

CMC-Funded Research Projects

Two calls for funding have been held by Carbon Management Canada. Round 1 was announced in the fall of 2010. Round 2 was held in the spring of 2011. After rigorous review processes, the following 36 projects were allocated funds totaling \$18 million. A third call will commence Nov. 15, 2011. For more information on CMC-NCE's projects and programs visit www.cmc-nce.ca or call Anita Arduini, Program Director, at 403 210-7572.

Theme A - Recovery, Processing and Capture

Theme A projects focus on reducing carbon emissions from power plants and material process plants, and during recovery of coal, petroleum and natural gas.

Fluidized bed gasification of low-grade coals and petcoke

Principal Investigators: Josephine Hill, UCalgary; Todd Pugsley, USask; Paul Watkinson, UBC; Charles Mims, UToronto; Jamal Chaouki, Polytechnique de Montréal; Rajender Gupta, UAlberta; Ray Spiteri, USask; Nader Mahinpey, UCalgary

Funding: \$1.16 million/3 years

Integrated fluidization bed gasification and looping CO₂ capture

Principal Investigators: Naoko Ellis, UBC; Nader Mahinpey, UCalgary; Edward Anthony, NRCan; Hugo de Lasa, UWO; John Grace, UBC; Serge Kaliaguine, Université Laval; Jim Lim, UBC; Arturo Macchi, UOttawa

Funding: \$1.069 million/3 years

Rapid routes to carbon-efficient recovery of bitumen and heavy oil

Principal Investigators: Ian Gates, UCalgary and Steve Larter, UCalgary

Funding: \$350,000/3 years

Development of direct air capture technology

Principal Investigators: David Keith, UCalgary; John Grace, UBC; Jim Lim, UBC; Edward Anthony, NRCan

Funding: \$249,000/2 Years

Hydrogen production and waste processing

Principal Investigators: Pedro Pereira Almao, UCalgary

Funding: \$350,000/3 years

Material Development and Optimization for Zero CO₂ Emission Energy Production

Principal Investigators: Abdelhamid Sayari, UOttawa; Viola Birss, UCalgary; Venkataraman Thangadurai, UCalgary

Funding: \$635,000/3 years

Designing Easy-Release CO₂ Capture Sorbents at the Molecular Level

Principal Investigators: George Shimizu, UCalgary; Tom Woo, UOttawa

Funding: \$563,000/3 years

CO₂ Microbubbles — A Safe and Secure Technique for Increased Sequestration and EOR Potential into Oil/Gas Reservoirs

Principal Investigators: Japan J.Trivedi, UAlberta; Ergun Kuru, UAlberta; Phillip Choi, UAlberta; Mingzhe Dong, UCalgary

Funding: \$240,000/2 years

Development and Techno-Economic Assessment of High Performance Amine Impregnated Solid Sorbents for Post Combustion CO₂ Capture

Principal Investigators: Rajender Gupta, UAlberta; Weixing Chen, UAlberta; Zaher Hashisho, UAlberta; Steve Kuznicki, UAlberta; Partha Sarkar, A.I.T.F.

Funding: \$816,000/3 years

THEME B - ENABLING AND EMERGING TECHNOLOGIES

Technology innovations in biology and other fields of study undergoing revolutionary change have yet to permeate the energy industry in any large way. New knowledge from biology, chemistry and engineering science, both within and without the energy sectors, has great potential to enable novel energy recovery processes, methods to reduce carbon emissions as well as innovative sensors and monitoring systems.

Enabling the capture of CO₂ under anaerobic (subsurface) conditions

Principal Investigators: Gerrit Voordouw, UCalgary

Funding: \$240,000/3 years

A pore scale microlab to perform fundamental laboratory-based studies of CO₂ transport and reactivity in reservoirs

Principal Investigators: David Sinton, UVictoria; Aimy Bazylak, UToronto; Savvas Hatzikiriakos, UBC; Steven Larter, UCalgary; John Shaw, UAlberta; Zhenghe Xu, UAlberta

Funding: \$1.05 million/3 years

Bioconversion of Coal by Enhanced Engineering Pathways into Fuel Products

Principal Investigators: Sushanta Mitra, UAlberta; Karen Budwill, A.I.T.F.; Julia Foght, UAlberta; Jennifer McIntosh, UArizona; Steve Larter, UCalgary; Arno de Klerk, UAlberta; Subir Bhattacharjee, U of Alberta; Thomas Thundat, UAlberta; David Nobes, UAlberta; Gordon Southam, UWestern Ontario; Marc Secanell, UAlberta; John Shaw, UAlberta; Ian Gates, UCalgary; Vinay Prasad, UAlberta; Bruce Peachey, New Paradigm Engineering Ltd.

Funding: \$1.92 million/3 years

Frustrated Lewis Pairs: A New Approach to CO₂ Capture and Utilization

Principal Investigators: Douglas Stephan, UToronto; Eugenia Kumacheva, UToronto

Funding: \$268,000/2 years

Development of Novel Nanostructured Photocatalysts for Highly Efficient Solar Photocatalytic Reduction of CO₂ to Fuels

Principal Investigators: David P. Wilkinson, UBC; Baizeng Fang, UBC

Funding: \$388,000/3 years

THEME C - SECURE CARBON STORAGE

One way to keep excess CO₂ out of the atmosphere is to inject it as a dense fluid into geological storage formations deep underground. A focus of Theme C is research to develop methods to track the movement of CO₂ and monitor storage sites

Storage geochemistry

Principal Investigators: Bernhard Mayer, UCalgary; Benjamin Rostron, UAlberta; Barbara Sherwood Lollar, UToronto

Funding: \$630,000/3 years

Adapting Probabilistic Seismic Hazard Assessment methods to site evaluation for carbon capture and storage

Principal Investigators: David Eaton, UCalgary; Jeffrey Gu, UAlberta

Funding: \$72,220/2 years

Storage geophysics and monitoring

Principal Investigators: Don Lawton, UCalgary; Gary Margrave, UCalgary; Mauricio Sacchi, UAlberta

Funding: \$632,300/3 years

Seismic behaviour of CO₂ saturated sandstones: laboratory measurements and modelling

Principal Investigators: Doug Schmitt, UAlberta and Mauricio Sacchi, UAlberta

Funding: \$300,000/3 years

Carbon mineralization in mine waste

Principal Investigators: Gregory Dipple, UBC; Ulrich Mayer, UBC; Gordon Southam, UWO; Michael Hitch, UBC

Funding: \$120,000/2 years

CO₂ for CCS from fuel cells

Principal Investigators: Viola Birss, UCalgary and Olivera Kesler, UToronto

Funding: \$280,000/3 years

Storage Geomechanics and Reservoir Modeling

Principal Investigators: Christopher Hawkes, USaskatchewan; Ron Wong, UCalgary; Yuri Leonenko, UWaterloo; Antonin Settari, UCalgary

Funding: \$633,000/3 years

Integrated Gravimetric and Geodetic Monitoring of Geological CO₂ Storage

Principal Investigators: Jeong Woo Kim, UCalgary; Michael Sideris, UCalgary; Spiros Pagiatakis, York U; James Merriam, USaskatchewan; Joseph Henton, National Resources Canada; Patrick Wu, UCalgary; Wooil Moon, UManitoba; Michael Collins, UCalgary; Bernhard Mayer, UCalgary

Funding: \$704,600/3 years

Innovative Approaches to Microseismic monitoring of Underground CO₂ Injection:**Seismic Interferometry and Ultralow Frequency Deformation Events**

Principal Investigators: Mirko Van der Baan, UAlberta; David Eaton, UCalgary; Ted Urbancic, Engineering Seismology Group

Funding: \$328,950/3 years

Distributed All-Optical CO₂ Sensing for Field-Scale Subsurface Carbon Management

Principal Investigators: Peter Wild, UVictoria; David Risk, St. Francis Xavier U; David Sinton, UVictoria; Martin Jun, UVictoria; Don Lawton, UCalgary

Funding: \$983,578/3 years

Secure Storage of Impure CO₂ in the Form of Solid Hydrate in Depleted Gas Pools in Northern Alberta

Principal Investigators: Hassan Hassanzadeh, UCalgary; Mehran Pooladi-Darvish, UCalgary; Peter Englezos, UBC; Shahin Dashtgard, Simon Fraser U

Funding: \$310,450/2 years

THEME D - ACCELERATING APPROPRIATE DEPLOYMENT OF LOW CARBON EMISSION TECHNOLOGIES

The human side of technology deployment must be understood and addressed in order for greenhouse-gas reducing innovations to be successful. Research into the social sciences, business and economics will help inform policy-makers and industry preparing to put new technologies into action.

Assessing the potential of low carbon fossil-fuel/derived technologies: A life cycle environmental and techno-economic evaluation of the oil sands

Principal Investigators: Heather MacLean, UToronto; Joule Bergerson, UCalgary; David Keith, UCalgary

Funding: \$337,000/3 years

Assessing the potential of low carbon fossil fuel / derived technologies: developing modeling and analytical tools for assessing the potential contribution of carbon management to Canadian GHG emission reduction

Principal Investigators: Mark Jaccard, Simon FraserU; John Nyboer, Simon FraserU; James Meadowcroft, CarletonU

Funding: \$375,000/3 years

Governance innovation and the transition to a low carbon economy

Principal Investigators: James Meadowcroft, CarletonU; Doug Macdonald, UToronto; Glen Toner, CarletonU

Funding: \$250,000/3 years

National and international legal and regulatory framework for carbon management

Principal Investigators: Nigel Bankes, UCalgary; Meinhard Doelle, DalhousieU; Shi-Ling Hsu, UBC; Shaun Fluker, UCalgary

Funding: \$360,000/3 years

Carbon Policy Uncertainty, Investment Decisions, and Commercial Feasibility of Carbon Capture and Storage Technology

Principal Investigators: Janne Kettunen, UCalgary; Jared Carbone, UCalgary; Mark Jaccard, Simon Fraser U

Funding: \$100,000/1 year

Towards Effective Engagement: Assessing Stakeholder Attitudes and Public Controversy

Surrounding Greenhouse Gas Mitigation Energy Systems

Principal Investigators: Edna Einsiedel, UCalgary; Stephan Hill, Trent U; Karena Shaw, UVictoria; Clare Demerse, Pembina Institute

Funding: \$350,000/3 years

Understanding Barriers to Low-Carbon Technology Investments in the Oil and Gas Industry: A Managerial Cognition Perspective

Principal Investigators: Natalie Slawinski, Memorial U of Newfoundland; Pratima Bansal, U of Western Ontario; Frances Bowen, UCalgary

Funding: \$151,500/2 years

Risk Assessment and Management of Carbon Capture and Storage in a Canadian Context

Principal Investigators: Daniel Krewski, UOttawa; Mamadou Fall, UOttawa; Jatin Nathwani, UWaterloo; Robert Gracie, UWaterloo; L. Shawn Matott, UWaterloo; James Craig, UWaterloo; Maurice Dusseault, UWaterloo; Joseph Arvai, UCalgary

Funding: \$930,000/3 years

A Comparative Life Cycle Assessment of Three Technologies: Post-combustion and Pre-combustion Capture and Oxyfuel, Combined with CO₂-EOR and Storage

Principal Investigators: Paitoon Tontiwachwuthikul, U of Regina; Christine Chan, U of Regina; Malcolm Wilson, U of Regina; Anastassia Manuilova, U of Regina; Darryl Dormuth, National Research Council

Funding: \$200,250/2 years

Achieving a low-carbon, globally competitive energy economy: Removing barriers and cultivating enablers to innovation in Canada's oil sands and heavy oil industry

Principal Investigators: Harrie Vredenburg, UCalgary; Luis Escobar, ULethbridge; Adam Fremeth, UWestern Ontario; Louis Rinfret, UQuebec (Trios-Riveires); Nancy Higginson, UCalgary

Funding: \$442,800/3 years

Managing the leak? A study of media, risk and crisis communication associated with the report of leakage at the Weyburn CCS facility.

Project investigators: James Meadowcroft, Carleton U; Edna Einsiedel, UCalgary

Funding: \$30,000/1 year