

Background

Theme A: Recovery, Processing and Capture

Summary

Theme A focuses on new technologies to improve the efficient use of carbon in the fossil fuel industry. Work in this theme also concentrates on the effective and economic capture of CO₂ from within power plants, material process plants, and at large scale directly from the atmosphere. It emphasizes Canadian expertise in gasification, catalysis and subsurface engineering. It looks at enhanced processes for more efficient recovery of coal, petroleum and natural gas. It also seeks to incorporate non-fossil carbon (e.g. biomass) into process streams and aims to innovate on bitumen processing to fuels.

Leadership

Dr. John Grace, Professor and Canada Research Chair in Clean Energy Processes, University of British Columbia

Dr. Grace's primary research interests are concerned with fluidized bed reactors and related multi-phase systems. Fluidized beds are used for a wide variety of chemical and physical purposes, for example in catalytic, gas-solid and three-phase reactors, drying, coating and thermal treatment.

Working closely with graduate students, fellow faculty members and other research associates, Dr. Grace has investigated a wide range of problems which are fundamental in nature, but which have practical application. Some of the topics studied in the recent past include transient forces on immersed tubes, heat transfer in the freeboard region of bubbling beds and to the walls of circulating fluidized beds, tube erosion, hydrodynamics and mixing in high velocity beds, effects of particle size distribution, reactor modelling, scale-up issues and attrition. Applications studied include fluidized bed combustion and gasification of biomass and coal, a novel process for steam reforming of natural gas to make pure hydrogen, greenhouse gas mitigation, thermal energy storage, drying of wood wafers.

Dr. Grace is involved, in collaboration with researchers from Civil Engineering and the Department of Fisheries and Oceans, with research on the factors leading to polybrominated diethyl ethers and other brominated flame retardants being dispersed in the environment.

Round 1 Funded Projects:

In 2010, CMC funded 17 Canadian research projects. Theme A funded projects were:

- Integrated Fluidized Bed Gasification with Looping CO₂ Capture
- Fluidized Bed Catalytic Gasification of Low-Grade Coals and Petcoke
- Rapid Routes to Carbon-Efficient Recovery of Bitumen & Heavy Oil
- Direct Capture of CO₂ from Ambient Air
- Hydrogen Production and Waste Processing