

Western Canada – How to Become a Global Leader in CCUS

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Summary

Western Canada is already a world leader in carbon capture, utilization, and sequestration (CCUS) due to our technical expertise, geological suitability, and legal, regulatory, and policy frameworks, which have enabled the safe and successful operation of numerous projects to date. Strengthened climate goals, increased investment incentives, and public perceptions have led to a dramatic increase in momentum for CCUS in Canada over the recent past that will further establish our place as a global leader. Technology will play an increasingly important role in Canada's net-zero 2050 ambitions and will deliver emission reduction solutions for a range of hard-to-abate industries. Furthermore, as the carbon sequestration industry matures, barriers to entry for novel applications will likely be lowered and present new opportunities for Alberta and Western Canada. The purpose of this presentation is to establish where CCUS is today to inform what the CCUS landscape might look like as a global leader in the future.

Policy and Regulatory

The Government of Canada's Federal Carbon Tax and anticipated Clean Fuel Standard have introduced a new series of costs to hydrocarbon emission that must be mitigated through emission reduction measures. The preferred emission reduction solution for many large industrial emitters will be CCUS, which has instigated a flurry of activity seeking sequestration solutions. Furthermore, tax incentives and taxation framework will benefit certain CCUS operations more than others based on the type of emitting facility and sequestration targets. In addition, emission Offset Credits under both Federal and Provincial guidelines follow a current unit price of \$50/tCO₂ and will increase to \$170/tCO₂ by 2030. Lastly, the Clean Fuel Standard is part of Canada's climate plan to reduce emissions. It is a performance-based approach to incentivize fuel suppliers to reduce their products' emission intensity. The Federal Government is targeting the publication of final Regulations Spring 2022.

The Alberta Government has outlined the path for issuing carbon sequestration pore-space rights whereby hub operators provide open sequestration services to several industrial emitters at fair rates. The selection process is currently underway and will be awarded to operators that demonstrate fiscal, technical, and operational expertise. These hubs relate only to dedicated saline sequestration while acid gas injection and CO₂-EOR operate under the mineral rights tenure system.

These established and anticipated legal, regulatory, and policy frameworks set the stage for how CCUS will continue to develop in Canada.

Sequestration Optionality

There are multiple subsurface sequestration options to consider understanding what the CCUS landscape might look like in Alberta and Western Canada. These options are uniquely beneficial and suitable depending on geographic location, policy, and objective. A summary of saline

sequestration, acid gas injection, and CO₂-EOR can be seen in Figure 1 below, which outlines each sequestration solution's regulatory and technical considerations.

Criteria	Aquifers	CO ₂ -EOR	Acid Gas Injection
Carbon Credits	●	●	●
Clean Fuel Standard	○	○	○
Federal Tax Incentive	●	●	●
Hydrocarbon Revenue	●	●	●
Storage Capacity	●	●	●
Reservoir Data	●	●	●
Legacy Well Penetrations	●	●	●
End of Life – Liability Transfer	●	●	●

Deep saline aquifers constitute the most considerable geologic storage potential across Western Canada and will be the primary targets for future sequestration hubs. Deep saline sequestration will be eligible for generating emission offset credits, garnering federal tax incentives to recover a portion of development costs, and potentially Clean Fuel Standard credits depending on the emission source.

The Alberta carbon hub model will likely result in a carbon infrastructure network that could break down economic barriers for CO₂ – EOR and increase incremental oil recovery with reduced emission intensity per barrel of oil produced. Numerous oil pools have shown technical success for CO₂-EOR but were unable to overcome economic barriers due to the high purchase costs of CO₂. The existing pure CO₂ storage due to depletion paired with additional CO₂ - storage capacity resulting from incremental production could support meaningful emission reduction efforts across Western Canada while responsibly producing hydrocarbons.

Finally, when the feasibility of tying into a carbon trunk or accessing an open carbon hub is challenged, emitting facilities may opt for acid gas injection into depleted reservoirs. While these operations will not fall under the carbon sequestration tenure, they could allow emitting facilities to reduce emissions while potentially earning emissions performance credits.

Conclusions

Western Canada has proven itself a leader in CCUS with a track record of safe and successful saline sequestration, carbon dioxide enhanced oil recovery, and acid gas injection. This success results from technical expertise, geological suitability, and legal, regulatory, and policy

frameworks. A combination of sequestration applications will continue garnering momentum and be instrumental to reaching Canada's net-zero 2050 ambitions for hard-to-abate industries. Therefore, technical, regulatory, and economic considerations are instrumental for understanding how Western Canada's carbon market will develop to become a global leader in CCUS (

