



The following 13 Cleaner Energy and Carbon Capture projects have been invited to go to the CCEMC's Full project proposal stage.

Air Products Canada Ltd.

The Application of ITM Syngas for the Partial Oxidation and Reforming of Syngas from MSW and other gasifiers for Enhanced Gas Conversion with Improved Carbon Capture

Air Products and Chemicals Inc. and Ceramatec Inc. will develop, manufacture and test improved Ion Transport Membrane (ITM) wafer and module designs that are optimized for the aggressive operating conditions expected in MSW, biofuels and underground coal gasification facilities. ITM is a new technology that utilizes the oxygen ion conducting properties of certain ceramics for the efficient production of synthesis gas from a methane containing stream using low pressure air. The technology has the potential to improve the economics, efficiency and extent of carbon capture for GTL facilities, hydrogen plants and gasification facilities in Alberta by up to 30%. For more information contact Ted Foster at ITM@airproducts.com

Akermin Inc.

Design, Construction and Testing of Field Pilot Plant to Demonstrate a Low Energy, Enzyme Catalyzed Process for Post Combustion CO2 Capture

Akermin is developing new technology to significantly reduce the energy consumption associated with the capture of CO2 from various industrial processes. Akermin's core technology uses an enzyme, Carbonic Anhydrase, to accelerate absorption of CO2 from industrial processes. By reducing capital and energy requirements, this technology can capture CO2 at a cost up to 50% lower than the best commercial technologies currently available. The proposed funding will be used to build and operate a slip-stream field pilot capturing CO2 from a coal-fired power plant. Commercial application of this technology could reduce CO2 emissions from stationary sources in Alberta by over 19.5 megatonnes. Contact Person: Sean Black (black@akermin.com)

Canadian Natural Resources Limited

Convergent Bitumen Recovery (CBR) for Cleaner Energy Production, Field Pilot Phase 2

The convergent bitumen recovery (CBR) process is an emerging technology for the in-place recovery of bitumen from oil sands. It is a collaborative program between Canadian Natural Resources Limited and CBR Inc. of Calgary. This new and innovative process eliminates the need for ore mining, preparation, hydro-transport and extraction. It is designed to work either concurrently with or to be an alternate technology to current oil sands mining operations.

The benefits of this cleaner energy technology include reduced GHG emissions when compared with conventional mining operations, reduced air pollutant emissions, reduced or complete elimination of fine tailings production, reduced energy consumption and improved public image of oil sands.

Cenovus Energy Inc.

Chemical looping Steam Generator

Cenovus requests CCEMC's financial support to install the world's first and biggest 10 MW chemical looping steam generator (CLSG) pilot in its Christina Lake Thermal Project in Alberta. CLSG is based on well-founded chemical looping combustion technology. It is inherently CO2 capture ready, emits ultra low NOx, and has higher energy efficiency and lower CO2 avoidance cost than conventional boiler with post combustion carbon capture. We have to advance this new technology to commercial readiness in order to provide cheaper options for Alberta producers to reduce their GHG footprint and to meet Alberta's GHG reduction strategy.

Chevron Technology Company

Hydrogen-Fired Field Test of a Once-Through Steam Generator

The Chevron Energy Technology Company is proposing to conduct a field test of firing a once-through steam generator (OTSG) with a concentrated hydrogen fuel. These steam generators are used extensively for in-situ bitumen extraction in a process called steam assisted gravity drainage (SAGD). Studies by an outside engineering company have confirmed that the avoided CO2 costs of hydrogen firing are lower than competing CO2 capture routes, such as oxy-firing or post-combustion capture. The key goal of the project is to confirm the technical feasibility of firing steam generators with hydrogen.

Husky Oil Operations Ltd.

Husky-HTC OTSG CO2 Capture Demonstration Plant

The Husky-HTC OSTG CO2 Capture Demonstration Project will capture 35 tonnes/day of CO2 from the exhaust gas of a once-through-steam-generator (OTSG) at Husky's Lashburn, Saskatchewan heavy oil production operations. The CO2 will be injected into heavy oil cold production wells. Husky selected HTC Pureenergy as the technology provider for the project. HTC is an energy technology company headquartered in Regina, SK. The completed plant will be commissioned and begin delivery of CO2 to the injection system for a pilot demonstration period of three to four years. The project will improve understanding in the thermal in-situ oil production industry of the feasibility of HTC's CO2 capture technology to help address environmental issues.

Imperial Oil Resources

Cyclic Solvent Process

Imperial Oil Resources is planning a 3-well field pilot of Cyclic Solvent Process, a new in-situ bitumen recovery process, at Cold Lake. CSP is a cyclic non-thermal process comprised of liquid solvent injection, followed by bitumen/solvent production. If successful, this process will result in a 90% reduction in greenhouse gas intensity for in-situ bitumen production from oil sands in Alberta. The pilot is part of a dedicated research program lead by an industry leading team of engineers and scientists at Imperial's Calgary Research facility. Regulatory approval was granted in May 2011, detailed engineering is ongoing, facilities construction will begin in 2012 and solvent injection will commence in 2013. Total cost is estimated at 100 M\$.

InvenTyS Thermal Technologies Inc.

Joffre Petrochemical Plant VeloxoTherm™ CO2 Capture Project

Nova Chemicals plans on installing a CO2 capture pilot plant at its Joffre located near Red Deer. The objectives of the project are to pilot, demonstrate, and evaluate the VeloxoTherm™ process so as to obtain data and operating experience for the design and commercialization of large scale CO2 capture plants.

At Joffre a 60 TPD VeloxoTherm™ process will be installed and the CO2 recovered in the pilot plant will be transported to an existing compressor station and stored at Penn West's CO2 flood at the Joffre Viking Tertiary Oil Unit.

Inventys is proposing a 5-million C\$ project to design, construct, and deploy a pilot plant and is seeking funding in the amount of 2.5-million C\$ from the CCEMC to support this project.

MEG Energy

Low Intensity Bitumen Upgrading – Field Pilot

MEG is an oil sands company focused on sustainable in situ oil sands production in the southern Athabasca region of Alberta. MEG also owns 50% of the Access Pipeline, which connects its production to the Edmonton area. Industry leading SAGD practices together with cogeneration has enabled MEG to achieve one of the lowest greenhouse gas intensity projects in Alberta. MEG is developing an innovative process to efficiently convert its bitumen into a crude oil suitable for transport by pipeline. A unique combination of mild intensity processes is applied to the bitumen, resulting in high yields and a reduction of conversion GHG emissions. To further this innovation, MEG proposes to construct and operate a pilot plant in the Heartland region.

North West Capital Partners Inc & Enhance Energy

Prometheus Project

The Project will install a carbon capture by adsorption prototype at ATCO Power's Battle River Generating Station to prove the economical capture of 80-100% of CO₂ from coal-fired flue gas. If deployed on Alberta's five largest coal-fired power plants, reductions of up to 40 megatonnes of CO₂ per year may be possible. The project is being jointly pursued by North West Capital Partners Inc. and Enhance Energy Inc., with ATCO Power Canada Ltd. acting as the Project Partner. InvenTyS Thermal Technologies Inc. and Global Thermostat, LLC. will supply proprietary adsorption technologies. This project helps ensure that Albertans continue to have access to cleaner, affordable coal-fired electricity. Email David Laycock at DLaycock@nwcap.tv

N-Solv Corporation

BEST (Bitumen Extraction Solvent Technology) Field Pilot Plant at Suncor Dover

A 500 BPD field pilot to be located at Suncor's Dover lease to validate a solvent-based in-situ bitumen extraction process, known as the BEST (Bitumen Extraction Solvent Technology) Field Pilot Plant, is the collaboration of N-Solv Corp, Suncor Energy, Enbridge, and Hatch. The process is similar to SAGD in its use of horizontal well pairs, but differs significantly in that it uses gaseous propane as a solvent; the propane condenses and reacts with the bitumen. Relative to steam, propane has been shown to reduce GHG emissions by 86% and eliminates the need for process water. The process is expected to produce a lighter, more valuable oil product and recover more resource from each well at lower capital and operating costs than SAGD.

Sherritt International Corporation

Field Demonstration of In-situ Coal Gasification Technology

Sherritt International Corporation is evaluating in-situ coal gasification (ISCG) as a transformational clean energy technology to convert deep, currently un-mineable coal seams in Alberta to synthesis gas (syngas). Syngas can be converted at a long term stable cost into a wide range of products including clean power, fuel for bitumen extraction and petrochemicals.

The project objective is the development, construction and operation of a field demonstration plant using an emerging, successfully piloted ISCG technology. Combined with its cost effective carbon capture and sequestration potential, an ISCG syngas based power facility could have a GHG intensity comparable to a natural gas fired combined cycle power plant.

Western Hydrogen, Ltd

Molten Salt Gasification for Production of Hydrogen at High Pressure from Carbonaceous Wastes

Western Hydrogen is developing a technology for generation of H₂ from carbonaceous wastes (e.g. residual, biomass, coke). The technology has been proven in the laboratory and a pilot facility that will produce ~200,000 scf/day of H₂ is being designed. The pilot will be installed on industrial land near Fort Saskatchewan, Alberta. The technology produces H₂ at ~2000 psig and separates the produced CO₂ in a high pressure stream directly suitable for sequestration. The process, molten salt gasification, has the potential to produce H₂ at a substantially lower cost than conventional technology and is "CCS Ready" at no additional cost. The company contact is Chief Operating Officer, Lyman Frost, 208 589-3727, ljfrostwhl@aol.com