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Heirloom California Carbon Management Hub Request for Information

Additional submitted attachment is included below.

Heirloom

January 29, 2025

California Energy Commission
Docket Unit, MS-4
RE: Docket No. 25-ERDD-01
715 P Street
Sacramento, CA 95814-5512

RE: California Carbon Management Hub Request for Information

On behalf of Heirloom Carbon Technologies (Heirloom), thank you for seeking our input for the purpose of exploring partnerships and technological capabilities for developing carbon management hubs in California. We appreciate the California Energy Commission's (CEC) interest in accelerating the deployment of direct air capture (DAC) and other carbon management technologies and addressing the many challenges in deploying these nascent technologies.

Heirloom is a California-based company, on a mission to remove billions tons of CO_2 from the atmosphere by 2050 to limit global temperature rise to the 1.5℃ warming threshold. Heirloom builds a hybrid carbon mineralization and DAC technology that taps into one of the Earth's most abundant resources, limestone, to remove CO_2 directly from the atmosphere; and then permanently stores it using a range of different storage partners.

Heirloom has demonstrated an ability to scale from California to the Gulf Coast. Heirloom recently unveiled America's first DAC facility in Tracy, CA and is currently building a DAC facility in Northwest Louisiana capable of removing hundreds of thousands of tonnes of carbon dioxide per year. Heirloom is also committed to robust public engagement processes about the deployment of such carbon removal technologies; centering the lived experience and expertise of impacted communities; and developing community benefits plans for any region we seek to build in.

Please see our responses below to the proposed questions in this RFI:

1. **Please describe your interest in partnering with other entities to apply for DOE funding and outline the role and expertise your organization would contribute to a carbon management hub. Include any relevant experience from prior collaborative projects that could help inform and strengthen a hub-based partnership.**

Heirloom

Yes, Heirloom is interested in partnering with other entities to apply for DOE funding to unlock significant finance to scale our existing California operations. As part of our deployment strategy, we've joined successful consortia to be selected for (and since awarded) funding for DOE-funded DAC Hubs as technology providers, including TA-1 awards in Illinois, Florida, and the Pacific Northwest as well as a TA-3 Award Project Cypress in Louisiana which is progressing through several project milestones (pre-FEED, FEED, NEPA).

2. **Which types of state-level support beyond grants — such as stakeholder convening, streamlined processes, technical assistance, research access, and community engagement — is your organization most interested in, and which does your organization believe would be most effective for advancing carbon management efforts, particularly with regards to a hub- based approach?**

Market Enablement: In order for the industry to thrive, the market for carbon dioxide removal needs to expand beyond the voluntary carbon market. Policy-driven demand in California would signal to investors, project financiers, and countries around the world that the State is committed to using every lever at its disposal to catalyze 21st century energy technologies to meet our global energy moment. This is critical to creating more supply of carbon removal tech in order to keep pace with government demands for ambitious emission reduction goals. This is why we have supported legislation ranging from policies that shape our State's carbon management Scoping Plan, to corporate disclosures of emissions, to standards in the Voluntary Carbon Markets to help ensure that the State's multi-megaton need for carbon removal, as scoped out by the Air Resources Board, is achieved through new and existing carbon management programs.

Establish High Quality CO2 Removals: As voices ranging from academics to think tanks to technologists and beyond have clamored for the need to set higher quality standards for CO2 removal around the world, California should create a "Measurement, Reporting & Variability" (or MRV) framework. These standards would over time not only ensure that only the high quality carbon removals are entertained by the State, but also be a helpful check on corporate greenwashing claims over time by ensuring corporations only use high quality removal credits to manage their carbon footprints.

Streamlined Permitting Process: To enable large-scale carbon removal projects in California, we support streamlined processes that ensure clean energy interconnection, predictable permitting timelines and processes for DAC facilities and CO2 storage, and funding mechanisms that don't introduce unnecessary delays. Heirloom's facility in Tracy runs on wind and solar. If more clean energy isn't permitted, built, and connected quickly, critical climate solutions like DAC will not come online at scale. Permitting remains another major barrier; while we built in Tracy in just eight months due to an existing Environmental Impact Report, we still faced challenges that could have delayed or killed the project were it not for support from the Governor's Office of Business and Economic Development (GO-Biz). Finally, when the state allocates funding for public goods like carbon removal, we believe it must ensure that grants are awarded at the pre-development stage, rather than

being gated behind lengthy CEQA determinations, so companies can make strategic investments without artificial bottlenecks.

3. **What is the current Technology Readiness Level (TRL) of your technology and/or the development stage of your project (e.g., preliminary front-end engineering and design, demonstration)? Please provide potential outcomes from partnering with your organization, including estimated annual carbon capture capacity (in tonnes per year), description of product (if carbon utilization), co-benefits (e.g., hydrogen or water production), and other relevant details.**

Heirloom's Commercial Pilot Plant, "Uno," validates the technology is currently at Technology Readiness Level (TRL) 7, having successfully transitioned from an engineering-scale system to a full-scale prototype demonstrated in a relevant environment. At TRL 7, a system must demonstrate its ability to operate under conditions that closely mirror the final commercial application, with components fully integrated and reflecting the final design. Heirloom's Commercial Pilot Plant has a design capacity to capture, regenerate, process, transport, and store CO2, using limestone as a low-cost sorbent, with operational systems — including carbonation, calcination, and material handling — demonstrated at full scale in real-world conditions. The plant operates under actual environmental conditions, with varying temperatures and humidity, and has successfully captured and processed CO2 in these settings. This confirms the technology's readiness for further scaling. Performance data, including throughput, component uptime, and system availability, support the step up to a full-scale system, meeting the criteria for TRL 7. Heirloom is exploring the possibility of an expansion of the existing facility, pending funding availability.

4. **What challenges are you currently facing, particularly related to funding (e.g., offsetting construction or operating costs, securing offtake agreements)? What challenges – financial or otherwise - do you anticipate in scaling these technologies within a hub-based approach, and are there any challenges unique to establishing a hub in California?**

As a new startup, our company faces significant challenges both at the State and Federal level this year. At the state level, we must give the CDR industry enough time to mature and scale up to meet California's climate goals by implementing demand-side measures to increase demand for permanent CDR, lower the costs, and accelerate deployment of innovative and durable carbon removal technologies. Heirloom has supported market enabling legislation in the past such as SB 253 (Wiener), SB 905 (Caballero), and SB 308 (Becker), to help signal to investors, project financiers, and countries around the world that California is committed to using every lever at its disposal to catalyze 21st century energy technologies to meet our global energy moment. We are also actively supporting the Governor's proposal in the January 2025-26 Budget to permanently fund positions to implement SB 905, which will lay the groundwork for CDR technologies in California. We are also committed to working with Governor Newsom's administration, key regulatory agencies and the Legislature on ways to help scale up capacity over time and create a market signal for investors.

At the federal level, we have received significant funding opportunities including up to $600 million from the previous administration's DAC Hub program for the DAC facility in Louisiana. Despite the recent news around Federal funding of programs we are optimistic that $1.8B of Direct Air Capture Hub Funding will continue to be awarded to technologies at varying levels of maturity. While we hope fellow California companies will apply for, and win these funds, for projects in the State of California – we urge the CEC to consider investing hundreds of millions of dollars in matching funding to promote the construction of megaton facilities in the State. While prior year appropriations via the Commission has been helpful to get projects going, additional monies from the CEC are vital to shore up more CA based DAC hub funding applicants to ensure that Operational Expenses (such as power) and Capital Expenditures (to build DAC infrastructure with good quality jobs) are covered, for young companies. We recognize that California faces fiscal constraints, but additional financial support of the industry will lower costs, accelerate deployment and help California achieve its climate goals.

Thank you for your consideration on this matter.