



The Canada Centre for Inland Waters— Building on Success

1 Background



Figure 1. Canada's National Water Research Institute.

Environment Canada's National Water Research Institute (NWRI, Figure 1) is Canada's pre-eminent freshwater research facility. One of NWRI's two main centers, the Canada Centre for Inland Waters (CCIW), is home to a successful Federal Buildings Initiative energy efficiency improvement project. Located on the shore of Lake Ontario in Burlington, Ontario, CCIW is one of the world's leading water-research centers. The CCIW complex consists of six interconnected buildings, most built in the early 1970s, with a total of almost 50 000 m² of floor space.

An energy efficiency retrofit of CCIW was first proposed in 1993, in response to the pressing need to control energy costs, upgrade equipment and installations, and reduce the environmental impact of operations. At that time, about 50 percent of CCIW's total annual operating and maintenance costs were being spent on electricity, gas and water – totaling \$1.5 million a year.

Faced with the challenge of maximizing operational efficiencies, Dave Gamache, NWRI's Manager of Building and Property Technical Services at CCIW, contacted the Federal Buildings Initiative, a voluntary program of Natural Resources Canada's (NRCan's) Office of Energy Efficiency.

The Federal Buildings Initiative (FBI) of NRCan's Office of Energy Efficiency aims at improving energy efficiency, cutting your organization's energy costs and reducing greenhouse gas (GHG) emissions that contribute to climate change. This initiative offers a comprehensive approach for improving the energy and water efficiency of Federally owned buildings. It enables Federal organizations to use savings from energy efficiency measures to finance the capital costs of building upgrades, retrofits and installations. This savings-financing approach for undertaking energy and water efficiency improvements is referred to as energy performance contracting.

2 The Energy Performance Contract

In 1995, following a competitive tendering process involving five energy service companies (ESCOs) pre-qualified by the Federal Buildings Initiative, CCIW awarded an energy performance contract to Rose Technology (now Cinergy Solutions – Demand Ltd.). The successful ESCO developed its proposal into a detailed feasibility study that outlined the efficiency measures and improvements that would produce the guaranteed energy savings.

Upon acceptance of the feasibility study, the energy savings were put into place. In addition to new equipment and improved technology, CCIW began benefiting immediately from an improved building environment, reduced maintenance, lower emissions from laboratories and access to recapitalization funding. Heightened employee awareness of energy use and efficiency resulted from the creation of a



“Go Green” committee and an e-mail exchange forum. Energy management training was provided to upgrade the skills of building operators and improve the technical performance of the project.

3 Project Results

In May 2003, the energy performance component of the project ended. The project cost of \$7.5 million was paid out of realized energy savings, exceeding original projections for the seven-year efficiency retrofit program. With \$9.1 million in total savings, the project also reduced greenhouse gas (GHG) emissions by 6700 tonnes per year.

The following measures helped the project realize significant energy savings and associated benefits:

- An 800-kilowatt cogeneration unit and a waste-heat-fired boiler were installed in the central plant to improve efficiency and permit main boiler shutdown in the summer months.
- A thorough upgrade to the heating, ventilation and air-conditioning (HVAC) system resulted in improved monitoring capabilities, upgraded laboratory airflow, improved pressurization standards and temperature control, reduced heat loss, lower maintenance costs and improved occupant comfort.
- Installation of T-8 fluorescent tubes and electronic ballasts, “white light” metal halide units, high-efficiency exit signs, lighting control switches and occupancy sensors were among the many electrical retrofit measures.
- Installation of fume hoods with nighttime set-back capabilities reduced emissions and improved the safety of operations.
- In addition to the energy efficiency measures, a waste audit led to the implementation of wet/dry recycling.

Even though research activity has increased at CCIW since the project started, energy consumption has fallen almost 15 percent from baseline levels, and water consumption has dropped 33 percent.

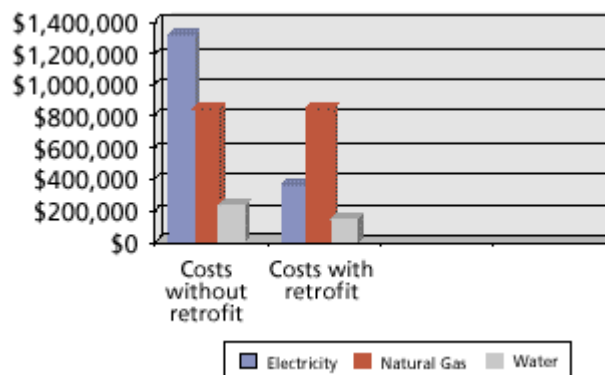


Figure 2. Energy retrofits reduce energy costs.

For the year 2000, the actual costs for electricity, natural gas and water at CCIW are shown on the right. Figure 2 shows the estimated costs for energy and water are illustrated on the left without the efficiency measures being implemented.

Looking back over the experience, Dave Gamache says, “This project demonstrates that environmental improvements to building operations can generate substantial economic savings as well.” As each stage of the project was completed, further potential savings emerged. The initial project was just the first step to new and innovative energy efficiencies.

Since project implementation, new measures have included the construction of a “summer steam line,” allowing the facility to shut the boilers off and to run on a waste heat boiler for the summer months. As well, they installed two solar walls to preheat incoming air, a photovoltaics system to generate electricity, and a living wall. (A living wall is an air biofilter that removes and treats airborne contaminants that can contribute to low-level, negative health effects, such as headaches, asthma,



drowsiness and malaise.) The living wall also offers a pleasing environment for employees who can now enjoy its beauty and fragrance and the sounds of trickling water.

NWRI intends to build on its success with the CCIW project and is now looking at more ways to save money and improve energy efficiency. Among the possibilities being considered are the naturalization of the grounds and the retrofit of the boiler plant to further increase efficiency and reduce GHG emissions.