

# Climate change and carbon capture and storage

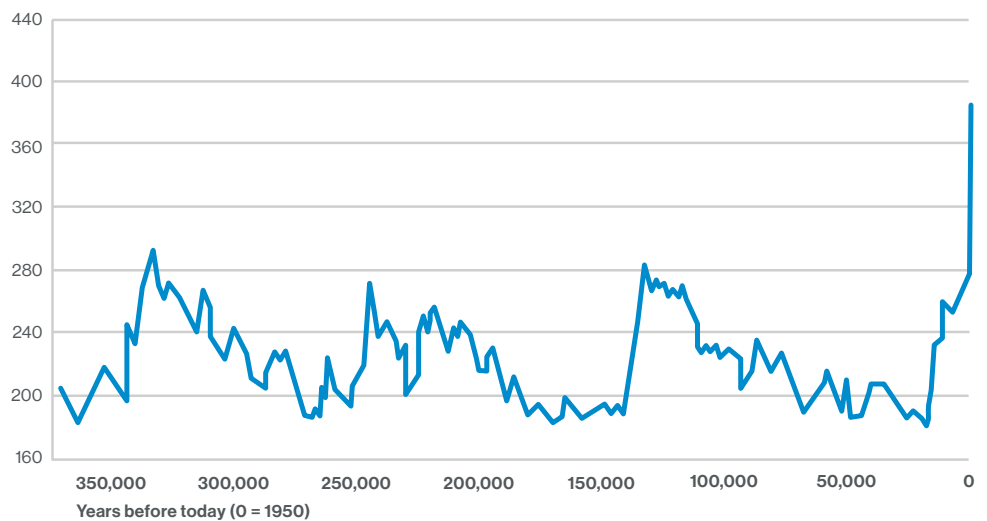
The world faces an urgent imperative to reduce greenhouse gas (GHG) emissions and transition to a lower-carbon future. Enbridge is working with industry, governments and communities to advance innovative carbon capture and storage (CCS) solutions across North America. According to global experts, CCS is a critically important part of the emissions reduction equation.

## What is carbon dioxide?

Carbon dioxide (CO<sub>2</sub>) is a naturally occurring molecule that contains two oxygen atoms and one carbon atom. In everyday conditions, CO<sub>2</sub> is a commonly occurring gas. It is colorless and odorless in gas form.

CO<sub>2</sub> is also a GHG because, as part of Earth's atmosphere, CO<sub>2</sub> traps the energy from the sun that keeps the world at a livable temperature. But significant increases in atmospheric CO<sub>2</sub> associated with human activities can pose problems. Burning of hydrocarbons releases GHGs such as CO<sub>2</sub>, increasing concentrations of these gases in the atmosphere. Other important industrial activities such as the production of cement, steel, petrochemicals and plastics also release GHGs, including CO<sub>2</sub>. When this increase in CO<sub>2</sub> output is combined with the destruction of forested areas, even less CO<sub>2</sub> is effectively absorbed by the planet's natural carbon cycle.

## CO<sub>2</sub> parts per million



> From the end of our last Ice Age about 12,000 years ago, the amount of CO<sub>2</sub> in the atmosphere has been relatively steady at below 280 parts per million (ppm). Since the Industrial Revolution, CO<sub>2</sub> has been increasingly produced by human activities including the burning of hydrocarbons.

## What is the carbon cycle and how is it being influenced by rising levels of CO<sub>2</sub>?

All living things contain carbon. Carbon is part of the air (atmosphere), ocean (hydrosphere) and the ground (geosphere). Carbon is constantly being recycled through all these spheres in different forms – and this movement is described as the carbon cycle.

In the atmosphere, carbon is always combined with oxygen to form CO<sub>2</sub>. Plants, trees, algae and some bacteria absorb, via photosynthesis, CO<sub>2</sub>, breaking down the carbon and oxygen, using the carbon to grow and releasing oxygen. Humans and animals breathe in the oxygen and eat carbon-rich plants and animals, breathing out CO<sub>2</sub>.

Over the past many hundreds of millions of years, animal matter and dead plants have ended up buried deep in the ground. Under the pressure of layers of rock, such materials are turned into highly concentrated carbon or hydrocarbons, such as coal, oil and natural gas.

From the end of the Ice Age about 12,000 years ago, the amount of CO<sub>2</sub> in the atmosphere has been relatively steady at below 280 parts per million (ppm). Since the Industrial Revolution, CO<sub>2</sub> has been increasingly produced by human activities including the burning of hydrocarbons. While the use of energy sources like oil and natural gas has led to enormous growth and improvements to quality of life, human activities have affected the carbon cycle and now add approximately 33 billion tonnes (gigatonnes) of CO<sub>2</sub> to the atmosphere every year, which is even more impactful because of deforestation.



**At Enbridge, we're taking a practical approach to the energy transition happening in North America and around the world – providing the energy needed today, while simultaneously advancing solutions for tomorrow.**

## How will CCS help address growing CO<sub>2</sub> emissions?

The world faces an urgent imperative to reduce GHG emissions and transition to a lower-carbon future. At the same time, energy demand is rising – and world events have been a powerful reminder that energy reliability, affordability and access remain critical considerations, alongside sustainability.

The United Nations' Intergovernmental Panel on Climate Change (IPCC) estimates that by 2050 up to 19% of required CO<sub>2</sub> emissions reductions must come from CCS applied to industrial facilities like power stations, steel mills, energy production and refining facilities, and cement plants. In short, CCS is a critical part of the GHG emissions reduction equation, along with energy efficiency, increasing renewable energy, and changes to the ways we live our lives.



**Experts globally agree CCS is vital for meeting greenhouse gas reduction goals. That's why Enbridge is developing CCS solutions. CCS is a viable way to meaningfully reduce greenhouse gas emissions from critical industries like cement production, power generation, energy production and refining, along with fertilizer, plastics, chemicals and steel manufacturing.**

CCS allows large emitters from various industries to reduce their emissions. These industries are crucial for our quality of life and economic well-being, and solutions for reducing their emissions are needed. That is why Enbridge is working with industry, governments and communities to advance innovative CCS solutions across North America.

*Enbridge is advancing CCS projects across North America as a key enabler to reaching national and international emissions reduction goals. This is one of a series of Enbridge fact sheets intended to provide an overview of the many facets of CCS.*