
CARBON CAPTURE AND STORAGE IN BC

QUICK FACTS

WHAT IS CCS?

Carbon Capture and Storage (CCS) is a permanent storage solution for carbon dioxide (CO₂) that would normally be released into the atmosphere. CCS involves taking CO₂ emissions from industrial sources and pumping them deep into a geological formation under the ground. Once injected into the ground, the CO₂ remains permanently trapped in the deep rock effectively reducing global greenhouse gas emissions (GHG) and combating climate change.

HOW IS CCS DONE?

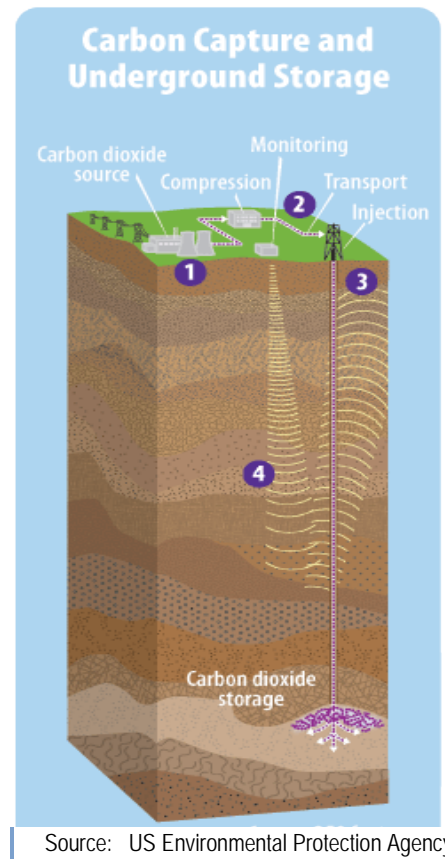
CCS involves a 4 phase process of collecting CO₂ from a large industrial source; compressing and transporting it via pipeline to a storage site; injecting it deep underground into the pore space of a rock formation and, then monitoring it to ensure it remains permanently stored deep underground. The underground formation could be a depleted oil or gas reservoir, a saline aquifer or other deep formation capable of receiving and retaining the CO₂. Sources of CO₂ appropriate for geological storage are large industrial facilities such as power plants and oil and gas operations.

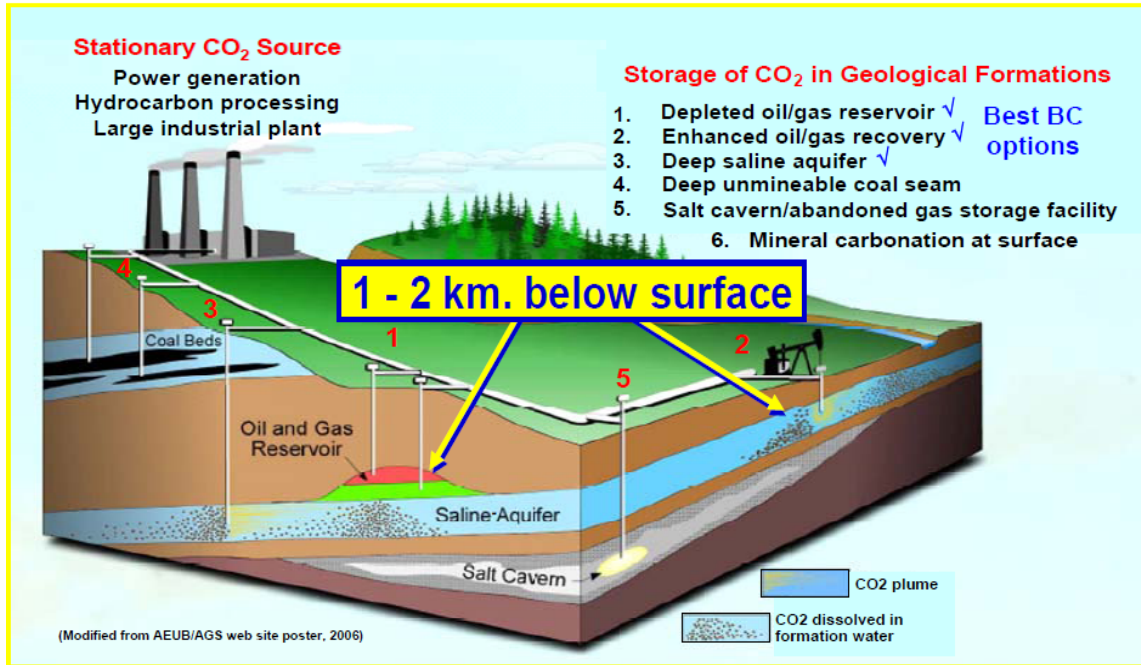
WHERE CAN CCS OCCUR IN THE PROVINCE?

CCS cannot occur everywhere. There are three main geological characteristics that make CCS possible:

- Capacity: sufficient pore space in the rock storage reservoir to store large volumes of CO₂;
- Injectivity: good permeability of the rock to allow timely injection into the storage reservoir as CO₂ arrives on site; and
- Containment: storage reservoir is enclosed by a hard cap rock so that the injected CO₂ cannot migrate or come back to the surface.

Capacity and injectivity are generally associated with sedimentary rocks such as those found in the Western Canada Sedimentary Basin of Northeast BC (NEBC). The Northeast of the province meets all additional prerequisites for viable CCS – minimal tectonic activity, suitable infrastructure, large industrial facilities (natural gas processing), and a well established knowledge of the geology of the region.





Best Options for CCS in British Columbia

Source: Hartling, BC Ministry of Energy and Mines, 2009

WHY IS CCS NEEDED IN BC?

Natural gas production is a key driver of economic growth in the province. A considerable source of CO₂ emissions comes from natural gas processing. As a province with abundant natural gas resources, advancing CCS is significantly important. By using CCS, BC can continue to grow production and extract the economic benefits of its natural gas resources without increasing process emissions. CCS is one of the key strategies identified for greenhouse gas emissions mitigation in reports prepared by the BC Natural Gas Climate Action Working Group.

WHAT IMPACTS COULD CCS HAVE ON THE ENVIRONMENT?



CO₂ Soil Survey at Weyburn, Saskatchewan

Source: Petroleum Technology Research Centre

CCS projects will store CO₂ at depths that are far below the surface and far below usable groundwater. Impacts on soils, plants, animals or groundwater are highly unlikely. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Carbon Dioxide Capture and Storage estimates that it is likely that 99 percent or more of the CO₂ injected in appropriately selected and managed geological reservoirs would remain in the intended storage formation for at least 1000 years. By preventing large amounts of CO₂ from entering the atmosphere, CCS is a powerful tool to address climate change.

CO₂ is a natural substance in the air that is essential to life. At normal concentrations, CO₂ is harmless and any CO₂ that might be released from geological storage is very unlikely to be at a harmful level. At CCS sites, monitoring activities ensure that any leakage is detected and early warning is provided to remedy the situation.

CO₂ injection wells are generally small and have little surface impact on surrounding areas. Industry practice for safe injection into underground formations is well established and highly regulated.



CO₂ injector within injector housing
Source: Petroleum Technology Research Centre

ARE THERE ANY CCS PROJECTS CURRENTLY BEING CONSIDERED IN BC?

Yes. As mentioned previously, CCS is an optimal GHG reduction method for natural gas processing and several processors in NEBC have considered this innovative solution. One company, Spectra Energy, has for several years been exploring a potential underground storage site near its Fort Nelson natural gas processing plant. Exploratory results to date show that an excellent storage reservoir exists in this location. Potentially 2 to 6 large scale CCS projects could be developed in NEBC over the next decade.

Small scale operations currently exist in BC that inject a mixture of CO₂ and H₂S deep into underground formations. This process, which is referred to as acid gas disposal, already occurs at 12 sites in NEBC.

IS CCS BEING USED ANYWHERE ELSE IN THE WORLD?

Yes. The technology of injecting CO₂ deep underground has been used for enhanced oil recovery in Alberta and Saskatchewan for many years. CCS projects are successfully being developed around the world in Australia, Denmark and the USA. A CCS project in Norway has been in operation since 1996.

HOW IS CCS REGULATED IN BC?

BC has a comprehensive regulatory regime that regulates all oil and gas industry activities including acid gas disposal, natural gas storage and CCS. However, current regulations were not developed with large scale CCS in mind and some changes are needed. The Ministry of Energy, Mines and Natural Gas is consulting with industry, communities and First Nations on a proposed regulatory policy framework to ensure that CCS is done safely, address any regulatory gaps and support CCS development.

WHERE CAN I FIND ADDITIONAL INFORMATION ON CCS?

General information on CCS can be found at the following websites:

www.ccs101.ca

www.ico2n.com

www.ieaghg.org/index.php?/ccs-resources.html

www.ptrc.ca

<http://canmetenergy.nrcan.gc.ca>

<http://www.solutionsstarthere.ca/>