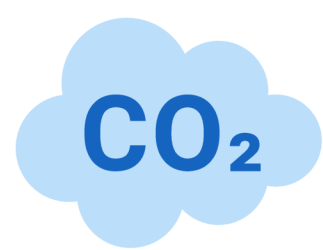


CO₂ Pipelines

What Is It?

CO₂ pipelines are used to transport Carbon Dioxide to be stored underground or used in industrial processes. CO₂ is a byproduct of power generation, ethanol production, steel manufacturing, and more.

These pipelines are necessary for Carbon Capture and Storage (CCS) solutions, which require moving captured CO₂.



What Are They Made Of?

CO₂ pipelines are typically made from steel but can also use advanced composite materials. Smaller pipes that operate under lower pressures may even use plastic. Special protective coatings are also required on CO₂ pipelines to protect it from damage.

What Does It Cost?

Pipeline construction costs fluctuate based on market conditions, diameter, and overall length. However, the average pipeline in the U.S. costs \$10.7 million per mile. Carbon Capture Facilities can be expensive, and the economic value of carbon capture is debated.



Space



There are approximately 5,200 miles of CO₂ pipeline in the U.S., but most of them are located underground. Like natural gas pipelines, CO₂ pipelines require compression stations to maintain pressure and keep the pipeline flowing and are typically placed every 20 to 100 miles along a pipeline route.

Point

- CO₂ pipelines have fewer incidents per mile than petroleum or refined products.
- CCS decreases carbon emissions and generates a product in need of transport.
- CO₂ pipelines are less common than natural gas or oil pipelines, often requiring eminent domain.
- CO₂ is not a flammable gas, meaning that when leaks or ruptures occur, it is less likely to result in explosive incidents.
- Enhanced Oil Recovery utilizes CO₂ pipelines to get better yields from older oil-fields.

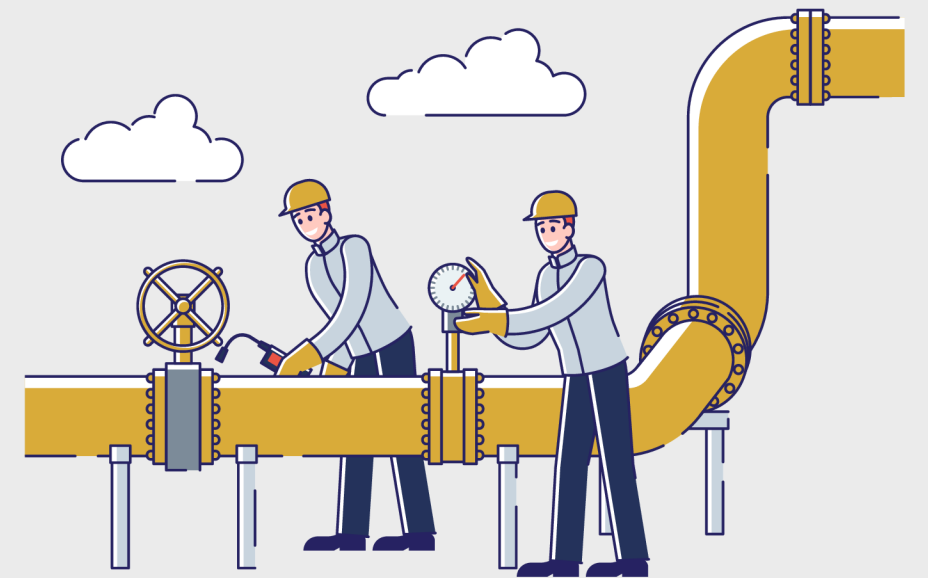


Counterpoint

- More pipeline incidents occur with liquids rather than gases, and the number of incidents does not account for severity.
- Carbon capture is dependent on facilitating transportation infrastructure, such as pipelines.
- Many CO₂ pipelines have been in operation for decades and are comparable in cost and construction details to common or popular pipelines.
- CO₂ is invisible and hard to avoid. People have been hospitalized after pipeline leaks.
- Public perception of CO₂ pipelines may be damaged by the amount of CO₂ that is not used for CCS, but instead for increasing oil production.

How Does It Work?

1. CO₂ is captured from power plant production, ethanol production, steel making, cement manufacturing, or other energy and industrial sources that emit carbon dioxide. Methods for capturing CO₂ include gas reforming, chemical solvents, or Oxy-fuel combustion.
2. The captured gas is compressed to high pressures to make transport easier. It will be re-compressed multiple times during transport to ensure a stable flow.
3. CO₂ is transported through pipelines from the capture site. It may be transported through distribution lines to a manufacturing facility or oil well for reuse in other industrial processes, or else moved to a CCS storage site.
4. Once at a CCS storage facility, the CO₂ is injected deep underground into reservoirs that will theoretically hold the CO₂ forever. There are several different geological mechanisms that can be used to keep the CO₂ secure.



Did You Know?

CO₂ pipelines have been in safe operation since the 1970's and are regulated by existing PHMSA rules, often in Enhanced Oil Recovery and other applications.

What's Next?

As circular economies evolve, the uses and utilization of carbon dioxide and other carbon byproducts will expand. CO₂ pipelines originally used for Enhanced Oil Recovery have been repurposed for use in bottling plants for carbonated beverages.

