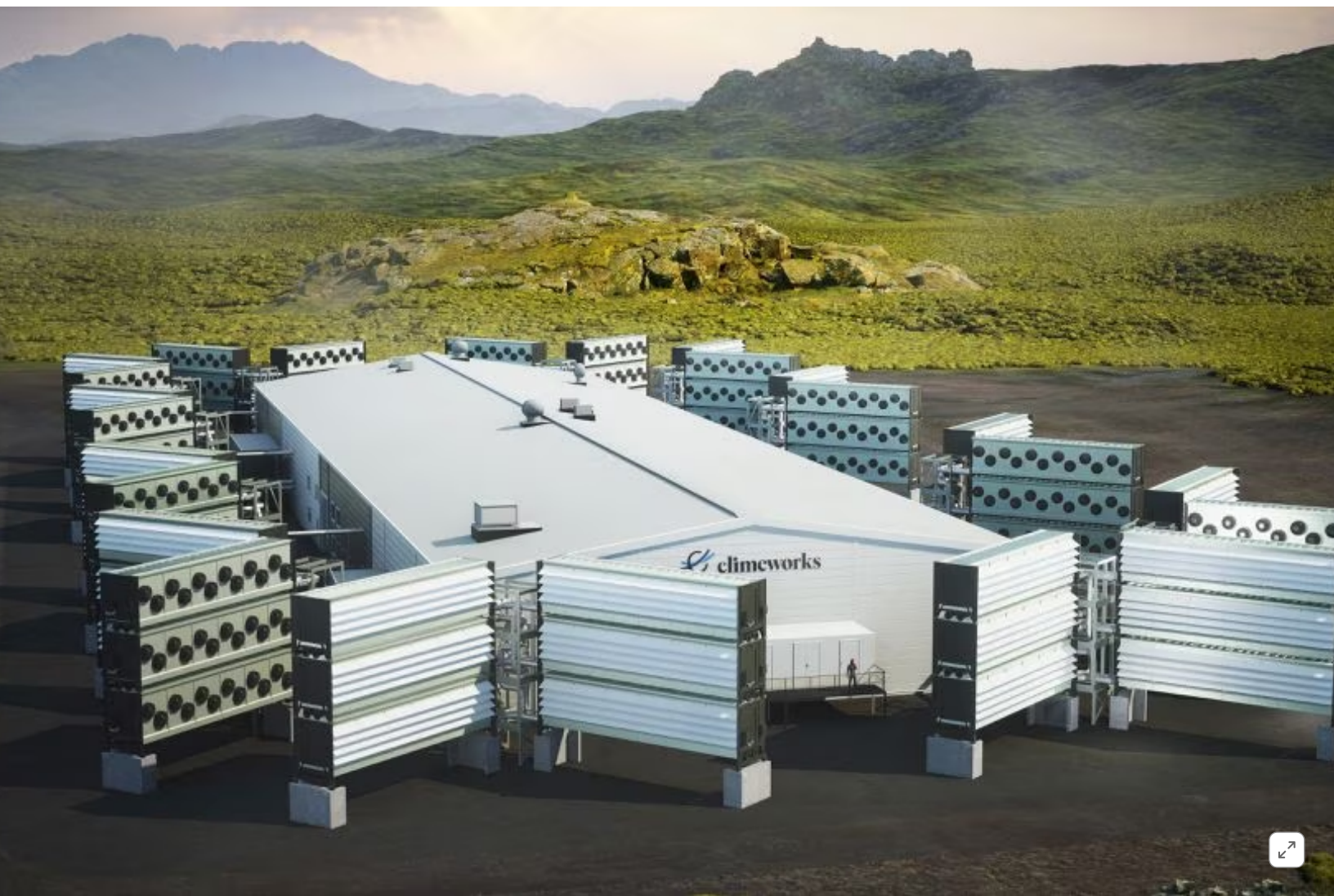


United States

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# Facing brutal climate math, US bets billions on direct air capture

By Susanna Twidale, Valerie Volcovici, Simon Jessop and Peter Henderson



[1/4] A view of a computer-rendered image of Climeworks' Mammoth direct air capture plant is seen in this undated handout picture obtained by Reuters, June 28, 2022. Climeworks/Handout via REUTERS

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[Summary](#) [Companies](#)

- Nine or more applications seen; goal in a few years is four hubs
- All bidding for slice of \$3.5 bln in govt grants
- Climeworks bids for three sites; plans 100 hires by 2025
- Unproven tech, talent shortage, costs — all challenges



April 18 (Reuters) - The world is failing to cut carbon emissions fast enough to avoid disastrous climate change, a dawning truth that is giving life to a technology that for years has been marginal – pulling carbon dioxide from the air.

Leading the charge, the U.S. government has offered \$3.5 billion in grants to build the factories that will capture and permanently store the gas - the largest such effort globally to help halt climate change through Direct Air Capture (DAC) and expanded a tax credit to \$180/tonne to bolster the burgeoning technology.



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The sums involved dwarf funding available in other regions, such as Britain which has pledged up to 100 million pounds (\$124 million) for DAC research and development. That compares with \$12 billion in federal spending to drive demand for personal and commercial electric vehicles, Boston Consulting Group estimated.

While bids for the U.S. DAC hub funding were due on March 13, the government and some companies have yet to fully disclose details about the applications, many of which Reuters is reporting for the first time. The Energy Department expects to announce winning bids this summer.

Worsening climate change and inadequate efforts to cut emissions have thrust the issue known as carbon removal to the top of the agenda, and U.N. scientists now estimate billions of tonnes of carbon will need to be sucked out of the atmosphere annually to reach a goal of capping global warming at 1.5 degrees Celsius.

While much of that will come from natural solutions such as planting more trees or increasing the ability of soil to sequester carbon, permanent carbon removal like DAC will also be needed.

Yet the list of hurdles is long.

The **biggest plant to-date** is capturing only 4,000 tonnes a year and costs are high, the talent pool is fledgling and corporate buyers for the credits largely remain on the sidelines. The role of oil companies in the space has also raised eyebrows and developers must muster support for hubs from communities that have often been damaged by big energy projects.

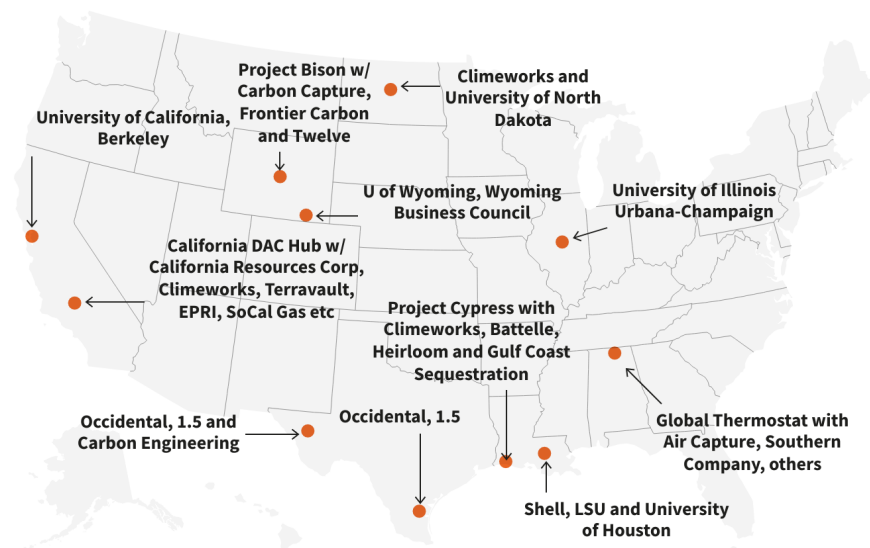
Plus, the CO2 must be stored permanently.

The U.S. government has said it wants to back four hubs, and interviews with more than 20 state, federal, company and investor sources show at least **nine applications** have been filed in a first round, with two major Occidental Petroleum (**OXY.N**) projects also seen as strong contenders.

It is offering three levels of funding, ranging from \$3 million for early stage feasibility studies to \$12.5 million for engineering design studies to up to \$500 million for projects ready to complete the procurement, construction and operation phases.

## Proposed Regional Direct Air Capture Hubs

Major DAC projects and applicants seeking part of an available \$3.5 billion from the Department of Energy to build regional hubs



Source: Interviews, public information

Reuters Graphics

Among the most active firms so far has been **Swiss start-up Climeworks**, which has raised more than \$800 million to date and is backed by Singaporean sovereign investor GIC.

In his first major interview since taking part in applications for three hubs - in Louisiana, California and North Dakota - Chief Executive Christoph Gebald said all had the potential to be scaled to the U.S. government's target of a million tonnes, known as a megatonne, a year.

The company planned to boost headcount from the low double-digits to more than 100 over the next 18 months, and by 2030, the three hubs could create 3,500 direct jobs and tens of thousands of indirect jobs, if given the green light, he said.

The real challenge, though, was access to talent, Gebald said. "Where are you getting those people in the next 30 years?... there's no university programme on DAC."

Gebald said it would cost "easily in the billions" of dollars to create a megatonne facility and the firm could look to raise funds depending on the success of its three bids, although it would likely wait until 2024 to return to the market.

"The lion's share of the capital is for assets, so it really depends on the build out programme."

Another bidding for funding is start-up CarbonCapture Inc., in partnership with Frontier Carbon Solutions and a new company called Twelve, which will use captured carbon to make sustainable aviation fuel in Wyoming, Jonas Lee, chief commercial officer for CarbonCapture, told Reuters.

"This industry is fragile right now, but all the arrows are lined up in the right direction. Now, we have to do our job which is to put iron in the ground and start taking out meaningful amounts of CO<sub>2</sub> from the atmosphere," Lee said.

"Hopefully that will help in a virtuous cycle that galvanizes even more support from corporations buying carbon credits, and maybe from state and local governments."

## OIL INVOLVEMENT

The sites being bid for stretch across the breadth of the country, yet all have several things in common: they are near cheap, renewable energy and plenty of space to store the gas.

Unsurprisingly, perhaps, that has drawn the attention of some of the large, incumbent energy giants keen to position themselves for what could be a multi-trillion-dollar industry as demand for fossil fuels subsides.

Occidental Petroleum has said it is well positioned for federal grants for what could be the biggest Direct Air Capture plants in the world. It declined to say whether it had applied for support for two DAC projects it is developing in Texas.

Oil companies are also far ahead in getting permitted, sequestration wells, guaranteed to keep the CO<sub>2</sub> in the ground.

"We have the pore space to begin with, from the reservoirs that are depleted or depleting, that we've operated that now can be repurposed into sequestration by the engineers who know how that reservoir reacts," said Chris Gould, chief sustainability officer, at California Resources Corp ([CRC.N](#)), an oil company that aims for net zero emissions and is working with Climeworks on a California project.

But the oil companies are still looked at with scepticism by some in the carbon removal community.

"It's really essential for the success of direct air capture that this be about removing legacy emissions and not be about continued fossil fuel use," said Erin Burns, executive director of Carbon 180, a DAC consultancy. "We're hoping to see hubs that don't have ties to fossil fuel production."

COSTS

Most DAC processes use a liquid or solid that is engineered to naturally soak up carbon dioxide, then heated or treated to extract the carbon to be put underground.

But the energy to run the process, the factories, pipelines and storage is expensive. The jury is still out on whether it can be deployed at a scale big enough to affect the climate, at a cost the world can bear.

Across a range of technical processes, it can cost more than \$1,000 to capture and lock away a ton of planet-warming carbon dioxide, yet the U.S. government has targeted a \$100 a ton price tag.

Heirloom Carbon, a California company which with Climeworks is part of an [application for a Louisiana hub](#), sees that as a realistic goal, while CarbonCapture told Reuters it expects to hit \$250 a ton by 2030 and \$150 a ton within a decade.

To get to a cost and scale that can affect the planet will mean designing an easily duplicated plant that does the same thing over and over again, like a franchised fast-food restaurant, said Dan Friedmann, chief executive of DAC firm Carbon Engineering, which is supplying technology to Occidental.

"It's a McDonald's kind of thing," he said.

(\$1 = 0.8056 pounds)

Reporting by Susanna Twidale and Simon Jessop in London, Valerie Volcovici in Washington and Peter Henderson in San Francisco Additional reporting by Sabrina Valle in Houston; Editing by Lisa Shumaker



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Valerie Volcovici covers U.S. environment and energy policy from Washington, DC. She is focused on climate and environmental regulations at federal agencies and in Congress. She also covers the impact of these regulatory changes across the United States. Other areas of coverage include plastic pollution and international climate negotiations.



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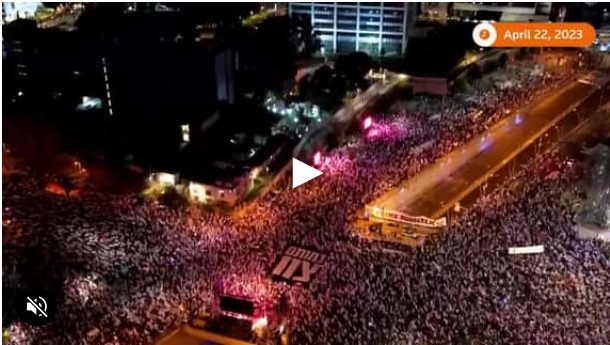
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