



# Direct Air Capture: Investment Snapshot

For many private companies, particularly those involved in fossil fuels or difficult to decarbonize sectors, direct air capture and other carbon capture, use, and storage technologies are increasingly important options to mitigate emissions. Comprehensive long-term policy frameworks that provide investors with greater certainty are crucial to incentivize innovative direct air capture projects and increase build out and adoption of carbon capture, use, and storage technologies.

## Direct Air Capture Companies and Their Investors



### Global Thermostat – United States

New York-based Global Thermostat has pilot plants in California and Alabama and plans to build a demonstration plant in Oklahoma and a technology center in Colorado. The company has recently signed a Joint Development Agreement with Exxon to help scale-up their direct air capture and point source capture units. It has also partnered with other leading companies, such as Corning, Linde, NRG, and BASF. Global Thermostat has attracted investment from public and private entities, including:

- Private Companies: Goldman Sachs; NRG Energy
- Public Investment: U.S. Department of Energy (DOE); New York State Energy Research & Development Agency
- Personal Investments: Edgar Bronfman, Jr., American venture capitalist
- Venture Capital/Private Equity: Zero Carbon Partners (David Elenowitz, also a Senior Advisor to the Company)



### Carbon Engineering – Canada

Vancouver-based Carbon Engineering Ltd. has a direct air capture plant in British Columbia and is partnering with Occidental Petroleum to build the world's largest direct air capture and sequestration facility in the Permian Basin. As of June 2019, Carbon Engineering has attracted investment from leading companies and investors, including:

- Private Companies: Chevron; Occidental Petroleum; BHP, an Australian mining company
- Public Investment: DOE; Natural Resources Canada; Sustainable Development Technologies Canada; British Columbia Innovative Clean Energy Fund
- Private Equity Funds: Rusheen Capital Management LLC
- Personal Investments: Bill Gates; Murray Edwards, head of Canadian Natural Resources Ltd; The Benjamin Family; the Hodgkinson Family; and the Hutchinson Family
- Venture Capital: First Round Capital; Lowercase Capital; Starlight Ventures; Thomvest Asset Management



### Climeworks – Europe

Zurich-based Climeworks has built direct air capture pilot plants in Iceland, Switzerland, and Italy. It has received a mix of funding from public entities and private investors, including:

- Private Investment: Zurich Cantonal Bank
- Public Investment: EU Horizon 2020
- Incubators: EIT Climate-KIC, Venture Kick
- Personal Investments: Several leading Swiss individual investors

## Select Examples of U.S. Direct Air Capture Research Teams and Their Investors



### Arizona State University's Center for Negative Emissions – Arizona

Researchers are developing a direct air capture technology based on [ion exchange resin](#). ASU has a three-year research [agreement](#) with Shell and in early 2019 received a \$4.7 million [grant](#) from DOE's Advanced Research Projects Agency-Energy (ARPA-E) program.



### Worcester Polytechnic Institute (WPI) – Massachusetts

James H. Manning Chair Professor Jennifer Wilcox literally wrote the [book](#) on carbon capture. Her extensive research, on topics including direct air capture and industrial carbon capture, is funded by the National Science Foundation (NSF), DOE, and private sector. WPI's [Clean Energy Conversions Laboratory](#), which Professor Wilcox is part of, receives support from the NSF, U.S. Air Force, U.S. Army Research Laboratory, Stanford University's Global Climate & Energy Project, and Chevron.



### Oak Ridge National Lab – Tennessee

Supported by the DOE Office of Science, researchers have developed a [new approach](#) that improves the energy efficiency of direct air capture technology. With the success of this new technique, the researchers' next objective is to partner with industry to scale up the process and develop a pilot plant.

## Domestic and International Public Sector Investment in Direct Air Capture



### United States

The past decade of federal research funding for direct air capture is **less than 1 percent** of the National Academies' recommended cumulative level of \$1.8-2.4 billion over the next one to two decades. For reference, since 2009, cumulative federal research funding for direct air capture totals less than **\$11 million** – about 4.6 percent of the average *yearly* appropriated research budget for solar energy technologies.<sup>1</sup>

Ways to advance direct air capture: Implementation and potential expansion of 45Q tax credits for carbon capture; Greater federal research and development (via DOE, Department of Defense, NASA, NSF, and others).



### Canada

While the total amount of funding the Canadian government has invested in direct air capture technology is not readily available, the government boasts numerous funding mechanisms (such as those supporting Carbon Engineering) that have been or can be leveraged for direct air capture projects, including:

- Business Development Bank of Canada's [Industrial, Clean and Energy Technology Venture Fund](#)
- Pan-Canadian Framework on Clean Growth and Climate Change – [Low Carbon Economy Fund](#)



### European Union

The European Union has clear policy frameworks, such as the Emissions Trading System, and multiple complementary funding opportunities that can support direct air capture projects. Long-term collective policymaking efforts continue to provide greater structure and certainty to carbon capture endeavors.

- [Horizon 2020](#): EU Research and Innovation Program with nearly 80 billion euros in funding available over seven years (2014-2020)
- [Innovation Fund](#): Focused on innovative, low-carbon tech in energy-intensive industries; carbon capture, use, and storage; renewable energy generation; energy storage

<sup>1</sup> Based on the average annual funding (FY2009 to FY2018) appropriated for solar energy technologies under the management of the DOE Office of Energy Efficiency and Renewable Energy.

## BOTTOM LINE:

Long-term policy frameworks and strong and consistent government funding can inspire greater certainty in investors and lead to increased investment in innovative direct air capture projects.

