



## COMMUNITY ENERGY PLANNING

### CLEAN ENERGY TECHNOLOGIES

## CORNWALL, ONTARIO DISTRICT HEATING SYSTEM

### Utilization of Local Energy Sources

*Is your community increasingly concerned about high fuel costs, dependence on imported energy supply and the environmental effects of its energy choices? CanmetÉNERGIE's Community Planning Group can help your community meet its energy needs more efficiently and cost-effectively. This fact sheet is one in a series of case studies highlighting how our group can help you identify and develop opportunities for the use of district heating and cooling, combined heat and power, waste heat recovery and local renewable energy sources.*

The city of Cornwall is located in Eastern Ontario on the banks of the St. Lawrence River and has a population of 47,403 inhabitants. Cornwall has never been connected to the Ontario hydro Grid and operates on an independent electrical system that purchases energy from various suppliers in Ontario, Quebec and New York. Historically, the electricity rates in Cornwall have been about 20% less than the provincial average.

Cornwall Electric, concerned about its dependence on an independent energy supply, built its own power plant which generates electricity at a competitive rate, adds stability to the system and minimizes negative environmental impacts.

### The System

In 1995, CDH District Heating Limited – a subsidiary of Cornwall Electric – opened the first municipally-owned hot water district heating/cogeneration system in Canada. Two "lean burn" natural gas reciprocating engines produce 5 MWe of base load electricity into the Cornwall grid and 7 MWth of heat

to the district heating system. The maximum supply temperature is 120°C and the maximum set pressure is 1,585 kPa. Thermally, the plant has two volume coil tube boilers providing backup and peaking capability. Electrically, the plant is backed up by the Cornwall Electric distribution grid. The Cornwall system has a thermal efficiency which approaches 90% during winter compared to approximately 35% efficiency for conventional electric only generating plants. The hot water is transported from the system to customers through pre-insulated direct-buried pipes. The unique design of the pipe allowed them to be buried cold and as a result of heat expansion, a bellows type expansion joint in the pipes closes once the pipes are put in service. No preheating is required for this installation. This is very important since the 4.5 kilometre distribution network is going through a residential area. Under normal operation the plant is unmanned. This facility comprised fibre optic communications and pre-insulated pipe technology



*Heat Exchanger at La Citadelle High School*

imported from Europe. In order to achieve low NO<sub>x</sub> emissions and good fuel efficiency, the “lean burn” engines make extensive use of high-speed computer technology.

Since the plant is located less than 15 meters from the nearest home, its design had to fit aesthetically into the residential neighborhood and limit the transmission of noise and vibrations. The Cornwall system consists of three buildings, one inside of the other each sitting on separate sets of piles. Each shell is separated below ground from the other by layers of Styrofoam. No structural members were permitted to go from one shell to another and the engines themselves were mounted on springs on independent structural pads. The result is that, outside the building, the engine noise of 106 dB cannot be heard.

The Cornwall district heating/cogeneration system heats approximately 14 buildings, including hospitals, schools, recreational buildings, a municipal library, a senior citizens' residence, an apartment building and a government office building. The system generates about 4% of the city's electrical energy.

### Benefits of District Energy

- The Cornwall system replaced numerous fossil-fuel fired boilers.
- The combined production of heat and power has reduced fuel consumption by close to 30%.
- Cornwall Electric has lowered its dependency on outside energy suppliers and maintained its low electricity rates.
- Local jobs were created for the construction and maintenance of the plant.

### Key Partners

- Cornwall Electric.
- Enbridge Consumers Gas Energy Inc.
- Natural Resources Canada's CanmetENERGY



*Boiler Room & Controls*

### For Further Information Please Contact:

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