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# **DIRECT AIR CAPTURE OPPORTUNITIES IN WYOMING**

# WYOMING DIRECT AIR CAPTURE HUB



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## WHAT IS THE DEPARTMENT OF ENERGY'S DAC HUB PROGRAM?

The U.S. Department of Energy's [Four Regional Clean Direct Air Capture Hubs program](#), made possible by the Investment in Infrastructure and Jobs Act, has allocated \$3.5 billion over the next five years to establish four regional direct air capture (DAC) hubs. The University of Wyoming School of Energy Resources (SER), together with the Wyoming Business Council (WBC) and Wyoming Energy Authority (WEA), is considering applying for funding through this program to encourage industrial growth in the state.

Each hub must have the capacity to capture at least 1 million metric tons of carbon dioxide (CO<sub>2</sub>) each year and the necessary infrastructure to transport and either sequester or utilize the captured CO<sub>2</sub>. Activities will be designed to meet the needs of stakeholders and may include a DAC test center, commercial components, shared infrastructure, and/or market considerations.

## WHAT IS DIRECT AIR CAPTURE (DAC) TECHNOLOGY?

- DAC is a form of Carbon Capture, Utilization and Sequestration (CCUS) in which ambient air is directly captured from the atmosphere and goes through a series of filters or chemical reactions where carbon dioxide (CO<sub>2</sub>) is extracted and permanently stored underground.
- DAC is similar to what plants and trees do every day, but it does it faster and on a larger scale with a smaller footprint.
- DAC offers solutions for "balancing carbon emissions from difficult to avoid, including long-distance transport and heavy industry," according to the International Energy Agency.
- DAC also offers CO<sub>2</sub> as a byproduct which can be used as a feedstock for a range of products that rely on carbon, including enhanced oil recovery, synthetic aviation fuels and cement.

## WHAT DOES A DAC FACILITY PRODUCE?

- CO<sub>2</sub> for permanent storage underground.
- CO<sub>2</sub> to be used in food processing, enhanced oil recovery, synthetic aviation fuels or cement.
- Carbon Removal Credits: Typically purchased by organizations seeking to offset their residual emissions, a carbon removal credit is a financial unit representing the removal of one metric ton of CO<sub>2</sub> from the atmosphere.

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## WHAT KIND OF EXISTING DAC FACILITIES ARE THERE?

There are currently 19 DAC plants operating worldwide, capturing more than 0.01 Mt CO<sub>2</sub>/year. The latest plant to come online (Sept. 2021) is capturing 4 kt CO<sub>2</sub>/year for storage in basalt formations in Iceland. In the [Net Zero Emissions by 2050 Scenario](#), DAC is scaled up to capture more than 85 Mt CO<sub>2</sub>/year by 2030 and ~980 Mt CO<sub>2</sub>/year by 2050. This level of deployment will require several more large-scale demonstrations to refine the technology and reduce capture costs.

[Project Bison](#) announced its plans to build a five-megaton DAC facility using CO<sub>2</sub> storage in southwest Wyoming starting in 2023.

## WHAT IS A DAC HUB?

- Facilitates the deployment of direct air capture projects.
- Has the capacity to capture and sequester, utilize, or sequester and utilize at least 1 million metric tons of carbon dioxide from the atmosphere annually from a single unit or multiple interconnected units.
- Demonstrates the capture, processing, delivery, and sequestration or end-use of captured carbon.
- Could be developed into a regional or interregional carbon network to facilitate sequestration or carbon utilization.

## WHY WYOMING?

Wyoming has been a proactive leader in carbon management for decades and is only one of two states with Class VI Well primacy. The state has substantial CO<sub>2</sub> storage and transportation infrastructure, favorable policy and leadership, and an energy-friendly workforce, making it a strong candidate for DAC technology.

- Capacity for more than 40 billion tons of permanent geologic CO<sub>2</sub> storage.
  - State-owned Class VI wells available for DAC storage testing and experimentation.
  - Privately operated Class VI wells that are close to being permitted.
- World-class research and development expertise in carbon management.
- Singularly advantageous regulatory and policy environment for carbon management.
- Uniquely suited workforce and education programs for DAC jobs.
- DAC projects planned for Wyoming (Project Bison).
- Shovel-ready surface locations for test and permanent DAC units.
- Pipelines and infrastructure connecting collection sites, storage sites, and CO<sub>2</sub> products incubation.

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## HOW MANY JOBS WOULD A DAC HUB REQUIRE?

According to the [Rhodium Group](https://rhg.com/research/capturing-new-jobs-and-new-business/)<sup>†</sup>, a typical 1-megaton capacity DAC plant can generate roughly 3,500 jobs across the sectors in the DAC supply chain, including up to 300 permanent operations and maintenance jobs. Wyoming's workers have the skills needed to perform these jobs.

<sup>†</sup><https://rhg.com/research/capturing-new-jobs-and-new-business/>

## WHAT KIND OF LAND AND RESOURCES FOOTPRINT DOES DAC REQUIRE?

DAC company inputs include land and a variety of power sources. Also important to site selection are sequestration wells and the availability of DAC-specific manufacturing.

- Energy: A variety of energy sources can be used to power a DAC facility. Scaling up today's DAC systems would use non-trivial amounts of energy.<sup>†</sup>
  - Many DAC companies are interested in renewable energy sources in order to keep facility emissions overall net negative based on their values.
- Land: Because of a limited footprint, there is flexibility when it comes to siting DAC facilities<sup>†</sup>
  - Many companies are looking to locate close to suitable storage, eliminating the need for long-distance CO<sub>2</sub> transport.\*
  - DAC facilities also require permanent storage. Wyoming has more than 40 billion tons of CO<sub>2</sub> storage.
- Water: Water usage will vary depending on the DAC system, local temperature and humidity.

<sup>†</sup><https://www.wri.org/insights/direct-air-capture-resource-considerations-and-costs-carbon-removal>

\*<https://www.iea.org/reports/direct-air-capture>

## WHAT IS THE ENVIRONMENTAL IMPACT ASSOCIATED WITH DAC?

- Class VI well safety:
  - Deep below water and oil and gas reservoirs.
  - 400-page applications.
  - CO<sub>2</sub> already in these reservoirs.
- Working closely with environmental NGOs to ensure wildlife, landscape and other siting considerations are looked at closely. This is also a priority for companies' customers, so it is something that is built into the business.

## HOW WILL THIS CREATE REVENUE FOR THE STATE OF WYOMING?

DAC projects will be subject to state and local property, sales, and other taxes, similar to other projects in the state. We will be working to quantify the scale of revenue and other economic benefits as part of the analysis of a DAC hub. Royalties and injection fees are being considered for Class VI wells on state lands. Other direct CCUS-specific state revenue policies are not currently in place. DAC is anticipated to contribute a significant number of high-paying primary jobs that match the skills of the current Wyoming workforce.



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**For more information:**

<https://www.iea.org/reports/direct-air-capture>

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