



Bipartisan Policy Center

Navigating the Stages of Commercialization to Deploy Direct Air Capture at Scale

A REPORT BY BPC'S DIRECT AIR
CAPTURE ADVISORY COUNCIL

Reaching economy-wide net-zero greenhouse gas emissions will require significant scale-up of technologies for removing carbon dioxide (CO₂) from the atmosphere¹, including direct air capture (DAC) at the scale of billions of tons of CO₂ per year. Fortunately, the number of companies pursuing DAC commercialization is growing rapidly as policymakers, investors, and entrepreneurs increasingly recognize the environmental and business opportunities that DAC presents. More than 20 DAC startups, many of them founded within the last five years, have each managed to raise at least \$1 million in private capital.

To effectively support these companies and accelerate DAC commercialization, it is important to understand where the industry stands today and the risks it faces. This latest report from the Bipartisan Policy Center's DAC Advisory Council provides a status update on the commercial landscape for DAC startups and identifies the key types of risk these startups must navigate on the path to full scale-up and commercial viability.

- **Science risk:** the risk that a process proves to be scientifically or physically infeasible.
- **Engineering risk:** the risk that a process cannot be reproduced cost-effectively at scale and under real-world conditions.

- **Commercial risk:** the risk that there is insufficient demand for the product being offered, or that the product being offered is not competitive in the marketplace, or that a company is not likely to be profitable.
- **Financing risk:** the risk that a company cannot access capital or manage its debt.

Bringing a new technology like DAC from idea to bankability on an industrial scale can take a decade or more of development time and millions of dollars of investment. While each DAC company is unique, each will confront similar types of risks, and all will have to consider what forms of private and public capital are best suited to support their next phase of development.

What stage of technology maturity are DAC companies in today?



Most DAC companies today have reached technology readiness levels (TRL)² between 4 and 6 – meaning that their CO₂ capture process works in the lab, but now needs to be productized and deployed at pilot- and demonstration-scales in the field. The nascent DAC industry is at a critical inflection point. To reach economy-wide net zero emissions, additional federal funding to support DAC pilot projects is needed soon. Leveraged effectively, such support, coupled with implementation of the Department of Energy’s DAC Hubs program, can help catalyze the deployment of a broad range of DAC technologies in the coming years. The sooner these activities begin, the faster the DAC costs will come down the learning curve.

¹ [Summary for Policymakers](#). Intergovernmental Panel on Climate Change, 2022.

² The U.S. government developed the TRL scale to assess technology maturity and it is now widely used by industry.

