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Dear Jason,

We are writing to call your attention to the topic of incorporating the California Air Resources Board's ("CARB") existing Carbon Capture and Sequestration (CCS) Protocol ("the Protocol") into the Cap-and-Trade Program.

Collectively, we represent a large and diverse array of energy producers, researchers, NGOs, labor unions and power producers. We agree with the vast majority of climate scientists that CCS is a key enabling technology for stabilizing CO₂ levels in the atmosphere and achieving carbon neutrality, and have been collaborating to find ways to make CCS a viable option in the quest to achieve California's climate goals.

We are also keenly aware that the Cap-and-Trade Program has been the subject of much debate, including recently in the legislature. Regardless of the exact nature of future changes to the program, we believe that inclusion of the CCS Protocol therein would strengthen the program, facilitating deeper emission cuts for CO₂ and possibly other pollutants, enabling more robust and equitable functioning of the program, and better aligning it with California's ambitious mid-century decarbonization goals.

CARB has invested several years' worth of time and effort to date in developing a comprehensive and protective regulation for CCS. The Protocol, which was incorporated into the Low Carbon Fuel Standard ("LCFS") effective January 1, 2019, goes to great length to ensure that only the very best sites are chosen for permanent geologic storage, that they are operated and decommissioned diligently, and monitored thoroughly during their operational life and beyond, with strong reporting and verification requirements. It is widely considered as the most comprehensive piece of regulation for permanent geologic CO₂ storage.

However, under California's current Cap-and-Trade and Mandatory Greenhouse Gas Reporting Regulation ("MRR"), there exists no mechanism to allow an entity to subtract captured and geologically sequestered CO₂ from its compliance obligation, even when the entity fully follows the requirements of the CCS Protocol.

Incorporation of such a protocol into the Cap-and-Trade Program was foreseen by CARB as far back as 2010, when the Cap-and-Trade regulation was adopted, under [Board Resolution 10-42](#)¹, in which the Board directs the Executive Officer to establish such a protocol in the Cap-and-Trade regulation:

“BE IT FURTHER RESOLVED that the Board directs the Executive Officer to initiate a public process to establish a protocol for accounting for sequestration of CO₂ through geologic means and recommendations for how such sequestration should be addressed in the cap-and-trade program [...]”

Doing so would offer covered entities the option to reduce their compliance obligation through CCS. Ten years later, we still see this as potentially beneficial for several reasons.

First, **CCS adds optionality to California’s pursuit of its climate mitigation efforts**. In a 2019 report², the Energy Futures Initiative, led by Obama Administration Secretary of Energy Ernest Moniz, analyzed deep decarbonization pathways for California to achieve carbon neutrality along with California’s other sector specific goals. The analysis found that technology optionality, flexibility and innovation in technologies that cut across sectors would be needed to achieve California’s climate goals at least cost. In other words, CCS adds security to the pursuit of mitigating existing emissions, and can contain costs.

Second, **CCS is a key enabling technology for removing CO₂ from the atmosphere and achieving economy-wide carbon neutrality by mid-century**. A first-of-its-kind study³ by the Lawrence Livermore National Laboratory and collaborators found that California can indeed achieve this ambitious goal, but that it will have to leverage both nature and technology to go beyond mitigation of existing emissions and physically remove about 125 million metric tonnes of CO₂ from the atmosphere *annually* by mid-century. Capturing and permanently storing CO₂ is a fundamental component of this endeavor.

Third, **CCS is the largest emission reduction option for some industrial facilities whose products cannot readily be substituted, such as cement or steel, and could reduce the need for allocating free allowances in these sectors if fitting CCS to these facilities becomes economical**. CCS is a proven technology that has been in use for decades, and which can also be applied in the industrial sector. For cement production, for example, CCS demonstrations are in development internationally in Norway, Canada,⁴ and in China.⁵ In 2019, a large scale commercial CCS project⁶ on a cement plant in Colorado was announced and the project is currently in early development stages. Analyses by the

¹ December 16, 2010.

² Optionality, Flexibility & Innovation: Pathways for Deep Decarbonization in California https://static1.squarespace.com/static/58ec123cb3db2bd94e057628/t/5ced6fc515fcc0b190b60cd2/1559064542876/EFI_CA_Decarbonization_Full.pdf

³ https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf

⁴ HeidelbergCement researching full-scale carbon capture and storage (CCS) in Canada <https://www.heidelbergcement.com/en/pr-29-11-2019>

⁵ GCCSI CCUS facility database <https://co2re.co/FacilityData>

⁶ Svante, LafargeHolcim, Oxy Low Carbon Ventures And Total Launch Study For Commercial-Scale Carbon Capture And End-Use At U.S. Plant <https://www.total.com/media/news/press-releases/svante-lafargeholcim-oxy-low-carbon-ventures-and-total-launch-study-commercial-scale-carbon-capture>

Intergovernmental Panel on Climate Change and the International Energy Agency found that with CCS, the cement industry is able to eliminate much higher shares (81%) of the sector's CO₂ emissions relative to other CO₂ reduction pathways that do not include CCS.⁷

Fourth, **CCS on Natural Gas Combined Cycle (“NGCC”) power plants is available today, and would significantly help California achieve its zero-carbon electricity goals.** Retrofitting NGCC power plants with CCS can generate nearly carbon-neutral electricity as the technology is able to eliminate virtually all of the plant's CO₂ emissions.⁸ In 2019, the U.S. Department of Energy (DOE) awarded grants⁹ to four NGCC power plants to conduct front-end engineering design (FEED) studies to retrofit them with CCS. Recent analyses have found that a power grid supported by a diverse portfolio of zero-carbon firm resources, including NGCC with CCS, would meet the State's zero-carbon electricity goals under SB100 at a much lower cost than one that excludes all available zero-carbon resources,¹⁰ while having a smaller land footprint and furthering grid reliability and mitigation goals in other sectors.

Fifth, **installation of CCS results in direct emission reductions at large point sources.** The Cap-and-Trade Program has been criticized for allowing emissions to continue unabated at specific facilities with a large emissions footprint that have a disproportionate local impact. CCS by nature is a direct mitigation measure that results in large CO₂ emission reductions at the facility where it is installed, reducing the need for offsets or allowances for compliance. It is also possible that installation of CCS can abate emissions of non-CO₂ pollutants that impact air quality, if the system is designed with that goal in mind. This topic merits a thorough look and analysis.

Last but not least, **CCS creates and protects good-paying, blue-collar, highly-skilled union jobs within California's borders.** CCS projects in the energy, industrial, and manufacturing sectors create construction and services jobs across the value chain, from carbon capture to pipeline transport to CO₂ storage, and support domestic and State workers. CCS can ensure high quality traditional energy jobs at power plants that continue into the future in harmony with California's climate goals. For some industrial applications, CCS is the only way to capture certain process emissions. This technology will protect and create new manufacturing jobs, and further ensures that we do not offshore carbon pollution or jobs. Inclusion of CCS in Cap-and-Trade would directly support projects undertaken *inside the state*.

We reiterate that, even though incorporation of the CCS Protocol into the Low Carbon Fuel Standard (LCFS) was a major inroad, incorporating the Protocol into the Cap and Trade program would be material to a broader class of projects. Natural-gas fired power plants are a striking example. While a plant that supplies baseload electricity to the grid *and* directly to oil field operations behind the meter could earn

⁷ Carbon Capture in the Cement Industry: Technologies, Progress, and Retrofitting
<https://pubs.acs.org/doi/abs/10.1021/acs.est.5b03508>

⁸ Towards Zero Emissions from Fossil Fuel Power Stations
<https://www.sciencedirect.com/science/article/abs/pii/S1750583618308934>

⁹ U.S. Department of Energy Announces \$110M for Carbon Capture, Utilization, and Storage
<https://www.energy.gov/articles/us-department-energy-announces-110m-carbon-capture-utilization-and-storage>

¹⁰ See “[Long-Run Resource Adequacy under Deep Decarbonization Pathways for California](#)”, Energy + Environmental Economics (E3), June, 2019, p.42.

LCFS credits for the portion of the plant's power that supplies the oil field operations, this is an exception and not the rule. Even so, under the current Cap-and-Trade regulation, such a plant's compliance obligation would *not* be reduced, and neither the CO₂ source nor the capture facility could take credit for the captured and sequestered CO₂ under the program. Both technologically and economically, a capture project would best be sized to capture the *entirety* of the plant's CO₂ emissions. For power plants that do not directly supply the electricity needs of oil field operations and are thus unable to access LCFS credits, the current disincentive is even more pronounced.

Time is of the essence. Swift action by CARB could help CCS project developers in California leverage the Federal tax credit (45Q) that requires construction to have commenced before January 1, 2024. As can be seen by the [list of CCS projects under development under the federal 45Q incentives](#) maintained by the Clean Air Task Force, the tax credit has stirred significant development activity. This creates a near-term opportunity for California to make use of an external incentive at no additional internal cost. Combined with the State's extensive climate policy framework, this incentive could help California be a leader in CCS deployment nationally and globally, and an exporter of technology and know-how.

We therefore urge CARB to promptly analyze if and how inclusion of CCS could strengthen the Cap-and-Trade program by examining potential impacts and benefits and, subject to the conclusions of the analysis, enhance the Cap-and-Trade regulation and MRR as needed to include CCS projects that comply with the already established CCS Protocol.

We recognize that this is not a trivial task. However, the necessary technical groundwork on the Protocol is already complete and has undergone significant public comment. We see any remaining effort as a worthwhile investment that capitalizes on, and leverages, existing work, and stand ready to support CARB in such an effort. A public workshop on this topic as a first step would help to further define the necessary steps forward.

Sincerely,

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