California Air Resources Board

Proposed California Carbon Capture, Removal, Utilization and Storage Program Regulations and Associated Regulatory Amendments

Staff Report: Initial Statement of Reasons

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Proposed California Carbon Capture, Removal, Utilization and Storage Program Regulations and Associated Regulatory Amendments 1
Staff Report: Initial Statement of Reasons 1
List of Acronyms and Abbreviations 4
Executive Summary 6
I. Introduction and Background 8
A. Carbon Management Context in California and Globally 8
B. California's Need for Carbon Capture and Carbon Removal 11
C. Statutory Direction to CARB Under SB 905 12
D. California's Multi-Agency Regulatory Landscape 15
E. Overview of the Proposed Regulation 17
II. The Problem that the Proposal is Intended to Address 18
A. Consequences If These Problems Are Not Addressed 21
B. How The Proposed CCUS Program Regulations Address These Problems 22
III. The Specific Purpose and Rationale of Each Adoption, Amendment, or Repeal 23
IV. Benefits Anticipated from the Proposed Regulation, Including the Benefits or Goals Provided in the Authorizing Statute 23
A. Expanded and Extended Monitoring Streamlined with Existing Federal Requirements 24
B. Ensuring Long-term Responsibility and Permanent Carbon Dioxide Storage 24
C. Updates to the CCS Protocol, Updates to Cap-and-Invest and LCFS, and Operator Requirements to Obtain Permanence Certification 25
D. Ensuring Community Communication and Public Disclosure for CCS Projects, CDR Projects, and GCS Sites 26
V. Air Quality 26
VI. Environmental Analysis 27
VII. Environmental Justice 30
VIII. Economic Impacts Assessment or Standardized Regulatory Impact Analysis 33
A. The creation or elimination of jobs within the State of California. 43
B. The creation of new businesses or the elimination of existing businesses within the State of California. 43
C. The expansion of businesses currently doing business within the State of California. 44

D. Significant Statewide Adverse Economic Impact Directly Affecting Business, Including Ability to Compete 44

E. The benefits of the regulation to the health and welfare of California residents, worker safety, and the state's environment 45

IX. Evaluation of Regulatory Alternatives 45

A. Small Business Alternative 46

B. Performance Standards in Place of Prescriptive Standards 47

C. Health and Safety Code section 57005 Major Regulation Alternatives 47

X. Justification for Adoption of Regulations Different from Federal Regulations Contained in the Code of Federal Regulations 48

XI. Public Process for Development of the Proposed Action (Pre-Regulatory Information) . 50

A. Workshops and Pre-Rulemaking Activities 50

B. Meeting Materials and Participation 52

C. Additional Outreach 55

D. Stakeholder Meetings 55

E. Webpage Resources and Transparency 55

XII. Documents Relied Upon 55

XIII. Appendices 66

List of Acronyms and Abbreviations

AB	Assembly Bill
BACT	Best Available Control Technology
BECCS	Bioenergy with carbon capture and storage
CalGEM	California Geologic Energy Management Division
CARB	California Air Resources Board
CCEJN	Central California Environmental Justice Network
CCS	Carbon capture and storage
CCS Protocol	Carbon Capture and Sequestration Protocol
CCUS	Carbon capture, utilization, and storage
CCUS Program	California Carbon Capture, Removal, Utilization, and Storage Program
CDR	Carbon dioxide removal
CEC	California's Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CISN	California Integrated Seismic Network
CNRA	California Natural Resources Agency
CO_2	Carbon dioxide
CRC	California Resources Corporation
CTV I	Carbon TerraVault I
DAC	Direct air capture
DOC	Department of Conservation
DOE	United States Department of Energy
EIA	Environmental impact analysis
EJC	Environmental Justice Advisory Committee
EOR	Enhanced oil recovery

ERRP	Emergency and remedial response plan
EU	European Union
GCS	Geologic carbon storage
GCS Protocol	Geologic Carbon Storage Protocol
GHG	Greenhouse gas
HSC	Health and Safety Code
ISOR	Initial Statement of Reasons
LCFS	Low Carbon Fuel Standard
MRR	Regulation for the Mandatory Reporting of Greenhouse Gas Emissions
NAICS	North American Industry Classification System
NBS	Nature based strategies
NO_x	Nitrogen oxides
OSFM	Office of the State Fire Marshal
PDF	Portable document format
PISC	Post injection site care
PRC	Public Resources Code
QAM	Quantification assessment methodology
SB	Senate Bill
SEM	Surface emissions monitoring
U.S. EPA	United Stated Environmental Protection Agency
UIC	Underground injection control
USDW	Underground sources of drinking water
VSP	Vertical seismic profiling

Executive Summary

California is experiencing increasing and widespread impacts from climate change, with extreme events occurring more frequently and with greater severity. Climate-driven disasters that once appeared decades away are now happening on a regular basis. In January 2025, destructive wildfires in Los Angeles driven by climate intensified drought resulted in hundreds of fatalities (McKoy, 2025), the loss of more than 16,000 structures (CAL FIRE, 2025), and economic damages exceeding $95 billion (Next 10, 2025). Wildfires, extreme heat, and drought events contribute to substantial public health harms and economic disruption (Connolly et al., 2024). These impacts underscore the urgent need for substantial greenhouse gas (GHG) emission reductions and long-term carbon management solutions to protect communities and reduce future harm.

California's statutory climate framework reflects this urgency. In 2022, the California Air Resources Board (CARB or Board) adopted the 2022 Scoping Plan for Achieving Carbon Neutrality (CARB, 2022) (2022 Scoping Plan), which outlines a cost-effective and technologically feasible path to achieve carbon neutrality by 2045 and reduce statewide GHG emissions to at least 85% below 1990 levels by 2045 per statutory requirements in Assembly Bill (AB) 1279 (Muratsuchi, Chapter 337, Statutes of 2022).[1] California achieved its 2020 target, returning to 1990 emissions levels six years early in 2014, demonstrating the State's track record of climate-policy leadership. Still, even with aggressive decarbonization across all AB 32 (Nuñez, Chapter 488, Statutes of 2006)[2] sectors, some residual emissions will remain in 2045 from sources that are difficult or infeasible to fully eliminate. Achieving the State's statutory climate goals requires prioritizing deep emissions reductions alongside carbon capture, utilization, and storage (CCUS) and carbon dioxide (CO_2) removal (CDR), including nature-based strategies (NBS) and other approaches such as direct air capture (DAC) and bioenergy with carbon capture and storage (BECCS).

As climate impacts have accelerated, science has laid out what our path forward should be. In early September 2026, the United Nations Environment Programme (UNEP) released a new report called "Limiting Overshoot" (UNEP, 2026). The report provides a frank discussion that globally, we are not on track to limit temperature increase to 1.5 degrees Celsius. However, missing that goal must not mean abandoning our efforts. The report clearly outlines that Carbon Capture and Storage (CCS), and CDR have an important role in bringing warming below 1.5 degrees Celsius by the end of the century. Consistent with the 2022 Scoping Plan, the report does not view carbon management as a silver bullet—it is needed in addition to, not instead of, sustained reduction in GHG emissions.

Recent uncertainty in federal climate policy further demonstrates the importance of strong, clear California-specific regulatory direction to support private investment in these tools. Reaching the State's carbon neutrality goals will require unprecedented pace and scale of CCUS and CDR deployment over the next two decades. CCUS projects were once seen as having a limited role for only hard to abate sectors where costs or technology did not exist to

[1] Health & Saf. Code § 38562.2.
[2] Health & Saf. Code § 38500, et seq.

reduce GHG emissions. The best available science is clear; we need to deploy at much larger scales to stop emissions from entering the atmosphere regardless of source and remove legacy emissions that continue to contribute to climate change.

Senate Bill (SB) 905 (Caballero, Chapter 359, Statutes of 2022) directs CARB to develop a comprehensive regulatory program to support the safe, effective, and viable deployment of carbon management technologies, including CCUS and CDR.[3] These projects are already occurring. The legislation requires CARB to establish a consistent statewide regulatory framework that complements existing state, local, and federal permitting programs and ensures that deployment of carbon management technologies aligns with California's broader climate and public health objectives.

Consistent with SB 905, CARB Staff propose to establish the California Carbon Capture, Removal, Utilization, and Storage Program, herein referred to as the CCUS Program. While there already exists an expansive regulatory framework at the federal, state, and local level to support deployment of these projects, SB 905 reflects additional protections the state should address to ensure the safe, effective, and viable deployment of carbon management technologies in the state.

The primary objectives of the Proposed Regulation are to:

- Support overall deployment of CCUS and CDR projects to meet statutory climate targets as demonstrated in the 2022 Scoping Plan;
- Implement the CCUS Program to reflect Health and Safety Code section 39741.1, subdivision (c);
- Adopt enforceable regulations requiring project operators to maintain financial responsibility for geologic carbon storage (GCS) projects as required by Health and Safety Code section 39741.5;
- Develop enforceable implementation, monitoring, reporting, and emergency response requirements to support the efficacy, safety, and viability of CCUS and CDR projects in alignment with authority provided by SB 905;
- Complement existing federal, state, and local permitting requirements associated with these project types and avoid creating duplicative regulatory requirements;
- Increase public transparency of CCUS and CDR project information; and
- Support alignment and integration with existing CARB programs.

[3] Health & Saf. Code § 39740.

I. Introduction and Background

This Initial Statement of Reasons (ISOR or Staff Report) presents CARB Staff's rationale for the proposed CCUS Program and related proposed regulatory amendments. The CCUS Program is a necessary component of California's climate policy framework to ensure the effective, safe, and viable deployment of carbon management technologies capable of permanently storing carbon dioxide (CO_2). SB 905 reflects additional priorities identified by the Legislature as being important considerations above the existing federal, state, and local requirements for these projects. This chapter provides background on the State's climate requirements, the history and context of CCUS in California and globally, the multi-agency regulatory landscape for carbon management projects, and an overview of the conceptual elements that inform the proposed regulation.

The proposed CCUS Program identifies specific types of carbon capture projects, CDR projects, and GCS sites that are subject to the regulation. Inclusion within the CCUS Program's applicability indicates that those project types are subject to the additional regulatory requirements established under the CCUS Program to ensure safe operation, long-term storage integrity, and transparently documented projects. Inclusion for regulatory purposes also reflects the State's recognition of the full suite of carbon management strategies, including NBS, utilization pathways, and other emerging tools across California's climate programs.

California's climate policies are grounded in statutory requirements established by the Global Warming Solutions Act of 2006, known as AB 32, which required statewide GHG emissions to return to 1990 levels by 2020 and directed CARB to develop and regularly update a climate change Scoping Plan.[4] SB 32 (Pavley, Chapter 249, Statutes of 2016)[5] strengthened these commitments by requiring at least a 40% reduction below 1990 levels by 2030. Most recently, AB 1279 established the State's statutory requirement to reduce anthropogenic GHG emissions at least 85% below 1990 levels and achieve carbon neutrality no later than 2045[6] and was passed with SB 905. The 2022 Scoping Plan (CARB, 2022) outlines a cost-effective and technologically feasible pathway to meet these requirements and identifies CCUS and CDR as essential components of California's mid-century climate goals.

A. Carbon Management Context in California and Globally

Carbon management activities are already happening in the state and globally. Carbon management technologies, including carbon capture, removal, utilization, and geologic storage and carbon dioxide removal,[7] are increasingly recognized as essential tools for achieving

[4] Health & Saf. Code § 38500, et seq.

[5] Health & Saf. Code § 38566.

[6] Health & Saf. Code § 38562.2.

[7] For the purposes of this document "carbon management" refers to the full suite of projects, facilities, and technologies involving the capture or storage of CO_2, including carbon capture projects, CDR projects, and GCS sites. The term "carbon capture projects" means a project that uses a process to separate carbon dioxide from industrial, commercial, or energy-related sources, other than oil or gas production from a well, and produces a concentrated fluid of carbon dioxide with the intent of preventing emission of the CO_2 into the

climate targets worldwide, such as those depicted in Figure 1. CCS is the process of separating CO_2 from a point-source emission stream, such as the flue gas of a natural-gas power plant, refinery, cement kiln, or other industrial facility, and placing the captured CO_2 into long-term storage, typically by injecting it into a deep geologic reservoir. Alternatively, CO_2 utilization is the process of reusing captured CO_2 to manufacture products that also permanently store carbon. CCS technology was first developed in the 1970s for enhanced oil recovery (EOR), and is now deployed globally (CCS Institute, 2025). California has significant potential for CCS adoption due to its suitable geology, and its extensive history of fossil-fuel extraction, which has resulted in well-characterized subsurface formations capable of supporting long-term geologic CO_2 storage. Importantly, SB 1314 (Limón, Chapter 336, Statutes of 2022)[8] bans the deployment of EOR in CCS projects in the state.

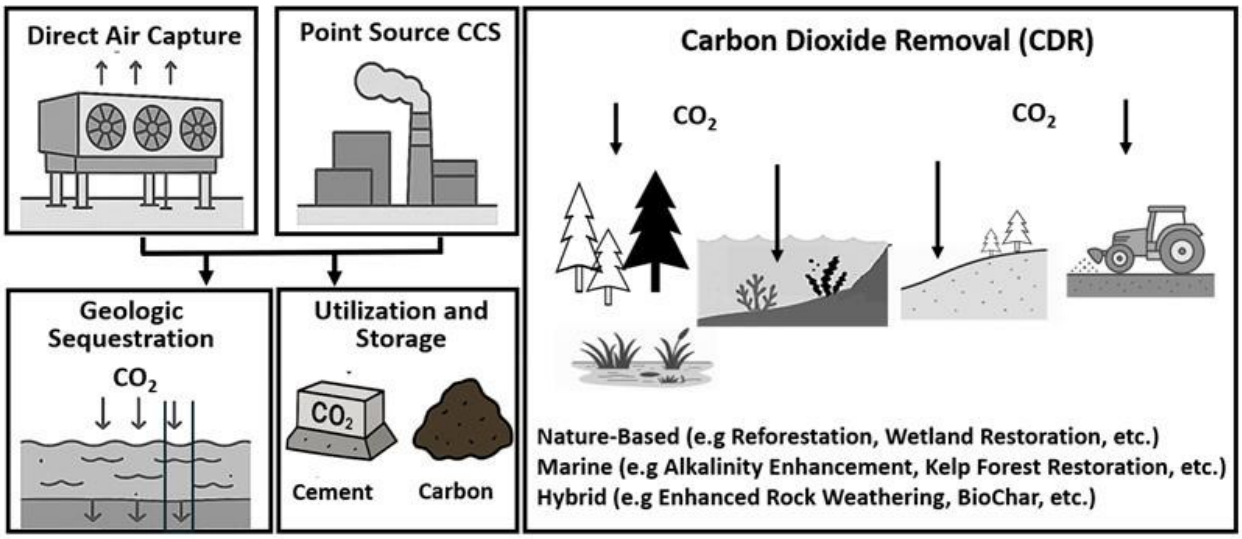


Figure 1: Carbon management technologies, including carbon capture, removal, utilization, and geologic storage (CCUS).

As of 2025, 77 CCUS projects are operational worldwide, with another 47 under development. Most are located in North America and Europe (Figure 2), supported by expanding policy commitments (CCS Institute, 2025). The European Union (EU) has established a strong regulatory foundation for GCS through its 2009 Carbon Capture and Storage Directive (Council Directive 2009/31/EC, 2009) and its 2024 Net-Zero Industry Act (Regulation (EU) 2024/1735), which includes an EU-wide target of 50 million metric tons of injection capacity by 2030.

atmosphere. The term “CDR projects” means a project that undertakes activities to remove carbon dioxide from the atmosphere or to capture, store, utilize or otherwise isolate carbon dioxide in a manner that results in GHG removal. The term “GCS sites” means the storage complex, all wells and any facilities used to ensure permanent storage of injected CO2. Detailed definitions for each of these terms are provided in the Staff Report and in the Proposed Regulation Order.

[8] Pub. Res. Code § 3132.

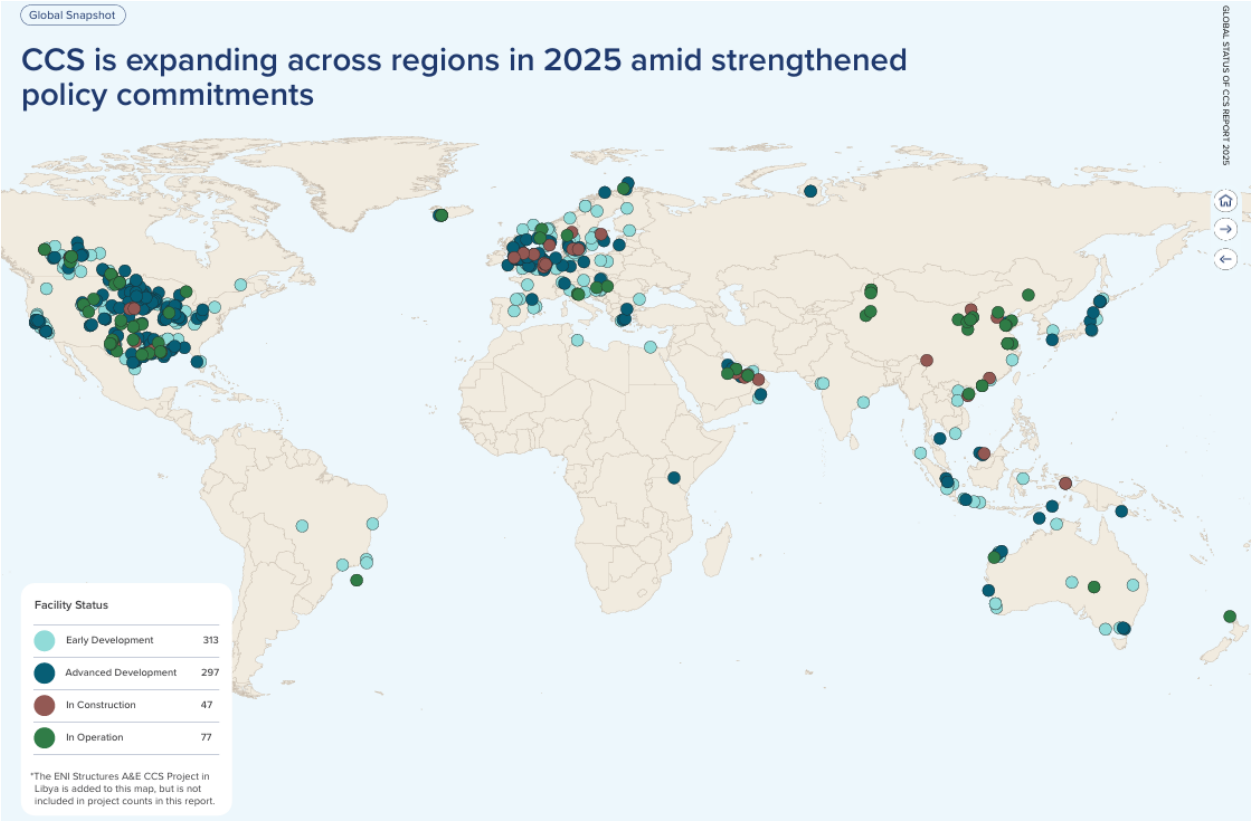


Figure 2: Global snapshot of CCS projects across the globe.

In the United States, federal support has included the U.S. Environmental Protection Agency's (U.S. EPA) Underground Injection Control (UIC) Class VI Program (UIC-SC, 2010), the Section 45Q federal tax credit which was expanded in 2018 and 2022 and preserved through 2033 (26 U.S.C § 45Q),[9] and other federal incentives with applicability to carbon management, such as the 45V[10] and 45Z[11] tax credits. Recent federal programs, including the Department of Energy's (DOE) DAC hubs, the Carbon Capture Demonstrations Projects Program, Climate Pollution Reduction Grants, and climate-smart commodities, were designed to support carbon management deployment, though several grants have been reduced or rescinded since 2025, contributing to uncertainty for project developers. There is existing data on projects that demonstrate CCUS projects have a capture rate of over 90% (SaskPower, n.d.).

California remains a leader in climate action and continues to advance climate policies that support significant GHG reductions and carbon neutrality. Several carbon management projects already operate in the state with many more in early planning stages, underscoring the need for the Proposed Regulation to ensure these current and future projects are safe, effective, and viable and that additional protections in SB 905, above and beyond the existing regulatory landscape, are in place. The Carbon TerraVault I (CTV I) project, operated by the

[9] 26 U.S.C § 45Q (Credit for carbon oxide sequestration, 2022).
[10] 26 U.S.C § 45V (Credit for production of clean hydrogen, 2022).
[11] 26 U.S.C § 45Z (Clean fuel production credit, 2022).

California Resources Corporation (CRC) in Elk Hills, represents California's first operational GCS site (California Resources Corporation, 2026). The CTV I project takes captured CO_2 from CRC's onsite gas plant and injects it into an underground geologic formation for permanent storage. The CTV I project is expected to store up to 1.6 million metric tons of CO_2 annually. Heirloom Carbon operates a DAC facility in Tracy, California, which has been removing up to 1,000 tons CO_2 annually since 2023 (Heirloom Carbon, n.d.). This facility uses limestone to remove CO_2 from the atmosphere, which is then separated using heat and permanently stored in concrete. Calpine has several projects underway to capture CO_2 emissions from natural gas facilities using solvent-based technologies (Calpine, n.d.a.). Calpine's Project Enterprise is an operational pilot scale project at the Los Medanos Energy Center that captures CO_2 from a natural gas-fired, combined generation power plant in Pittsburg, California (Calpine, n.d.b.). Calpine is also developing the Sutter Decarbonization Project, which would retrofit a natural gas combined cycle power plant in Yuba City to capture and store up to 1.75 million metric tons of CO_2 each year (Calpine, n.d.c.). The Proposed Regulation will provide the certainty for these and new project developers and investors on how to plan and implement projects in compliance with the state's statutory requirements.

Since the first AB 32 Climate Scoping Plan in 2008, carbon, capture, and sequestration has been highlighted as an additional tool to achieve the state's climate targets. Today, CARB's GHG Inventory and Mandatory Greenhouse Gas Reporting Regulation (MRR); the Low Carbon Fuel Standard (LCFS), which already includes a Carbon Capture and Sequestration Protocol (CCS Protocol); the Cap-and-Invest Program; nature-based strategies under AB 1757 (C. Garcia, Chapter 341, Statutes of 2022);[12] and the California Energy Commission's (CEC) Carbon Removal Innovation Support Program, funded through California Climate Investments, are all opportunities to help advance the carbon management strategies needed for California to achieve its statutory objectives.

B. California's Need for Carbon Capture and Carbon Removal

California's climate statutes (e.g., AB 1279 and SB 905), as well as the 2022 Scoping Plan, identify a need for both carbon capture and carbon removal strategies to meet California's 2045 climate targets. As identified in the 2022 Scoping Plan Update and numerous independent analyses, even with aggressive deployment of clean electricity, low-carbon fuels, zero-emission vehicles, and industrial decarbonization, some residual emissions are likely to persist (IPCC, 2022; IEA, 2023). To address these emissions, as well as legacy atmospheric CO_2 concentrations, California must scale various approaches to carbon capture and removals, including carbon capture, DAC, BECCS, and NBS such as improved forest management and soil sequestration.

Legislation has also expanded climate and decarbonization policy into the energy sector. For example, SB 100 (De Leon, Chapter 312, Statutes of 2018)[13] requires California's energy agencies to evaluate zero-emission electricity generation technologies. Under SB 100's

[12] Health & Saf. Code § 38561.5.
[13] Pub. Utilities Code §§ 399.11, 399.15, 399.30, 454.53.

framework, carbon capture applied to natural-gas electricity generation could serve as a zero-emission, or near-zero-emission, resource, thereby contributing to the clean electricity portfolio envisioned in the statute. In this context, CCS can be deployed on stationary sources such as gas power plants to mitigate GHG emissions, whereas residual emissions and legacy atmospheric CO_2 can only be addressed through carbon removal approaches like DAC, BECCS, and nature-based removals. This legislative direction reflects a broader expansion of climate policy beyond hard-to-abate sectors and reinforces the need for both emissions mitigation and carbon removal strategies statewide. AB 1757, directs California to include nature-based solutions within its strategy for mitigating climate change, and SB 1279 directs CARB to develop a path towards carbon neutrality by 2045, which is shown to require carbon management projects within CARB's 2022 Scoping Plan as directed by AB 32.

California's mature climate-policy foundation positions the State to integrate carbon management into the States emissions reductions and carbon removal strategy safely and responsibly. Programs such as the LCFS and the Cap-and-Invest Program provide opportunities to support voluntary deployment of carbon capture and CDR pathways. California's GHG and Natural Working Lands (NWL) Reporting and Inventory programs provide the scientific basis for evaluating statewide emissions and progress toward climate targets, including how emissions reductions and removals from CCS and CDR programs contribute to progress while ensuring there is no double counting. Further, continued focus on nature-based strategies under AB 1757 and other complementary efforts (e.g. 30x30) demonstrate the State's commitment to climate-smart land management and to resilient natural and working lands that can both protect and enhance ecosystems, reduce wildfire risk, and support CO_2 removal. Together, these programs and policies create a landscape in California for the State to benefit from the environmental and economic opportunities of carbon capture and CDR, spurring innovation, while also ensuring safe deployment and long-term storage of captured CO_2.

C. Statutory Direction to CARB Under SB 905

SB 905 provides direction to several state agencies to coordinate or develop regulations and policies to regulate carbon removal activities in the state. Specifically, SB 905 requires CARB to establish the CCUS Program to support safe, effective, and viable deployment of carbon management technologies. The legislation also directs CARB to establish a consistent statewide regulatory framework that complements existing state, local, and federal regulations to ensure that carbon management technologies are deployed safely and in alignment with California's climate and public health objectives.

SB 905 directs CARB to incorporate multiple core elements into the CCUS Program to ensure effective oversight of carbon management projects. The statute requires CARB to ensure that all CCUS and CDR projects include strategies to minimize certain potential environmental impacts, including co-pollutant emissions from CCUS and CDR technologies and construction and transportation related air and water pollution impacts. SB 905 also directs CARB to establish robust, long term financial responsibility, seismic monitoring, air pollutant monitoring, and leak detection requirements for GCS sites that remain active through injection operations and extend for at least 100 years after CO_2 injection ceases. In addition, the legislation requires operators of GCS sites to demonstrate effective prohibitions on drilling or other

subsurface extractive activities that could penetrate the storage reservoir, thereby protecting containment integrity throughout injection activities and long-term monitoring. These statutory obligations are intended to ensure long-term containment integrity and make certain that operators remain accountable for preventing seismic activity and CO_2 leakage from posing any risk to public health, safety, or the environment throughout the full life of a GCS site. SB 905 also authorizes CARB to support additional methods of utilization or storage of captured CO_2, including carbon capture for use in products.

While SB 905 has directions for several state agencies, this Proposed Regulation is focused on a narrower scope identified for CARB. Other components of SB 905 are being implemented by other State agencies or are outside the scope of this proposed rulemaking. See

	Statute Reference	Lead A
Program Administration. Establishing and administering the CCUS Program ort the efficacy, safety, and viability of projects. As part of the program, where e and in recognition of existing regulations, ensuring that projects include es to minimize pollution and seismic risks, mitigate pollution impacts, and ongoing monitoring and reporting.	HSC § 39741.1 HSC § 39741.3 HSC § 39741.4 HSC § 39741.5 PRC § 71464	CARB
Permitting Application Portal: Developing and hosting a single window, ry-use permit application portal to streamline coordination across participating nd local agencies.	HSC § 39741.2(a)	CARB
work for Geologic Storage Governing Agreements: Framework and nendations on how to set agreements when two or more pieces of land sit he same reservoir.	PRC § 71461(a)	CNRA
ate Carbon Dioxide Pipeline Safety Standards: Minimum safety standards for pelines in the state, including requirements for design, construction, operation, and emergency preparedness for CO_2 pipelines.	PRC § 71465(a) Gov. Code § 51011.5 HSC § 51012.2	OSFM
Safety Oversight for Pipelines: Overseeing emergency response planning eline integrity management to reduce risks from high-pressure CO_2 releases.	PRC § 71465(a)-(b) Gov. Code § 51018.6 Gov. Code § 51018.9	OSFM
c & Subsurface Monitoring: Providing geological consultation to agencies to safe, permanent CO_2 storage, including regulatory requirements for seismic ing. Evaluating seismic risks and monitoring and reporting seismic activity and l subsurface leakage to regulators.	PRC § 71463	CGS
lity Assessment: Evaluating the suitability of geologic reservoirs for carbon to support regulators, pore space management considerations, and provide available data.	PRC § 2213	CGS

Table 1 and the next section for a summary overview of the key state agencies with a role in implementing the Health and Safety Code (HSC) and Public Resources Code (PRC) sections in SB 905.[14] Ultimately, SB 905 functions to establish additional state requirements that build upon the existing and numerous local, state, and federal requirements to help ensure a robust regulatory framework that can advance climate action while safeguarding Californians (CARB, 2026a).

[14] See CARB, *SB 905: Multi-agency Roles (2026). https://ww2.arb.ca.gov/sites/default/files/2026-08/SB_905_Multi_Agency_Roles_0.pdf*.

Table 1: Summary of State Agency Responsibilities for Implementation of SB 905 and Related Statute.

Topic	Statute Reference	Lead Agency
CCUS Program Administration. Establishing and administering the CCUS Program to support the efficacy, safety, and viability of projects. As part of the program, where feasible and in recognition of existing regulations, ensuring that projects include strategies to minimize pollution and seismic risks, mitigate pollution impacts, and include ongoing monitoring and reporting.	HSC § 39741.1 HSC § 39741.3 HSC § 39741.4 HSC § 39741.5 PRC § 71464	CARB
Unified Permitting Application Portal: Developing and hosting a single window, voluntary-use permit application portal to streamline coordination across participating state and local agencies.	HSC § 39741.2(a)	CARB
Framework for Geologic Storage Governing Agreements: Framework and recommendations on how to set agreements when two or more pieces of land sit above the same reservoir.	PRC § 71461(a)	CNRA
Intrastate Carbon Dioxide Pipeline Safety Standards: Minimum safety standards for CO_2 pipelines in the state, including requirements for design, construction, operation, testing, and emergency preparedness for CO_2 pipelines.	PRC § 71465(a) Gov. Code § 51011.5 HSC § 51012.2	OSFM
Public Safety Oversight for Pipelines: Overseeing emergency response planning and pipeline integrity management to reduce risks from high-pressure CO_2 releases.	PRC § 71465(a)-(b) Gov. Code § 51018.6 Gov. Code § 51018.9	OSFM
Seismic & Subsurface Monitoring: Providing geological consultation to agencies to support safe, permanent CO_2 storage, including regulatory requirements for seismic monitoring. Evaluating seismic risks and monitoring and reporting seismic activity and potential subsurface leakage to regulators.	PRC § 71463	CGS
Suitability Assessment: Evaluating the suitability of geologic reservoirs for carbon storage to support regulators, pore space management considerations, and provide publicly available data.	PRC § 2213	CGS

D. California's Multi-Agency Regulatory Landscape

California has one of the most rigorous environmental, public health, and safety regulatory landscapes in the world and this regulatory proposal will both complement this existing State, local, and federal regulatory landscape and will also continue California's tradition of being a leader in environmental and public health protection. As identified below, these projects are implemented with oversight from several agencies, including the California Natural Resources Agency (CNRA), the Department of Conservation California Geologic Survey (CGS), Office of the State Fire Marshall (OSFM), Department of Conservation/California Geologic Management Division (CalGEM), State Water Resources Control Board (SWRCB), and now CARB. Additionally, local agencies such as local land use zoning authorities and local air districts review, approve, and have oversight of these projects. There is also federal oversight from U.S. EPA.

Under the existing regulatory landscape at the local and state level, all CCUS and CDR projects are required to comply with the California Environmental Quality Act (CEQA), which requires a thorough environmental review of project impacts. CEQA reviews ensure that carbon management projects identify potential risks, disclose environmental effects, and incorporate mitigation strategies before approval. This framework applies broadly across sectors and is intended to minimize pollution, safeguard public health, and prevent disproportionate environmental burdens on communities.

Local permitting for CCUS and CDR projects in California also involves a layered set of air, water, and land-use requirements administered by regional air districts, water boards, and county or city planning authorities. Air districts review proposed projects for compliance with local air quality standards and may require ongoing monitoring and mitigation to ensure that carbon capture systems are permitted for emissions and appropriately monitored and mitigated in furtherance of achieving air quality standards. Water-related permitting typically involves demonstrating that projects will not contaminate groundwater or surface waters, and operators may be required to implement long-term monitoring programs to track any potential impacts associated with pipeline operations, injection wells, or associated industrial processes. Land-use authorities, including county planning departments and local permitting boards, evaluate CCUS and CDR proposals for compatibility with zoning rules, existing land uses, and community impacts. These local agencies commonly require project developers to conduct site-level reporting and maintain public transparency about operations, environmental performance, and long-term stewardship to ensure that projects align with local priorities and minimize risks.

At the federal level, CCUS and CDR projects typically intersect with permitting systems overseen by agencies such as the U.S. EPA. For example, geologic sequestration requires compliance with UIC regulations, which are designed to ensure that the long-term injection of CO_2 for geologic sequestration is conducted safely and responsibly. Its primary objective is to protect underground sources of drinking water (USDW) by requiring comprehensive site characterization, rigorous monitoring of well integrity, injection operations, and groundwater quality, as well as detailed area-of-review modeling to prevent contamination from the migration or leakage of a sequestered matter.

While the regulatory and permitting requirements can vary project-to-project in California, they typically involve the following multiple agencies:

- Local city or county authorities for CEQA, compliance with land-use requirements, and other local permits and ordinances.
- Local air districts regulate stationary sources of air pollutant emissions, permit combustion devices and gas-handling equipment, set best available control technology (BACT) requirements, and address potential odor and nuisance complaints.
- State Water Resources Control Board and regional water boards regulate water-quality impacts, wastewater discharges, and stormwater requirements associated with carbon-capture operations.
- CalGEM regulates the plugging and permanent sealing of abandoned, idle, and orphaned oil, gas, and geothermal wells to protect public health, safety, and underground drinking water.
- CGS provides geological evaluations and plays a statutory role under SB 905 in tracking seismic activity and reporting potential leakage to CARB.
- OSFM oversees the design, construction, testing, operation, maintenance, emergency planning, and integrity management of intrastate supercritical CO_2 pipelines. Under SB 614 (Stern, Chapter 529, Statutes of 2025),[15] OSFM sets safety standards, requires community safety measures, and has authority to order emergency shutdowns.
- The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides a state pipeline safety base grant under 49 U.S.C. section 60107, enabling OSFM to inspect and enforce safety regulations for intrastate hazardous liquid and CO_2 pipelines under a cooperative agreement (State certification). As part of this grant, PHMSA annually audits OSFM's pipeline safety program, though PHMSA does not directly inspect intrastate CO_2 pipelines. PHMSA retains federal inspection authority for interstate CO_2 pipelines if constructed in California. While PHMSA may amend federal CO_2 pipeline regulations that OSFM references in its title 19 California pipeline safety regulations, OSFM does not automatically adopt federal amendments; any updates only take effect in California if OSFM specifically amends its regulations under Title 19, section 2172.
- U.S. EPA oversees Class VI well permitting in California, which includes site characterization, well construction requirements, and long-term monitoring for geologic storage.

The projects currently operating in California must comply with all existing regulations at the local, state, and federal level. Nothing in SB 905 removes or reduces requirements with any existing federal, state, or local regulations. As part of implementation, CARB Staff is committed to ensuring clarity on the CARB public website about the various roles and authorities involved in oversight and enforcement of the various regulations and permits that apply to these projects.

[15] Gov. Code §§ 51010, 51010.5, 51011.5, 51011.6, 51015.06, 51018.6, and 51018.9; Health & Saf. Code §§ 116375, 39741.7; Pub. Res. Code §§ 71465, 21087.

E. Overview of the Proposed Regulation

Consistent with the requirements of SB 905 and the rulemaking objectives identified in the Executive Summary, and to provide California with the one of the most comprehensive regulatory frameworks for CCUS and CDR deployment in the world, CARB Staff are proposing regulatory requirements that build on a regulatory baseline where carbon management projects are already moving forward under existing requirements while leveraging incentives, as applicable. The Proposed Regulation adds additional requirements specified in SB 905 with a focus on filling regulatory gaps with additional monitoring and mitigation, an extended Post-Injection Site Care (PISC) monitoring timeframe, legally binding agreements, community communications, and expanded financial responsibility requirements for GCS sites and public transparency requirements for those who voluntarily choose to implement these projects. The CCUS Program would regulate entities voluntarily pursuing the following carbon management activities:

1. Carbon capture projects (capturing CO_2 from a concentrated stream such as a power plant)
2. DAC projects (open air carbon capture)
3. GCS sites (geologic carbon storage and injection)

The Proposed Regulation includes the following components:

- *Public Disclosure*. To support the safe, effective, and viable deployment of carbon management technologies, the Proposed Regulation includes several public disclosure requirements that would apply to operators of carbon capture projects, CDR projects, and GCS sites. Operators would need to maintain a public-facing webpage that provides key project information, including monitoring plans and periodic reports, permitting and regulatory information, existing air monitoring and mitigation activities, and emergency and remedial response plans, as applicable. This webpage would be accessible from the CARB website as well.

- *Geologic Storage Requirements.* The Proposed Regulation includes several requirements specific to GCS sites to further ensure the long-term storage of CO_2 and increased public access to project information. GCS operators must:
    - Monitor surface and subsurface CO_2 leakage from the storage complex;
    - Monitor ambient concentrations of criteria air pollutants and toxic air contaminants;
    - Implement strategies that minimize air quality impacts;
    - Perform risk-based seismic monitoring to reduce seismic impacts and the probability of an undetected leak;
    - Provide Emergency and Remedial Response Plans (ERRPs) that also incorporate seismic and leakage risks;
    - Demonstrate long-term financial responsibility to support ongoing monitoring and mitigation costs even after injection is no longer happening;

    - Provide proof of binding agreement to ensure no drilling or extraction activities penetrate the storage reservoir; and
    - Engage with nearby communities to ensure transparent communication about project activities and impacts.

- *Alignment with Existing Programs*. The Proposed Regulation includes regulatory proposals and amendments to several of CARB's existing programs to support alignment and integration for carbon capture projects, CDR projects, and GCS sites with CARB's existing programs.

    - *Cap-and-Invest*: Proposed amendments to the Cap-and-Invest Program would clarify how carbon capture and sequestration can be used as a method to reduce GHG emissions from covered entities. Within the Carbon Management Projects and Quantification Methodologies section, the Proposed Regulation would establish criteria and procedures for the Executive Officer to review and certify innovative and new carbon management projects.
    - *MRR*: Proposed amendments to the MRR would require monitoring, reporting, and verification provisions for all GCS sites operating in the state and claims of sequestered carbon.
    - *LCFS*: Proposed procedural amendments to the LCFS would reflect updates to the GCS Protocol. The CCS Protocol under the LCFS would separate the accounting provisions and permanence provisions. The LCFS-specific accounting provisions would move from that protocol into a separate quantification methodology document, while the permanence provisions would become a standalone protocol called the GCS Protocol. The GCS Protocol will continue to operate as a voluntary permanence certification program for CCS and DAC developers for all projects inside California and those outside of California seeking voluntary recognition under CARB's existing regulations.

Chapter II provides a detailed discussion of the purpose of the rulemaking and the problems the proposal seeks to address and Chapter III summarizes the purpose and rationale for each regulatory element.

II. The Problem that the Proposal is Intended to Address

CARB Staff have prepared this Staff Report to propose regulations establishing the CCUS Program that builds on the existing regulations that govern these projects. CCUS and CDR projects are moving forward but lack the regulatory certainty SB 905 directs state agencies to provide project operators. Under direction of SB 905, this proposed regulatory action is part of a comprehensive statewide regulatory framework that ensures the safety, efficacy, and viability of CCUS and CDR in California. As such, this rulemaking is focused on ensuring that CCUS and CDR are deployed in alignment with California's long-term climate goals and in a manner that protects public health and safety, minimizes environmental impacts, and establishes foundational standards necessary for long-term CO_2 storage in California as identified by the

Legislature. The Proposed Regulation aims to fill targeted regulatory gaps, improving oversight, and enabling responsible deployment of carbon management projects, which fulfills the goals of SB 905 and reinforces California's leadership in climate action.

SB 905 and recent legislative analyses highlighted that carbon management has not yet been broadly deployed in California, in part due to jurisdictional ambiguity, fragmented regulatory responsibilities, lengthy permitting timelines, and the absence of clear monitoring and safety requirements tailored to GCS. While one GCS site commenced injection in 2026, this deployment occurred without the advantage of a consistent statewide framework, underscoring the need for clear standards to guide future projects. A recent report, referenced in legislative history, indicated that CCUS permitting in California may take five to six years because of overlapping agency roles, unclear long-term responsibilities, and a lack of coordinated review processes (Pett-Ridge et al., 2023). This regulatory fragmentation and uncertainty constitute a key issue that the CCUS Program is intended to help resolve. Moreover, deployment and scaling of these projects will require incentives and support in the early years before costs come down over time as the technology and deployment matures.

As identified in SB 905, California currently lacks a dedicated monitoring and reporting program for induced seismicity resulting from underground CO_2 injection (Senate Committee on Environmental Quality, SB 905 Analysis, 2022). While existing U.S. EPA UIC requirements under Class VI include detailed siting, construction, monitoring, area-of-review delineation, corrective action, and emergency response planning all aimed at minimizing the risk of CO_2 leakage, their primary focus remains on protecting underground sources of drinking water. In contrast, SB 905 establishes broader protections encompassing public health, safety, and the environment. Under Class VI, Post-Injection Site Care (PISC) and monitoring requirements may support extended CO_2 storage. However, operators may, subject to demonstrating non-endangerment and receiving U.S. EPA approval, terminate monitoring in less time than the 50-year period referenced in the UIC regulation. As a result, absent State requirements, Class VI permitted GCS sites may not be required to meet the statutory requirement to ensure 100 years of stored CO_2 containment. Without additional State requirements, stored CO_2 may not be monitored long enough to detect delayed leakage risks, and operators may not have clear obligations to respond to seismic events. Additionally, seismic, air monitoring, and surface CO_2 monitoring requirements are largely left to the discretion of the U.S. EPA Regional Director, whose determination may depend on site- or project-specific conditions. This variability has the potential to result in inconsistent practices across GCS sites and could leave gaps in California's ability to ensure that seismicity, air quality, or surface CO_2 leaks are detected promptly. Under this proposed rulemaking, and consistent with SB 905 and in consultation with the California Geological Survey, California would at least double the post-injection period over which GCS operators will have clear obligation to monitor for, respond to, and correct any subsurface anomaly or unauthorized movement of previously injected CO_2, adding assurance of long-term storage.

SB 905 explicitly directs CARB to require financial assurances that extend for at least 100 years after injection, reflecting the reality that CO_2 storage sites must be monitored, maintained, and, if necessary, remediated long after a project's operational phase with injection ends. Long-duration carbon storage carries long-duration risk, and the State must ensure that project developers, not taxpayers or communities, remain accountable for those

risks over time. Financial responsibility requirements ensure that operators have the financial capacity to manage the full lifecycle of their projects, including potential corrective action, long-term monitoring, and site closure. These requirements help prevent stranded liabilities, protect public health and the environment, and ensure that projects will be responsibly managed for decades. Robust financial assurance also supports market credibility by providing long-term guarantees for investors, regulators, and federal partners. Under this proposed rulemaking, and consistent with SB 905, California would require GCS operators to maintain financial responsibility for at least 100 years.

Understanding the efficacy, safety, and viability of any individual project can be a challenge, due in part because the existing regulatory responsibilities are distributed across so many different agencies. While each entity performs essential regulatory functions and these individual agency requirements often include public processes and reporting, there is no single centralized repository of project monitoring plans, compliance information, or permit conditions that allow the public to easily understand how projects are permitted and overseen during operation. This lack of standardized, accessible information reduces opportunities for meaningful public transparency, limits oversight capabilities, and contributes to public uncertainty about how carbon management projects are monitored and enforced. As part of the 2022 Scoping Plan Update, SB 905 development, and CARB's initial rulemaking efforts, community and environmental justice stakeholders expressed concern that without clear oversight, restrictions and monitoring, and attention to community safety, carbon management could increase pollution burden on local communities, perpetuate fossil-fuel infrastructure, and undermine trust in the State's broader carbon management strategy (Central California Environmental Justice Network, 2024). Under this proposed rulemaking, and consistent with SB 905, California would require CCUS and CDR project operators to establish a public website that includes important project information, including information on pollution monitoring and mitigation as well as permitting and compliance information. The proposed rulemaking also includes a requirement for community communication to support increased public transparency.

Meeting California's climate targets depends on credible, high-integrity carbon removal and sequestration. Utilizing CCUS and CDR project types in California's climate efforts, as called for in SB 905, requires that projects meet high standards for monitoring, reporting, and verification of claimed sequestered or captured tons of CO_2. Without standardized and scientifically robust quantification assessment methods, projects may produce inconsistent or unverifiable claims of CO_2 capture and storage.

California currently lacks an administrative process to evaluate emerging carbon management project types as they quickly evolve and grow and keep pace with innovation. Failure to develop these standards at the pace of CDR development and innovation risks the State potentially falling short of its statutory climate goals and facing higher long-term climate and economic burdens. SB 905 explicitly authorizes CARB to support additional methods of utilization or storage of captured CO_2 and so under this proposed rulemaking CARB Staff are proposing an administrative process by which potential carbon management projects are reviewed and certified by CARB's Executive Officer through meeting certain regulatory requirements and criteria.

Carbon management projects are moving forward leveraging federal tax incentives, but not at the scale needed to achieve the state's climate targets. And while federal tax incentives will continue to apply to carbon capture and DAC projects that break ground before 2033, as with early deployment of most technologies, stacking of financial incentives will remain important to any voluntary deployment of carbon management projects over the next decade. The LCFS has already incorporated a carbon management protocol for voluntary projects, and the Cap-and-Invest Regulation already includes voluntary carbon management projects to sequester carbon and also contemplates voluntary carbon management projects to reduce compliance obligations. The Proposed Regulation includes proposed amendments to the Cap-and-Invest Regulation which would incorporate by reference the GCS Protocol, thus enabling a covered facility to reduce its Cap-and-Invest compliance obligation by capturing CO_2 and storing it following the requirements of the GCS Protocol. The proposed amendments to the Cap-and-Invest Regulation also include updates that provide a regulatory mechanism for carbon management projects certified by the Executive Officer to be considered compliance offset projects and be credited under Cap-and-Invest, subject to preexisting Cap-and-Invest offset crediting requirements.

Underground injection projects also need a clear legal framework for geologic storage projects that span multiple, separately owned subsurface property interests. For a CCS project to operate safely and effectively, CO_2 must be injected, contained, and monitored across an entire geologic reservoir and not only the land owned by the GCS operator, which can be less than the surface projection of a geologic reservoir. The Legislature recognized that without a legal mechanism to unitize subsurface interests, projects could be stalled, there could be fragmented reservoir management, or conditions created that undermine containment and long-term monitoring. As part SB 905 implementation, CNRA is developing a framework for governing agreements pertaining to carbon sequestration and this rulemaking includes requirements for those legally binding governing agreements.

Because the regulatory landscape for projects to move forward already exists and specific provisions in SB 905 direct other state agencies to promulgate regulations, this regulation is primarily focused on requirements for additional monitoring and actions at GCS sites that can collect captured CO_2 from CCUS or CDR projects to store deep underground. No new requirements are added to sources of CO_2 as those emissions are regulated under various other regulations.

In addition to the summary information in this chapter, each update is discussed individually in Chapter III, The Specific Purpose and Rationale of Each Adoption.

A. Consequences If These Problems Are Not Addressed

If California does not address these problems, carbon management deployment may proceed without additional regulatory safeguards designed to reduce CO_2 leakage, air pollutants, and seismic risks, potentially posing risks to public health, safety, and the environment. Without standardized seismic monitoring, operators may overlook subsurface hazards, allowing injection-induced seismicity, unauthorized plume movement, or CO_2 leaks to go undetected. Surface CO_2 monitoring adds a necessary safeguard by ensuring any surface leakage is detected early so it can be mitigated promptly. Without these CO_2 monitoring requirements, a surface leak could go undetected, resulting in a larger release of CO_2. Without this rulemaking,

operators may design emergency-response plans that are not adequately assured or tailored to the geologic setting of the State, which could further lead to delayed or inconsistent responses to seismic activity or surface leakage, increasing risks to communities, workers, and critical infrastructure. Without long-term containment protections included in this rulemaking, including 100-year monitoring, financial responsibility, and legally binding prohibitions on drilling, future subsurface activities may compromise stored CO_2, resulting in climate-damaging releases of CO_2 and undermining decades of emissions reduction progress.

The Proposed Regulation provides direction for industry and demonstrates a safe, effective, and climate aligned model for carbon management deployment, more rigorous than current regulations. Without this clear regulatory direction, emerging CDR technologies may be deployed without adequate oversight, leading to inconsistent accounting and uncertain net climate impacts. Together, these risks would erode public confidence in carbon management solutions.

B. How The Proposed CCUS Program Regulations Address These Problems

The Proposed Regulation addresses these problems by establishing a unified statewide framework that complements existing regulatory requirements and addresses specific gaps in project monitoring, disclosure, financial responsibility, and other areas related to injection and storage of carbon, thus providing more consistent oversight, enhanced safety requirements, long-term accountability, and improved public access to project information. The Proposed Regulation establishes requirements for seismic monitoring, surface CO_2 monitoring, and long-term subsurface monitoring requirements for all GCS sites operating in the State, ensuring early detection of reservoir changes and consistent baseline, operational, and post-injection monitoring. Air pollutant monitoring provides GCS operators with key information about potential air quality impacts of their operations. Emergency response provisions require operators to develop site-specific seismic risk thresholds, clear operational triggers for remedial action, and structured responses to suspected or confirmed leakage events. These measures create specific, uniform expectations where federal rules leave discretion.

To ensure containment, the Proposed Regulation requires a minimum of 100 years of post-injection monitoring at GCS sites and establishes robust financial responsibility requirements covering extended monitoring, seismic monitoring, surface CO_2 and air monitoring, and expanded emergency response measures that address seismic risk. GCS operators must obtain legal agreement demonstrating long-term protection of injected CO_2 by prohibiting drilling and subsurface extraction, protecting the integrity of the reservoir throughout the monitoring period.

The Proposed Regulation improves transparency by including a requirement for public access to project information, including readily accessible online postings of monitoring plans, permit conditions, and compliance status, as applicable. Additionally, the Proposed Regulation obligates GCS operators to communicate with adjacent communities about project development and operations. This centralized information structure and community communication strengthens accountability, supports public transparency, and helps support public confidence.

The Proposed Regulation also establishes a mechanism for reviewing and certifying carbon management projects by enabling CARB to evaluate projects and project quantification assessment methods to ensure the monitoring, reporting, and verification standards provide clear regulatory support for safe, effective scaling of CDR approaches. The Proposed Regulation includes amendments to the Cap-and-Invest Regulation that would incorporate by reference the GCS Protocol, thus enabling a covered facility to reduce its Cap-and-Invest compliance obligation by capturing and geologically storing CO_2 following the requirements of the GCS Protocol. The amendments would also support the capture and permanent storage of CO_2 as compliance offsets, subject to preexisting offset crediting requirements and usage limits. In developing the Proposed Regulation, CARB consulted with CGS, CNRA, SWRCB, California Energy Commission (CEC), OSFM, the California State Lands Commission, and others.

III. The Specific Purpose and Rationale of Each Adoption, Amendment, or Repeal

Government Code section 11346.2(b)(1) requires CARB to describe the specific purpose for each adoption and amendment. It also requires a description of the rationale for CARB's determination that each provision of the regulation is reasonably necessary to carry out the intent of CARB Staff's proposal and to address the problems described in Chapter II of the ISOR. Accordingly, the following appendices summarize the new provisions and amendments and provide rationale for each proposal:

- Appendix E: Purpose and Rationale for Proposed Adoption and Amendments to Title 17 Regulation Order;
- Appendix F: Purpose and Rationale for Proposed Adoption and Amendments to the Carbon Capture and Sequestration Protocol Under the Low Carbon Fuel Standard

IV. Benefits Anticipated from the Proposed Regulation, Including the Benefits or Goals Provided in the Authorizing Statute

Government Code section 11346.2(b)(1) requires an enumeration of the anticipated benefits of the proposed regulatory action, including the benefits and goals of the authorizing statute. Although the Proposed Regulation does not directly produce immediate, quantifiable improvements to public health, worker safety, or environmental conditions, it is expected to strengthen regulatory oversight of GCS sites and support achievement of the State's statutory climate targets. SB 905 directs CARB to develop a comprehensive CCUS Program to ensure carbon management technologies operate and scale safely and effectively as part of California's broader climate strategy. The Proposed Regulation advances this statutory direction by establishing requirements that improve long-term storage assurance, monitoring rigor, public access to information, and community communication.

CARB Staff anticipate the following qualitative benefits from the Proposed Regulation:

- Ensuring operational safety through strengthened monitoring, financial responsibility, and public disclosure requirements, which support safer CCUS and CDR activities;
- Supporting State climate goals by advancing CDR project pathways for emissions reductions and removals; and
- Improving long-term storage through binding agreements that prohibit activities that could cause leakage, along with extended and expanded financial responsibility provisions to ensure long-term monitoring and remedial actions.

Taken together, these anticipated benefits support the core intent of SB 905: to ensure safe, effective, and viable deployment of carbon management technologies in California. The Proposed Regulation strengthens long-term storage assurance, creates reliable pathways for verifiable emissions reductions and removals, and enhances community engagement and access to project information, thereby supporting the State's climate goals and the protection of public welfare, while also providing regulatory clarity for project developers and investors.

A. Expanded and Extended Monitoring Streamlined with Existing Federal Requirements

U.S. EPA Class VI regulations require plume tracking during injection operations, and for up to 50 years after injection ends. The Proposed Regulation extends this period to 100 years and adds air pollutant and surface CO_2 monitoring requirements. These expanded monitoring requirements bolster existing regulatory safeguards by reducing the likelihood of undetected leaks to the atmosphere or USDW.

The proposed program also requires baseline, operational seismic monitoring, and post-injection monitoring for at least 100 years, exceeding U.S. EPA's Class VI monitoring and testing recommendations (U.S. EPA, 2013). Additionally, the proposed program requirements supplement U.S. EPA's Emergency and Remedial Response Plan with seismic-specific triggers, notification timelines, cessation conditions, and a Traffic Light System to manage induced seismicity. The traffic light approach is a well-established method for managing induced seismicity risk, affording early detection and defined mitigation, supporting public safety and long-term confidence in GCS operations.

B. Ensuring Long-term Responsibility and Permanent Carbon Dioxide Storage

U.S. EPA requires financial responsibility for corrective action, well plugging and site closure, emergency and remedial response, and post injection site care for up to 50 years following the last date of injection. The Proposed Regulation expands financial responsibility requirements associated with the additional seismic monitoring, surface CO_2 and air monitoring, long-term emergence and remedial response that account for seismic risk and avoiding duplicative requirements with U.S. EPA. Extending post injection site care monitoring activity and emergency and remedial response preparedness up to 100 years strengthens assurance against undetected leaks and gives the State and surrounding communities added protection against undue assumption of project liabilities, particularly during the post injection phase.

In addition, GCS operators must enter into legally binding agreements prohibiting drilling or extraction in and around the storage reservoir for at least 100 years. This requirement further protects against leakage of stored CO_2 and supports long-term, permanent storage needed to meet State climate goals.

C. Updates to the CCS Protocol, Updates to Cap-and-Invest and LCFS, and Operator Requirements to Obtain Permanence Certification

The Proposed Regulation amends the existing LCFS Program's CCS Protocol by removing LCFS-specific accounting requirements into a separate quantification methodology document and renaming the permanence requirements to the GCS Protocol. While the GCS Protocol aligns with the SB 905 requirements, the procedural amendments to the LCFS regulation do not result in any substantive changes for compliance under the LCFS program.

The proposed amendment to the Cap-and-Invest Regulation would clarify how covered entities can utilize carbon capture and storage technologies to lower their net emissions for covered sources, and therefore their compliance obligation and provide a mechanism for carbon management projects certified by the Executive Officer to be considered compliance offset projects. CARB Staff did not directly quantify emissions reductions resulting from the amendments to Cap-and-Invest, as they do not constitute a mandated compliance response under Cap-and-Invest. Potential and likely CCS adopters, such as cement producers, power plants, oil refineries, and hydrogen producers, remain free to meet their compliance obligations through alternative strategies. Rather, the proposed amendments to Cap-and-Invest would clarify how to quantify emission reductions for covered entities utilizing CCS as one available means of reducing their compliance obligations. The amendments also incorporate the GCS Protocol by reference, ensuring that if an operator is voluntarily deploying CCS with underground injection to reduce their compliance obligation, they must follow the GCS Protocol requirements to ensure sequestration permanence. The proposed amendments to the Cap-and-Invest Regulation also include updates that provide a regulatory mechanism for carbon management projects certified by the Executive Officer to be considered compliance offset projects and be credited under Cap-and-Invest, subject to preexisting Cap-and-Invest offset crediting requirements.

Taken together, these amendments to Cap-and-Invest and LCFS provide an opportunity for the stacking of incentives through compliance reduction that will remain important to any voluntary deployment of carbon management projects over the next decade. Further, the manufacturing decarbonization incentive (MDI) under the Cap-and-Invest Program could provide a financial incentive for adoption of these technologies to accelerate the deployment and scaling needed to achieve the science-driven GHG reduction outcomes needed to minimize climate change impacts. And while the Proposed Regulation may increase the scaling and deployment of carbon management projects, to what extent is unknown due to project specific costs, permitting, and other external factors, and so CARB Staff did not produce a quantitative estimate of the benefits associated with any chances in the scaling or deployment of carbon management projects.

Additional amendments to the GCS Protocol focus on streamlining and clarifying existing requirements. Standardizing risk assessment methodology, expanding geophysical and

seismic testing requirements, and requiring more robust monitoring of soil, vadose zone, and surface CO_2 benefit public safety and storage integrity through minimizing the risk of undetected leaks. As mentioned previously, minimizing risks of undetected leaks also benefits protection of the State's climate goals.

D. Ensuring Community Communication and Public Disclosure for CCS Projects, CDR Projects, and GCS Sites

The Proposed Regulation requires CCS, CDR, and GCS operators to maintain a project webpage that discloses general project information, permitting information, monitoring and mitigation information, and financial responsibility compliance. In conjunction with community communication requirements, the Proposed Regulation creates an integrated framework of accountability to provide the public with timely, accessible information throughout the project's lifecycle.

Public disclosure of facility-level monitoring and mitigation actions can build trust, support early identification of concerns, and help avoid project delays or increased costs. CARB Staff plans to link to each of these project pages on CARB's public website to ensure accessibility from one central public webpage for each project.

V. Air Quality

Mandatory requirements under the proposed CCUS Program are primarily administrative, analytical, or related to monitoring activities. Consistent with SB 905, the Proposed Regulation does not generally mandate emissions controls or deployment of carbon management technologies beyond those that would be required under current federal, state, or local rules. The Proposed Regulation would require air pollutant monitoring at GCS sites, but these requirements would not directly affect project emissions or air quality. As a result, the Proposed Regulation would not result in any estimated quantifiable reductions in air pollutant emissions.

The Proposed Regulation also includes amendments to Cap-and-Invest that would clarify how covered entities could reduce compliance obligations by voluntarily implementing CCS. However, there is no reasonable way to forecast, with any degree of certainty, how many CCS projects may ultimately be developed or what portion of future carbon management deployment could be attributed specifically to the proposed amendments, as opposed to the many external economic, technological, and policy factors that influence an operator's decision to pursue such projects. Accordingly, CARB has not quantified the potential air pollutant emissions reductions or GHG emissions reductions from future CCS project development because such estimates would be too speculative to provide a meaningful evaluation. If CCS projects are deployed, there are emerging technologies to capture and filter out air pollutants to support a pure stream of CO_2 for transport and injection (CATF, 2023).

It should also be noted that the Proposed Regulation would not affect the existing authority of local air districts to regulate criteria air pollutants and toxic air contaminant emissions from stationary sources. Project proponents for newly constructed CCS projects would apply for and comply with all appropriate air quality permits for project construction from the local agencies

with air quality jurisdiction, including New Source Review, which may require operators to install air pollutant control systems meeting Best Available Control Technology (BACT) requirements determined by the air district. CCS projects may need to obtain Title V operating permits, which establish enforceable emission limits along with monitoring and reporting requirements for ongoing operations. Air districts issue authority-to-construct and permit-to-operate approvals for equipment that may emit air pollutants, which can apply to smaller emissions sources that fall below minor source thresholds, like compressor stations and diesel generators that could be located at GCS sites. For CCS retrofits at existing industrial facilities, a modified Title V permit may be required. These permit modifications undergo technical review by the permitting authority and may trigger additional BACT or other mitigation requirements for the new equipment which is consistent with direction in SB 905.

There are a number of air pollution control technologies that can be applied to CCS projects to mitigate potential operational emissions sources and that are generally accepted to meet BACT requirements. Large emissions sources, such as natural gas combined cycle powerplants, typically control emissions of nitrogen oxides (NO_x) by implementing selective catalytic reduction systems and low-NO_x burners. Volatile organic compounds and ammonia emissions can be controlled using vapor recovery systems, water or acid washes, thermal or catalytic oxidizers, and carbon adsorption filters. Bag house filters, electrostatic precipitators, cyclones, and wet scrubbers can be used to reduce ultra fine particulate matter emissions. Additional information on accepted control technologies and current BACT determinations can be found in CARB's BACT Technology Clearinghouse.[16]

VI. Environmental Analysis

CARB is the lead agency for the proposed regulation and has prepared an environmental impact analysis (EIA) pursuant to its certified regulatory program (Cal. Code Regs., tit. 17, §§ 60000 - 60008) to comply with the requirements of the California Environmental Quality Act (CEQA). CARB's regulatory program, which involves the adoption, approval, amendment, or repeal of standards, rules, regulations, or plans for the protection and enhancement of the State's ambient air quality has been certified by the California Secretary for Natural Resources (PRC § 21080.5; Cal. Code Regs., tit.14, § 15251(d)). PRC section 21080.5 allows public agencies with certified regulatory programs to prepare a "functionally equivalent" or substitute document in lieu of an environmental impact report or negative declaration, once the program has been certified by the Secretary for the Resources Agency as meeting the requirements of CEQA. CARB, as a lead agency, prepares a substitute environmental document (referred to as an "Environmental Impact Analysis" or "EIA") as part of the Staff Report to comply with CEQA (Cal. Code Regs., tit. 17, § 60005).

The Draft EIA for the Proposed Regulation is included in Appendix D. The Draft EIA provides a programmatic environmental analysis of an illustrative, reasonably foreseeable compliance scenario that could result from implementation of the proposed regulation. For determining

[16] See CARB, "*BACT Determination Tool*." https://ww2.arb.ca.gov/capp/cst/tch/bact-determination-tool.

whether the Proposed Regulation would have a potential adverse effect on the environment, CARB evaluated the potential physical changes to the environment resulting from reasonably foreseeable compliance responses. Reasonably foreseeable compliance responses associated with the Proposed Regulation with potential physical changes to the environment include: construction of new industrial facilities or modification of existing industrial facilities to capture CO_2 emissions and process feedstocks; construction of new infrastructure, such as pipelines, wells, roads, and other surface facilities, to enable the transport and injection of CO_2 into a geologic formation for storage; installation of seismic monitoring wells and supporting infrastructure (e.g., seismic sensors, down-borehole sensors, solar panels) at GCS sites; installation of monitoring stations (e.g., CO_2 analyzers, power source, data logger, meteorological monitoring stations, and data transmission system) at legacy wells, fault zones, and injection well pads at GCS sites; collecting yard waste, food waste, and agricultural residues and diverting the organic waste from landfills for other uses; forest management including the use of herbicides; planting of new trees and vegetation; marine habitat restoration; new anaerobic digestion systems at wastewater treatment plants, dairies, and organic waste diverted from landfills; and system repairs if emergent conditions are identified at GCS sites.

Additionally, there are several reasonably foreseeable compliance responses associated with the Proposed Regulation that are administrative in nature. Those include: creation of project reports and monitoring plans and publication of a public-facing webpage that provides general project information and access to project reports, monitoring plans, permits, and compliance status information. Given the administrative nature of these compliance responses, CARB has determined that these aspects of the Proposed Regulation would not result in any potential physical changes to the environment and therefore have no potential to result in adverse environmental impacts.

Given the programmatic nature of the Proposed Regulation, the Draft EIA contains a degree of uncertainty regarding the feasibility of mitigation for potentially significant impacts. While CARB is responsible for adopting the Proposed Regulation, it does not have general land use authority, nor specific land use authority over the potential infrastructure and development projects that could be undertaken in response to the Proposed Regulation. Other agencies are responsible for the site-specific review and approval – including any required environmental analysis – of any facilities and infrastructure. These project-specific environmental reviews would include identifying and adopting any feasible project-specific mitigation measures, and any monitoring of mitigation implementation. Because CARB cannot predict the location, design, or setting of specific projects that may result and does not have authority over the implementation of development that may occur, the programmatic analysis in the Draft EIA does not allow for identification of the precise details of project-specific mitigation. As a result, there is inherent uncertainty in the degree of feasible mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in the Draft EIA.

Given the foregoing, and due to legal factors affecting the feasibility of mitigation for several of the identified potential significant indirect impacts associated with the Proposed Regulation**,** CARB's implementation of the identified project-level impact mitigation set forth in the Draft EIA is infeasible, based on the following: (1) the lack of certainty of the scope, siting and specific design details of compliance-response development projects, which prevents CARB

from being able to determine the projects' significant environmental impacts; and (2) even if there was certainty with respect to compliance-response development projects and associated significant environmental impacts, CARB lacks the legal authority and jurisdiction to permit these projects, which, inherently, prevents CARB from legally imposing any enforceable mitigation measures on the projects pursuant to CEQA. Therefore, while the project-level mitigation measures identified below in this Draft EIA are considered by CARB to be potentially feasible for other agencies to implement—meaning they are capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors—CARB cannot legally enforce them. Therefore, the project-level mitigation measures cannot be counted as feasible CEQA mitigation measures for the Proposed Regulation because they lack the adequate enforceability required. Consequently, where appropriate, this Draft EIA takes the conservative approach in its post-mitigation significance conclusions and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, due to the lack of jurisdiction by the lead agency to enforce the potential mitigation measures. As such, reasonably foreseeable compliance responses associated with the Proposed Regulation could result in potentially significant and unavoidable environmental impacts. Table 2 summarizes the potential environmental impacts of the Proposed Regulation.

Table 2: Summary of Potential Environmental Impacts.

Impact Number	Resource Area Impact	Significance
1-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts on Aesthetics	Potentially significant
2-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts on Agriculture and Forest Resources	Potentially significant
3-1, 3-2	Short-Term Construction-Related and Long-Term Operational-Related Impacts on Air Quality	Potentially significant
3-3	Short-Term Construction-Related and Long-Term Operational Impacts from Odors	Potentially significant
4-1, 4-2	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Biological Resources	Potentially significant
5-1	Short-Term Construction-Related and Long-Term Operational-Related Effects to Cultural Resources	Potentially significant
6-1	Short-Term Construction-Related Impacts to Energy Resources	Less-than-significant
6-2	Long-Term Operational-Related Impacts to Energy Resources	Potentially significant
7-1, 7-2	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Geology and Soils	Potentially significant
8-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Greenhouse Gas Emissions	Less-than-significant

9-1, 9-2	Short-Term Construction-Related and Long-Term Operational-Related Impacts Related to Hazards and Hazardous Materials	Potentially significant
10-1, 10-2	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Hydrology and Water Quality	Potentially significant
11-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts on Land Use	Potentially significant
12-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Mineral Resources	Potentially significant
13-1, 13-2	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Noise and Vibration	Potentially significant
14-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Population and Housing	Less-than-significant
15-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Public Services	Less-than-significant
16-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Recreation	Less-than-significant
17-1, 17-2	Short-Term Construction-Related and Long-Term Operational-Related Impacts to Transportation	Potentially significant
18-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts on Tribal Cultural Resources	Potentially significant
19-1	Long-Term Operational-Related Impacts to Utilities and Service Systems	Potentially significant
20-1	Short-Term Construction-Related and Long-Term Operational-Related Impacts on Wildfire	Less-than-significant

CARB Staff prepared a Notice of Preparation and made it available for review and comment for 30 days, per the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15082(b)). The comment period for the Notice of Preparation began on May 7, 2026, and ended on June 6, 2026. Written comments on the Draft EIA will be accepted starting October 30, 2026, through December 14, 2026. The Board will consider the Final EIA and responses to comments received on the Draft EIA before taking action to adopt the Proposed Regulation. If the Proposed Regulation is adopted, a Notice of Decision will be filed with the Secretary of the Natural Resources Agency for public inspection (Cal. Code Regs., tit. 17, § 60004.2, (d)) and posted on CARB's website for transparency.

VII. Environmental Justice

State law defines environmental justice as the fair treatment and meaningful involvement of people of all races, cultures, incomes, and national origins, with respect to the development,

adoption, implementation, and enforcement of environmental laws, regulations, and policies (Gov. Code, § 65040.12 (e)(1)). Environmental justice includes, but is not limited to, all the following: (A) The availability of a healthy environment for all people; (B) the deterrence, reduction, and elimination of pollution burdens for populations and communities experiencing the adverse effects of that pollution, so that the effects of the pollution are not disproportionately borne by those populations and communities; (C) governmental entities engaging in and providing technical assistance to populations and communities most impacted by pollution to promote their meaningful participation in all phases of the environmental and land use decision making process; (D) at a minimum, the meaningful consideration of recommendations from populations and communities most impacted by pollution into environmental and land use decisions (Gov. Code, § 65040.12 (e)(2)). The Board approved its Environmental Justice Policies and Actions (Policies) on December 13, 2001, to establish a framework for incorporating environmental justice into CARB's programs consistent with the directives of State law. These policies apply to all communities in California but are intended to address the disproportionate environmental exposure burden borne by low-income communities and communities of color. Environmental justice is one of CARB's core values and fundamental to achieving its mission.

CARB is charged with developing a Scoping Plan that outlines how California will achieve its climate goals, including measures related to carbon sequestration projects, and to update the plan every five years. CARB also convenes an Environmental Justice Advisory Committee (EJC) to advise the Board on environmental justice considerations in the Scoping Plan and related to AB 32 implementation efforts.

The EJC held several meetings that discussed SB 905 related work, including joint meetings with CARB on September 14, 2023, and September 14, 2024, as outlined in Table 6. All meeting agendas, recordings and other information can be accessed on CARB EJ webpage.[17] EJC met publicly in August 2024 and adopted a resolution on SB 905 and CCUS and DAC projects, calling for these technologies to be narrowly applied to essential processes or legacy emissions and only when designed with robust protections for frontline communities and safeguards for air and water quality. They also elaborated on expectations for meaningful community engagement (EJC, 2024a). CARB formally responded on September 9, 2024, acknowledging EJC's concerns regarding public health, potential project risks, and equity safeguards, expressing willingness to develop community-focused policies, and recognizing the complementary role of these technologies in achieving climate goals. (EJC, 2024b). In February 2025, CARB invited EJC members to present at the CARB informational workshop on SB 905, where committee members commented on the need for buffer zones, notification procedures, community engagement, and strengthened protections (CARB, 2025a). The

[17] CARB, *Environmental Justice Advisory Committee Meetings and Events,* *https://ww2.arb.ca.gov/environmental-justice-advisory-committee-meetings-and-events* (last visited Oct. 12, 2026).

resolution and CARB's response, along with recording of their comments during the workshop can be found on the CCUS Program's Meetings and Workshops Page. [18]

Throughout 2026, CARB continued SB 905 engagement by convening statewide in-person and virtual community listening sessions on August 27, September 1, September 2, and September 8, 2026, to share updates, review draft materials, and invite public input both prior to the formal rulemaking period. CARB Staff also presented during the EJC meeting on August 31, 2026, to ensure the most recently appointed members had the context and scope of the requirements for the SB 905 direction as it relates to the regulatory proposal. The EJC also held their own public comment period on SB 905 at their September 2026 public meeting to hear community concerns. These engagement efforts strengthened transparency, supported public participation, and helped CARB Staff understand the scope of community and environmental justice advocates SB 905 priorities.

SB 905 calls on CARB to establish and administer the CCUS Program to support the efficacy, safety, and viability of projects. As part of the program, where feasible and in recognition of existing regulations, CARB is tasked with ensuring that projects include strategies to minimize pollution and seismic risks, mitigate pollution impacts, and include ongoing monitoring and reporting. As part of engagement with the EJC and the public over the course of regulatory development, CARB Staff heard consistently about the importance of incorporating these statutory directives for project safeguards, monitoring, reporting, and transparency into the CCUS Program and regulation. The Proposed Regulation advances these statutory directives by extending and strengthening seismic and leakage monitoring obligations, requiring continuous tracking of subsurface CO_2 and seismic data, and establishing robust financial assurance requirements. The Proposed Regulation also requires operators to make key project information accessible to the public, improving community access to information and enabling community and regulatory oversight. Together, these provisions help ensure operators are financially capable of addressing potential impacts while providing communities with timely, reliable project information.

As part of the public meetings and written informal comments, CARB Staff and representatives from other agencies also heard comments and concerns that extend beyond the scope of CARB's Proposed Regulation but are important considerations for regulatory agencies and project developers. For instance, many commenters raised concerns about enforceability of existing and new regulations. Enforceability is a key aspect of regulatory oversight, and nothing in CARB's Proposed Regulation would alter or limit federal, state, and local agencies authority to audit, oversee, and enforce any regulations under their jurisdiction. For CARB's Proposed Regulation, CARB would leverage its existing oversight and enforcement authority provided under longstanding health and safety statutes.

Many commenters raised concerns about CO_2 pipeline safety for communities. While outside the scope of CARB's Proposed Rulemaking, safely transporting CO_2 via pipeline is vital to safe deployment of CCUS and CDR in California. Given the importance of pipeline safety, the

[18] CARB, *Meetings, Workshops, and Solicitations, https://ww2.arb.ca.gov/our-work/programs/carbon-capture-and-sequestration/ccs-meetings-workshops* (last visited Oct. 12, 2026).

OSFM in response to SB 905 and direction in SB 614 recently adopted the most stringent requirements for pipeline safety in the nation, based on model rules initially proposed by Pipeline and Hazardous Materials Safety Administration (PHMSA) in 2023. Additional comments and concerns were raised on induced seismicity, groundwater, and CO_2 leakage. As part of community and stakeholder engagement, CARB, OFSM, CalGEM, the California Environmental Protection Agency (CalEPA), and the SWRCB produced public fact sheets to provide more information on these topics and support the community listening sessions.[19] State agencies will continue to coordinate on these important considerations and to ensure SB 905 delivers protection for communities.

VIII. Economic Impacts Assessment

Government Code sections 11346.2(b)(2) and 11346.3(b) require preparation of an economic impact assessment because the Proposed Regulation is not a major regulation. This chapter summarizes the analysis of expected economic impacts on regulated entities, individuals, and government agencies. Detailed assumptions, methodologies, and calculations supporting this assessment are provided in Appendix C. Importantly, implementation of a CCS or CDR project in total can reach costs close to $1 billion, when factoring in capture, transport, and geologic storage costs. The economic analysis below only focuses on the costs for complying with the Proposed Regulation, not for the full project costs.

Economic Assessment Assumptions

In order to complete the Economic and Fiscal Impact Statement (Form 399) for the Proposed Regulation, this analysis includes a pre-rulemaking baseline (what could reasonably be assumed to happen in the absence of the regulation) for carbon management projects that may be voluntarily implemented and also includes estimated impacts of the Proposed Regulation on the baseline voluntary projects.

This analysis reflects the following assumptions:

Baseline:

- Carbon management projects are moving forward leveraging federal tax incentives, but not at the scale needed to achieve the State's climate targets.
- Federal tax incentives will continue to apply to carbon capture and DAC projects that break ground before 2033.
- As with early deployment of most technologies, stacking financial incentives will remain important to any voluntary deployment of carbon management projects over the next decade.
- The LCFS has already incorporated a carbon management protocol for voluntary projects.

[19] CARB et al., *Carbon Management Fact Sheet* (2026), *https://ww2.arb.ca.gov/sites/default/files/2026-08/Carbon_Management_Fact_Sheet.pdf*.

- The Cap-and-Invest Regulation includes voluntary carbon management projects to sequester carbon and also contemplates voluntary carbon management projects to reduce compliance obligations.
- Existing local, state, and federal regulations require monitoring and ensuring safe implementation of many aspects of carbon management projects.

Proposed Regulation:

- Carbon management projects remain voluntary and are not mandated by law.
- Amendments to the LCFS are narrowly limited to incorporating by reference an updated CCS Protocol (renamed as the GCS Protocol), along with a GHG quantification methodology for CCS under the LCFS that reorganizes the LCFS quantification elements of the current LCFS CCS Protocol. These changes are not expected to have a material impact on the voluntary deployment of carbon management projects as it creates no further financial incentive.
- Amendments to the Cap-and-Invest Regulation would incorporate by reference the GCS Protocol, thus enabling a covered facility to reduce its Cap-and-Invest compliance obligation by capturing and geologically storing CO_2 following the requirements of the GCS Protocol. The amendments would also support the capture and permanent storage of CO_2 as compliance offsets, subject to existing usage limits.
- The Proposed Regulation may increase the scaling and deployment of carbon management projects, but to what extent is unknown due to project specific costs, permitting, and other external factors.

Based on the specific scope of the Proposed Regulation and how it places new requirements for projects that may be implemented voluntarily, the costs presented in the economic analysis do not represent full costs of carbon management project deployment. Instead, the costs represent the new requirements established on voluntary projects by the Proposed Regulations. Additionally, due to high capital and operational costs of carbon management projects, combined with CARB's assessment that these regulatory amendments and new requirements to implement SB 905 would add operational costs on projects, it is unknown whether projects would be built in response to these regulatory amendments and new requirements to implement SB 905. Because this analysis assumes this Proposed Regulation will not directly result in a growth of carbon management projects, this analysis also does not include any direct emissions or other environmental benefits that would come from carbon management projects.

In addition to these considerations, publicly available analyses demonstrate that carbon management projects entail significant capital costs, underscoring the need for meaningful in-state incentives to support deployment. An assessment by Lawrence Livermore National Laboratory (LLNL) and the Clean Air Task Force estimate that capital costs for industrial carbon capture projects in California, including capture, transportation, and geologic storage, range from approximately $156 million to $542 million (Grove and Peridas, 2023). Industrial sectors that could potentially utilize carbon capture in California include ethanol production, refineries, natural gas power plants, and cement manufacturing. Additional transportation and

storage costs depend on the transport distance, type, and number of injection wells with costs ranging from roughly $12 million to $65 million and $77 million to $98 million, respectively. For DAC, capital costs for the individual capture system equipment can range from $130,000 to $420 million depending on the system type and component pieces (Ozkan et al., 2022). These substantial cost ranges highlight the financial barriers to deploying carbon management projects and reinforce the importance of developing incentives to facilitate investment and enable project development and scaling.

As discussed earlier, the Proposed Regulation establishes reporting, monitoring, and administrative requirements for carbon capture projects, CDR projects, and GCS sites operating in California. While implementing carbon capture and GCS is voluntary under the Proposed Regulation, regulated entities that elect to undertake these activities would incur direct capital and operational costs associated with compliance. CARB Staff quantified the expected capital and operation and maintenance costs associated with the proposed requirements. Table 3 summarizes the first year and annual (ongoing) costs for a typical carbon capture or CDR facility operator and GCS site operator.

Table 3: Summary of Estimated Costs of the Proposed Regulations (in 2025$).

Regulated Entity	**First Year Cost ($/year)**	**Annual Ongoing Costs ($/year)**
Carbon capture/CDR operator	$14,200	$6,000
GCS operator	$1,046,900	$702,300

CARB Staff prepared cost estimates by provision and aggregated them for all projected carbon capture projects, CDR projects, and GCS sites anticipated to be operational during the six-year analysis period (2028-2033) in Table 4 and Table 5. These tables summarize the costs by provision in 2025 dollars for carbon capture or CDR projects and GCS operators subject to this Proposed Regulation, respectively.

As described in the Proposed Regulation, several provisions are only applicable to GCS sites. As a result, estimated costs are significantly higher for GCS operators than for carbon capture/CDR project operators. For carbon capture/CDR facilities, first-year costs are estimated at approximately $14,200 per project and annual ongoing costs at $6,000 per project. For a typical GCS site, first-year costs are estimated at approximately $1,046,900 and annual ongoing costs at $702,300.

The total estimated annual costs for all carbon capture and CDR projects operating in 2029, when the majority of projects are anticipated to become operational, are estimated as

$217,100 in the first year and $125,800 annually thereafter as shown in Table 4. Total annual costs for all projected GCS sites in 2029 are estimated at $10.2 million in the first year and $11.6 million annually thereafter as shown in Table 5.

Annual total costs to the regulated entities vary from year to year as new carbon capture, CDR, and GCS sites come online; therefore, CARB Staff present annual costs over a six-year period Table 4 and Table 5. Here, CARB Staff discuss the costs projected for 2033, which represents the peak annual costs over the timeframe of the analysis. The total annual cost for all carbon capture and CDR projects operating in 2033 are estimated as $134,800 as shown in Table 4. Total annual costs for all projected GCS sites in 2033 are estimated to be $13.1 million as shown in Table 5.

These costs account for projects continuing to operate and those that are assumed to become operational in 2033. The total cumulative costs over the six-year timeframe (2028-2033) are estimated at $762,900 for all carbon capture and CDR projects and $57.5 million for GCS sites, for a combined total of $58.3 million. These costs reflect the projected year-over-year growth of both carbon capture/CDR projects and GCS sites.

Detailed estimates by individual provision and the detailed methodology and calculations behind these estimates are provided in Appendix C.

Table 4: Annual Estimated Costs by Provision for Carbon Capture/CDR Project Entities for 2028-2033.

Provision	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
General Project Disclosure	$42,700	$217,100	$116,700	$122,800	$128,800	$134,800
Total	**$42,700**	**$217,100**	**$116,700**	**$122,800**	**$128,800**	**$134,800**

Table 5: Annual Estimated Costs by Provision for GCS site Entities for 2028-2033.

Provision	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
General Project Disclosure	$14,200	$134,000	$88,700	$100,800	$112,900	$124,900
CO_2 Plume and Pressure tracking	$15,900	$152,600	$123,300	$141,600	$159,900	$178,200
Air Pollutant and Surface CO_2 Monitoring	$120,900	$1,195,000	$1,314,400	$1,529,000	$1,743,500	$1,915,600

Provision	2028	2029	2030	2031	2032	2033
Baseline Seismic Monitoring	$187,600	$1,688,300	$375,200	$375,200	$375,200	$375,200
Operational Seismic Monitoring	$179,600	$1,767,400	$1,868,500	$2,170,300	$2,377,400	$1,818,400
Emergency Remedial Response Plan	$33,200	$305,000	$126,800	$138,900	$151,000	$163,100
Financial Responsibility	$465,200	$4,652,200	$5,582,600	$6,513,000	$7,443,500	$8,373,900
Legal Instruments for Proof of Agreement	$17,300	$155,700	$34,600	$34,600	$34,600	$34,600
Community Engagement Events	$7,200	$64,800	$14,400	$14,400	$14,400	$14,400
Total	***$1,046,900***	***$10,172,300***	***$9,597,200***	***$11,097,900***	***$12,503,900***	***$13,101,300***

Businesses Subject to the Regulation

This Proposed Regulation applies to carbon capture projects, CDR projects, and GCS sites voluntarily operating within California. Data for GCS sites were obtained from the U.S. EPA Class VI well permitting database (U.S. EPA, 2026b). Data for carbon capture projects was obtained from CARB's CCUS and CDR project list that was last updated on October 13, 2025 (CARB, 2025b).

CARB Staff projected the number of businesses operating in California based on existing state policy, federal regulations, and academic modeling. Carbon capture projects, CDR projects, and GCS sites deployment depends on numerous external factors that are uncertain and beyond the control of the Proposed Regulation. To account for deployment uncertainty when estimating implementation costs for this Proposed Regulation, CARB Staff evaluated High and Low project-deployment scenarios to represent the range of possible carbon management development. CARB Staff evaluated costs over a six-year period from 2028 to 2033 to capture both the expected peak implementation cost and the projected peak number of carbon management projects operating in California in 2033, the year when the 45Q federal tax credit–an important incentive for CO_2 storage–sunsets (26 U.S.C § 45Q).[20]

[20] 26 U.S.C § 45Q (Credit for carbon oxide sequestration, 2022).

Although the Proposed Regulation is expected to be fully implemented January 1, 2028, staff anticipate that three carbon capture and CDR projects (Calpine Corporation, n.d.c.; CRC, 2026; Heirloom Carbon, n.d.) and one GCS site (CRC, 2026) will be operating between 2027 and 2029. CARB Staff averaged the High and Low scenario projections to compute annual compliance costs to the regulated entities from 2029 through 2033. Based on this average, CARB Staff projects that approximately 26 businesses would be subject to the regulation in 2029, increasing to 38 businesses by 2033. There is no significant projected growth in CCUS projects between 2027 and 2028 due to assumed project permitting and construction lead times (Peridas, 2021).[21]

CARB Staff did not identify any small businesses subject to the regulation.

Estimated Costs to a Typical Business

CARB Staff identified a "typical business" as a business operating a single GCS site because GCS operators incur the majority of costs under the Proposed Regulation. CARB Staff estimated first-year costs of $1,046,900 and ongoing annual costs of $702,300 for such a project. Costs for carbon capture/CDR operators are substantially lower because only a subset of provisions apply to these project types.

The businesses that would incur additional costs due to the Proposed Regulation include carbon capture and CDR operators (NAICS code 221118) and GCS operators (NAICS code 213111). Carbon capture and CDR projects incur costs related to project disclosure, while GCS operators incur costs for all monitoring, disclosure, and long-term storage provisions. Most required activities can be absorbed by existing businesses or contractors, limiting the likelihood of significant business restructuring. The costs for each project type are shown in Table 6.

Table 6: Share of Costs by Industry.

Industry	**NAICS Title**	**NAICS Code**	**Annual Ongoing Costs (starting second year)**	**Percentage of Total Private Sector Costs**
Carbon Capture/CDR Projects	Other Electric Power Generation	221118	$6,000	1%
GCS sites	Drilling Oil and Gas Wells	213111	$702,300	99%

[21] Calculated as the difference between the estimated CCS project development time of 5.5 years based on the LLNL report and U.S. EPA Class VI permit new project permitting time (i.e., final permit decision date - application received data) of 3.5 years.

CARB Staff also estimated recordkeeping and reporting costs resulting from disclosure of operational data, permitting, and monitoring plans to public-facing websites, seismic monitoring data retention and evaluation, air pollution and surface CO_2 monitoring data retention and evaluation. The added recordkeeping and reporting costs are derived in Appendix C. CARB Staff estimated the cost for recordkeeping and reporting for a typical business by summing up the requirements resulting in $51,800 per GCS operator. Over the six-year analysis period, recordkeeping and reporting estimated costs total $3.1 million for all projected GCS operators.

Costs to Individuals

The Proposed Regulation is not expected to impose any direct costs on individuals. All carbon capture projects, CDR projects, and GCS sites subject to the Proposed Regulation are voluntary, and operators elect to undertake these projects based on available federal and State incentives. In particular, federal tax credits, such as the 45Q credit, and state-level compliance opportunities, including potential use of the GCS Protocol under Cap-and-Invest, provide support for project development.

Because projects are undertaken voluntarily and are supported by these incentive structures, CARB Staff expect operators to incorporate compliance costs into their overall project economics and anticipated returns. As a result, the Proposed Regulation is not expected to lead to increased costs for electricity consumers, ratepayers, or purchasers of goods produced by facilities that choose to implement carbon management projects. Any potential costs would be minimal relative to the large-scale federal incentives and compliance value motivating these investments.

Accordingly, CARB Staff concludes that the Proposed Regulation will not result in direct or meaningful pass-through costs to individuals.

Provisions

Detailed assumptions, data sources, methodologies, and cost calculations for each provision are provided in Appendix C. This section describes the high-level summary of the compliance activities and associated costs for carbon capture project, CDR project, and GCS site operators under the Proposed Regulation.

General Project Disclosure:

The Proposed Regulation requires carbon capture, CDR project, and GCS operators to create a data information listing on a public-facing webpage that hosts project monitoring plans and up-to-date compliance status information. Initial development and annual updates require engineering and web support. This results in total six-year estimated costs of approximately $762,900 for carbon capture/CDR operators and $575,500 for GCS operators.

Subsurface Plume and Pressure Monitoring:

Under this Proposed Regulation, GCS operators would need to meet the requirements for plume and pressure tracking under U.S. EPA's Class VI well regulations. The proposed requirements would not result in any physical construction, equipment installation, or other on-site compliance actions. As a result, the only compliance responses associated with this provision relate to preparing and updating plans. At the end of the U.S. EPA-approved PISC

timeframe pursuant to 40 CFR section 146.93, the GCS operator may seek to reduce the frequency of or retire the subsurface CO_2 plume and elevated pressure monitoring.

CARB Staff estimated a labor requirement of 110 total hours in the first year and 20 hours in subsequent years, split equally between an administrative worker and a geological engineer. This results in total six-year estimated costs of approximately $771,500 for GCS operators.

The Proposed Regulation extends the subsurface and plume tracking requirements for an additional 50 years after the U.S. EPA Class VI requirements end. Therefore, associated equipment costs are not included in the total cost estimates for the Proposed Regulation because they occur outside the six-year economic analysis period.

Air Pollutant and Surface CO_2 Monitoring:

To meet the air pollutant monitoring requirements of the Proposed Rulemaking, GCS operators may need to install at least one air pollutant monitoring station at the GCS site. More than one monitoring station could be required if sensitive receptors are identified downwind of the project that could be impacted by project activities. A typical air pollutant monitoring station would include a carbon monoxide (CO) analyzer, a nitrogen dioxide (NO_x) analyzer, a sulfur dioxide (SO_2) analyzer, an ozone (O_3) analyzer, a particulate matter ($PM_{2.5}$) analyzer, a hydrogen sulfide (H_2S) analyzer, a power source (e.g., solar panels), a data logger, and a system capable of transmitting data to a centralized repository (CARB, 2025f; Kern County CTV1 EIR, 2024). The exact equipment configuration would depend on the pollutants being measured and the instrumentation selected by the operator. Generally, an air pollutant monitoring station can be housed in a temperature-controlled enclosure or installed on a standalone pole or bracket. Additionally, GCS operators would be required to develop an air mitigation plan and implement minimization strategies on air quality impacts identified.

CARB Staff assumed a standard air monitoring station would include a CO analyzer, NO_x analyzer, SO_2 analyzer, O_3 analyzer, $PM_{2.5}$ analyzer, H_2S analyzer, a power source (e.g., solar panels), a data logger, and equipment to transmit data to a central repository. Stations may be mounted on existing infrastructure or installed on a standalone pole or bracket. GCS operators would also need to install meteorological monitoring equipment since meteorological data are essential for supporting air pollution quality assurance and interpreting local dispersion patterns.

CARB Staff assumed that air pollutant monitoring would occur at one location at the GCS site. Six-year costs are estimated at approximately $6.0 million for GCS site operators. If such monitoring is already required by another agency, that could be used to meet the air monitoring requirement in the Proposed Regulation.

To meet the surface CO_2 monitoring requirements of the Proposed Regulation, GCS operators would need to install monitoring stations at certain legacy wells, fault zones, and injection well pads throughout the GCS site. GCS operators would also need to install meteorological monitoring equipment since meteorological data are essential for supporting CO_2 measurement quality assurance and interpreting local dispersion patterns.

CARB Staff assumed that surface CO_2 monitoring would occur at each injection wellhead at the GCS site.[22] Six-year costs are estimated at approximately $1.8 million for GCS site operators.

Baseline Seismic Monitoring:

The Proposed Regulation requires GCS operators to establish a seismic monitoring array capable of monitoring within and around the surface projection of the storage complex. Using that seismic array, GCS operators are required to develop and publicly disclose a baseline monitoring plan, perform a site-based seismic risk assessment to inform the thresholds of a Traffic Light System, and characterize the resulting background seismic data.

Compliance may require installing borehole and shallow sensors. CARB Staff assumed six seismic stations per site under high- and low-depth scenarios. Six-year costs are estimated at approximately $3.4 million for GCS site operators.

Operational Seismic Monitoring:

During injection, GCS operators must analyze seismic monitoring and operational data (e.g., injection rate, down-hole pressure) to determine if injection activities are causing induced seismicity. GCS operators would also be required to analyze monitoring data and prepare annual summaries that will be retained for at least 10 years. This results in total six-year estimated costs of approximately $10.2 million for GCS site operators.

Post-Injection Seismic Monitoring:

GCS operators must conduct continuous seismic monitoring until they have completed the U.S. EPA-approved post-injection monitoring timeframe. Once proof of U.S. EPA-approval for site closure is provided to CARB, GCS operators would be able to apply for a full or partial retirement of their seismic array. If CARB approves a full or partial retirement of the seismic array, the GCS operator would maintain their connection to the California Integrated Seismic Network (CISN) and continue preparing seismic monitoring summaries every five years and incidental reports until at least 100 years after injection ends.[23, 24]

Labor needs parallel those of subsurface plume and pressure monitoring. As noted in Table 4, these post-injection costs are not included in the total cost estimates for the Proposed Regulation because they occur outside the six-year economic analysis period.

GCS Emergency Remedial Response Plan:

Under U.S. EPA's Class VI regulation, permitted storage projects must already develop Emergency Remedial Response Plans (ERRP) that include notification procedures and remedial actions that address any movement of the injection or formation fluids that could

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[22] CARB Staff estimate and average of four U.S. EPA Class VI wells within GCS sites located in California. California Geological Survey provided this assumption to CARB Staff on May 7, 2026.

[23] Site closure may be declared 100 years after the final day of injection, provided there is evidence that the stored CO2 no longer poses a threat to public health or the environment.

[24] During the post-injection phase, GCS operators may need to reinstate their seismic monitoring system if a Traffic Light System Threshold Red-light is triggered.

endanger a USDW during construction, operation, and post-injection site care (UIC-ERR, 2010).[25] These ERRP requirements apply from construction phase of a geologic project through up to 50 years after injection has ceased (i.e., post-injection phase). Under the Proposed Regulation, GCS operators would need to include in those ERRP seismicity-related risks and extend responsibilities to cover the full 100-year post-injection phase. GCS operators would also need to provide additional notification and reporting anytime the ERRP is triggered.

Compliance is limited to reporting and notification activities. This results in total six-year estimated costs of approximately $918,100 for GCS site operators.

Financial Responsibility for GCS Sites:

Under U.S. EPA's Class VI regulation, permitted storage projects must meet financial responsibility provisions that include covering cost for corrective action, well plugging and abandonment, post-injection site care, and emergency remedial response plans (40 C.F.R. Part 146). These financial responsibility provisions apply from the start of permit issuance up to 50 years during the post-injection phase. Under the Proposed Regulation, GCS operators would need to expand coverage to incorporate additional air pollutant monitoring and surface CO_2 monitoring for a minimum of 50 years, as well as additional seismic monitoring and extended ERRP coverage for 100 years post-injection.

Compliance activities under this section would require GCS operators to submit a financial plan demonstrating that they have expanded coverage sufficiently to ensure completion of additional monitoring and emergency preparedness. GCS operators would also be required to publicly disclose their financial plan on their website.

Annual financial responsibility estimated costs total approximately $470,900 per GCS operator, resulting in six-year costs of approximately $33.4 million.

Legal Instruments for Proof of Agreement:

To meet the requirements of the Proposed Regulation, GCS operators would need to obtain legal agreements with all relevant parties and submit them to CARB. Subsequently, operators would need to adhere to prohibition of drilling activities into the storage reservoir for at least 100 years after the last date of injection, and until it has been determined there is no threat to public health or the environment through risk of CO_2 leakage to the atmosphere. Activities under this provision involve preparing and submitting legal agreements to CARB and maintaining the long-term prohibition on drilling or extraction activities.

This results in total six-year estimated costs of approximately $311,400 for GCS site operators.

Community Communication:

The Proposed Regulation would require GCS operators to inform communities adjacent to proposed and operating GCS sites, as well as any other interested party, of project development and operations.

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[25] 40 CFR § 146.94, Subpart H (UIC-ERR, 2010).

Six-year estimated costs total approximately $129,600 for GCS site operators.

Amendments to GCS Protocol, Cap-and-Invest, and LCFS:

These amendments are voluntary and administrative in nature. Therefore, there are no anticipated direct costs associated with the proposed amendments.

Amendments to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR)

Proposed MRR amendments clarify existing requirements and ensure consistency with Cap-and-Invest by requiring separate reporting of already-collected data and removing the current verification threshold, so all GCS operators complete annual verification.

Compliance activities under the Proposed Regulation would involve data reporting and verification activities only. For projects that inject less than 25,000 metric tons CO_2e annually, compliance responses would include annual verification of injected CO_2. These verification activities would include a site visit by a third-party verifier every three years and analysis of project data on an annual basis. CARB Staff did not identify any GCS sites expected to fall under the threshold of projects injecting less than 25,000 metric tons CO_2-equivalent annually; therefore, these costs were not included for the projected population.

A. The creation or elimination of jobs within the State of California.

The Proposed Regulation is not expected to directly create or eliminate jobs within regulated industries. Some provisions may indirectly increase demand for specialized labor associated with monitoring equipment installation, seismic analysis, and financial or legal compliance. These activities are expected to be performed largely by existing staff or contractors in related industries such as oil and gas, engineering, or environmental consulting. Because these labor needs are limited and intermittent, they are not expected to result in sustained job creation or elimination. The carbon management industry is still emerging, which makes potential job impacts difficult to quantify. This uncertainty is heightened by the scheduled sunset of key federal carbon management incentives in 2033, which may slow project development and reduce long-term employment impacts (Suter, 2022). For these reasons, potential job creation or elimination is not quantified.

B. The creation of new businesses or the elimination of existing businesses within the State of California.

The Proposed Regulation is not expected to directly cause the creation or elimination of businesses. Carbon capture, CDR projects, and GCS site deployment depends on multiple external factors, many of which are uncertain and lie outside the control or influence of the Proposed Regulation. In particular, carbon capture/CDR projects and GCS sites require significant capital investment (Pett-Ridge, 2023), and implementation of the Proposed Regulation alone may not provide sufficient incentive for new business development of these project types. Recent federal funding reductions and subsequent reinstatements have also created uncertainty around continued federal support for the emerging carbon management sector (Volcovici, 2026). Additionally, carbon capture and DAC projects must begin construction by 2033 to qualify for the federal 45Q tax credit, a key incentive mechanism for

the developing carbon management industry in the United States (26 U.S.C. § 45Q). In California, permitting approval and CEQA review can take several years to complete (Peridas, 2021). As a result, carbon capture, CDR projects and GCS sites that are not already in planning stages (i.e., in the absence of the Proposed Regulation) may be unable to complete necessary permitting in time to meet the 2033 construction deadline. For these reasons, the Proposed Regulation alone is unlikely to directly lead to development of new carbon capture/CDR projects and GCS sites in California, though increased carbon capture adoption could drive some increased demand for GCS capacity.

The Proposed Regulation provides regulatory certainty by expanding the use and development of protocols to support the carbon management industry and establishing minimum monitoring obligations to ensure continual safe implementation of these projects, thereby supporting developers in making informed investment and implementation decisions. The Proposed Regulation also places additional costs on developers voluntarily pursuing carbon management projects in response to requirements directed in SB 905. The Proposed Regulation includes proposed amendments to the Cap-and-Invest regulation that clarify how CCS-related reductions in GHG emissions from large stationary sources and how CDR projects would be accounted for under Cap-and-Invest. It is reasonably foreseeable that the Proposed Regulation could potentially encourage additional carbon capture and CDR development, particularly among large emitters that may voluntarily choose to retrofit their facilities with carbon capture systems. However, because the extent of future business development directly attributable to the Proposed Regulation remains highly uncertain given the multiple external factors, CARB assumes the Proposed Regulation does not have a direct impact carbon capture, CDR, or GCS business growth.

C. The expansion of businesses currently doing business within the State of California.

Expansion of regulated businesses is not anticipated as a direct result of the Proposed Regulation. Some ancillary sectors providing monitoring equipment, well installation, insurance, or consulting services may experience modest increases in demand.

D. Significant Statewide Adverse Economic Impact Directly Affecting Business, Including Ability to Compete.

Significant statewide adverse economic impacts are not expected as a result of the Proposed Regulation. Impacts of competitiveness are expected to be minor because the costs to comply with the regulation are minor compared to the costs to develop and maintain carbon capture, CDR projects, or GCS sites, and to comply with existing federal regulations.

The Proposed Regulation does not directly facilitate or incentivize the development of new carbon capture or CDR projects outside the State because Cap-and-Invest compliance obligations are not applicable to out-of-state emission sources. Therefore, any reasonably foreseeable impacts outside of California are expected to relate to GCS infrastructure rather than additional capture project development.

Regulated entities are not expected to experience reduced competitiveness because carbon management projects generally compete within local or project-specific markets rather than

across state borders. California carbon capture, CDR projects, or GCS sites projects are unlikely to compete meaningfully with out-of-state projects, and the Proposed Regulation is not expected to influence project development outside the State.

E. The benefits of the regulation to the health and welfare of California residents, worker safety, and the state's environment.

Government Code section 11346.2(b)(1) requires enumeration of the anticipated benefits of the regulatory action, including the benefits and goals of the authorizing statute. The Proposed Regulation is not expected to result in direct, quantifiable benefits to the health and welfare of California residents, worker safety, and the state's environment. However, the proposed requirements would strengthen safety and effectiveness of GCS sites operating in California, ensuring the long-term storage of injected CO_2. The CCUS Program will also contribute to diversifying the State's methods for reducing GHG emissions, which will support California's climate goals. The success of the program is essential for California to achieve its net zero goals.

In addition to the summary information in this chapter, benefits are discussed individually in Chapter IV.

IX. Evaluation of Regulatory Alternatives

Government Code section 11346.2, subdivision (b)(4) requires CARB to consider and evaluate reasonable alternatives to the proposed regulatory action and provide reasons for rejecting those alternatives. This section discusses alternatives evaluated and provides reasons why these alternatives were not included in the proposal. As explained below, no alternative proposed was found to be less burdensome and equally effective in achieving the purposes of the regulation in a manner that ensures full compliance with the authorizing law. The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business. As identified above, it is not expected to impact small businesses.

Alternative A: Adopting Less Stringent Amendments Alternative

Alternative 1 is a less stringent version of section 95704.1 of the Proposed Regulation, which requires surface CO_2 monitoring at GCS sites. Under this alternative, GCS operators would install fewer stationary CO_2 monitoring stations, one upwind and one downwind of the storage complex, rather than multiple stations placed at specific locations where leakage risk is elevated (e.g., injection wellheads, abandoned wells, and geologic features).

Alternative 1 would reduce compliance costs by eliminating the requirement to install additional monitoring stations. Alternative 1 would reduce the costs of the Proposed Regulation by an estimated $969,400 over six years (approximately $161,600 annually).

However, the reduced number of monitoring stations could weaken the ability to detect and respond quickly to potential CO_2 leakage. Limiting monitoring locations would risk not providing sufficient coverage of known or potential migration pathways and would reduce CARB's ability to gather information critical for understanding leakage risks across a storage complex.

Though leakage from an appropriately sited reservoir is unlikely, prompt detection is essential for ensuring permanent storage and protecting USDW.

Because the forgone benefits cannot be quantified and the reduced monitoring increases the risks that CO_2 leaks go undetected, CARB rejected Alternative 1.

Alternative B: Adopting More Stringent Amendments Alternative

Alternative 2 is a more stringent version of section 95704.1 of the Proposed Regulation. In addition to meeting the stationary monitoring requirements outlined in Section 95704.1, operators would conduct quarterly surface emissions monitoring (SEM). SEM surveys, performed on a 25-foot grid across the surface projection of the GCS site, would supplement the continuous monitoring required under the Proposed Regulation at higher risk locations. Quarterly SEM coverage of 6.25% of the surface area results in 25% coverage annually and full coverage over a four-year cycle.

The costs of Alternative 2 are the costs of the Proposed Amendments plus additional costs for SEM at the surface projection of the GCS storage complex. Alternative 2 would add estimated costs of approximately $2.3 million over six years (approximately $388,100 per year). Methods, data sources, and calculations underlying the Alternative 2 cost analysis are provided in Appendix C.

The most common atmospheric monitoring techniques are optical CO_2 sensors, atmospheric tracers, and eddy covariance flux measurements. Routine monitoring of surface CO_2 concentrations or fluxes provides additional data and prompts corrective action which can prevent leakage that result in emissions and failure to ensure permanence of CO_2 storage.

The literature ranks SEM as less effective compared to continuous monitoring at potential surface leakage pathways, as required in the Proposed Regulation (NETL, 2017). In most cases, potential leakage from the storage reservoir would be detected through subsurface monitoring and mitigation would occur before CO_2 reaches the surface. Extensive subsurface monitoring is already required under U.S. EPA's Class VI regulation, which would be further bolstered by the plume tracking and seismic monitoring requirements under the Proposed Regulation. The Proposed Regulation requires GCS operators to conduct surface CO_2 monitoring under section 95704.1. This continuous monitoring can detect the small, dispersed increases in CO_2 concentrations that would be reasonably expected but that survey-based sampling would likely fail to detect. For these reasons, the Proposed Regulation emphasizes continuous monitoring techniques instead of implementing SEM requirements.

Because Alternative 2 adds substantial cost without providing proportionate detection benefits beyond the proposed requirements, CARB rejected this alternative.

A. Small Business Alternative

The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business. The Proposed Regulation is not expected to impact small businesses.

B. Performance Standards in Place of Prescriptive Standards

The Proposed Regulation includes prescriptive standards for seismic monitoring and financial responsibility duration for GCS sites in California. SB 905 explicitly prescribes a minimum duration of 100 years for seismic monitoring and financial responsibility (Health and Safety Code §§ 39741.1(a)(3)(D); 39741.5). Thus, to the extent these requirements qualify as prescriptive standards, they are required by statute and thus necessary. GCS operators must use one or more CO_2 monitoring techniques that meet technical criteria for accurately measuring and tracking CO_2 concentrations or fluxes. These requirements are based on the best available science while allowing operators to choose the monitoring equipment that meets the standards. These are performance standards which require operators to choose technologies which can meet the provided criteria, rather than require operators to use particular technologies.

SB 905 also requires CARB Staff to develop financial responsibility standards which are no less stringent than those of the U.S. EPA's UIC program including long-term obligations for corrective action, plugging, postinjection site care, and emergency response (UIC-FR, 2010).[26] Thus, to the extent that these requirements contain prescriptive standards, they are required by statute and thus necessary.

The Proposed Regulation includes seismic monitoring thresholds to meet the requirements in Health and Safety Code section 39741.1.(a)(3)(C)–(D), and Public Resources Code section 71463. The seismic thresholds and the traffic light system were developed in collaboration with the CGS to ensure consistent detection of subsurface hazards, seismic or leakage risks, and to support transparency for public safety. These are performance standards because they require operator-maintained seismic monitoring systems to be capable of detecting seismic events falling within each of the thresholds, rather than using particular technologies.

Where performance standards were feasible, CARB Staff included them to minimize cost while meeting statutory objectives. Where prescriptive standards appear in the regulation, they reflect statutory requirements or the lack of sufficient operational data from current CCS projects to support development of purely performance-based standards.

C. Health and Safety Code Section 57005 Major Regulation Alternatives

CARB Staff estimates the Proposed Regulation will have an economic impact on the state's business enterprises of more than $10 million in one or more years of implementation. CARB Staff evaluated alternatives submitted to CARB and considered whether there is a less costly alternative or combination of alternatives that would be equally as effective in achieving increments of environmental protection in full compliance with statutory mandates within the same amount of time as the proposed regulatory requirements, as required by Health and Safety Code section 57005.

[26] 40 CFR § 146.85 (UIC-FR, 2010).

X. Justification for Adoption of Regulations Different from Federal Regulations Contained in the Code of Federal Regulations

Government Code section 11346.2(b)(6) requires CARB to describe its efforts to avoid unnecessary duplication or conflicts with federal regulations that address the same issues. The U.S. EPA UIC Program[27] regulates the injection of CO_2 for long-term geologic sequestration under the Safe Drinking Water Act and is designed primarily to protect USDW. Class VI requirements focus on characterizing the storage zone, ensuring mechanical integrity of wells, establishing monitoring requirements, and ensuring adequate financial responsibility to prevent endangerment of USDW. However, the federal program does not extend its regulatory objectives to broader protections such as public health and safety, air quality, or long-term environmental performance.

SB 905 expands the regulatory scope for GCS sites in California by directing CARB to adopt a comprehensive CCUS Program that protects public health, and safety, and the environment. The Proposed Regulation implements these statutory directives by addressing risks beyond the narrower focus of the federal Class VI requirements.

The Proposed Regulations include several requirements that are more protective than the federal Class VI requirements and are necessary to meet California's statutory obligations under SB 905. First, the Proposed Regulation requires surface CO_2 monitoring for 50 years following injection, whereas the federal Class VI requirements include surface CO_2 monitoring only at the discretion of the U.S. EPA Director.[28] These monitoring requirements strengthens early detection in case of CO_2 migration to the surface and supports California's responsibility under Health and Safety Code section 39741.1(a)(3)(E) to protect air quality and public health.[29] The Proposed Regulation also requires GCS operators to monitor ambient concentrations of criteria air pollutants and toxic air contaminants for up to 50 years following injection, which is not required by U.S. EPA under Class VI. Second, the Proposed Regulation require baseline, operational and post-injection seismic monitoring that extends to 100 years after injection ceases, a requirement that is not included in the federal Class VI program. Given California's elevated seismic risk profile, seismic monitoring is needed to detect induced seismicity and ensure the long-term integrity of the storage reservoir. [30] Third, the Proposed Regulation requires subsurface CO_2 plume and pressure-front monitoring to continue until carbon dioxide migration no longer poses a risk to public health, safety, or the environment. The Proposed Regulation also establishes a 100-year stewardship period for the storage complex, exceeding the federal 50-year post-injection site care timeframe.[31] This long-term stewardship includes maintaining an active emergency and remedial response plan and the capacity to reinstate monitoring if seismic activity or other evidence indicates potential impacts to storage integrity. These provisions ensure continued oversight necessary to verify storage

[27] 40 CFR Part 146 Subpart H (UIC-CS, 2010).
[28] 40 CFR § 146.90(h) (UIC-TMR, 2010).
[29] Health & Saf. Code § 39741.1(a)(3)(E).
[30] Health & Saf. Code § 39741.1(a)(3)(D).
[31] 40 CFR § 146.93(b)(1) (UIC-PISCSC, 2010).

permanence and protect public welfare, consistent with California's statutory obligations. This extended requirement ensures that injected CO_2 remains contained within the intended geologic formations and enhances protection of storage containment. Additionally, the Proposed Regulation enables long term oversight, allowing operators to take prompt remedial action in the event of unintended CO_2 leakage through migration pathways—such as existing wells or faults and fractures—consistent with Health and Safety Code section 39741.1(a)(3)(D). The Proposed Regulation requires financial responsibility for 100 years, compared to the 50-year requirement under federal regulations for Class VI wells.[32] This ensures that operators maintain adequate financial resources for long-term monitoring and emergency response over for the full 100 years required by SB 905, ensuring storage permanence and protection of public welfare as required by Health and Safety Code section 39741.5.[33] Collectively, these requirements expand regulatory coverage beyond the existing federal program in support of public health, safety and environmental protections.

California has explicit statutory authority to adopt additional requirements. SB 905, codified in Article 2 (beginning with section 39741) of Chapter 4.3, Part 2, Division 26 of the Health and Safety Code, directs CARB to establish a CCUS program that protects human health, public safety, public welfare, and the environment. Section 39741.1(a)–(f) authorizes CARB to adopt monitoring, reporting, seismic, environmental protection, and financial responsibility requirements necessary to ensure safe and effective deployment of carbon capture and storage technologies. The additional requirements in the Proposed Regulation are therefore authorized by statute and are necessary to achieve the protective objectives established by the Legislature.

The Proposed Regulations are designed to complement, and not conflict with, the U.S. EPA Class VI requirements. CARB incorporated federal provisions where appropriate and added State-specific elements to meet California's statutory mandate under SB 905. For example, because federal Class VI requirements do not expressly require seismic monitoring, CARB's proposed seismic requirements for safe project deployment in a seismically active state. The cost of differing or more stringent State requirements is justified by the benefits to human health, public safety, public welfare, and the environment, as discussed in the economic analysis in Chapter VII. In addition, under some situations, CARB was still legally required by SB 905 to adopt regulations at least as stringent as Class VI, resulting in some overlap between state and federal requirements. This overlap is intentional, non-conflicting, and necessary to ensure that operators can comply with both State and Federal requirements without ambiguity. The aligned requirements enhance regulatory clarity, support consistent long-term oversight, and ensure administrative consistency for GCS operators in California.

[32] 40 CFR § 146.85 (UIC-FR, 2010).
[33] Health & Saf. Code § 39741.5.

XI. Public Process for Development of the Proposed Action (Pre-Regulatory Information)

Consistent with Government Code sections 11346, subdivision (b), and 11346.45, subdivision (a), and with the Board's long-standing practice, CARB Staff held several public workshops, solicited public written feedback on several questionnaire and concept documents, and met with interested parties throughout the development of the Proposed CCUS Program Regulation. These informal pre-rulemaking discussions provided CARB Staff with useful information that informed the regulation now being proposed for formal public comment.

CARB Staff have engaged with the public since 2023 to support development of the CCUS Program. Between August 2023 through June 2026, CARB conducted three public workshops, released two written pre-rulemaking documents for stakeholder review and comment, and held 4 community listening sessions along with discussion with the Environmental Justice Advisory Committee. Each workshop, solicitation, and concept document, and other meetings are summarized below, followed by a consolidated table of outreach activities (Table 7).

A. Workshops and Pre-Rulemaking Activities

On August 15, 2023, CNRA, the California Department of Conservation (DOC), CARB, and the CEC jointly hosted two virtual workshop sessions to provide stakeholders, including community residents, multiple opportunities to participate. The workshops provided an overview of CDR as part of achieving the 2045 carbon neutrality goal under AB 1279 and described initial agency efforts to implement SB 905.

On February 27, 2025, CARB Staff hosted a workshop featuring a legislative and regulatory overview by CARB, followed by expert panel sessions focused on CCUS and CDR, voluntary carbon markets, technology readiness, and deployment benefits and considerations. Staff held a public question and answer period with the panelists.

On August 25, 2025, CARB Staff released the document *Information Solicitation to Advise Implementation of the Carbon Capture, Removal, Utilization, and Storage Program: Senate Bill 905.* This pre-rulemaking document posed 27 questions related to Program design, including definitions, project applicability, financial responsibility for geologic storage; monitoring and mitigation considerations, the voluntary permitting application, project development, and project tracking. The solicitation was open for public comment for 45 days and closed on October 6, 2025.

On April 23,2026, as part of an offsite study session, the CARB Board heard an overview of California's CCUS landscape and its role in achieving the state's climate goals. Industry experts and environmental justice community representatives answered questions from the Board and the public to provide an informational update.

On May 7, 2026, CARB Staff released *Concepts for Potential Regulations for Establishing the Carbon Capture, Removals, Utilization, and Storage Program* (Concepts) to request additional stakeholder input, consistent with direction from SB 905. The concepts reflected similar topic areas as the solicitation document. The public comment period remained open for 30 days and closed on June 6, 2026.

On June 23, 2026, CARB hosted a virtual pre-rulemaking workshop to present the anticipated regulatory timeline and summarize the Concepts document. CARB Staff provided an overview of feedback received and facilitated a verbal public comment period.

CARB hosted a series of joint agency community listening sessions to share information on the state's broader efforts to advance the CCUS Program and to hear directly from the public throughout the state. An in-person meeting was held on August 27, 2026, at San Joaquin Delta College in Stockton, followed by additional in-person meetings on September 1, 2026, at the Long Beach Senior Center and on September 2, 2026, at the Four Points by Sheraton in Bakersfield. CARB also hosted a virtual public meeting on September 8, 2026 to provide an overview of the state's efforts and gather further public input. Spanish interpretation services were provided at all four meetings.

Finally, CARB held an Informational Item at a CARB Board Hearing on September 24, 2026, to discuss the roles and oversight of CCS projects across various jurisdictions and agencies. This hearing included guest speakers from U.S. EPA, Kern County, State Lands Commission, CGS, SWRCB, and the OSFM. The Board heard about the different responsibilities these agencies have over projects and also heard from CARB Staff on the Concepts released earlier in the year. Public comments were also made at this hearing.

The EJC held several meetings that discussed SB 905 related work, including joint meetings with CARB on September 14, 2023, and September 14, 2024, as outlined in Table 7. All meeting agendas, recordings and other information can be accessed on CARB EJC webpage.[34] EJC met publicly in August 2024 and adopted a resolution on CCUS and DAC projects, calling for these technologies to be narrowly applied to essential processes or legacy emissions and only when designed with robust protections for frontline communities with safeguards for air and water quality (EJC, 2024a). CARB formally responded on September 9, 2024, acknowledging EJC's concerns regarding public health, potential project risks, and equity safeguards, expressing willingness to develop community-focused policies, and recognizing the complementary role of these technologies in achieving climate goals. (EJC, 2024b). In February 2025, CARB invited EJC to present at the CCUS informational workshop, where committee members reiterated the need for buffer zones, notification procedures, community engagement, and strengthened protections (CARB, 2025a). The resolution and CARB's response, along with recording of their comments during the workshop can be found on the CCUS Program's Meetings and Workshops Page.[3] CARB Staff also presented during the EJC meeting with new committee members on August 31, 2026 to ensure the most recently appointed members had the context and scope of the requirements for the SB 905 direction as it relates to the regulatory proposal. The EJC also held their own community presentation and public comment period at their public meeting on September 30, 2026.

Feedback from these meetings contributed to refinement of regulatory concepts.

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[34] See CARB, *Environmental Justice Advisory Committee Meetings and Events, https://ww2.arb.ca.gov/environmental-justice-advisory-committee-meetings-and-events* (last visited Oct. 12, 2026).

B. Meeting Materials and Participation

All workshops included real-time English to Spanish interpretation, and video recordings of the meetings were publicly posted in both English and Spanish. Several workshop materials were also made available in Spanish after the events. Workshops were held virtually to facilitate broad participation. Notices were sent approximately two to three weeks in advance to CARB listservs including the Cap-and-Invest Program, Cement Industry of California, Climate Change, Environmental Justice Stakeholders Group, Low Carbon Fuel Standard Program, and Carbon Capture and Sequestration lists, reaching approximately 35,000 subscribers. Materials for public workshops and community meetings, including staff presentations, were posted to CARB's Carbon Capture Removals, Utilization, and Storage Program Meetings and Workshops webpage[35] prior to the workshops. All workshop recordings and written public feedback are accessible through this webpage.

Participants included representatives from industrial facilities such as cement plants and natural gas utilities, community members and environmental justice organizations, advocacy groups, legal firms, carbon registries, researchers, labor representatives, and consultants. Stakeholders engaged by attending workshops, providing data, and submitting written feedback on the Information Solicitation and Concepts document. This input was used to develop, inform, and refine CARB Staff proposals.

Table 7: Workshops, Meetings, and Outreach Activities.

Workshop and Pre-Rulemaking Activity	**Date**	**Time**	**Location**	**Comment Letters Received**
SB 905 and Carbon Neutrality	August 15, 2023	10:00 a.m.-11:30 a.m. 5:30 p.m.-7:00 p.m.	Virtual	Public Comments provided in person
AB 32 Environmental Justice Advisory Committee Meeting	August 25, 2023	1:00 p.m.-5:30 p.m.	Sacramento, CA and Virtual	Public Comments provided in person
CARB and AB 32 Environmental Justice Advisory Committee Joint Meeting	September 14, 2023	4:00 p.m.	Virtual	Public Comments provided in person

[35] *Id.*

AB 32 Environmental Justice Advisory Committee Meeting	April 4, 2024	12:00 p.m.-5:00 p.m.	Sacramento, CA and Virtual	Public Comments provided in person
AB 32 Environmental Justice Advisory Committee Meeting	July 18, 2024	1:00 p.m.-5:00 p.m.	Sacramento, CA and Virtual	Public Comments provided in person
AB 32 Environmental Justice Advisory Committee Meeting	August 16, 2024	2:00 p.m.-5:00 p.m.	Sacramento, CA and Virtual	Public Comments provided in person
CARB and AB 32 Environmental Justice Advisory Committee Joint Meeting	September 14, 2024	4:00 p.m.	Virtual	Public Comments provided in person
Final Assembly Bill 32 Environmental Justice Advisory Committee Resolution: Opposition to CCUS and DAC in California	August 16, 2024	N/A	Virtual Submission	Public Comments provided in person
CARB response to Final Assembly Bill 32 Environmental Justice Advisory Committee Resolution: Opposition to CCUS and DAC in California	September 9, 2024	N/A	Virtual Submission	Public Comments provided in person
Panelists: Voluntary Markets, Startups Community Advocates (includes EJC)	February 27, 2025	9:00 a.m.-1:00 p.m.	Virtual	24
AB 32 Environmental Justice Advisory Committee Meeting	March 13, 2025	1:00 a.m.-5:00 p.m.	Sacramento, CA and Virtual	Public Comments provided in person

Written Solicitation to inform draft concepts-written comment	August 24, 2025	N/A	Virtual Submission	65
CARB Study Session	April 23, 2026	11:00 a.m.	Marshall, CA	Public Comments provided in person.
CCEJN Roots of Resiliency Conference	April 25, 2026	8:00 a.m.-4:00 p.m.	Avenal, CA	Public Comments provided in person.
Draft concepts for potential regulations-written comment	May 7, 2026	N/A	Virtual submission	72
Draft Concepts Feedback Workshop	June 23, 2026	9:00 a.m.-12:00 p.m.	Virtual	Public Comments provided in person
Statewide Community Listening Sessions: CCUS Program #1	August 27,2026	5:00 p.m.-8:00 p.m.	Stockton, CA	Public Comments provided in person
AB 32 Environmental Justice Advisory Committee Meeting	August 31, 2026	1:30 p.m.-4:00 p.m.	Sacramento, CA	Public Comments provided in person
Statewide Community Listening Sessions: CCUS Program #2	September 1, 2026	5:30 p.m.-8:00 p.m.	Long Beach, CA	Public Comments provided in person
Statewide Community Listening Sessions: CCUS Program #3	September 2, 2026	5:30 p.m.-8:00 p.m.	Bakersfield, CA	Public Comments provided in person
Statewide Community Listening Sessions: CCUS Program #4	September 8, 2026	5:30 p.m.-8:00 p.m.	Virtual	Public Comments provided in person /18 letters*

				*total number received from 4 listening sessions
CARB Informational Board Hearing on SB 905	September 24, 2026	9:00 a.m.	Sacramento, CA	31

C. Additional Outreach

CARB Staff attended the CCEJN Roots of Resiliency Conference on April 25, 2026, and presented general information on carbon management technologies, known projects in the Central Valley, and the regulatory development timeline. During breakout discussions, community members shared feedback related to emergency response, monitoring, water contamination concerns, well safety, pipeline siting, project transparency, and community benefits commitments.

Between March and May 2025, CARB Staff and contracted staff from LLNL met with permitting agencies across the State, including counties, regional air districts, water boards, and the CEC, to gather information about permitting processes, CEQA requirements, monitoring needs, and mitigation measures for carbon management projects. CARB Staff conducted follow-up meetings to clarify permitting agency roles and procedures. Feedback from these meetings contributed to refinement of regulatory concepts.

D. Stakeholder Meetings

CARB Staff held numerous meetings requested by individual organizations and interested parties. These discussions typically involved clarifying questions about the scope of potential regulations or sharing information about technologies and how they may fit within the CCUS Program. Feedback from these meetings contributed to refinement of regulatory concepts.

E. Webpage Resources and Transparency

The CCUS Program website has been continually updated to facilitate public participation and support transparency. Materials posted include workshop notices, presentations, recordings, written comments, background information on technologies, previous outreach materials, and information on planned and active projects.

XII. Documents Relied Upon

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XIII. Appendices

Appendix A-1 Proposed Regulation Order - Carbon Capture Utilization Removal and Storage Program

Appendix A-2 Proposed Regulation Order – Cap and Invest

Appendix A-3 Proposed Regulation Order - Mandatory Reporting Regulation

Appendix A-4 Proposed Regulation Order - Low Carbon Fuel Standard

Appendix B-1 Proposed Amendments to the Carbon Capture and Sequestration Protocol – Geologic Carbon Storage Protocol

Appendix B-2 Proposed Amendments to the Carbon Capture and Sequestration Protocol - Low Carbon Fuel Standard Quantification Methodology

Appendix C Economic Analysis

Appendix D Environmental Impact Assessment

Appendix E Purpose and Rationale – Proposed Regulation Orders

Appendix F Purpose and Rationale - Proposed Amendments to the Carbon Capture and Sequestration Protocol