



Response to California SB 905 Solicitation

October 6th, 2025

Dear California Air Resources Board,

RMI (founded as Rocky Mountain Institute) appreciates the opportunity to provide feedback on the implementation of California SB 905. As an independent, non-partisan, non-profit organization founded in 1982, RMI has a long-standing commitment to transforming energy systems through market-based solutions. Our work spans electricity, transportation, buildings, and industry. In 2022, we launched the [Carbon Dioxide Removal Initiative](#) to catalyze the development and deployment of carbon dioxide removal (CDR) in partnership with industry, government, and the scientific and academic community. We bring deep expertise in evaluating and supporting CDR approaches and policy frameworks that enable their responsible scale-up. While this response is largely focused on CDR, we also sourced contributions from colleagues focused on chemicals, carbon utilization, and methane emissions.

Question 1: In addition to the terms defined in statute, are there other key terms that should be defined? Please provide any proposed definitions with applicable citations.

If CARB wishes to set a clear definition of high-quality CDR, it should include additional definitions of the following terms that play an important role in defining CDR:

- **Net-negative** - The entire life cycle of the removal results in net removal of CO₂ out of the atmosphere ([US States and Carbon Dioxide Removal](#), RMI).
- **Additional** - The carbon removed by a project or activity is over and above what would have happened in its absence ([US States and Carbon Dioxide Removal](#), RMI).
- **Verified** - Removals must be verified by an entity without a conflict of interest to ensure that the promised climate outcomes are delivered ([US States and Carbon Dioxide Removal](#), RMI).
- **Radiative forcing** – a change in the amount of radiative energy entering the atmosphere as compared to the amount of radiative energy leaving the atmosphere ([Annex VII: Glossary](#), IPCC).

Question 2: Are there any definitions in the statute that may require further expansion or clarification?

CDR technology is currently defined as “carbon dioxide removal, defined as anthropogenic activities that use technologies or engineered strategies to remove carbon dioxide from the atmosphere and put it into long-term storage, including direct air capture.” Further, carbon dioxide capture, removal, or sequestration project is defined as “a carbon dioxide capture project, a carbon dioxide removal project, or a sequestration project that seeks to provide for the long-term isolation of the carbon dioxide from the atmosphere through storage in a geologic formation.”

If CARB wishes to support the development of all CDR approaches, it should adapt its definitions to be modeled after the IPCC definition of CDR: “Anthropogenic activities removing carbon dioxide (CO₂) from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products” ([Annex VII: Glossary](#), IPCC).



There are four aspects of the current definition in statute that limit its applicability:

- Geologic storage is an important storage mechanism for CDR but is not the only means of storing CO₂. The definition should be inclusive of other storage methods, similar to the IPCC definition.
- While removing CO₂ from the atmosphere is the end result of all CDR approaches, some approaches actively remove CO₂ from the ocean, which in turn draws CO₂ down from the atmosphere.
- Some CDR approaches (e.g. biomass burial or improved forest management) may not be widely considered to be technologies or “engineered”.
- Calling out a single CDR approach (direct air capture, in this case) may unintentionally introduce bias or preference for that technology.

Question 3: Are there any project categories missing from this list?

If CARB wishes to support a full portfolio of solutions, which is important to ensuring California can meet climate goals in a sustainable and competitive manner, project categories should be edited / added, including:

- Biomass-based CDR should include a variety of approaches such as biomass burial, biochar, biooil, marine biomass sinking, storage in building products, and any project that utilizes stabilized biomass to store CDR.
- Geochemical CDR should be added and include mention of surficial mineralization, enhanced rock weathering, and ocean alkalinity enhancement.
- Direct ocean capture and electrochemical alkalinity production should be added.

For more, see the [Applied Innovation Roadmap](#) (RMI, slide 2).

Question 4: Are there suggestions for further description of these categories, or ways to group categories?

The Applied Innovation Roadmap taxonomy categorizes CDR approaches based on the necessary feedstock to understand possible barriers to scaling. The roadmap splits CDR approaches into biogenic (sustainably sourced biomass as the primary feedstock), geochemical (alkaline minerals as the primary feedstock), and synthetic (low-carbon energy as the primary feedstock). We recommend using this taxonomy to categorize CDR projects because it is not only useful for understanding limitations to the scaling potential of CDR in California but can also be a way to simplify regulation and policymaking. For example, there will be overlap in how CARB wishes to regulate biomass use and biogenic CDR is a comprehensive category of approaches that use biomass. See the visualization below for additional detail ([Applied Innovation Roadmap](#), RMI, slide 11).

CDR term:	Biogenic CDR	Geochemical CDR	Synthetic CDR	Storage of CO ₂
				
Definition:	Biogenic CDR (bCDR) approaches use naturally-occurring biogenic carbon fixation mechanisms to capture CO ₂ from the atmosphere. The most important of these mechanisms is photosynthesis.	Geochemical CDR (gCDR) approaches use naturally-occurring neutralization reactions between acidic forms of carbon and alkaline minerals to convert CO ₂ from the atmosphere into solid carbonate minerals or dissolved bicarbonates.	Synthetic CDR (sCDR) approaches use engineered systems powered by low carbon energy to directly separate CO ₂ from the air and capture it or to alter water chemistry to indirectly remove CO ₂ from the air.	Storage of CO ₂ approaches store captured and concentrated streams of CO ₂ through trapping, mineralization, or other physical or chemical processes.
Key input:	Sustainable biomass	Alkaline materials	Low-carbon energy	Suitable sites for CO ₂ storage
Implications for scaling:	<ul style="list-style-type: none"> The potential scale of bCDR will be bounded by the availability of sustainable biomass feedstocks. The most competitive bCDR solutions, long run, will be those that source and transform available biomass inputs into durable CDR most efficiently. 	<ul style="list-style-type: none"> The potential scale of gCDR will be bounded by the availability of alkaline mineral feedstocks needed for neutralization reactions with carbon. The most competitive gCDR solutions, long run, will be those that can source, process, transport, and dispose of alkaline minerals for CDR most efficiently. 	<ul style="list-style-type: none"> The potential scale of sCDR will be bounded by the availability of low carbon energy. The most competitive sCDR solutions, long run, will be those that can transform low carbon energy into CDR most efficiently. 	<ul style="list-style-type: none"> The potential scale of these approaches will be determined by access to suitable storage sites. The most competitive storage solutions, long run, will be those with the lowest cost to establish and operate.

CARB may also consider separating out ocean CDR into its own category. While ocean CDR approaches exist across all the AIR categories above, there are likely to be some commonalities across all ocean approaches with respect to regulatory and permitting considerations that are unique to marine settings.

Additionally, we recommend creating general guidance for carbon dioxide utilization products, based on the source of carbon dioxide and duration of storage.

1. If products with long-term storage capability are produced with CO₂ drawn from biogenic sources or the atmosphere, they can result in CDR.
2. Carbon utilization products with short-term storage capability (such as some chemicals and fuels) can at best be net-zero emissions if their carbon is sourced from biogenic sources or the atmosphere, rather than from fossil-fuel emissions.
3. Short-lived utilization products in some cases may have net-positive emissions if their carbon is sourced from fossil fuels and thus do not qualify as net-zero emission CO₂ utilization.

See the visualization below for additional detail ([From Waste to Value](#), RMI).

Impact of various CO₂ sources on emissions reduction potential of CO₂ utilization

Durability of carbon storage in utilization product

		Long duration of carbon in product	Short duration of carbon in product
Source of carbon	AND CO ₂ source: biogenic, atmospheric, ocean Utilization processes and other inputs are net-zero or net-negative	Negative emissions / carbon removal capable	Net-zero emissions capable
	OR CO ₂ source: point-source fossil fuel combustion Utilization processes and other inputs are net-positive	Net-zero emissions capable	Net-positive emissions

Source: National Academies of Sciences, Engineering, and Medicine; 2023. Carbon Dioxide Utilization Markets and Infrastructure: Status and Opportunities: A First Report. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26703>.

Question 13: What frequency of monitoring and reporting should CARB consider, and should this differ by project type? Do you have estimates on costs for monitoring and reporting?

The nature and frequency of monitoring and reporting that is needed will vary based on two factors:

- **Project type.** Some project-specific factors that may impact MRV requirements include whether the CDR is done in open or closed system, uncertainty of removal volume, risk of reversal, and anticipated durability under normal conditions.
- **The claim being made with the associated CDR credit or activity.** The monitoring and reporting requirements as well as other rules governing the credit should be calibrated to ensuring that the removal activity delivers the climate impact matching the claim being made. When making a compensatory claim for a greenhouse gas emission, the removal credit should fully counterbalance the radiative forcing impact of the original emission. To do so, CARB will need to evaluate whether the risk of reversal and expected durability of the credit meet this threshold. Projects that have a higher risk of reversal and/or a lower expected durability may need to be paired with contracted permanence mechanisms (e.g. insurance, horizontal stacking with more durable credits, or participation in a permanence trust).

The variation in project performance and claims mean that individual methodologies will have to be created or adopted for each CDR approach to establish different monitoring and reporting requirements.

Question 14: Should CARB consider different monitoring requirements at carbon capture sites versus carbon removals utilizing natural systems?

Please refer to our response to Question 13.

Question 18: What key issues should CARB address when developing the unified permit application?

Permitting will likely vary by individual approach given the different natural resources needed by approaches, different potential impacts of approaches, and different locations where approaches can occur. For example, an ocean CDR approach will likely need to undergo a different permitting process, ensure compliance with different regulations, and be reviewed by different agencies than a direct air capture project or an enhanced rock weathering one. For some approaches, the permitting process is likely unclear if no pilots have been conducted in California. If CARB wishes to ensure a streamlined permitting process and help project developers, variety and uncertainty in permitting should be addressed by creating clear instructions for project developers to follow depending on their approach type. Additionally, given that CDR is an ever-innovating field, if CARB wishes to support novel approaches, it should create new permitting resources on a regular basis for evolving or new approaches.

Question 22: What role could projects developed under SB 905 play in these programs and are there other programs or policies in which carbon capture removal, storage, and utilization could play a role for compliance?

For all programs that have the goal of decarbonization in California but are considering allowing CDR credits as an offset pathway, caution should be taken to ensure that allowing CDR does not deter decarbonization. CDR offsetting should only be integrated into mechanisms if measures are taken to limit use to compensating for emissions that are cost prohibitive or technologically infeasible to abate. CARB should determine, for a sector, what counts as cost prohibitive or technologically infeasible.

1. **LCFS:** Allowing producers to offset their emissions from high carbon fuels with carbon credits generated through CDR enables continued fuel production and delays the transition away from ICE vehicles to EVs that will be necessary to meet climate targets. Due to this risk, CDR offsets should be integrated into LCFS policies only if they are being used to cover modes of transportation without currently viable or cost-effective alternatives (such as aviation and shipping before alternative fuels are able to be fully phased in). Limiting the total amount of CDR to a small fraction of allowed offsets could support the growth of the CDR industry while limiting mitigation deterrence risk. Alternatively, CDR can be used in the manufacturing of synthetic fuels (by using streams of removed CO₂ such as from direct air capture facilities as a feedstock); allowing CDR to be used as a feedstock in the LCFS would have a lower risk of mitigation deterrence because it is a method of decarbonization, not offsetting.
2. **Cap-and-Trade:** CDR offsets should only be integrated into the cap-and-trade program with restrictions to ensure CDR does not discourage the adoption of alternative, lower-carbon processes. One way to do this is to institute a cap on the fraction of total emissions that can be offset by CDR. Ideally, the emissions allowed to be offset by CDR would match the expected residual emissions (those that cannot yet be abated because of highly prohibitive cost or lack of technology) of the covered sectors.
3. **Embodied Carbon in Buildings / Net Zero Emissions Strategy for Cement Sector:** Introducing CDR as offsets into the Embodied Carbon in Buildings or Net Zero Emissions Strategy for the Cement Sector would undermine the main purpose of these programs: to support the commercialization of decarbonized processes and products. Alternatively,



carbon utilization is a promising method for producing low-embodied carbon materials and reducing industrial emissions. Certain types of timber and other building materials can qualify as CDR and removed CO₂ can be stored in concrete qualifying it as CDR as well. In these cases, CDR should be allowed as an input to create low-carbon buildings and concrete.

In any instance that a CDR credit is being used to offset residual emissions, the durability of the removal must account for the emissions source. To do so in a science-based way, the radiative forcing impact of the removal must balance the radiative forcing impact of the emission. Any residual fossil CO₂ emission therefore needs to be compensated for by permanent CDR, whether that is by high-durability CDR or low-durability CDR with contracted permanence (i.e., horizontal stacking of low-durability CDR with high-durability CDR). Residual land-based CO₂ emissions can be compensated for with low-durability CDR.

Beyond CDR, without well-designed accounting practices guardrails, the net lifecycle emissions impact of CCUS projects may be lower than expected as additional energy demands for carbon capture may increase upstream methane emissions from marginal fossil fuel supply. If California wishes to maximize emissions reductions from CCUS projects, it could require robust independent assurances that the upstream methane emissions associated with oil and gas demands affected by the project are measured, monitored, reported, and verified and that those upstream emissions are minimized as practical.

Question 23: Are there other things the state could be doing to scale up deployment of projects under SB 905?

If CARB wishes to support the development of novel CDR approaches, it should consider providing support for innovation and pilot projects for CDR that are too early to integrate into existing programs. Support measures could include grants, tax incentives, non-dilutive debt financing, pre-permitted sites, and workforce development.

To ensure stakeholders are aware of what CDR is, the opportunities it poses, and the risks it poses and how to overcome them, CARB should also support the industry with proactive information campaigns with a variety of communities and stakeholders.

Question 24: Is there a potential role for carbon removal using climate-smart agriculture practices under the SB 905 framework?

Yes, if CARB wishes to utilize climate-smart agriculture practices to support CDR, it should explore adding certain CDR approaches to incentive programs (e.g., CDFA's Climate Smart Agriculture program). Some examples include nature-based solutions such as improving soil carbon and other approaches like biochar and enhanced rock weathering amendments to soil ([A Review on Current Status of Biochar Uses in Agriculture](#); [Transforming US agriculture for carbon removal with enhanced weathering](#)).

Question 26: Should CARB consider adopting project type specific protocols or defining more widely applicable standards, or a combination of both? If CARB were to define key standards applicable to all methodologies as opposed to individual methodologies based on specific technology or storage, what could those look like (i.e. recommendations on existing



standards), and would that approach help to scale and innovate in this space faster than development of individual protocols?

To ensure that the creation of a CDR industry in CA does not lead to the fragmentation of the CDR industry worldwide and to ensure that CA is able to provide CDR credits to other jurisdictions in the future and reap the economic benefits of being a CDR exporter, CARB should define a high-quality standard for CDR projects that is interoperable with other standards (e.g., Paris Agreement Crediting Mechanism, EU CRCF) and then allow methodologies to apply and be accepted if they meet these standards. Accepted methodologies should be updated regularly to ensure alignment with the best available science and to make sure that they are harmonized with other international compliance regimes. This model of allowing methodologies to apply for certification is commonly practiced across voluntary and compliance markets (e.g. ICVCM's Core Carbon Principles or CORSIA) and is a model for maintaining rigor while not further fragmenting the market with the development of a new set of methodologies.

We appreciate the opportunity to contribute to the implementation of SB 905. California has already begun supporting CDR in a meaningful way, and the implementation of SB 905 opens further opportunities to do so.

Sincerely,

Kyle Clark-Sutton

Principal, Carbon Dioxide Removal, RMI

kclarksutton@rmi.org