



E N E R G Y E F F I C I E N C Y



Office of Energy Efficiency  
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Case Studies

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## FEDERAL BUILDINGS INITIATIVE (FBI)

# TARGETING ENERGY SAVINGS AT CANADIAN FORCES BASE GAGETOWN

In early 1995, Major M. Labrecque and his staff at the Base Construction and Engineering Office (BCEO) of CFB Gagetown, New Brunswick, knew that reducing operating costs was urgently required. Although the BCEO was responsible for managing 30 percent more infrastructure than it was in 1992, operations and maintenance budgets had already been reduced and further reductions were planned.

After looking closely at operating costs, it was decided that the Base's annual energy bill of almost \$4 million might be a source of potential savings. There was a problem, however. How could energy efficiency be improved without capital? Major Labrecque turned to NRCan's Federal Buildings Initiative (FBI) for the answer.

### SAVINGS FINANCING HELPS MAKE IT HAPPEN

The FBI offers an innovative approach to updating federal government buildings with energy-saving technologies and practices with no front-end cost. The program uses a "savings financing" mechanism and a comprehensive package of products and support services to reduce energy costs.

For example, before the FBI was implemented, if a decision was made to replace outdated fluorescent lighting with new, energy-efficient lamps and electronic ballasts, the work would have been funded out of the capital budget.

Under the FBI's savings financing arrangement, a pre-qualified energy service company (ESCO) finances the project, supplies and installs the new equipment, and guarantees the savings. The ESCO is then paid an amount equivalent to the energy savings generated by the equipment upgrades until the full cost of the energy efficiency project is recovered.

At no time will the Base pay more than its pre-improvement energy bill and, once the costs of the improvements have been recovered, it will pay considerably less.

### GETTING STARTED

First, reliable baseline data on energy consumption levels and patterns of use were needed for the buildings covered by the project. Such data make it possible to identify the most cost-effective energy-management measures *before* the work is done. The FBI was able to provide CFB Gagetown with advice and guidance on what was needed to complete the detailed baseline report and supplied model bidding documents, model savings financing contracts, and a list of pre-qualified ESCOs that could help.

After following the FBI's tendering procedure, the Enerplan/Rose Group, a joint venture between Enerplan Consultants of Moncton, New Brunswick, and the Rose Technology Group of Toronto, was selected to undertake the energy audit and initial feasibility study. The feasibility study was completed during the summer and autumn of 1996 and, once negotiations were concluded, Defence Construction Canada signed an energy



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performance contract (EPC) with Enerplan/Rose Group on behalf of CFB Gagetown in December 1996.

Under the terms of agreement of the EPC, the Enerplan/Rose Group conducted both the initial and the detailed energy audits and identified and designed the energy-saving measures that would be carried out. The ESCo is installing new equipment, commissioning the work, supervising the complete project and guaranteeing the savings. CFB Gagetown's BCEO is also playing an important role: it is monitoring quality control and ensuring that the scheduled work meets with the requirements of Base operations throughout the 18-month construction phase of the contract.

## SCALE AND IMPACT OF THE PROJECT

**C**FB Gagetown's energy efficiency improvement project is ambitious. About \$7 million will ultimately be invested in energy-saving retrofits in 90 buildings that have a total floor area of 240 000 m<sup>2</sup>. The project is expected to reduce the Base's annual energy bill of almost \$4 million by about \$1 million per year. A full range of buildings will be refurbished, including administration offices, chapels, drill halls, guard houses, living quarters, maintenance garages, mess halls, pumping stations, recreation and training facilities, storage buildings, and water and sewage treatment plants.

The savings will be broad-based. The annual oil bill is expected to drop by \$460,000, electricity by \$450,000, water by \$55,000 and propane by \$5,000. Maintenance costs will also fall significantly, due to the installation of new equipment under the terms of the contract.

CFB Gagetown's energy efficiency initiative will yield significant environmental dividends as well. Once the work has been

completed, annual greenhouse gas emissions are expected to decrease by some 4600 tonnes.

## EQUIPMENT RETROFITS AND UPGRADES

**F**irm plans are in place to retrofit and upgrade several building systems:

- **Building envelope retrofits and upgrades** focus on the repair and replacement of weatherstripping around doors and windows, air-sealing, and adding insulation in perimeter walls and at construction joints. No major structural changes are planned for any of the buildings on the Base.
- **Major lighting systems upgrades** are planned. Before work began, the Base's lighting systems consisted of a mix of technology dating from the 1950s to the 1990s. The standardization of lighting systems across the Base was identified as a priority in order to maximize savings and reduce maintenance costs. Specific lighting measures include the following:
  - the redesign of specific areas for use with fluorescent fixtures;
  - fluorescent fixtures already in operation will be retrofitted with high-efficiency T-8 fluorescent lamps and electronic ballasts;
  - reflector panels will be installed in fluorescent fixtures to increase light output and permit the removal of some fluorescent lamps;
  - new lenses will be installed on some fluorescent fixtures;
  - inefficient incandescent desk and other lamps will be replaced by halogen and compact fluorescent fixtures;
  - low-wattage LED bulbs will be installed in exit signs;

- occupancy sensors will be installed in many areas;
- exterior fixtures will be equipped with photocells;
- exterior incandescent and metal halide fixtures will be replaced by high-pressure sodium and fluorescent fixtures;
- exterior lighting systems will be linked to the direct digital control (DDC) system; and
- little-used exterior fixtures will be removed.
- **Planned heating, ventilating and air conditioning (HVAC) equipment upgrades** are more modest but will increase the efficiency of the installed HVAC systems significantly, without the expense and disruption of a major retrofit:
  - mechanical equipment and piping will be insulated;
  - an ammonia de-superheater and heat exchanger will be installed for water pre-heating;
  - destratification fans will be installed in buildings with high ceilings; and
  - misapplied equipment will be withdrawn from service.
- **Plans to improve the effectiveness and efficiency of the energy management control system** will keep electrical demand to a minimum. Specific measures include converting a number of functions to DDC, specifically:
  - improved low-temperature hot water scheduling using new space feedback and DDC;
  - conversion of the low-temperature hot water pump;
  - conversion of the domestic hot water recirculation pump;
  - domestic hot water tank optimization;
  - nighttime setbacks;
  - exhaust fan duty cycling; and
  - cycling of air-handling units.
- **Water conservation measures** will cut waste, lower the cost of treating potable water and wastewater, and reduce pumping costs. Planned measures to reduce water use include:
  - low-flow aerators for taps and shower heads;
  - adjustable flush valves to reduce flow in water closets;
  - reduced water volume storage in water closet flush tanks; and
  - solenoid valves to control urinal flushing through DDC.

## **ENERGY EFFICIENCY AWARENESS - PEOPLE MAKE THE DIFFERENCE**

In addition to equipment upgrades and retrofits, an energy efficiency awareness program for all staff and employees has been developed under the slogan "Aiming at Energy Efficiency - Be Part of It." The program will have far-reaching effects. Since it is people who turn off lights, notice dripping taps and maintain expensive equipment at peak efficiency, the awareness program will aim to educate all personnel about the importance of energy efficiency and what everyone can do to contribute to the effort.

In the past, energy supply to individual buildings at CFB Gagetown was not metered, and there was no way to apportion energy costs to the various divisions operating on the Base. Since personnel had little idea of the impact of their activities and habits on energy costs,

there was no incentive to reduce consumption. The energy efficiency awareness program is designed to introduce new ways of thinking and has the potential to generate savings of up to \$120,000 per year. The program aims for total long-term coverage and consists of several elements:

- a billboard to be erected at the main gate announcing the energy efficiency program to all visitors;
- production of a calendar with energy tips and dates for energy awareness activities;
- a Base-wide energy contest – personnel will be invited to submit energy efficiency tips for use on posters and in newsletters;
- an on-Base e-mail user group will be set up to receive regular updates;
- local schoolchildren will be invited to participate in a light-switch cover contest and to design energy efficiency stickers;
- articles promoting energy efficiency will be submitted to local newspapers and Base newsletters;
- posters will be released every month during the first year of the project and then four times per year, and charts illustrating energy savings and reduced emissions will be distributed with the posters;
- energy contacts will be displayed on CFB Gagetown's web site; and
- an Energy Awareness Week featuring a "kick-off" event and an energy show – buttons and program logos will be distributed and prizes awarded for the best entries to the Base-wide energy contest.

Many of the facilities operations and maintenance staff at CFB Gagetown were trained to operate equipment that uses older technologies. Training to update the skills of these employees will ensure that they are able to manage the newly retrofitted facilities at peak efficiency.

## ENERGY PERFORMANCE CONTRACTING - NO-COST SAVINGS

**C**FB Gagetown is now well on its way to reducing its operating costs through improved energy efficiency. The FBI approach to energy efficiency upgrades is a proven winner: it stimulates investment, saves money and yields important environmental benefits. A key measure of the FBI's success with the CFB Gagetown project is the strength of the partnership that has developed among the allies who make it all happen.

## THE WAY AHEAD

**T**he full impact of the energy efficiency project at CFB Gagetown will not be known until a year after all the work has been completed. Major Labrecque is confident, however, that all expected savings will be achieved, and he has already begun work on his next goal to make CFB Gagetown the most energy-efficient Base in Canada.

*NRCan's Office of Energy Efficiency offers a full range of initiatives to encourage greater energy efficiency and the use of alternative energy in all sectors of the economy. For more information, start by visiting NRCan's Office of Energy Efficiency web site at <http://oee.nrcan.gc.ca> or fax (613) 947-4121.*

