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The Williston Basin as a Platform for Carbon Capture and Storage: Operational Insight from Long-Term CO_2 Storage in Saskatchewan

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Theory / Method / Workflow

Saskatchewan has been a global leader in carbon capture and storage (CCS) leveraging the geological suitability of the Williston Basin for secure CO_2 storage over many years. Williston basin is a geologically unique basin comprised of “Pre-Cambrian basement”. The Basin’s favorable structural characteristics and remarkable geological advantage have supported sustainable injection and containment for CCS deployment. The Aquistore project is one of those initiative that have been central to advancing CCS in the province.

The Petroleum Technology Research Center has been managing the Aquistore Carbon Dioxide (CO_2) Deep Saline Storage Project near Estevan in southeastern Saskatchewan . Aquistore was established as a CO_2 measurement, monitoring and verification project .It is a fully operating CO_2 injection site, having stored anthropogenic CO_2 captured by burning coal at the Unit 3 of the SaskPower’s Boundary Dam power station. So far, up to 630000 tons of CO_2 has been stored in a sandstone formation 3.2km deep. The project features an impressive MMV program.

Over 30 monitoring technologies have been deployed at the site. The research project is demonstrating the scientific and economic feasibility of deep saline geological formation storage and is providing the knowhow for other jurisdictions and companies thinking of doing the same. One objective of the Aquistore project is to offer start up CO_2 storage projects a fundamental understanding of the reality of CO_2 injection and suggest minimum measurement and monitoring technologies required for a fully operational storage site.

To further expand the research, PTRC is drilling a second monitoring well at the Aquistore site in 2026. This new well will be drilled directly into an active CO_2 saturated reservoir at the same depth as the injection zone which will ultimately provide important insight through direct measurement and sampling of a CO_2 saturated reservoir. Drilling this new well is focused on advancing data collection, monitoring and commercialization.

This work will review the lessons learned from 10 years of MMV, including which monitoring methods should be used at each phase of the project, the key monitoring approaches that proved effective at Aquistore, and the supplemental monitoring required to ensure containment and conformance and discuss objectives and challenges of drilling into an active CO_2 storage reservoir.

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