



1 Background

The Royal Canadian Mounted Police (RCMP) Depot Division in Regina, Saskatchewan, is the main Training Academy for the RCMP. The primary objective of the Academy is to train cadets and law enforcement professionals. Also located on the site is "F" Division Headquarters, which provides policing services for the province. With historic associations dating back to its legendary frontier days, the Depot Division is truly the "home" of the force.

Following a Request for Proposal in May of 2002, the RCMP received and evaluated four Proposals from pre-qualified energy service companies (ESCOs) to provide energy and water efficiency improvements at the Training Academy as part of a savings-financing arrangement under the Federal Buildings Initiative (FBI).

In 2003, the RCMP signed an energy performance contract (EPC) with Vestar (now Optimira Energy Ltd.) to design, manage, construct, finance and guarantee the results of their energy efficiency retrofit. The project was prompted by the success of the RCMP "D" Division Headquarters project in Winnipeg, Manitoba, where \$90,000 in annual savings had been realized through energy upgrades and water efficiency measures.

As the RCMP's largest energy consumer, the Training Academy offered a significant opportunity for reducing energy and water consumption and greenhouse gas (GHG) emissions.

2 The Project

The Training Academy's 10-year, \$4.6-million EPC was signed in August 2003. Of the 49 buildings at the site, 35 have been included in the EPC. Several different types of buildings have been refurbished – garage, laboratory, medical, mess, office, pool, residence and recreational. Each one presented a different energy use intensity, pattern and savings opportunity.

Due to the comprehensive nature of the energy efficiency project, savings at the Training Academy have been broad-based. Direct annual energy and water savings have reached an estimated \$460,000 and GHG emissions have been reduced by about 7800 tonnes of CO₂ equivalents per year. Natural gas consumption has been cut by 1.5 million m³ per year. Purchased electricity has decreased by an annual 4.3 million kWh. Water conservation measures have led to a drop in water consumption of 37 000 m³ per year. Due to infrastructure renewal and the installation of new technologies, maintenance costs have also decreased considerably.

After an extensive analysis and energy audit of the site, the ESCOs identified several measures applicable to the buildings selected, including:

- Replacing standard efficiency motors used on various mechanical and electrical equipment with new, high-efficiency electric motors
- Installing carbon monoxide sensors to modulate garage exhaust fan systems for optimum control
- Insulating all steam valves with special insulation jackets to reduce heat dissipation and reduce overall gas consumption costs
- Updating the lighting system to T-8 fluorescent lamps and electronic ballasts, which will provide a 35 per cent reduction in energy use while improving light quality and occupant comfort
- Installing an override system for a paint shop ventilation system so occupants can adjust the exhaust system during periods of intensive use, and adjust to low flow during periods when fumes do not accumulate
- Installing a variable frequency drive on the swimming pool circulation pump to reduce overall electrical consumption during off hours.



As well as traditional energy and water efficiency measures, the project included a number of emerging technologies.

2.1 Solar Walls

Solar walls have been installed for combustion air in the Central Heating Plant and at the Firing Range.

Solar walls can provide heated ventilation air for buildings. They operate by drawing air through a cavity formed by the solar wall. Because the wall is metal, it can absorb a significant amount of heat from the sun. This heat, in turn, is transferred to the cool makeup air passing through the metal chamber, preheating the air prior to introduction to the ventilation unit.

Preheating of outside air provides a savings opportunity in reduced steam consumption and associated gas usage.

2.2 Firing Range: Schedule Optimization and Heat Recovery

The Firing Range at the Training Academy is used intensively, with the makeup air unit and exhaust fan running from 12 to 14 hours per day, Monday through Friday. Regardless of occupancy, which varies throughout the week, the makeup air unit and fan exhaust is always operational. The makeup air and fan exhaust is used to ensure that lead vapors in the air do not migrate into the shooting area. Makeup air is provided at the shooting end and exhaust air is drawn from the Range at the target end. This supplies fresh air to the occupants. To save on gas consumption, the ESCO installed a glycol coil in the makeup air unit to allow for heat recovery. Energy from the warm exhaust air is applied to the cold makeup air, preheating the air so that supplemental heat used to raise the air to room temperature is reduced. In addition, air drawn through the solar wall located on the south face of the building is preheated prior to entry to the ventilation system. The installation of an occupancy sensor also ensures that the makeup air unit and the fan system are only operational when the area is occupied. These measures have cut gas consumption at the Firing Range by 50 percent.

2.3 Low Consumption Plumbing

The water conservation measures at the Training Academy include the replacement of water closets in all buildings, except those built in the 1990s, with 6-litre fixtures. All wall-mounted urinals have been replaced with new "waterless" urinals. This fixture functions touch-free, is odorless, uses no water, and has been found to be very acceptable to clients. Floor-mounted urinals with flush valves have been re-fitted with new 3.7-litre flush valves. Faucets have been equipped with anti-drip, anti-siphon, low-flow aerators. Existing shower heads have been replaced with low-flow units. There has been considerable impact on overall savings as a result of the project's water conservation measures. Water in the City of Regina is an especially valuable resource and as such is very costly. Retrofitting the plumbing fixtures throughout the complex has led to a significant decrease in water consumption. The low consumption plumbing has also helped reduce fuel costs for domestic hot water and has lowered overall maintenance costs.

3 Project Success

3.1 Early Planning

Early planning is a critical component of any effective and successful energy efficiency project. It is paramount to managing change, and it also ensures that challenges or obstacles can be met quickly and efficiently. This requires a regular examination of plans and targets, and an ongoing focus on the measures and opportunities being put in place.



From the outset, the Training Academy's Project Team coordinated their efforts and began outlining some of their goals and objectives. In other words, they detailed what they expected from the energy efficiency project in terms of their energy, water, and environmental needs.

Early planning proved a useful tool for the Project Team when the ESCOs first toured the buildings, at the Request for Proposal stage. According to Karen Dupuis, Manager of Sustainable Development at the RCMP, Northwest Region, the ESCOs were "very responsive to our needs. They had an opportunity to consult with knowledgeable staff. This consultation not only helped in initiating an inclusive relationship, but really lent to buy-in from staff who have been directly affected by any proposed changes."

The preliminary audit allowed the ESCOs to gather needed information and data for their proposal preparation. With help from staff, the ESCOs also identified the energy needs of the organization. This, in turn, reinforced staff support as it gave them the opportunity to become involved in the retrofit project, while exposing them to the ESCO personnel. Early planning and involvement by the Project Team also proved critical once the successful ESCO was selected.

Since the Project Team had a good understanding of their energy management situation, they were able to begin working in a collaborative fashion with the ESCO from the outset. This helped cement a strong relationship between parties during the design and construction phase. With a good understanding of project goals and objectives, the Project Team could easily identify with the measures being implemented by the ESCO.

With open communication and a mutual understanding of the goals and needs of the organization, both parties were better able to share in the responsibilities and tasks of project implementation. As well, they were more responsive when adapting to changes during the life of the project.

3.2 Flexibility of the EPC

In the original proposal, the ESCO had planned for the installation of an 800-kW reciprocating cogeneration unit, complete with a high-pressure steam waste heat boiler. The unit would have provided domestic hot water for the Central Training Facility, the Pool Building and the RCMP "F" Division head-quartered nearby. Once a detailed analysis of the cogeneration measures was finalized, however, both parties concluded that the expected added value of the unit would not justify the extra costs to the project. Because cogeneration is always a large, complex measure, it may not be economically viable in every situation. Although the cogeneration measure did not proceed, the strength of the ESCO and client relationship allowed the RCMP and the ESCO to adapt to the changing needs of the retrofit project. Both parties are now investigating new energy efficiency opportunities for the facilities at the Training Academy.

A key benefit of an EPC is that, as a service contract, measures can be updated and changed to best suit the client's needs. As prices and technologies evolve, measures that were, at first, not feasible can later be introduced into the project. Throughout project planning and development, and continuing into the contract, the overall viability of measures must be determined.

For the RCMP, the flexibility of the EPC will allow them to select energy measures that will benefit the Training Academy and reduce energy costs. For example, they are currently considering the replacement of steam absorption chillers at the forensics laboratory with high-efficiency electric chillers.

Continued efforts to implement energy efficiency measures throughout the project will further improve the efficiency of facilities at the Training Academy, and will lead to an increased reduction in energy and water costs and GHG emissions.