cancarb

Waste Heat Recovery Power Plant

The Cancarb power facility captures large volumes of waste heat from the adjacent thermal carbon black operation to produce power for consumers in southern Alberta.

Cancarb produces carbon black by cracking natural gas into its constituent elements - carbon and hydrogen - using 10 high temperature reactors. Carbon is extracted and sold, while the hydrogen gas, called reform gas, is used as a fuel to heat the reactors for the production cycle. The reactors reach temperatures of 1100 to 1500 celsius releasing hot exhaust gases that were formerly vented to the atmosphere.

These exhaust gases are now captured and used to produce steam that drives an electric generator. This super-efficient use of the hot exhaust results in the production of zero-emissions power.

Facility Highlights

Configuration:
Waste heat recovery power plant

Location:
Adjacent to Cancarb's thermal carbon black facility, Medicine Hat, AB.

In-Service Date:
Feb. 15, 2001

Capacity:
From process waste heat
28 megawatts (MW)
From natural gas duct burner
13 megawatts (MW)

Environmental Features:
Makes use of a pre-existing waste heat stream. Particulate emissions have been reduced. Supplementary natural gas is burned in a low emissions burner.

Primary Customers:
City of Medicine Hat,
Merchant Market

Fuel:
Waste heat and natural gas

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The waste heat recovery plant is configured around a single Foster Wheeler Waste Heat Recovery Steam Generator (WHRSG) and a Siemens HNK 63/3.5 steam turbine generator. The high temperature waste gas from the Cancarb carbon black process, supplemented when economically viable by a natural gas-fired duct burner, passes through the WHRSG to produce high-pressure, superheated steam.

The high-pressure steam is directed to a condensing steam turbine which generates electricity onto the City of Medicine Hat's electrical grid. This turbine also allows for the extraction of medium-pressure steam for the Cancarb process, and low-pressure steam for the power plant.

The power plant provides 28 MWs of net power from waste heat to the City of Medicine Hat. On occasion, an additional 13 MWs of power from a natural gas duct burner is sold into the Merchant Power market. The power plant is monitored and operated using a stand-alone Distributed Control System with control capability from the plant's control room. The plant is designed to operate at full load, 24 hours per day, year-round, except for short periods of planned maintenance.

The power plant's operations benefit the local economy through the employment of seven people and annual expenditures of approximately $2.5 million. Additional skilled employment is created through contracted maintenance activities provided by the carbon black plant and third-party contractors. By generating electricity from an existing industrial waste product (in this case, heat), the Cancarb plant provides for 28 MWs of environmentally responsible and competitively priced power to residents of the City of Medicine Hat.

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