Great $aves

Seven projects prove retrofits are far less daunting when the energy efficiency contract is tied to successful performance.

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MODERN CONCERNS about energy started with two oil-price shocks in the 1970s, coming to the fore again in the 1980s with the Chernobyl nuclear disaster and the Exxon Valdez oil spill. Then, more recently, we experienced the Deepwater Horizon and Fukushima disasters. Who knows what the future holds?

The response to these episodes largely consisted of trying to clean up the mess and finding replacement energy. Now, however, there is a drive to look for ways to reduce our energy use in the first place through energy conservation and efficiency. With this change in focus have come some inventive means of realizing energy performance gains in cost-effective and business-friendly ways.

Using less energy has always been a good idea, but it makes even more sense now as energy prices rise and greenhouse gas emissions mount. Walmart, according to a November 2011 article in *The Economist*, claims to be saving more than $200-million per year in fuel costs as a result of its greening strategies. And energy efficiency measures not only save money, they also create more jobs than energy-supply projects. According to a 2010 presentation given by former US president Bill Clinton, energy efficiency measures account for seven times as many jobs as coal-fired electricity plants and twice as many solar or wind projects when you compare jobs per dollar invested. You can think of it as the 3Es of energy conservation: employment, economy and environment.

An $8-million retrofit of the Royal Canadian Mint buildings garners an annual savings of $1-million.

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But the fact is, we continue to waste huge amounts of energy. In its *2011 Primer on Energy Systems in Canada*, Pollution Probe estimated that Canadians waste more than 50 per cent of the primary energy they consume. Moreover, Ontarians use about 50 per cent more energy per capita than people in New York State.

So why do Canadians waste so much energy? In 2010, the International Energy Agency surveyed experts from around the world and identified five major categories of barriers to energy efficiency:

Market – various subsidies for conventional sources of energy, and the landlord-tenant problem. The building owner pays for upgrades but savings go to the tenant.

Financial – lack of available capital to finance energy efficiency upgrades, lack of understanding of investment opportunities and savings, and aversion to perceived risk. (There is a tendency to focus on payback rather than return on investment. A five-year payback sounds onerous, but a 20 per cent return on investment sounds fantastic.)

Information/awareness – lack of sufficient information about opportunities.

Regulatory/institutional – regulated energy costs that do not reflect all the true costs and are generally biased to supply-side investments.

Technical – lack of affordable technologies suitable to local conditions and insufficient local capabilities, which is mostly an issue in developing countries.

Interestingly, consumer awareness was the most frequently cited barrier to energy efficiency, followed by low/subsidized energy prices, affordable financing, and policy/implementation capacity. The perceived riskiness of energy efficiency followed, with product or technical availability and transaction costs among the least frequently mentioned causes.

Consumer awareness is a particularly acute problem for energy efficiency as most efficiency measures are buried between walls or in mechanical and electrical rooms. Because they are often hard to see, especially when compared to something as visible as a new wind turbine, politicians often don't see them either.

One of the most important opportunities for realizing major improvements in energy use is in the commercial and institutional buildings where people work, shop, learn and get well. According to a 2010 Natural Resources Canada report entitled *Improving Energy Performance in Canada*, such buildings use 13 per cent of all energy and generate about the same percentage of Canada's greenhouse gas emissions. Between 1990 and 2007, the amount of energy used in these buildings rose 34 per cent. But without energy efficiency improvements, this increase would have been 33 per cent higher again, costing building owners about $2.9-billion in 2007.

As this finding demonstrates, real progress has been made on energy efficiency, and there is more to come. Ontario's new building code will require new commercial/institutional buildings to be 25 per cent more efficient. The challenge put forward by the US-based non-profit Architecture 2030 calls for all new buildings and major renovations to be carbon neutral by 2030.

These are important initiatives, but it is imperative that we reduce the energy requirements of existing buildings, since they make up the vast majority of the building stock. Recognizing this opportunity, the Canadian Green Building Council has set an objective of 50-per-cent-verified energy savings from all existing commercial and institutional buildings by 2015.

To take advantage of energy savings, owners of more and more institutional buildings and a number of commercial ones, such as the Empire State Building, TD Centre and the Toronto condominium Palace Pier, are turning to performance-based solutions. For these schemes, the cost associated with implementation of the energy retrofits and capital upgrades is paid through the savings guaranteed by the energy service company throughout the contract term. These deals can take several forms. Clients may access funds from internal budgets, they might arrange funding through their financial institution, or they may get funding through arrangements made by the energy service company.

Anthony DaSilva, chair of the Energy Services Association of Canada, says, "Allowing an energy services company [to] assume the risk in a performance-based-solution contract empowers the client to truly focus on their core business, and addresses the funding and resource issues that they've encountered in the past, while giving the energy services company the drive to ensure the project is successful, as the risk is now theirs."

Over the past 25 years, public sector institutions, including municipalities, universities, schools and hospitals (often referred to as MUSH), have made extensive use of performance-based solutions. (Interestingly, they have also begun to use similar contracts for deferred maintenance and infrastructure renewal projects.) As the seven project descriptions below demonstrate, there is growing evidence that performance-based solutions are a cost-effective, practical and increasingly popular means of saving energy and reducing greenhouse gas emissions.

1. University of British Columbia

UBC is one of a number of Canadian universities to improve energy efficiency by using performance contracts. In addition to $25-million worth of energy efficiency upgrades, the UBC contract included $12-million for

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facility renewal projects, such as building metering, training, recommissioning and compressor controls. In all, 227 buildings were upgraded. According to a 2006 UBC press release, savings were $3.8-million over the first three years and the upgrades are expected to generate an ongoing annual saving of $2.6-million.

2. City of Toronto

Canada's largest metropolis upgraded eight of its existing solid-waste transfer stations. The measures included lighting retrofits, building-automation systems, mechanical modifications and water-conservation fixtures. For this project, the energy service company put up 100 per cent of the capital outlay and was paid back only if the projected cost savings were achieved during the contract period. As it turned out, actual savings were equal to or greater than what had been projected. With an eight-year payback, the project resulted in reduced operating costs, improved building conditions and environmental benefits.

For the City of Toronto, this project also connected the dots between capital and utility budgets. Frank Cammalleri, director of energy engineering services at Direct Energy, the energy service company, noted, "This is a common problem among various organizations. They have a hard time connecting the two [and] getting a mechanism in place to acknowledge that there is an issue."

3. Lester B. Pearson School Board

Saving energy and money in schools is not only important for taxpayers, it also provides an opportunity to educate children about conservation practices. Robert Mills, director general of the Lester B. Pearson School Board in Montreal, noted that Johnson Controls, the service company he used, "has proven to be a forward-looking and valued partner in assisting our organization to ensure for our students and staff a healthful learning setting that promotes appropriate environmental values and awareness within a sustainable framework."

The Pearson board undertook a major retrofit of its head office and 26 schools. Guaranteed energy savings of $1-million per year financed the $26-million project. Among the many measures undertaken was work to ensure year-round optimal operation of all systems, and implementation of a preventative-maintenance program to reduce occupant complaints and increase equipment life.

4. Royal Canadian Mint

The federal government has upgraded about one-third of its buildings, often using a performance-based solution called energy-performance contracts. The $8-million retrofit of the Royal Canadian Mint in Ottawa has resulted in annual savings of $1-million. This multi-use building contains offices, laboratories, a refinery and a production area for gold and other precious-metal products. Special attention was required to maintain the building's historic elements.

5. Hastings and Prince Edward District School Board

This Ontario school board undertook an extensive retrofit that involved 60 schools and 68 portables. Lighting retrofits, building automation systems, boiler replacements and conversion from electric to natural gas/propane were among the many measures undertaken as part of this $10-million project. All of the $1.2-million in annual savings is used to retire the capital investment. For this contract, 80 per cent of the savings were guaranteed.

6. London Health Sciences Centre

When it decided to merge three of its sites into two, the London Health Sciences Centre took the opportunity to re-evaluate its energy and operational efficiencies across all buildings. Faced with rising costs, reduced government funding and ageing equipment, the hospital turned to a performance-based contract. Turnkey projects included evaluation, design, procurement, operating- and maintenance-process analysis, as well as financing. The first two phases of this contract resulted in annual savings that were 164 per cent and 112 per cent of the guaranteed energy savings.

A critical component of this work was that it was undertaken without disrupting the hospital's ongoing operations. Dave Crockett, vice-president of integrated planning at the hospital, noted that as a result of the retrofit, "[We are] now in a much better position to manage our usage, control our costs and improve our operating flexibility to reduce costs."

7. Institut Philippe-Pinel de Montréal

The challenge for Institut Philippe-Pinel de Montréal was to address ageing buildings systems, high-energy waste and high operating costs with limited capital. The solution was a seven-year energy-performance contract that guarantees the energy savings will pay for the upgrades. Measures undertaken include improved lighting and pumping systems, an upgraded cooling tower, reduction in steam production and control optimization.

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Details on these projects and 28 more are on the Energy Services Association of Canada's website: **energyservicesassociation.ca**.