

Canada



CETC

CANMET ENERGY TECHNOLOGY CENTRE

# SUSTAINABLE BUILDINGS AND COMMUNITIES GROUP COMMUNITY ENERGY SYSTEMS

#### **CLEAN ENERGY TECHNOLOGIES**

### INTEGRATED ENERGY SOLUTIONS FOR COMMUNITIES

#### COMMUNITY ENERGY SYSTEMS

A community energy system, or district energy system, supplies heating, cooling and power to multiple buildings from a centralized plant or from several interconnected but distributed plants. The system is comprised of pipes, heating equipment, cooling equipment, heat exchangers, as well as the social infrastructure for management and settlement.

The benefits of this type of system over current building-based systems include increased efficiencies due to economies of scale, reduced operating costs, increased reliability, reduced emissions such as greenhouse gases, and a broader choice of fuels including renewable energy and low grade heat.

### EARLY EXPERIENCE AND FUTURE DIRECTIONS

District energy systems in Canada originated through centralized steam plants where boilers provided steam to nearby commercial buildings. The economic justification for this approach was the availability of less expensive fuel to plant owners, which was not available to individual building owners. However, widespread access to natural gas removed this advantage and saw community energy systems become providers of service rather than simply heating and cooling.

Recent systems have been designed to efficiently supply hot water at around 90 degrees Celsius, a lower temperature than traditional systems. This change has increased the practicality and reliability of these systems allowing for the use of lower grade heat sources available within the community.





Community energy systems are increasingly incorporating renewable and alternative energy sources. These include biomass, landfill gas, industrial waste heat, sewer water, ground-source heat pumps, and solar thermal collection and storage.

This approach to community energy has demonstrated far greater utility than simply efficiency and fuel cost reduction. Positioned as an integrated supply and energy management system for a community, supplies of excess energy may be provided to the network while consumers in need of energy are drawn from the network. The result is an increased synergy and efficiency of energy use throughout the community that maximizes local resources.



# CANADIAN SUCCESS STORIES

Investment in community energy systems is increasing in Canada. It is estimated that between 2006 and 2009, over \$90 million will be invested in new and existing plant expansions.

The integration of municipal waste and energy systems is resolving many municipal issues while saving money. Charlottetown, PEI uses wood waste and municipal waste to heat over 80 buildings, a university and a hospital.

Some cities are taking integration further by connecting to the electrical grid, enabling combined heat and power (CHP) for efficient generation of electrical power while meeting the thermal demands for hot water supply. Hamilton, Ontario, for example, uses CHP to provide heating to its downtown core and electricity to its City Hall, keeping the lights on during recent electrical blackouts. Winnipeg, Manitoba is studying a gas-free development using ground source heat pumps. And Revelstoke, British Columbia has developed a wood waste fired district energy system that links together industry and the community.

Energy expenditures constitute a major loss of community wealth while little physical benefit is seen within the community. Markham, Ontario recognizes that the use of local resources retains wealth within the community. The Markham District Energy Corporation is recognized as an economic development tool, successfully attracting business and development to the area with the prospect of stabilized heating and cooling costs.

## CETC AND COMMUNITY ENERGY SYSTEMS

The CANMET Energy Technology Centre (CETC) promotes and supports the development of community energy systems as part of a municipality's overall sustainable community strategy. Through research, demonstration and deployment activities CETC facilitates community energy planning and development practices across Canada.

CETC's Sustainable Buildings and Communities Group offers stakeholders a range of expertise and tools for community energy planning and technologies, housing and buildings, integrated energy systems and distributed generation, and renewable energy technology. From the planning phase to post-development performance measurement activities, CETC can assist existing and new municipalities achieve successful community energy systems.



To find out how CETC can assist with your community energy system project, please visit <u>www.sbc.nrcan.gc.ca</u> or contact Ken Church (<u>kchurch@nrcan.gc.ca</u>; (613) 947-8952) or Roger Senecal (<u>rsenecal@nrcan.gc.ca</u>; (613) 990-2591) of the Community Energy Planning Group.