DOCKETED	
Docket Number:	25-ERDD-01
Project Title:	Carbon Management Hub RFI
TN #:	261395
Document Title:	Skytree LLC Comments - Skytree LLC Comments to CEC's Carbon Management Hub RFI
Description:	N/A
Filer:	System
Organization:	Skytree LLC
Submitter Role:	Applicant
Submission Date:	1/29/2025 6:01:00 AM
Docketed Date:	1/29/2025

Comment Received From: Skytree LLC
Submitted On: 1/29/2025
Docket Number: 25-ERDD-01

Skytree LLC Comments to CEC's Carbon Management Hub RFI

Additional submitted attachment is included below.

California Energy Commission: Carbon Management Hub RFI

Docket # 25-ERDD-01

Submitted by Skytree LLC

Question 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.

Skytree is a pioneering developer of modular Direct Air Capture (DAC) technology designed for scalability and integration with diverse energy sources. With a proven track record in deploying cost-effective carbon removal solutions, we are committed to partnering with the California Energy Commission (CEC) and other stakeholders to develop a carbon management hub.

Our expertise is demonstrated through, for instance, Project Concho, the world's first wind-powered DAC facility, developed in collaboration with:

- Return Carbon (a developer of scalable carbon removal projects),
- Verified Carbon (a Texas-based CO_2 storage solutions provider), and
- Greenalia (an independent renewable energy power producer).

Designed to capture and store 500,000 tons of CO_2 annually by 2030, Project Concho highlights Skytree's ability to integrate DAC technology with renewable energy infrastructure, making it a model for similar initiatives in California.

In a California-based carbon management hub, Skytree would contribute:

- **Proven DAC Technology:** Our solutions are already deployed in the field and can seamlessly integrate with various energy sources (e.g., renewable energy, waste heat, thermal energy), helping to drive down operational costs.
- **Scalable DAC Deployment:** Offering modular units designed to meet varying carbon capture thresholds efficiently through flexible deployments.
- **Technical and Operational Expertise:** Bringing extensive experience in designing, optimizing, and deploying DAC systems for reliability and efficiency (including FEL-1 studies).

California’s leadership in climate policy and innovation provides an ideal foundation for establishing the next generation of carbon management hubs. Skytree is eager to collaborate with stakeholders to achieve the state’s ambitious decarbonization goals.

Question 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?

Skytree recognizes that establishing a carbon management hub requires more than funding—it demands comprehensive state-level support to address technical, logistical, and community-related challenges. Beyond grants, several key support mechanisms are critical to establishing a successful carbon management hub:

Stakeholder Convening and Facilitation: Essential for fostering partnerships and collaboration across the carbon capture value chain. As a pure-play OEM, Skytree is interested in meeting with project developers, operators, and CO_2 end-users (e.g., concrete producers) to align technology development with practical applications. We also see necessary partnerships with renewable energy providers to power DAC facilities with clean energy—particularly relevant in California's Central Valley, where new storage initiatives like Carbon TerraVault are being explored, and in the Salton Sea region, where geothermal resources could supply low-carbon heat and power.

Streamlined Permitting and Clear Regulatory Processes: Based on our experience developing DAC hubs, permitting consistently has the longest lead time and sits on the critical path, making it the most likely stage to encounter delays. Simplifying permitting pathways for carbon capture facilities and associated CO_2 transport and storage infrastructure can reduce unnecessary setbacks, while maintaining rigorous environmental standards. Expedited approval timelines for projects that align with California's decarbonization goals will enable faster deployment and impact.

Technical Assistance and Research Access: Providing technical assistance can significantly enhance technology validation and system optimization. Access to state-supported research facilities, pilot programs, and data resources can help validate performance and optimize system designs. Supporting feasibility studies and DAC pre-FEED/FEED assessments will de-risk early-stage projects and ensure scalability.

Community Engagement and Public Awareness: Building public trust and increasing awareness of DAC's role in decarbonization are critical for smooth implementation and long-term support. Carbon management hubs must deliver tangible economic and environmental benefits, particularly for historically underserved communities.

Maximizing Impact: To unlock the full potential of these measures, collaborative decision-making should prioritize inclusive forums where diverse stakeholders—including industry leaders, academia, and local communities—can align on shared objectives. For instance, California's Central Valley offers promising geology for long-term CO_2 storage, as evidenced by emerging CCS projects under development. Similarly, the Salton Sea region could leverage geothermal energy resources to power DAC operations, reducing both emissions and costs. Integrated financial and regulatory support, combining grants, tax incentives, and low-interest financing with streamlined permitting and technical assistance, will help reduce barriers to entry and accelerate development timelines. A community-centric approach with early and ongoing engagement will ensure that these hubs achieve equitable outcomes and long-term credibility.

Conclusion:

California's leadership in climate innovation and policy—anchored by legislation such as SB 905 and AB 1279—presents a unique opportunity to establish a blueprint for successful carbon management hubs. Specifically, SB 905 underscores the state's commitment to facilitating carbon capture, utilization, and storage (CCUS) through streamlined permitting and robust regulatory frameworks. Meanwhile, AB 1279 codifies the state's goal of achieving carbon neutrality as soon as possible, and no later than 2045, highlighting the importance of strategies like DAC to meet these ambitious targets.

By leveraging geologically favorable regions like the Central Valley for CO_2 storage and abundant renewable energy resources, including geothermal energy from the Salton Sea, California can significantly reduce the cost and complexity of DAC deployment. Additionally, initiatives such as Carbon TerraVault demonstrate the state's proactive approach to developing comprehensive CCS infrastructure, which Skytree can integrate into a hub-based framework.

Skytree is eager to collaborate with the state and its stakeholders to realize these hubs' full potential, advancing both environmental and economic goals while ensuring equitable outcomes for local communities. Our commitment to innovation, scalability, and collaborative partnerships aligns perfectly with California's vision for a sustainable and carbon-neutral future.

Question 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.

Skytree's Stratus units are designed for medium to large-scale applications and are currently at TRL 7, with beta systems operational at our R&D facility. These units will achieve TRL 9 and ship to customers in 2025. Available in electric and hybrid configurations, Stratus units provide scalable CO_2 capture solutions tailored to diverse needs.

Annual Carbon Capture Capacity:

- Electric Units: Capture ~400 tons of CO_2 per unit annually, projected to reach ~720 tons per unit by 2027. These units also produce up to 600 liters of water per day, ideal for water-scarce regions.
- Hybrid Units: Capture ~300 tons of CO_2 per unit annually, projected to reach ~540 tons per unit by 2027, leveraging thermal energy (such as waste heat) to improve energy efficiency.

Skytree's modular DAC systems are engineered for scalability, capable of capturing millions of tons of CO_2 annually with flexible deployment configurations. Key contributions include:

- Scalable Deployment: Modular systems allow seamless scaling to meet varying carbon capture thresholds, ensuring efficient integration into existing facilities or greenfield projects.
- Streamlined Installation: Plug-and-play units are pre-assembled and rigorously tested, minimizing disruption and enabling rapid deployment.
- Sorbent Innovation: Proprietary sorbent technology enhances capture efficiency and scalability. Modular sorbents are designed for easy replacement and upgrades, ensuring long-term performance improvements.

By combining cutting-edge technology with operational expertise, Skytree offers practical and impactful solutions to support California's decarbonization goals and the development of a robust carbon management hub.

Question 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?

Skytree has identified the following key challenges in scaling DAC technologies within a hub-based approach:

- Funding: Although the 45Q tax credit is likely to remain available, it only provides financial benefits once a DAC hub becomes operational. One of the primary challenges lies in securing the development and upfront capital needed to construct a DAC hub. State-level incentives and public-private partnerships are essential to help address these funding gaps.
- Energy: The availability of abundant, cost-effective renewable energy is a key concern, especially with rising demand from data centers.
- Community Engagement: Building public trust and increasing awareness of DAC's role in decarbonization are critical for smooth implementation and long-term support.