Technologies for Clean Energy, CO2- Enhanced Recovery and CO2 Geological Storage: Optimizing the Mix

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Western Canada is the location of the Western Canadian Sedimentary Basin, a mature basin, which is the centre of the Canadian oil and gas industry, and produces a large amount of Canada's CO2 emissions. These oil and gas reservoirs as well as the aquifers can be used to store a large amount of western Canada's CO2 emissions in the pore space, which formerly was occupied by fossil fuels. The requirement for hydrogen for upgrading of Alberta's oil sands and the requirement for reduction in CO2 emissions leads to a technology strategy for Canada's future - gasification of solid carbon fuels and CO2 Capture and Geological Storage to reduce greenhouse gas emissions significantly in the 21st century. Carbon Conversion, Capture and Storage (CCCS) is a key technological process that will play a central role in the movement towards sustainable energy development – in Canada and around the world.

A key element of the CCCS strategy is gasification. Currently, carbon sources contemplated to be used in gasification for the oil sands are the bottom of the bitumen barrel (the asphaltenes) and existing stock piles of coke formed in bitumen processing. However, bitumen is a much more valuable commodity than coal; and it is expected that coal would fuel the hydrogen fuelled conversion systems of the future (boilers/steam turbines and/or gas turbines) once this feedstock has been fully characterized and piloted in gasifiers. Such technology development is critical for the efficient development of the oil sands. The waste CO2 streams produced by gasification could be more easily captured and stored in the geological formations of the Alberta Sedimentary Basin relative to other CO2 reduction technologies; whilst utilizing the technologies that provide added value streams first (i.e. EOR, EGR, ECBM).

Biography

Dr. William D. Gunter received his BSc and MSc degrees in geology from the University of New Brunswick and his PhD in geochemistry from the Johns Hopkins University. He taught Igneous and Metamorphic Petrology at the University of Wyoming; and was a Research Fellow in Hydrothermal Geochemistry at ETH in Zurich. He currently is a Professional Geologist practicing in Alberta, and a Distinguished Scientist at the Alberta Research Council located in Edmonton, Alberta, Canada where he has spent over 25 years of his career, and has served terms as an Adjunct Professor at the Universities of Alberta and Calgary. His expertise is in geochemical processes (stressing use of field data, experiments and modeling) as they impact the environment, and on the oil and gas industry.

Over the past 10 years, he has been leading combined industry-government funded projects for geological storage of CO2 and H2S in aquifers, oil reservoirs and coal beds. As a result of this, more than 70 publications are available in the public domain on geological storage of CO2, a major contributor to greenhouse gas (GHG) emissions. In 1999, he served as a member of the Canadian Federal “Technology Issues” Table on GHG emissions.
He co-chaired the Canadian Capture and Geological Storage Roadmapping task which led to two reports, CANiSTORE and CANiCAP (addressing planning options for technology development in Geological Storage and CO2 Capture in Canada). Both are downloadable from www.co2network.gc.ca and together they contain the elements of a plan for commercialization of CCS [CO2 Capture and Geological Storage] in Canada, and form part of the basis for the Canadian Roadmap for CCS). He also was a Lead Author on the IPCC (Intergovernmental Panel on Climate Change) special report on CO2 Capture and Storage released in December 2005. He currently serves as a member of the Alberta Government’s ”Capture and Geological Storage of GHG Emissions” working group.