

■ December 2001

COMPARING ENERGY MANAGEMENT IN CANADIAN HEALTH CARE FACILITIES

INTRODUCTION

When Canada adopted the Kyoto Protocol in 1997, it demonstrated its commitment to the international issue of climate change by agreeing to reduce its greenhouse gas (GHG) emissions to six percent below 1990 levels between the years 2008 to 2012.

As part of Canada's commitment, Natural Resources Canada (NRCan) was charged with implementing new energy efficiency measures and established the Office of Energy Efficiency (OEE) for this purpose.

The OEE manages 17 energy efficiency and alternative fuels programs, including the Energy Innovators Initiative (EII), which helps businesses and public institutions explore energy efficiency options and strategies. Member organizations can save money and help the environment by reducing greenhouse gas emissions related to energy consumption. The EII offers access to tools, services and financial incentives – delivered through Energy Innovators officers who work with members as they pursue energy management planning and energy-saving retrofits.

In cooperation with the Canadian College of Health Service Executives (CCHSE), one of the EII's partners, the EII has embarked on an ambitious research project to assess energy efficiency practices and awareness levels in the Canadian health care sector.

RATIONALE

Although it has been estimated that more than \$1 billion is spent in Canada every year on energy in the health care sector alone, there are few facts to support this estimate. To improve energy consumption, energy efficiency and future GHG emissions reduction strategies, it is necessary to get a clearer picture of the sector. Researchers set out with the following three objectives:

1. to gather basic data on energy use in Canada's health care sector;
2. to determine the level of energy efficiency awareness within the sector; and
3. to gather information for a benchmarking and best practices guide for the sector.

Analysis of the findings has revealed some interesting trends in consumption and energy management practices, and we are pleased to share them with you. We also encourage your facility to become an Energy Innovator and to establish energy reduction practices. The intent of this report is to foster a greater understanding and awareness of the impact your facility has on the environment. By increasing the energy efficiency of your facility, you help Canada meet its national GHG emissions reduction targets.



METHODOLOGY

In the fall of 1998, a survey¹ developed by the EII and the CCHSE, and fully endorsed by the Canadian Healthcare Engineering Society, was mailed to 759 individual facilities with another 120 mailed to contacts that represented multiple facilities. The 879 facilities sampled covered the entire spectrum of Canadian health care, including acute and chronic care, residential facilities for seniors, assisted living and nursing homes, community health and physical rehabilitation facilities, mental health facilities and community living homes. In total, 222 (25 percent) of these questionnaires were completed and returned for analysis.

Statistical analyses were performed on the data from the returned questionnaires to examine the relationship between individual responses and four of the following key factors:

- facility size;
- a system for monitoring and tracking (M&T) energy use;
- existence of an energy efficiency program; and
- membership in the Energy Innovators Initiative.

The population base served by the reporting facilities ranged in size from 30 people to 4.5 million people; the mean population base for the 222 facilities reporting was 213 000 people. Although 20 percent of all facilities had population bases of less than 3770, only 28 percent had bases of 88 000 or more. Physical rehabilitation facilities reported the highest population bases, with a mean population of 1.2 million people.

SURVEY FINDINGS

Energy Management and Purchasing

Over 60 percent of all Canadian health care facilities tend to combine energy management with “operations” rather than treating it separately. Twenty-six percent of survey respondents reported that they considered energy management a function of “environmental services,” and just four percent purchased and managed energy as a separate function or responsibility.

Facilities reported spending an average of \$554,452 to purchase energy over the 1997–1998 fiscal year. This ranged from \$14,000 to \$8 million, or 1.6 percent of their

overall budgets. The four percent of facilities that managed these purchases as a separate function devoted an average of 1.2 internal staff to energy management, at a yearly average cost of \$51,026, or nine percent of mean energy expenditures. Of facilities with dedicated resources, 22 percent hired contractors to assist them and 15 percent hired consultants.

Energy Expenses and Consumption

Figure 1. Distribution of Energy Expenses

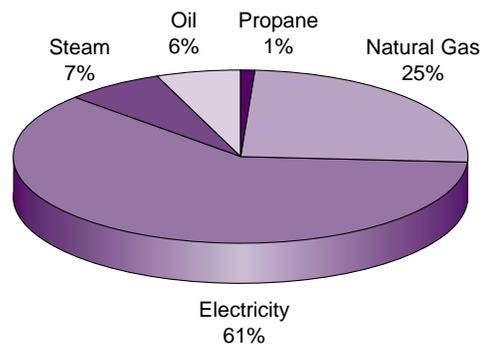
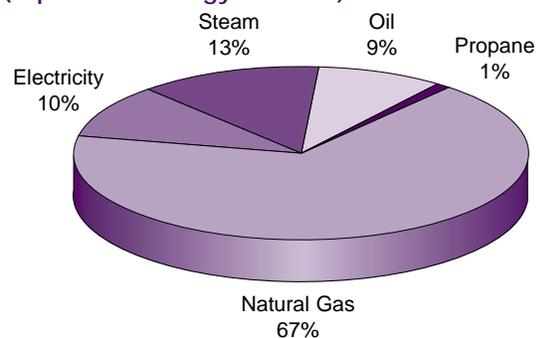


Figure 2. Distribution of Energy (Equivalent Energy Content)



Although few facilities purchase all types of energy sources (see Figures 1 and 2), one in three facilities reported electricity as its only source of energy. In these cases, increasing efficiency even slightly could dramatically reduce operating costs and the amount of environmental pollutants resulting from power generation. Actual savings and benefits are related to the origin of the electricity provided (i.e., hydro, coal, nuclear, etc.) in the province in which the facility is located.

Acute care facilities reported the highest average annual costs for electricity at \$512,000 (an average

¹ All data capture and analysis was conducted by GPC Factor Research Group under strict guidelines as set by the Canadian Survey Research Council, a non-profit organization established to monitor and provide validation of marketing and opinion research in Canada.

of 9 million kWh per year); residential care facilities had the lowest at \$17,600 and 219 000 kWh per year.

On the other hand, average propane budgets proved to be lowest for acute care facilities (\$2,700 per year), with chronic care, nursing care and multi-level care progressively higher at \$4,000, \$13,100 and \$60,100 each annually.

Do you know what kind of energy sources your facility is purchasing and how much each costs?

Use the chart in Appendix 1 to help you determine your facility's energy-usage profile.

Higher-than-average costs were also recorded for natural gas, oil, steam and water in multi-building facilities. These facilities were also more likely to produce energy for distribution to other sites. Eight percent of facilities generated electricity directly or as a by-product of other processes, and almost 10 percent indicated that they planned to implement a cogeneration project in the next five to seven years.

Physical rehabilitation facilities registered the highest total annual energy costs with a mean of \$3 million, followed by nursing care facilities at \$356,000, chronic care facilities at \$220,000 and residential care homes at \$25,000.

Cost projections for the 1998–1999 fiscal year anticipated an 11-percent increase in total energy costs over the previous year. On the basis of “mean” values, respondents said that they expected cost increases of 30.8 percent for natural gas, 9.3 percent for water, 9.2 percent for steam, 5.3 percent for electricity and 5.2 percent for oil.

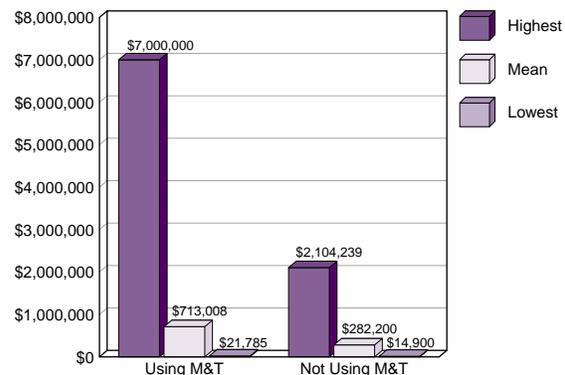
Monitoring and Tracking

Today's proactive managers are well aware that good budgeting requires a firm grasp on all expenditures under their charge. A properly prepared and executed monitoring and tracking (M&T) system will help provide accurate and timely snapshots of your facility's energy budget and usage patterns.

It may seem logical to conclude that only large organizations with large energy budgets require, or can justify, an M&T system. However, results of the survey indicate that facilities of all sizes use M&T systems to monitor their energy usage. Figure 3 illustrates that the use of an M&T system is not related to the size of a facility's energy budget.

Although the mean energy budget for facilities using M&T is two and a half times greater than that for facilities not using M&T, facilities with annual energy costs as low as \$21,785 benefit from using M&T systems.

Figure 3. Energy Budget vs. the Use of an M&T System



Does your facility use an M&T system?

If so, do you follow up on your findings with an eye toward continued improvements, perhaps comparing your results to facilities of similar size and nature?

If your facility does not use an M&T system, it could be losing thousands of dollars that could be better spent on patient care.

Regardless of size, facility use or energy budget, there is always a place for a proper M&T system in your facility. Take advantage of the unique M&T workshop offered by the OEE as part of its “Dollars to Sense” series of workshops. For more information, please contact the OEE at the address provided on page 6.

Fifty-four percent of survey respondents claim to perform at least some type of M&T, including the use of computerized energy management software, monthly energy consumption tracking, performance contractor quarterly reports, budget monitoring, reviewing building management system and financial reports, or simply confirming monthly bills with meter readings. Sixty-eight percent of respondents report that they monitored monthly. A further 11 percent undertake weekly reporting, and eight percent monitor quarterly. Only six percent of respondents follow a daily monitoring regime.

The responsibility for M&T systems varied greatly among respondents, but was typically assigned to maintenance supervisors (eight percent), directors of finance

(six percent), chief engineers (five percent) and then to any number of managers, mechanics and electricians, coordinators and, in some cases, outside contractors.

Awareness of Energy Efficiency

Reducing energy consumption in any facility requires the widespread adoption of energy management practices not only by senior management but also by staff and building occupants. Adopting energy-efficient practices requires awareness, recognition and an understanding of energy conservation initiatives. Only 35 percent of those surveyed

reported having an energy efficiency awareness program in place.

When reporting on their participation in sustainable development or environmental programs, 75 percent of facilities indicated that they recycle paper, 47 percent recycle plastic, 46 percent recycle glass and 64 percent have a waste management program. However, only 15 percent of respondents reported that they have GHG emission reduction programs and organic waste management programs in place. Interestingly, facilities with M&T systems were far more likely to have active waste

management programs (77 percent versus 53 percent) and paper recycling programs (83 percent versus 74 percent).

Energy Management Training

In addition to monitoring and tracking energy performance, your facility needs staff with the required training to operate its M&T systems, undertake analysis and, where necessary, carry out corrective measures.

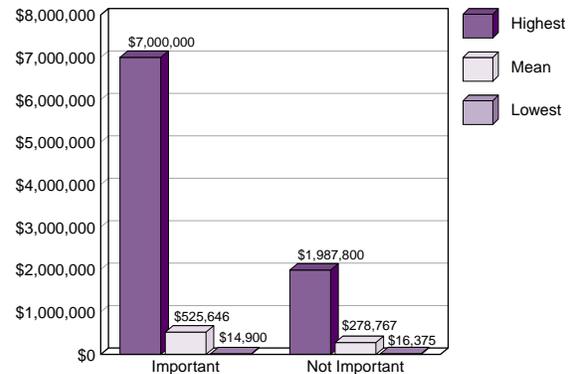
Ongoing training should be seen as an integral part of any operation. It may be provided by in-house personnel or by third-party instructors such as equipment suppliers, energy service companies or accredited training colleges and academies.

More than 30 percent of survey respondents rated on-going energy management training as “important,” and almost 40

percent considered it to be “very important.” However, training was ranked as significantly more important by facilities with an M&T system and energy efficiency programs in place. Moreover, 70 percent of the respondents

who indicated that they were Energy Innovators considered training to be “very important.” Awareness is the first step toward action. Figure 4 shows that, regardless of facility size and type, properly designed training programs are being implemented across Canada’s health care sector.

Figure 4. Energy Budget vs. the Importance of Energy Management Training



Maintenance Planning

One in three survey respondents revealed that critical maintenance work is being deferred due to lack of funds. Other obstacles cited included difficulties in obtaining approvals from government ministries and in maintaining facility operations during construction.

Survey results also indicate that using an M&T system affects the maintenance decision-making process. Facilities without an M&T system were far more likely (33 percent) to defer critical maintenance than those that do use M&T systems. Most (72 percent) respondents acknowledged being “quite aware” or “very aware” of the costs of deferring maintenance. When asked to describe in their own words the energy efficiency issues that they would like to see addressed by their facilities, the most frequently mentioned were as follows:

- lighting retrofits;
- boiler upgrades;
- replacing or upgrading windows;
- cogeneration;

For more information on how to implement an employee awareness campaign in your health care facility, please contact the Energy Innovators Initiative at the address provided on page 6.

Training is also available through the OEE’s “Dollars to Sense” workshops, which offer some of the most up-to-date energy expertise available. For more information, please contact the OEE at the address provided on page 6.

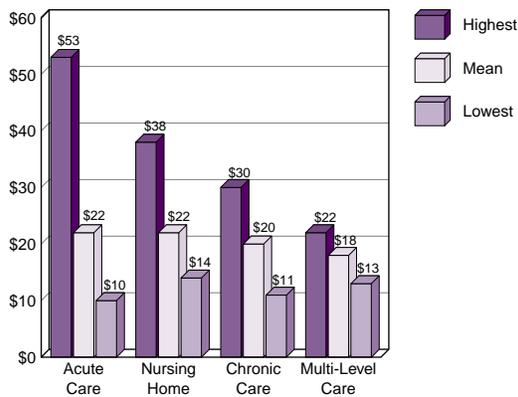
If your facility is paying the price for years of deferred maintenance, you should investigate how to fund renovation projects without having to pay the costs upfront. For more information, please contact the Energy Innovators Initiative at the address provided on page 6.

- reducing electricity use or increasing efficiency; and
- implementing performance contracting.

Energy Cost and Use Performance

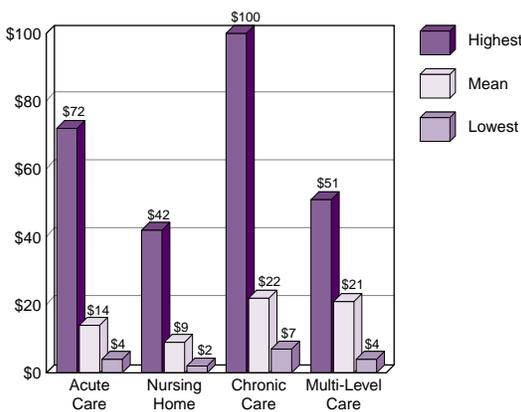
To compare facilities of similar type, a common reference point such as annual consumption per unit of floor area, or annual energy cost per revenue unit, is required. The energy intensity (energy cost/m²/year) of facilities of similar types is compared in Figure 5.

Figure 5. Total Energy Cost per m² per Year by Facility Type



If we assume that a “patient-stay day” is a revenue unit for the same four types of health care facilities, the graph changes significantly (see Figure 6).

Figure 6. Energy Cost per Patient Stay Day by Facility Type



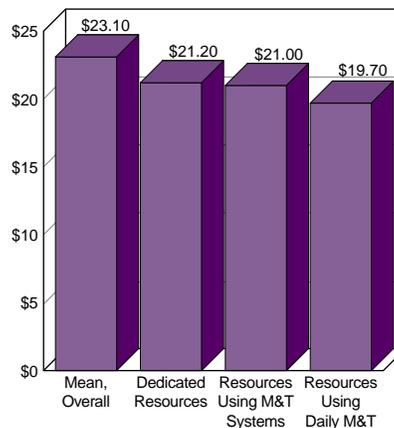
A facility’s performance can be affected by any number of extraneous factors, including building orientation, climate, passive solar heat gains, amount and nature of glazing materials, visitor traffic and the nature of a facility’s clinical activities.

MOST SIGNIFICANT FINDINGS

If your facility falls into one of the four facility types indicated above, how do you rate? Is there any room for improvement? Try filling out the tables in Appendix 2.

- Health care facilities can become far more proactive in lowering their costs and reducing harmful GHG emissions through improved management of their energy consumption and expenditures.
- There is a great variation in energy use performance among various facility types as well as within similar facilities.
- The use of M&T systems operated by trained staff tended to result in better-than-average energy performance.
- Annual energy cost intensity is directly related to the frequency of data collection of M&T systems: the more frequent the data collection, the lower the energy cost intensity. Facilities assembling data on a daily basis reported a mean energy cost intensity of \$19.72 per square metre per year, 14.6 percent lower than the overall mean of \$23.10 (Figure 7).
- Interestingly, 94 percent of the facilities using dedicated resources and M&T systems ranked ongoing energy management training as “important” or “very important.” Nearly one-half of these are registered as Energy Innovators.

Figure 7. Annual Energy Cost Intensity of Facilities with Resources Dedicated to Energy Management (dollars per m² per year)



The “Facts Revealed”

Does your health care facility use

- dedicated resources;
- ongoing energy management training;
- an M&T system;
- the Energy Innovators Initiative?

If you answered “no” to any of these questions, your facility can start saving energy dollars by improving your energy management. Even if you answered “yes” to all four questions, a minimal investment of time, energy or resources could still result in significant savings.

The Energy Innovators Initiative offers information programs that can

- equip energy users with a basic understanding of energy use;
- alert building occupants to the existence and benefits of energy efficiency opportunities;
- increase awareness, acceptance and use of energy-efficient technologies; and
- ensure that energy users are aware of other NRCan programs and assistance (including support for research, development and demonstration) to improve their level of energy efficiency at home, at work and on the road.

There are great benefits for us as individuals, and much to be learned and taught to our staff about energy use. Collectively, improved use of energy will pay major dividends in cost savings, guarantee future availability of energy resources and help us work toward a healthier environment. In health care, what we save in supporting operating costs such as energy can be reallocated to patient care. Isn't that really why we are here in the first place?

– Bruce H. Swan, C.H.E.
Former CEO, South Westman RHA

THE ENERGY INNOVATORS INITIATIVE CHALLENGE

We at the Energy Innovators Initiative want to ask you to help all Canadians to meet the climate change challenge and to bring about lasting change in energy-use attitudes, not only at your facility but also within your community.

Working with the Energy Innovators Initiative, the manufacturing and mining industries have demonstrated their commitment to this issue by voluntarily establishing 23 task forces and soliciting the support of 30 trade associations representing more than 3000 companies or 90 percent of the secondary industrial energy demand in Canada. Known as the Canadian Industry Program for Energy Conservation, this group defines attainable sector-specific energy efficiency targets to develop and implement action plans to achieve them and report annually. We encourage health care facilities in Canada to set sector-specific measurable and attainable targets for energy efficiency.

We challenge you to take action and become an Energy Innovator. How much have you spent already by not being a member?

LEARN MORE

Energy Innovators Initiative

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Appendix 1

Worksheet 1. Annual Energy Sources and Relative Costs for _____(year)

	(A1) Electricity	(A2) Gas	(A3) Oil	(A4) Propane	(A5) Steam	(A6) Total
Fiscal Year (_____)						
Percentage of Total Energy Costs						

Add A1 through A5 together for your fiscal year and enter the total in box A6, then divide each individual value (A1 through A5) by A6 and multiply by 100 to find the percentage for each purchased energy source.

Appendix 2

Worksheet 1. Annual Energy Cost per m²

(B1) Facility Area (m ²) for Year _____	(B2) Total Annual Energy Costs (from A6) _____	(B3) = (B2)/(B1) Annual Energy Cost per m ²	(B4) Derive mean value from Figure 5 for your facility type	(B5) + or - Is your facility above or below the mean?

Worksheet 2. Energy Cost per Patient Stay Day

(C1) Facility Patient Stay Days for Year _____	(C2) Total Annual Energy Costs (from A6) for Year _____	(C3) = (C2)/(C1) Energy Cost per Patient Stay Day	(C4) Derive mean value from Figure 6 for your facility type	(C5) + or - Is your facility above or below the mean?

Leading Canadians to Energy Efficiency at Home, at Work and on the Road

The Office of Energy Efficiency of Natural Resources Canada
strengthens and expands Canada's commitment to energy efficiency
in order to help address the challenges of climate change.

