New wastewater treatment systems include public resource recovery

Communities across Canada and North America are including new technologies to recover heat, solid material and/or energy from water processing as part of upgrading wastewater treatment facilities. And despite the repeated rhetoric that we need to privatize in order to get innovation, most of these are publicly operated.

Wastewater treatment has important environmental and social impacts, which is why the majority of communities across North America have chosen to keep the service publicly controlled and operated. In the United States there are over 16,000 such facilities, including some of the world's largest. What is clear from the following examples is that public operation can easily capitalize on resource recovery opportunities and that these opportunities provide both financial and environmental savings.

Whistler Wastewater Treatment Plant, Whistler, BC

The Resort Municipality of Whistler (RMOW) began construction on the $51.5 million dollar upgrade of their aging wastewater treatment facility in 2008. After considering a public-private partnership, the RMOW chose to pursue traditional procurement methods. The move proved extremely beneficial, giving the RMOW the flexibility and control to introduce some of Canada's most advanced resource recovery systems. In addition, the Resort Municipality was able to ensure that all upgrades and new facilities conformed to the area's environmental policies and were constructed to conform to LEED standards.

The plant's defining feature is an ultra-efficient direct energy system used to provide space and water heating to the Olympic Athlete's Village and new Cheakamus Canyon Neighbourhood. The efficiency of this system was recognised by the Canadian Association of Municipal Administrators, who awarded Whistler its Environmental Award in 2009. The system also earned the Resort Municipality the coveted Community Energy Association's Energy Action Award for Community Planning and Development in 2008.

The Whistler system extracts low-temperature ambient heat from treated wastewater and provides 95% of heating and cooling needs of approximately 2200 homes, covering 85 000 square meters of space. In doing so, green house gas emissions are 90%-95% less than standard heating/cooling system. After less than a year of operation, the system is already garnering financial savings and is projected to save money in the long term.

The treatment plant does more than reduce GHG emissions and energy costs. To further reduce the Resort Municipality's environmental footprint, the facility is combined with a state of the art composting system which transforms biosolids, residential food wastes and wood chips into usable soil amendments. The Resort plans to sell the Class A compost. Alternatively, compost can be dried and cured for 2-3 months to produce biofuels for sale to commercial operators.

The composter currently handles 50 tonnes of waste a day. At this level it has the potential to divert 5000 tonnes annually, or 20% of the Resort Municipality's waste.

False Creek Energy Centre – Vancouver, British Columbia
On January 14, 2010 the City of Vancouver became the first major city in North America's to use wastewater as the primary source to produce heat and hot water in an urban core. The False Creek Energy Centre provides 70% of the energy requirements for 2800 residents of the Olympic Athlete's Village, only steps away from the metropolitan downtown. Future residential and business developments in the area will be connected to the energy center, which has the capacity to serve up to 16,000 residents and businesses. The system will reduce greenhouse gas emissions by 50% compared to conventional energy production methods.

The Energy Centre cost the City a total of $30 million, portions of which were funded through the Canadian federal government's Gas Tax Fund and the Federation of Canadian Municipalities' Green Municipal Fund.

The system works by pumping sewage into the facility, where heat is extracted then used to heat water circulated through the buildings. The cold sewage is then pumped into the city's collection system and taken to the Iona treatment plant in nearby Richmond.

Union of British Columbia Municipality president Harry Nyce applauded Vancouver's system saying, "This project may lead to a breakthrough in technology that could be used in projects throughout the province." MLA Margaret MacDiarmid, on behalf of Minister Bill Bennett echoed this sentiment: "The Province is embracing clean and renewable energy as a way to reduce greenhouse gas emissions and build a greener economy. Cutting-edge projects like this create a strong foundation for sustainable growth and development and minimize our impact on the environment."

Point Loma Wastewater Treatment Plant – San Diego, California
Opened in 1963, the PLWTP treats approximately 175 million gallons of wastewater per day and services more than 2.2 million San Diego residents. It is wholly owned and operated by The City of San Diego.

It is located on the California coast just south of the city's major metropolitan center. Treated wastewater is discharged directly into the Pacific Ocean via a 4.5 mile long outfall pipe.

The plant is designed to capture the methane gas produced during the solid waste digestion process. A portion of the gas is removed and used to power two Caterpillar engines in the plant's Gas Utilization Facility. This allows the plant to be self-sufficient in energy. Excess energy is sold into the local electrical grid, further offsetting the energy costs at pump stations around the city. Additional energy is produced by a hydroelectric plant driven by effluent dropping 90 feet along the outfall pipe.

The city's wastewater branch is currently undertaking a new "Beneficial Use of Digester Gas Project" through which it will sell excess gas to a private operator, Biofuels Energy LLC. The private contractor will truck the gas to offsite fuel cells where it will be converted into "ultra-clean" electricity. This new energy will be used to power the city's South Bay Water Reclamation Plant and plans are being developed to use future cells at QUALCOMM Stadium, the University of California San Diego and the San Diego Zoo.

Energy co-generation currently nets the city over $1.7 million a year. The additional fuel cell contract is expected to increase revenues by $2.6 million and save the City $780 000 in energy costs. Resource recovery of this type also is forecast to reduce the City's carbon emissions by 7000 tones per year.

Hyperion Treatment Plant, Los Angeles, California

The Hyperion Treatment Plant is Los Angeles' oldest and largest wastewater facility and has been operating since 1894. Over the last century the plant has been upgraded to capitalize on new technology, most recently to recover resources used for energy generation and agriculture. Over the last twenty years the plant has won 27 awards for the plant's safety and design and the quality of the effluent.

As of November 2009, the plant recycled 650 tons of biosolids a year which it sends to local farms to use as fertilizer and soil amendments. Methane produced in the digesters is shipped to a nearby power plant. In exchange for the gas, the city receives power at a reduced rate. The city estimates that 8 million cubic feet of biogas is converted to electricity per day.

The plant is wholly owned by the City of Los Angeles and operated by the City of Los Angeles Department of Public Works.

Joint Water Pollution Control Plant, Los Angeles County Sanitation District

The JWPCP is one of the largest wastewater treatment plants in the world. The facility provides secondary and tertiary treatment for approximately 300 million gallons of water a day. Biosolids by-products are collected and transported off-site for composting, after which they are used as soil amendments for city and agricultural users. Methane by-products are reused in the Plant to power the Total Energy Facility. As a result, the JWPCP is able to provide almost all its own energy needs.

The JWPCP has won numerous awards for the quality of operations, including the US Environmental Protection Agency's National Clean Water Act Recognition Award. The Clean Water Act highlights innovative and outstanding publicly operated systems. There are over 16,000 such facilities in the United States. The JWPCP earned the honour for demonstrating creativity in pollution prevention, process control and field monitoring and biosolids management.

San Bernardino Water Reclamation Plant, San Bernardino, California

The WRP services the communities in California's eastern Inland Empire. The plant was recently upgraded to include a co-generation facility to produce energy from methane gas. The facility powers two 750-watt generators which supply the WRP's electricity needs – thereby reducing costs and GHG emissions. The co-generation facility is estimated to save the region $1000 per day.

City of Boulder Wastewater Treatment Plant, Boulder, Colorado
This plant uses methane by-products to fulfill the plant's heating and energy needs. Biosolids are also composted and sold as valuable agricultural conditioners and fertilizers. The City of Boulder is the sole owner/operator of the plant.

Deer Island Sewage Treatment Plant, Winthrop, Massachusetts
The Deer Island Sewage Treatment Plant treats an average of 360 million gallons of water each day from 43 communities in the greater Boston area. It is also one of the largest electricity users in the Northeast. Despite its needs, the plant is able to supply 20% of its electricity through a combination of methane gas extraction and wind turbine. The facility is on track to reach its goal of increasing self-sufficiency to 30% by 2020.

Energy is produced from waste material in two ways. First, hydroelectricity is generated as the treated wastewater drops from the plant into the outfall tunnel. This produces over 5 million kilowatt hours of electricity and saves the plant $500 000 annually.

Second, methane by-products are converted into steam energy. This saves the facility another $15 million annually in fuel costs, and ongoing modifications are expected to provide a further net savings of $500 000 per year. The steam-generated electricity also qualifies as renewable energy under the Massachusetts RPS Program. Consequently, the facility is able to sell carbon/power shares to other companies. This generates a further $1 million annually.

Excess electricity is sold into the regional grid and has been purchased competitively since 2001. In addition, the Plant has the ability to increase onsite electricity generation during peak times and thereby relieve pressure on the regional system and avoid the high rates usually charged during such periods.

Helena Wastewater Treatment Facility, Helena, Montana
The Helena Wastewater Treatment Facility threats 2.68 million gallons of wastewater per day, removing between 600 and 800 tons of solids. These solids are then used for compost of direct land application. The treated discharge water is disinfected with ultra-violet light and reused in the ***treatment plant*** for all irrigation and processing water needs. Methane gas released from solid digestion is used to meet some of the plant's heating and energy requirements.

Rocky River Regional Wastewater Treatment Plant, Concord, North Carolina
The Rocky River Regional Wastewater Treatment Plant is owned and operated by the Water and Sewer Authority of Cabarrus County. Over the last ten years it has been continuously upgraded to maximize heat and energy savings. It does so at nine different stages throughout water processing. Among these is a state of the art heat recovery system to extract heat and warm plant buildings. It is also one of the few plants in the United States to preheat all incinerator combustion air in a Flue Gas Heath Exchanger, which nearly eliminates fuel needs for incineration.