the power sector, where we can rely on clean renewables like solar and wind with storage.

BECCS

Bioenergy with carbon capture and storage, or BECCS, must not be allowed for two reasons. First, it is bad for the climate, increasing emissions while purporting to do the opposite. On paper, turning biomass into energy and capturing the carbon produced

may appear net negative, but only if unrealistic modeling assumptions are baked into the math. In other words, BECCS facilities will be net emitters of carbon in a life cycle analysis in the real world, and BECCS only makes sense if it is net negative, which it will never be in practice. This graphic illustrates the point well:



Second, to our knowledge, all of the planned BECCS facilities rely on refurbishing existing biomass plants that were shuttered because they were uneconomic. When active, and despite grand promises to improve air quality, these facilities ranked among the top point sources for particulate matter, causing severe local and regional pollution in EJ communities located in nonattainment zones. Even with these facilities shuttered, we are out of attainment for PM NAAQS. Indeed, the San Joaquin Valley Air District has never met any federal PM_{2.5} standard, and it is in severe nonattainment for even the original 1997 standard, despite multiple more stringent standards layered on top. Adding these new/old point sources will be disastrous for our regional air quality and even worse for the communities where the projects will be sited. Note also that, while open agricultural burning is fairly common in the Valley, it will be quickly phased out under new Air District rules, so the comparison of a biomass facility is not properly to open burning but to more sustainable biomass waste management processes.

Project proponents are once again making bold promises on air quality. We don't believe them, and, following the old adage "Fool me once, shame on you; fool me twice shame on me," it would be shameful for CARB to trust them a second time. Our mistrust is also backed up by sound science that remains skeptical that we can burn—or even gassify—a bunch of organic matter without causing significant local and regional pollution.

Instead, biomass should be sustainably mulched with attention to local externalities and returned to the soil, where it can improve soil health, reduce the need for fertilizers and

¹ https://www.fern.org/fileadmin/uploads/fern/Documents/2022/Six_problems_with_BECCS_-_2022.pdf

pesticides, improve soil water retention, reduce irrigation demand, improve crop yields, and sequester carbon.

Waste incinerators and chemical recycling facilities

Burning garbage is a bad idea. It releases a host of air and water pollution. That remains true even when some of the carbon is captured. Also, even if some of the carbon would be captured, as with almost all CCUS projects worldwide, most of the carbon will be released in the real world, no matter what the modeling shows. Burning garbage releases carbon faster than other waste management practices, so it is worse for the climate. CARB must not pour billions of dollars of taxpayer money into a practice that is bad for the climate and terrible for local communities, and it must prohibit this harmful practice.

Chemical recycling is functionally the same, with a coat of greenwashing to help the poison go down, and the dubious benefit of also producing more plastic.

Ethanol production facilities

Ethanol is less a climate program than an inefficient farm subsidy, given that it has been shown to produce more carbon than gasoline. Adding CCUS would increase funding and drive ethanol production while only exacerbating climate harms by providing lucrative incentives to change land use toward domestic corn production and pushing cultivation of other domestic crops onto unused land, often in forested areas such as the Amazon Rainforest. Razing the rainforest to produce ethanol is not a coherent climate policy, and the land use implications of this application of CCUS are sufficient to demonstrate that this approach is a climate dead end. Further, ethanol facilities create significant local harms, comparable to oil and gas refineries. The only winners are corn and ethanol producers, with frontline communities and the world population losing.

STORAGE

The California Geological Survey must complete a study on maximum sequestration potential in the state before storage projects can be allowed to proceed. As part of this study, CGS must determine not just the available volume of our formations suitable for storage, but also the maximum amount that can be safely stored over time and the maximum safe storage rate. For any formations that will be used for carbon storage, CGS must find that the formations will store the carbon for at least 1,000 years. This study should be conducted statewide but broken down to individual fields and suitable subdivisions (e.g., for oil and gas formations, pools). Once that study is complete, the state can allow carbon storage to be deployed in a manner that prioritizes safety and equity, avoids siting near disadvantaged communities, minimizes risks of leakage and seismicity, and remains suitably distant from all sensitive receptors.

Storage project operators must assess and prove stable geology where projects are to be sited and ensure no risk of leakage, and they must prove that projects will not increase geological risks. Before projects can proceed, the State Geologist

must certify that proposed projects are in geologically stable areas and that the proposed project will not increase seismicity.

CARB must ensure that any carbon stored underground will be permanently stored for at least 1,000 years. While SB 905 requires CARB to identify formations capable of such permanent storage, the statute is curiously silent on requiring that only such formations be used for storage, and this loophole must be fixed by rule or new statute.

CARB must also ensure proper site characterization. Before being permitted to sequester carbon, an operator must properly characterize the storage site and demonstrate conclusively that the carbon will be stored where they say it will be stored. A mere assertion of expected behavior is insufficient. The Clean Energy Systems (CES) BECCS facility being planned for Mendota is a good illustration of this concern. In its permit application to the U.S. EPA, CES stated that the plume would move Northeast without providing evidence, let alone proof. Incidentally, many people reside to the Southwest, which, if the plume traveled in that direction, would presumably involve more property owners and thus more issues with property rights, as well as more potential opposition by community members who don't want millions of tons of a deadly asphyxiant stored under their homes. The state cannot rely on such opportunistic assertions.

Relatedly, CARB must require and verify monitoring of carbon storage to ensure that the carbon is behaving as expected underground. Plume monitoring must be extensive enough to ensure that carbon is not moving beyond where project operators have projected. If the plume does extend beyond the projected storage area, CARB must pause storage injections until appropriate storage rights are attained and all applicable laws are met for the new storage area, including new plume monitoring as needed.

For a sequestration project to proceed, the State Geologist must certify that the project is unlikely to harm groundwater supplies. Specifically, the Geologist must find that the project will not cause groundwater acidification from carbonic acid, that the project will not result in acids carrying heavy metals into groundwater, and that the project will not create enough pressure to force formation of saltwater into groundwater supplies.

TRANSPORTATION

The [Pipeline Safety Trust](#) (PST) provided helpful research on CO2 pipeline regulatory shortfalls in their report "Carbon Dioxide Pipelines: Dangerous and Under-Regulated". As PST points out, existing federal regulations do not allow for the safe transportation of CO2 via pipelines. California's current carbon pipeline regulations are just an incorporation of the federal regulations, so existing regulations are insufficient. Before pipelines can be deployed, the regulations must be improved, but in order for the

regulations to be improved, more research must be conducted to fill knowledge gaps that in many cases underlie regulatory gaps. At a minimum, the state must do the following.

Keep the carbon pipeline moratorium in place until at a minimum updated federal regulations are in place. PHMSA research on the pipeline rupture in Satartia, MI won't be available for 2 years. California should not move ahead with its own rulemaking before there is federal guidance and more research available on pipeline risks and strategies. Additionally, the national conversation is likely to be very generative, with groups like PST more interested in engaging federally. Thus, the moratorium must remain in place until it automatically lifts at the conclusion of the PHMSA rulemaking.

There must be a defined safe distance or plume dispersion model for developing a potential impact area (PIR). We propose the previously stated minimum buffer zone distance be set around sensitive receptors like homes and schools through which carbon pipelines cannot run. This distance must be likely to prevent mass fatality events as well as to protect public health and safety more generally, especially given toxic impacts from non-fatal doses of carbon dioxide exposure.

An odorant must be added to CO₂ for effective leak detection. CO₂ is classified as a hazardous substance by workplace standards and under the California Hazardous Waste Control Law, yet it is hard to identify because it is odorless and colorless. Unlike the colorless, odorless gas methane, which is odorized for public safety, carbon dioxide remains odorless during transport, despite the dangers of carbon dioxide being far greater. Further, research has yet to identify an appropriate odorant for carbon dioxide. Until such an odorant is developed or identified, it would be highly irresponsible to proceed with hundreds or thousands of miles of new or repurposed pipelines.

Community burdens and resources should be considered during pipeline site exploration. Regulations governing siting decisions must consider access to emergency medical services, training of local first responders, and the compounding risks of existing sources of pollution. Emergency response and evacuation plans inclusive of nearby communities should be required to be in place before any project can proceed, and should be updated as needed.

Pipeline operators must assess and prove stable geology where projects are to be sited and ensure no risk of rupture due to seismicity. Before a pipeline can proceed, the State Geologist and the Office of the State Fire Marshal must certify that seismicity poses no significant safety risk for the pipeline.

A regulatory definition of "carbon dioxide" needs to assure all phases of CO₂ apply. Current definitions apply only to liquid and gaseous carbon dioxide, leaving a major loophole for supercritical carbon dioxide, which is not really a gas or a liquid and yet is the most likely form in which carbon dioxide will be transported. This loophole must be closed.

Converting existing transmission pipelines to CO2 service presents serious risks that have not been fully investigated and must be prohibited. In the presence of water, carbon dioxide forms carbonic acid, which eats through steel. Existing oil and gas pipelines fail to account for this additional risk and are thus poor candidates to become carbon pipelines. In addition to the pipes themselves, each pipeline contains numerous fittings, interchanges, and other additional sources of potential leaks and ruptures, each of which must be optimized for carbon pipelines instead of for oil and gas. Old pipelines built for different purposes present risks too grave and comprehensive to consider for transporting carbon dioxide.

Regulations must require pure carbon dioxide streams. Contaminants within CO2 products being transported can jeopardize the integrity of the pipeline. Water and CO2 create carbonic acid, which can break down the pipeline and lead to ruptures. Other contaminants, such as hydrogen sulfide, create additional health risks upon rupture and also corrode pipelines.

Other modes of transportation such as trucks, trains, and barges are not safe or cost effective and should not be utilized to transport CO2. While the risks of pipeline transport are serious and demand very careful regulatory and enforcement regimes, given the economics and the risks, the state must prohibit the transportation of carbon dioxide by truck, rail, and barge altogether.

SIGNATORIES

The following organizations are aligned on the above and commit to uplifting these principles in their CCUS work:

Authors:

Asian Pacific Environmental Network
Central California Asthma Collaborative
Central California Environmental Justice Network
Center on Race, Poverty & The Environment
Central Valley Air Quality Coalition
Communities for a Better Environment
Leadership Counsel for Justice and Accountability
Little Manila Rising
Physicians for Social Responsibility-Los Angeles
Valley Improvement Projects

Endorsers:

California Environmental Justice Alliance
California Environmental Voters
Californians for Pesticide Reform

Center for Biological Diversity

Dolores Huerta Foundation

Greenaction for Health and Environmental Justice

Madera Coalition for Community Justice

San Francisco Bay Physicians for Social Responsibility

Sunflower Alliance