

Direct Air Capture

RESEARCH AND DEVELOPMENT OF DAC



A NEW FRONTIER FOR NORTH DAKOTA ENERGY

Direct air capture (DAC) is a carbon capture technology that utilizes air-contacting modules to remove carbon dioxide (CO_2) from the atmosphere with chemical or physical reactions that trap CO_2 . DAC involves two main steps. First, CO_2 is captured and separated from ambient air via DAC technology. Second, the captured CO_2 is then permanently stored underground using geologic sequestration. DAC modules use fans to draw high volumes of air into the system, then filters capture some of the CO_2 in the air moving across them. Over time, this process results in a significant volume of CO_2 being removed from the atmosphere and permanently stored.



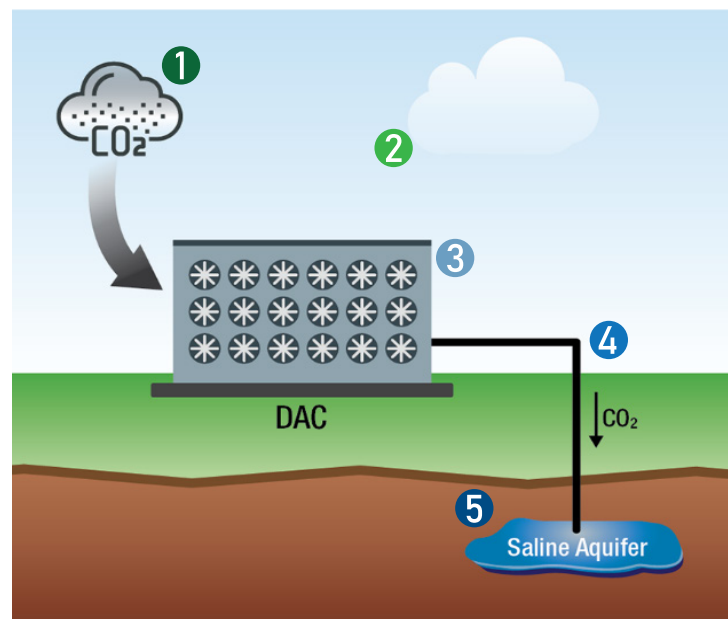
Image Courtesy of the Department of Energy

HOW DOES IT WORK?

In one method of DAC, modules capture atmospheric CO_2 by adsorption on a solid sorbent and apply a temperature/vacuum swing process to desorb concentrated CO_2 :

- 1** Air is drawn into the module using fans, and the CO_2 within the air is chemically bound to the sorbent material, henceforth referred to as the filter.
- 2** Air with reduced CO_2 concentration is released back into the atmosphere.
- 3** Once the filter is saturated with CO_2 , it is heated using low-grade heat for regeneration.
- 4** The heated CO_2 is then released from the filter and collected as concentrated CO_2 , and the cycle is ready to begin again.
- 5** The captured CO_2 is then compressed and permanently and safely stored in the subsurface in deep geologic formations.

Typical filter material lasts for several thousand cycles. It is arranged in a structure optimized for low-pressure drop, and that allows a variety of filter materials to be used as technology improvements are made.



The DAC process allows a means of reducing the carbon intensity of distributed or otherwise hard-to-abate emission sources and CO_2 that has already been emitted to the atmosphere.

WHY NORTH DAKOTA

North Dakota has long-standing experience with safely leveraging the phenomenal subsurface resources in the state along with established and experienced service industries with the trained workforce necessary to support DAC projects.

- North Dakota has massive geologic storage resources capable of supporting carbon capture and storage from DAC in addition to in-state industries.
- North Dakota leads the nation with the regulatory framework needed to support CO₂ storage.
- DAC is one part of an all-of-the-above approach to a safe, resilient, reliable, economic, environmentally sustainable, and diversified energy industry.
- DAC will help meet Governor Burgum's goal of carbon neutrality through innovation by 2030.

BENEFITS FROM OUR OWN BACKYARD

DAC projects can generate billions of dollars of investment, generating new revenue in the state.

- DAC can foster multiple cobenefits locally by fueling new permanent jobs, engaging a highly skilled workforce, and creating a supply chain for deployment of future projects.
- DAC will provide economic benefits, including customers for utilities, revenue for landowners and storage site developers, and additional tax revenue.
- Business case is supported by emerging commercial markets for carbon credits for companies seeking to reduce or offset the carbon intensity of their businesses.
- DAC can provide industry with local ties, greater resilience to potential future carbon regulations, and advantages for competing in a global economy.



***DAC will provide an opportunity
for North Dakota to lead in
carbon-negative efforts.***

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