
THE TRANSFORMATION OF THE ENERGY SECTOR

CARBON CAPTURE

3 CCS trends to watch

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The Great Plains Synfuel Plant has delivered around 38 million metric tons of carbon dioxide for enhanced oil recovery in the Weyburn and Midale fields in Canada since 2007, according to a new report. Emily Holden

The carbon capture industry witnessed several "firsts" in 2019, but there needs to be more projects in the pipeline to reduce greenhouse gas emissions enough to avoid catastrophic warming, according to a new industry report released this morning.

Among the milestones this year: Injection started at the world's largest dedicated CO₂ storage facility, the Gorgon natural gas processing facility off the Australia coast, and the Alberta Carbon Trunk Line, a CO₂ pipeline that will ferry captured gas from industrial operations to central Canada, is on track to come online in 2020, the Global CCS Institute said. The Boundary Dam project in Canada, the world's first demonstration of CCS on a coal plant, captured 3 million metric tons of carbon dioxide as of this year.

The institute, which advocates for the technology, also said that interest in hydrogen and carbon capture and storage (CCS) is at a level "not seen for several decades," as governments look for a way to decarbonize a production process that is currently driven almost entirely by fossil fuels.

Despite the advances, there needs to be more incentives to get the technology going, advocates say. Most planned projects remain in industrial sectors where high-concentration carbon dioxide is readily available for capture. In the electricity sector, the Petra Nova project in Texas and Boundary Dam plant remain the only operating power plants with CCS, and there are no additional projects under construction, although several are in the stages of "advanced development."

In the United States, guidelines to implement a federal tax credit for carbon storage also could be pushed to next year, after initially being expected by year's end.

Here are three CCS trends to watch as outlined in the [report](#):

1. 3,000% behind

The number of large-scale CCS facilities increased to 51 this year, although only 19 of those are currently operating. The rest are either under construction or in a developmental stage, according to the report.

While there are "roughly four times as many" large-scale facilities today under development compared with 2010, the uptick lags far behind where it should be to hit climate targets outlined in the Paris climate accord and other international studies, according to the report.

"If all facilities in the CCS pipeline now were operational in 2040 and no more entered the pipeline, CO2 capture capacity would still be approximately a factor of 20 below what is required," the report said, citing a greater need for government policies that would incentivize private-sector interest in the technology.

Roughly 2,000 large-scale facilities must be deployed by 2040, the report said, to meet climate change mitigation targets. That would be an increase of more than 3,820% from today.

Jan Mares, a senior adviser at Resources for the Future, said it will be "really difficult" to achieve the target of 2,000 large-scale facilities by 2040 due to a lack of financial incentive.

"Today, only a few countries provide economic incentives, and a few plants are being built, but it is not commercial, except sometimes with advanced oil recovery, to build large CCS facilities," Mares said. "There will have to be much more financial assistance in order for there to be widespread deployment."

The institute said facilities now in operation and under construction have the capacity to capture and permanently store an estimated 40 million tons of CO2 each year. That's expected to increase by roughly 1 million tons over the next 12 to 18 months, the report said. More than 25 million tons of CO2 from the industrial and power sectors was permanently stored using CCS last year, the report noted.

The Gorgon facility off of Western Australia is capable of storing up to 4 million tons per year, the report said. A gas processing plant in Wyoming has also cumulatively captured more than 100 million tons of CO2 from its natural gas processing operations, used in enhanced oil recovery, where the gas is deployed to recover hard-to-reach oil.

Rory Jacobson, a senior policy adviser at Carbon180, said that although the approximate quadrupling of large-scale CCS facilities since 2010 is encouraging, "the costs of deploying CCS technologies decrease with experience."

"Current policies will provide a proportionately stronger incentive for existing and new facilities considering the technology," said Jacobson, adding that if the world intends to scale up its CO2 capture to 1.5 billion tons per year by 2050, a "substantial increase" in global coordination and national deployment incentives is crucial.

2. A tax credit delay?

While policies such as tax credits under Section 45Q of the U.S. tax code have created an incentive for the storage of CO2, uncertainty about the release of long-awaited implementation guidance from the IRS is holding back projects, the report said.

The report called 45Q the "world's most progressive CCS-specific incentive" but noted that because it's yet to be formally implemented, ambiguity remains about which projects are actually eligible.

"The Internal Revenue Service, tasked with implementation, sought comments from stakeholders in mid-2019 and a draft guidance is expected by early 2020 at the latest," the report said.

Draft guidance had been expected by the end of this year, but neither the IRS nor the Department of the Treasury has released updates on the timeline.

Jeffrey Bobeck, the director of energy policy engagement at the Center for Climate and Energy Solutions, said his group is hoping to see the main 45Q rules published "close to the first of the year," although he said that may turn into an extra month or two.

Luke Bolar, managing director of external affairs at conservative clean energy group ClearPath, said the

organization is also hearing it could be 2020 before 45Q guidance comes out. Bolar said there are some efforts out there to extend the Jan. 1, 2024, deadline in which CCS projects currently must begin construction in order to take advantage of the current 45Q tax credit.

"Some recommendations are 2 year extensions but we think there may be others who will recommend even longer," Bolar said over email.

The report said the extra costs of capture and the absence of policies to justify investment are "primary barriers to large-scale deployment of CCS in power generation."

Yet it also pushed back on the idea that CCS is too expensive to pursue compared with other climate change mitigation technologies. Putting a "material value" on CO₂ is "the most obvious way" to create incentives for investors, the institute said.

3. Hydrogen and heavy emitters

To meet net-zero emissions by midcentury, CCS is "a key option" for deep decarbonization of cement, steel and iron production, the report said.

Power plants and heavy emitters, such as cement and steel, have been more difficult to equip with CCS technology than natural gas processing. The report said that the LEILAC project, or the European Union's Low Emissions Intensity Lime and Cement project, recently demonstrated that "direct separation" — or the act of removing CO₂ from limestone as it is heated — could capture more than 95% of CO₂ process emissions.

It also pointed to advancements in iron and steel production, where CCS is combined with new technology called the smelting reduction HIsarna process. It has the potential to capture 80% of CO₂ from steelmaking with CCS's assistance.

As for hydrogen, it is garnering interest in part because 98% of its production now is from fossil fuels and in opposition to national climate targets, according to the institute. "To meet climate targets, hydrogen must be produced via zero or very low emission pathways," it said.

Carbon capture, for instance, can be tied to coal gasification or the steam methane process to produce hydrogen. There are five hydrogen CCS facilities operating, including the Great Plains Synfuel Plant in North Dakota that produces hydrogen-rich syngas. Three additional global hydrogen CCS projects are under construction, including a pilot gasification plant that will ship hydrogen from Australia to Japan, the report said.

Yet CCS detractors say that money should be funneled to other low-carbon technologies that are not tied to fossil fuels.

Janet Redman, climate campaign director at Greenpeace, said that CCS is nothing more than a smoke screen to lock in investment for "climate-wrecking fossil fuel infrastructure."

"Instead of investing in false solutions to the climate crisis, we should be rapidly phasing out oil, gas, and coal and pursuing a just transition to clean, community-powered, renewable energy," Redman said.

Reporter Christa Marshall contributed.

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