Sustainability
in Depth
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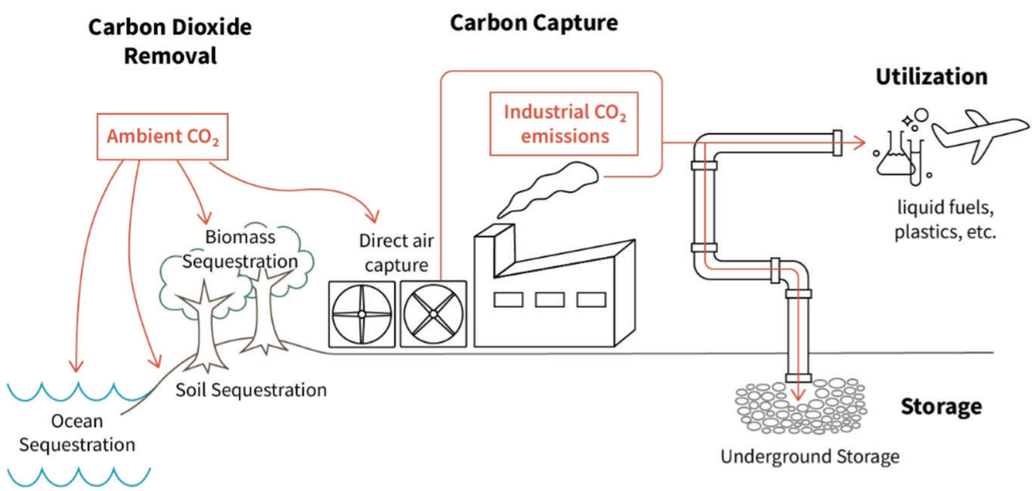
Turning Emissions Into Assets: A Guide to Carbon Capture, Utilization and Storage

It is increasingly clear that carbon emissions management will have a role to play in helping hard-to-abate sectors reach their medium and long-term decarbonization goals. As such, investors need to understand the emergent technologies shaping this market and the role that demand for carbon management will play in driving future sector-level dynamics. Here, we attempt to demystify carbon capture, utilization and storage (CCUS), using insights gleaned from our thematic research on the topic.

CCUS refers to the deployment of technologies dedicated to the prevention from entering or removal of CO2 emissions in the atmosphere, and ultimately storing compressed CO2 deep underground.

Broadly, CCUS includes two approaches to removing and sequestering CO2 emissions:

- Point source Carbon Capture and Storage: removal of "new" emissions directly produced by industrial operations.
- Carbon Dioxide Removal: atmospheric carbon capture and removal of "existing" emissions.



Source: Stanford Energy Carbon Management as of October 2023.

Although CCUS projects currently reduce only a small percentage of emissions worldwide, they have the potential to play a crucial role in helping the energy and capital goods sectors significantly lower their emissions in the future. In fact, some sectors have few alternative solutions for achieving net zero. Recent campaigns like "Gigatonne by 2030" — referring to a target capturing one gigatonne (one billion metric tonnes) of CO2 emissions annually by the year 2030 — in part reflects an appetite in the energy sector for large-scale carbon management solutions.

Cross-sectoral research reveals potential in CCUS

In service of understanding sector trends, related alpha opportunities and downside risks, we aimed to:

1. Understand the recent spike in CCUS project announcements, and whether it is realistic and sustainable
2. Inform our view on the long-term outlook of gas (and coal) in energy and industrial processes
3. Identify areas of risk for stranded assets, wasted capex or substantial cost-overruns
4. Understand credibility of transition plans for energy and industrials companies
5. Identify who is doing it effectively as well as solutions providers with substantial growth potential

In line with the above, members of our investment team conducted focused research, engaged with issuers and held internal discussions across relevant sector teams around the growing importance of carbon capture technology in the global push for decarbonization. The work sought to contribute to our investment process and relate conviction on names active in this emerging space.

Net zero targets and regulatory support are driving demand for CCUS innovation

Market trends, including policy incentives, technological advancements and corporate demand in high emitting sectors, are key drivers of increased market demand for CCUS technology and are helping to make this an economically viable option.

Country/ Region	Legislation	Date	Description
United States	Bipartisan Infrastructure Law (BIL)	2021	Provided funding to be invested in carbon management projects and infrastructure.
	Inflation Reduction Act (IRA)	2022	Provided enhanced tax credits (45Q) for carbon capture projects and deployment at scale.
European Union	EU Innovation Fund	2020	Funded large-scale CCUS and clean energy projects across EU member states.
	Fit for 55 Package	2021	Included carbon pricing and support mechanisms to incentivize CCUS adoption.
	Net Zero Industry Act	2024	Set annual union-level CO2 storage goals and aims to build up carbon storage market.
United Kingdom	North Sea Transition Deal	2021	Provided investment and regulatory backing for offshore carbon storage and hydrogen production.
Canada	CCUS Investment Tax Credit	2022	Offered tax incentives for deploying carbon capture technologies in industrial and energy sectors.
Norway	Longship Project	2020	A comprehensive government-supported CCUS initiative for industrial-scale deployment.
China	14th Five-Year Plan for CCUS Development	2021 – 2025	Set targets and provided funding for CCUS pilot and demonstration projects.

Above: A non-exhaustive list of global government action supporting CCUS implementation and scaling. Please note that this list reflects initiatives as of 1 March 2025.

This supportive policy environment encourages companies to adopt CCUS and also incentivizes investment in the development of more cost-efficient, scalable carbon capture technologies, further enabling the transition to a low-carbon economy. Financial incentives to produce or purchase lower emission products could also alter supply chains, shifting competitive advantages toward firms with lower emissions or countries with a higher concentration of firms with CCUS. As CCUS has become more mainstream, geographical formations allowing for underground carbon storage — depleted oil and gas wells, saline reservoirs, basalt formations and old coal seams — have offered a disproportionate "first mover" advantage to a handful of global regions. These regions include North American oil and gas regions, the European North Sea, Australia and Saudi Arabia.

CCUS in the energy sector

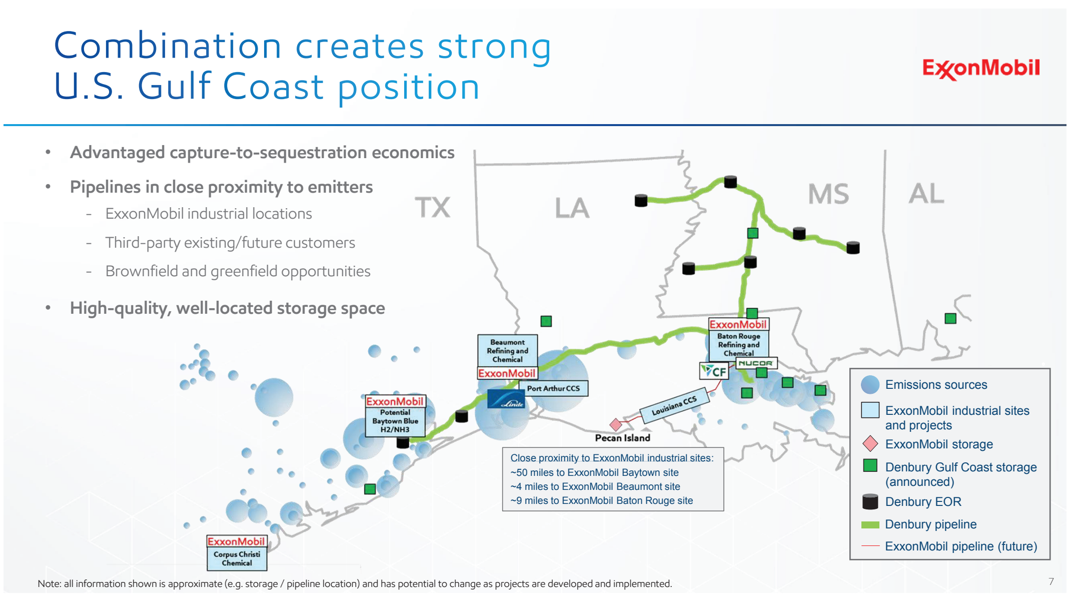
Upstream energy producers able to offer CCUS to customers can create new revenue streams. In power utilities, CCUS can enable power suppliers to meet rising demand for low carbon energy. However, implementing this technology also has the potential to increase production costs.

Case study: Exxon and Denbury

Major players in the energy sector are placing bets on the future profitability of CCUS, as evidenced by Exxon's $4.9 billion acquisition of American carbon capture and storage company Denbury Inc. in 2023. Touting the US' largest pipeline network across the southeastern Unites States, Denbury was one of the largest and most established players in the American CCUS space.

The case for the acquisition was enhanced by factors including:

1. States in the Southeast US — including Mississippi, Louisiana and Texas — are the dominant domestic producers of oil and natural gas, thus much infrastructure was already in place.
2. There is significant demand for CCUS from the substantial local industrial base, in addition to Exxon's own industrial sites.
3. Denbury's pipelines are positioned above deep earth geographic formations suited to long-term CO2 storage.
4. Denbury had already secured the necessary Class VI permits for carbon sequestration, which Exxon would be grandfathered into.



Source: ExxonMobil Announces Acquisition of Denbury Presentation as of July 13, 2023.

The Denbury deal was deemed a more cost-effective alternative to building out separate infrastructure and pipelines from scratch. Acquiring infrastructure that avoids permitting delays and allows for immediate large-scale point-source carbon capture and storage for industrial emissions gives Exxon a key "first mover" advantage in this market. Exxon is also positioning itself to offer a reliable, low-cost and end-to-end carbon capture and storage solution for clients, as well as enabling production of lower carbon commodities like blue hydrogen (hydrogen that utilizes carbon capture technology during production). Although this seems to be a "long game" investment for the company, it is indicative that the energy sector predicts future profitability and compelling growth in CCUS ventures.

Is CCUS here to stay?

While an extremely promising frontier in the transitioning economy, CCUS is still far from exhibiting widespread cost-effective adoption and may face strong headwinds in the coming years. Long-term factors, including competition from other clean technologies and carbon pricing volatility, could affect market demand for CCUS over time. Regulatory support for projects could also waver in line with shifting policy support and it is not yet clear if there is an economic case for the use of unsubsidized CCUS given the high cost of implementation.

Sometimes touted as a "silver bullet" to achieve net zero goals, investors and issuers will need to navigate conversations around CCUS technology while still prioritizing initiatives that will reduce operational emissions. Ultimately, we will need to ensure that CCUS is not being over-relied on and that related investments will generate appropriate and durable returns.

Despite the risks, its growth potential, applicability to some of our highest emitters, early uptake by key players and policy support makes CCUS a worthwhile exploration for issuers and investors.

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