



INTEGRATED CARBON CAPTURE & CONVERSION TECHNOLOGY

UNLOCKING FUNDAMENTAL DISCOVERIES AND TRANSFORMING THEM INTO TECHNOLOGICAL SOLUTIONS FOR CARBON CAPTURE

Current atmospheric concentrations of carbon dioxide (CO₂) have exceeded pre-industrial revolution levels by 47 percent. Technology that can reduce the amount of CO₂ entering the atmosphere will be key to tackling the climate crisis.

In the drive toward decarbonization, Pacific Northwest National Laboratory (PNNL) offers technology that can both capture and convert pre- and post-combustion carbon from industrial plants, turning it into alternative and usable products, such as methane or methanol, and even CO₂ negative building materials.

Our pre- and post-combustion solvents also offer opportunities to capture CO₂ from bioenergy facilities,

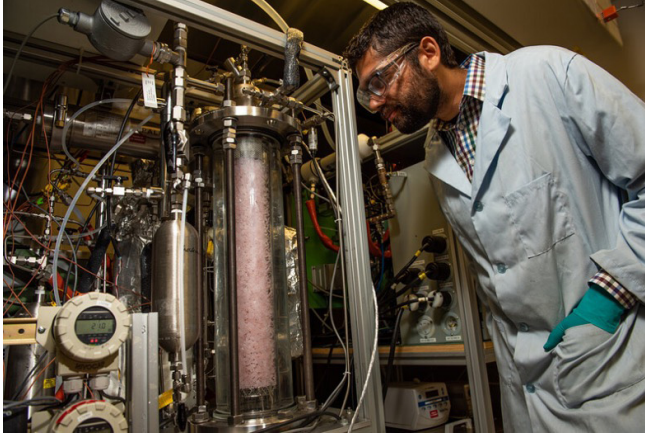
which, coupled with geologic storage, could provide net negative emissions under existing and future market and policy incentives.

IN THE NEWS

Researchers at PNNL continue to reach milestones making carbon capture more affordable for industry deployment. Using PNNL-developed solvents, our scientists recently unveiled the least costly carbon capture system to date at \$39 per metric tonne of CO₂. The system efficiently captures CO₂ and converts it into one of the world's most widely used chemicals in one continuous flow, bringing the 45Q tax credit within reach for those pursuing near-zero emissions targets.



AVAILABLE TECHNOLOGIES



CO₂BOL Solvents for Cheaper Carbon Capture and Sequestration, Pre- and Post-Combustion | Battelle Number: 15845-E

This carbon capture technology absorbs CO₂ at the source during pre- or post-combustion, in power plants and other flue gas emitting facilities. PNNL's custom solvents are cheap, durable, efficient, nontoxic, and easy to manufacture. These water-lean, drop-in solvents are 19 percent cheaper and use 17 percent less energy than commercial counterparts.

ADVANTAGES

- Has up to **97 percent capture rates**.
- Reduces capture cost by **19 percent (and as low as \$38 per metric ton)** relative to commercial technologies.
- Requires **17 percent less energy** than commercial counterparts.
- Is a **drop-in replacement** for lower-performing solvents in existing systems.
- Is **adaptable** to any CO₂-concentrated gas stream.

PARTNER WITH PNNL

PNNL focuses its research for the Department of Energy (DOE) Basic Energy Sciences separations program on understanding the fundamental processes that govern CO₂ behaviors at a molecular level. This work enables us to partner with industry under DOE's Fossil Energy Carbon Capture program to improve existing capture technologies.

LEARN MORE

www.pnnl.gov/carbon-capture



Integrated Capture and Conversion of Pre- and Post-Combustion Carbon Dioxide to Methanol | Battelle Number: 31637

Integrated capture and conversion technology offers energy- and cost-efficient solutions to convert captured CO₂ to fuels. Under a new, PNNL-developed method, captured CO₂ can be mixed with renewable hydrogen and a catalyst in a simple chamber, then heated at half the pressure used in conventional methods to make methane.

ADVANTAGES

- PNNL technology captures more than **95 percent of CO₂ emitted** in flue gas.
- Converts more than **90 percent of captured CO₂** to methane.
- Methanol production costs of **less than \$4.39 per gallon**. Potential production costs of **less than \$2.05 per gallon**.
- CO₂ can be **monetized to offset costs** of capture.
- Increases in **thermal efficiency** by integration means overall lower capital costs.

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