

AWESOME SCIENCE

Cooling Downtown Toronto with Deep Lake Water

In the middle of the day in summer, temperatures in Toronto (Figure 1) can reach 40 °C. As a result, air conditioners run all day to provide a comfortable environment for people who live and work downtown in tall buildings. Most of these buildings do not have windows that open. Air conditioning systems are expensive and require lots of electricity to operate. The City of Toronto has recently installed a new air conditioning system called Enwave. Enwave is a Deep Lake Water Cooling System that uses cool water from Lake Ontario to remove thermal energy from some buildings in the downtown core.



Figure 1 Downtown Toronto

Cold water is more dense than warm water. During the winter months, cold, dense water on the surface of Lake Ontario sinks. Warmer, less dense water from below the cold water moves toward the surface to take its place. As a result of this, there is a layer of cold water deep in the lake in the spring and summer months, when city temperatures become very warm.

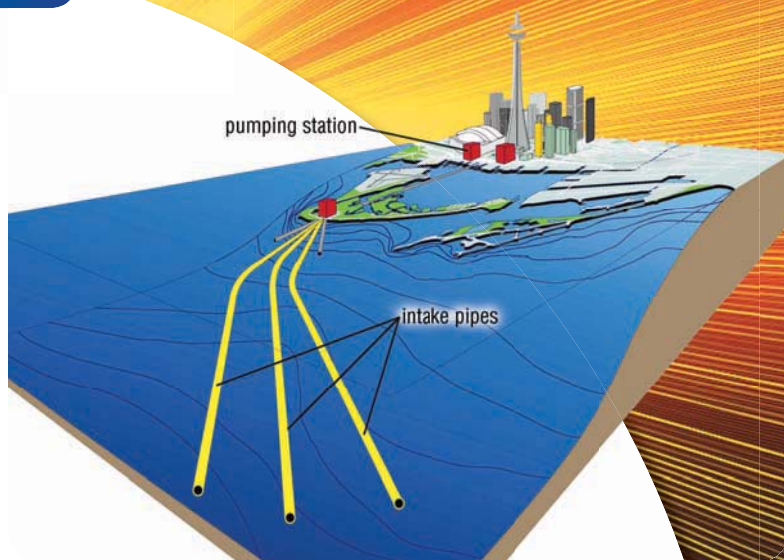


Figure 2 The three intake pipes of Enwave collect water from far and deep in Lake Ontario.

Enwave has three large intake pipes that extend 5 km off the shore of Lake Ontario and 83 m below the surface (Figure 2). Here, the temperature of the lake water is 4 °C all summer long.

The cool water is transported through the pipes to a pumping station that uses some of the cold lake water to cool buildings. The rest of the water is used for normal distribution in the city's water supply.

In 2007, 27 buildings, including the Air Canada Centre, the Metro Toronto Convention Centre, and the TD Centre, were already using the Enwave system. Eventually, Enwave will cool up to 100 large buildings in downtown Toronto.

The Enwave system uses 90 % less electricity than the air conditioning systems that it replaces. This results in millions of dollars in financial savings. The Enwave system also produces far lower greenhouse gas emissions due to reduced electricity consumption.

To learn more about Enwave,

Go to Nelson Science

