Fluidized Bed Combustion

# ADVANCED COMBUSTION TECHNOLOGIES

## FLUIDIZED BED COMBUSTION

CLEAN ENERGY TECHNOLOGIES

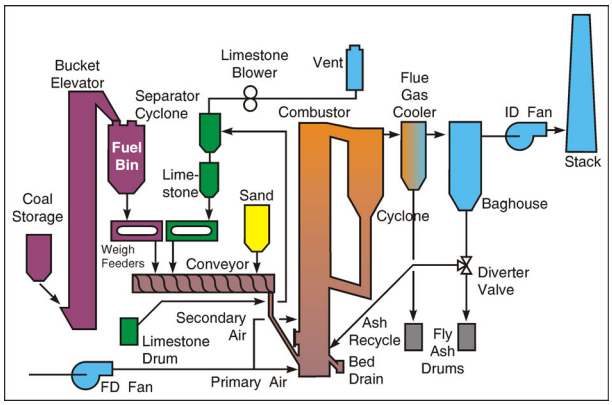
*Fluidized Bed Combustion (FBC) is one of the most promising energy conversion options available today. FBC combines high efficiency combustion of low-grade fuels with reduced emissions of sulphur and nitrogen oxides ($SO_x$ and $NO_x$). CETC's test facilities are available to assist in the development of systems to burn low-grade fuels in an efficient and environmentally friendly manner.*

### CETC-O'S Research Services

CETC-O's research services are playing a leading role in developing potential applications of fluidized-bed combustion. CETC-O offers these specialized services to assist utilities and other industrial agencies in:

- planning and running of a full-fledged demonstration program or in specific areas of testing such as combustion product analysis;
- developing mathematical models to pilot-scale combustion tests with specific feedstocks;
- generating data about the combustion performance of high-sulphur coals from eastern Canada, high-moisture plains coals, high-ash rejects from western Canadian coal washeries, coke from oil sands upgraders and pitch residues from hydrocracking; and
- assessing the feasibility of applying fluidized bed combustion technology to specific industrial sites.

Tighter environmental controls on the disposal of wastes have resulted in increased market demands to evaluate the combustion of waste products, including paper sludge, using FBC technology.




*CETC-O's Circulating Fluidized Bed Combustor*

FBC's major potential applications in Canada are in:

- the utilization of eastern Canadian, high-sulphur coals for electricity generation;
- the utilization of high-sulphur pitch and coke residues from heavy oil/oil sands upgrading;
- the utilization of coal washery rejects;
- co-firing of wood waste and coal in the forest products industry;
- incineration of contaminated solid and liquid wastes; and
- co-firing of pulp and paper wastes or municipal solid waste, with coal or other fuels for energy recovery and disposal of wastes.

FBC technology is well suited for burning these low-grade fuels and wastes, because it offers long combustion residence times, lower temperatures to control $NO_x$ formation, and the flexibility to accept a wide range of fuel forms and sorbents in sand or limestone beds.

Canada

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## R&D Facilities

CETC-O's laboratory has an extensive inventory of the specialized equipment necessary for FBC research:

- a pilot-scale circulating fluidized-bed combustor with a bed area of about 0.12 $m^2$;
  - equipped to fire solid and liquid fuels (with and without sorbents for capturing sulphur compounds)
  - thoroughly instrumented to monitor pollutant formation, combustion performance, heat transfer characteristics, and metal wastage of heat transfer surfaces by corrosion/erosion mechanisms
- a mini-pilot-scale, batch-fed, 10 cm diameter CFB facility, for ranking the reactivity of solid biomass and fossil fuels and for studying fundamental combustion mechanisms;
- a bench-scale facility for determining sulphur capture characteristics of sorbents; and
- a pilot-scale (0.78 $m^2$ ) bubbling bed combustor to study corrosion, erosion and the fate of trace metals in feedstocks.

## Collaborative Accomplishments

A variety of arrangements are available to assist industry in the application of this technology.

In past years, in cooperation with a maritime power-generating utility and the Department of National Defence, CETC-O has set up two demonstration-scale FBC units:

- 22 MWt circulating FBC plant at Chatham, NB; and
- 15 MWt bubbling FBC plant at Summerside, PEI

More recently, CETC-O has cooperated with :

- a major Tar Sands operator in the development of an improved bitumen thermal cracking process;
- a major nickel producer in testing of a novel liquid fuel combustion method; and
- various partners in the development of a number of sorbent reactivation processes.

## Your Invitation to Work with Us

At CETC-O, development of fluidized bed combustion technology is supported by in-house pilot-scale research, by contract research at both fundamental and pilot-scale levels, and by technical support of major demonstration projects.

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