August 2023

Carbon Dioxide Removal Announcements

Fossil Energy and Carbon Management



Fossil Energy and Carbon Management

Suite of announcements:

- Regional Direct Air Capture Hubs (DE-FOA-0002735):
 - TA1: Concept Studies
 - TA2: Front-End Engineering (FEED) Studies
 - TA3: Full DAC Hub Design, Construction, Operation
- Carbon Negative Shot Notice of Intent (DE-FOA-0003081):
 - Commercial DAC Prize (Section 410005b of BIL):
 - Track 1: CDR Purchase Prize
 - Track 2: Small DAC Pilot Prize
 - Base appropriations Small CDR pilots (DE-FOA-0003081)
- Responsible Carbon Management Pledge RFI/Notice of Intent



Topic Area 1: Feasibility *Concept Studies*

\$40,875,131 total selected Maximum award of \$3,000,000 per project 14 awards 10 states Up to 24 months to complete Topic Area 2: Design *FEED Studies*

\$58,658,012 total selected
Maximum award of
\$12,500,000 per project
5 awards
5 states
Up to 24 months to complete

Topic Area 3: Build *Full Hub Design, Construction, and Operation*

Up to \$1.2B 2 states Up to 10 years to complete

- Meets industry at diversity of technology readiness levels → avoids tech lock in for early movers
- Supports a diversity of technologies and business models
- Launches community benefits conversations before detailed design
- Shows opportunity for DAC across geographies

Topic Area – 3, Regional DAC Hub Project Selections

Regional DAC Hub Projects are led by the Office of Clean Energy Demonstrations (OCED) Two projects selected for negotiations

- Project: South Texas DAC Hub
- Location: Kleberg County, TX
- DAC Hub Owner: 1PointFive
- Technology Provider: Carbon Engineering Ltd.
- CO₂ Removal: Designed to capture up to 1 million metric tons of CO₂ annually
- **CO₂ Storage:** Saline geologic CO₂ storage site
- CBP Highlights: Creation of ~2,500 jobs in construction, operations, and maintenance with existing agreements for local hiring—including a target quota for local construction and operations; creation of a Citizen Advisory Board to ensure meaningful community engagement



- Project: Project Cypress
- Location: Calcasieu Parish, LA
- DAC Hub Owner: Battelle
- Technology Providers: Climeworks, Heirloom Carbon Technologies
- CO₂ Removal: Aims to capture more than 1 million metric tons of CO₂ annually
- **CO**₂ **Storage:** Deep saline aquifer, through an offtake agreement with Gulf Coast Sequestration
- **CBP Highlights:** Creation of ~2300 jobs, with a goal to hire workers formerly employed by the fossil fuel industry for 10% of the overall workforce; robust two-way community engagement towards developing a Community Benefits Plan



Topic Area – 3, Proposed Project Locations





Direct Air Capture Map TA 1 + 2 Selections





Community Benefits are Key to Project Sucess

DAC Hubs are a covered program under the Justice40 Initiative (J40). J40 directs 40% of the overall benefits of certain Federal investments to flow to disadvantaged communities.



DOE Justice40 Priority Benefits for Disadvantaged Communities:

- 1. Decrease energy costs and burdens.
- 2. Decrease environmental exposure and burdens.
- 3. Increase parity in clean energy technology.
- 4. Increase access to low-cost capital in DACs.
- 5. Increase clean energy enterprise creation and contracting.
- 6. Increase clean energy jobs, job pipeline and job training.
- 7. Increase energy resiliency.
- 8. Increase energy democracy, including community ownership.

TA-1 Selections:

 Community Benefits Plans not required as just assessing project feasibility; provides basis for detailed community engagement in future.

TA-2 Selections:

 Community Benefits Plans indicates intent to engage with community and labor stakeholders. Plans will be updated post award

TA- 3 Selections:

 Community engaged process beginning during negotiation and post award to refine and implement measurable Community Benefits.



Carbon Negative Shot Notice of Intent (DE-FOA-0003081)

Commercial DAC Prize (Bipartisan Infrastructure Law funded)

Track 1: *Direct Air Capture (DAC) Pilot Prize*

Supports next generation of transformational DAC technology at approximately 1-5ktCO2/year scale \$60M

Provides proof point to scale into DAC Hubs in the future

Track 2: CDR Purchase Pilot

World's first direct government CDR purchasing effort with \$35M distributed over several prize phases.

CDR suppliers representing a suite of technologies consistent with the Carbon Negative Shot will compete for purchase agreements with DOE. Small CDR Pilots and MRV funding (Base appropriations funded)

CDR pilots – shows DOE's commitment to full suite of CDR approaches. Includes:

- Biomass carbon removal with storage
- Enhanced mineralization
- Multi-pathway CDR testbeds
- Marine CDR (both biotic and abiotic)

Additional MRV funding to support robust carbon crediting.

2023 CARBON MANAGEMENT RESEARCH PROJECT REVIEW MEETING | netl.doe.gov



Responsible Carbon Management Initiative

- Notice of Intent and Request for Information
 - Seeking input on draft Responsible Carbon Management principles and initiative structure
 - Opportunity for all projects, not just DOE funded projects, to demonstrate robust community benefits
 - DOE intends to finalize principles once feedback is received
- Phase 1:
 - Project developers pledge to abide by principles
 - Indicate intention and foster transparency
- Phase 2 (as funds available): Evaluate efforts and elevate leaders

Planning for Societal Considerations & Impacts in FECM Projects | Department of Energy



Ocean CDR and DAC-to-products awards

Ocean CDR (AOI-2F: Carbon Dioxide Removal R&D: Field Validation of Abiotic Ocean-Based Carbon Removal

- 8 projects
- Total of \$1,388,547 or average award of \$198,568
- 5 states

DAC to Products (AOI-2G: Carbon Dioxide Removal R&D: Integrated Carbon-Neutral Methanol Synthesis from Direct Air Capture and Carbon-Free Hydrogen Production)

- 11 projects
- \$4,371,658 or average award of \$397,423
- 9 states

Link to 2614 press release: <u>Project Selections for FOA 2614: Carbon Management (Round</u> 2) | <u>Department of Energy</u>



Carbon Negative Shot coordinates innovation grand challenge across DOE





All-of-Government Support for Carbon Removal





Fossil Energy and Carbon Management









fecm.energy.gov

TA-1 & 2 Anticipated DAC Hub Location



TA-1, 2 & 3 Anticipated DAC Hub Location RMI Pacific Northwest (non-specific) University of North Dakota EERC -ND Carbon Capture, Inc. WY University of Illinois Northwestern University Illinois Basin University of California, Berkeley Midwest Region (non-specific) **Fervo Energy Company** San Joaquin Valley, CA University of Illinois Southwest. UT University of Kentucky Pueblo, CO **Research Foundation** Eastern Kentucky (non-specific) Siemens Energy, Inc. Aera Federal LLC AZ Board of Regents; Midwest (non-specific) Kern County, CA Arizona State University Electric Power Research Institute, Inc. CA Chevron Kern County and adjacent **General Electric University of Illinois** counties, CA TA-1 Houston (area), FL TA-2 ΤX TA-3 **ASRC Energy Services, LLC** Multiple Potential Locations, AK Pre-FEED Studies Louisiana State University FEED Studies LA Sedimentary Basins

Battelle

Calcasieu Parish, LA

SSEB

Mobile County, AL

U.S. DEPARTMENT OF ENERGY Fossil Energy and Carbon Management

ent

Kleberg County, TX

1PointFive