

A LAKE OF ENERGY SAVINGS

AN ENERGY SERVICES
FACILITY CASE STUDY



The Enwave Deep Lake Water Cooling System provides cooling to some of Toronto's largest office buildings, saving more than 61 Mwh of electricity annually. This reduction in energy usage and GHG emissions is equivalent to taking 15,800 cars off the road for a year.

The choice of Vertical In-Line pumps reduced the installed cost by more than \$120,000 and reduced the 5-year maintenance costs by over \$3,500.

Enwave Deep Lake Water Cooling System

Armstrong Vertical In-Line Pumps are a high efficiency, low maintenance solution for commercial cooling. The vertical in-line orientation reduces the need for floor space, and allows operators to maintain mechanical seal without removing the motor, or disturbing shaft alignment.

To meet the specific flow and head requirements of the Deep Lake Water Cooling project, Armstrong designed a new size of the existing 4300 VIL pump.

Background

Deep Lake Water Cooling (DLWC) is an innovative cooling system that provides an alternative to conventional air conditioning to cool 140 buildings in Toronto's downtown core.

The idea for DLWC dates back to 1982 when the Canada Mortgage and Housing Corporation presented results of a study describing 'the concept of pumping water from the bed of Lake Ontario through a hydraulic heat transfer system to cool major downtown buildings.'

In 1987, TDH, the company that would eventually become Enwave, opened the chilled water plant in the south building of the Metro Toronto Convention Centre. In 1992 the design of phase II of DLWC was finalized, with plans to expand the chilled water distribution system north to serve a larger section of the downtown core. The expansion project called for the addition of 16 new pumps to draw the lake water and serve the heat exchangers.

To meet the specific flow and head requirements of the project, Armstrong designed a new size of the existing 4300 VIL pump. The new 16x16x15 VIL with 350hp motors could provide high flow rates (10000 gpm) at low head (86 feet).

Benefits

Toronto's Deep Lake Water Cooling system has become an example of efficient, renewable, clean cooling. The DLWC system:

- Eliminates 79,000 tonnes of carbon dioxide annually
- Eliminates the need for 45,000 kg of polluting CFC refrigerants.

- Eliminates 145 tonnes of Nitrogen Oxide
- Eliminates 318 tonnes of Sulphur Oxide

Because the DLWC concept was still new at the time, design engineers could not foresee the actual operating conditions of the pumps. It later turned out that the system flow requirement was forcing the pumps to operate at a duty point that was substantially different from the originally specified performance curve. Responding to the customer's request, Armstrong redesigned the pump impellers for higher pressure, lower flow operation. With that correction in place, the pumps have operated flawlessly since 1992, with very few maintenance requirements.

Tech-info

The DLWC system saves more than 61 Mwh of electricity annually - the equivalent power demand of 6,800 homes. This reduction in electricity demand relieves the pressure on an over-burdened electrical grid in the downtown core and eliminates the need to install expensive cooling equipment in each of the 140 buildings served.

Armstrong equipment

- 16 Vertical In-Line Pumps 16x16x15 with 350hp motors and custom impellers
- 7 duty + 1 standby for domestic water
- 7 duty + 1 standby for distribution of chilled water around city buildings

TORONTO
+1 416 755 2291

BUFFALO
+1 716 693 8813

BIRMINGHAM
+44 (0) 8444 145 145

MANCHESTER
+44 (0) 8444 145 145

BANGALORE
+91 (0) 80 4906 3555

SHANGHAI
+86 21 3756 6696