



# Oil Sands

A strategic resource for Canada, North America and the global market

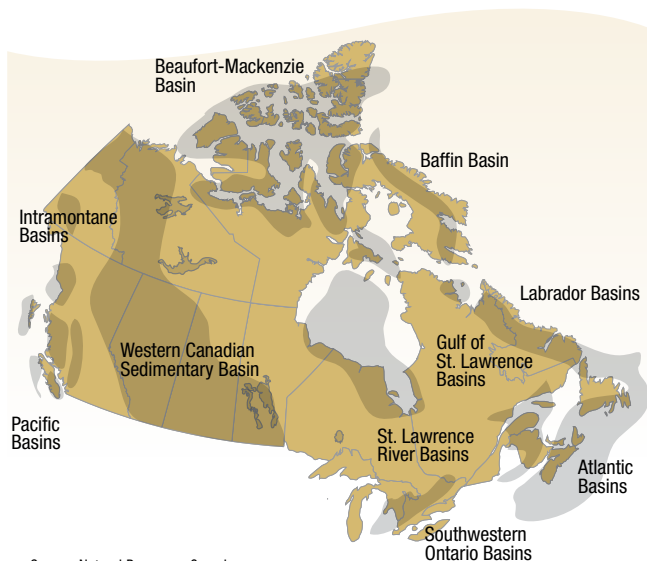
## Carbon Capture and Storage

### A clean energy technology

Carbon capture and storage (CCS) is a clean energy technology that aims to capture emissions of carbon dioxide (CO<sub>2</sub>), a greenhouse gas (GHG) from industrial facilities, before they are released into the atmosphere. Once captured and compressed, the CO<sub>2</sub> is transported by pipeline or tanker to a storage site, often to be injected between one and five kilometres underground in deep geological formations, where it will be safely stored for the long term.

It is estimated that Canada has the potential to store, largely in the Western Canadian Sedimentary Basin, as much as 600 million tonnes of CO<sub>2</sub> a year, roughly equal to 75 percent of Canada's current annual GHG emissions. CCS sites are carefully selected to ensure CO<sub>2</sub> remains safely stored.

### CO<sub>2</sub> Storage Potential in Canada



Source: Natural Resources Canada

Many of the deep geological formations chosen as potential storage sites have already had fluids (such as oil) or gases (such as natural gas) trapped within them for tens of millions of years.

### Canada is a leader in conducting CCS research and development

Significant CCS research and development activities are underway in Canada, including important work on CO<sub>2</sub> capture and storage at federal laboratories. Provinces, universities and research institutes across Canada are also carrying out research on technical, economic and policy issues related to CCS.

Canada, with its world-class geological storage potential for CO<sub>2</sub>, is doing its part to demonstrate CCS technology. The Weyburn project in Saskatchewan – one of the first large-scale efforts in the world – was launched in 2000, followed by the adjacent Midale project in 2005. These projects involve capturing CO<sub>2</sub> emissions in North Dakota and transporting the CO<sub>2</sub> across the Canada-U.S. border, where it is used to assist with oil recovery from older wells and then remains permanently stored in deep geological formations.

### Canadian investments in CCS projects total over C\$7 billion

Both federal and provincial governments and industry are working to develop this technology and lower the costs so that it can be fully commercialized. Seven large-scale, fully

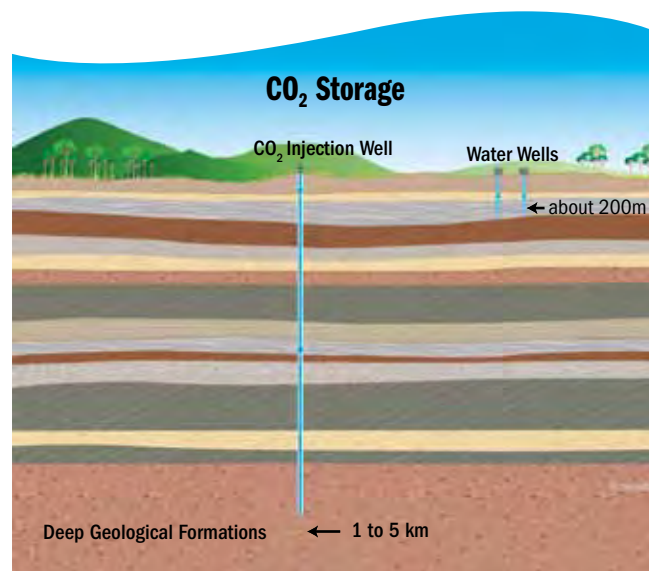
integrated CCS demonstration projects are co-funded by the two levels of governments, which have committed over C\$3 billion in total toward CCS demonstration projects. With leveraged private investments, the total Canadian investment in CCS projects rises to over C\$7 billion. Two of these large-scale demonstration projects, Shell Quest and the Enhance Alberta Trunk Line, will capture CO<sub>2</sub> from oil sands upgraders.

Provincial governments – in particular Alberta, Saskatchewan and British Columbia – are evaluating their regulatory frameworks to ensure they are appropriate for commercial-scale CCS projects. Alberta has passed legislation to address barriers to the development of CCS on a commercial scale. The province has assumed ownership of the underground space where the CO<sub>2</sub> would be injected, and has taken long-term responsibility for sequestered CO<sub>2</sub> after injection operations are closed. It would also create a post-closure fund to ensure money is available when the province assumes responsibility for closed storage sites.

### **CCS could account for up to 19 percent of global GHG reductions by 2050 – IEA**

Moving ahead with implementing CCS on a worldwide basis is essential so that the technology can be tested and demonstrated. The International Energy Agency (IEA) has stated that CCS is the only technology available to mitigate GHG emissions from large-scale fossil fuel use. The IEA suggests that CCS could account for 14 to 19 percent of the total global GHG reductions needed by 2050.

CCS projects are being pursued in several other countries such as Norway, the United Kingdom, the United States and Australia. The United Nations' Intergovernmental Panel on Climate Change (IPCC) fully supports CCS technology, as does the IEA. The IPCC agrees that CCS is crucial to help the world make necessary, long-term reductions in greenhouse gases.



Source: CO2CRC, adapted by Natural Resources Canada, 2011.