



MEDICAL IMAGING EQUIPMENT STUDY



Assessing Opportunities to Reduce Energy Consumption in the Health Care Sector



A Report to Natural Resources Canada by the Canadian Coalition for Green Health Care in association with Dr. Tony Easty



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The Authors

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- Nanaimo Regional General Hospital (NRGH), Island Health (VIHA), in British Columbia
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- University Health Network (UHN) in Ontario
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Executive Summary

The purpose of this project was to obtain energy consumption data from hospital medical imaging equipment (MIE) which would assist government sponsors of the ENERGY STAR® program determine if a new category of ENERGY STAR products should be developed for MIE. Partnering hospitals, as well as BC Hydro, which was one of our funders, also wanted to gain a better understanding of MIE energy consumption at hospitals so that strategies could be developed to help reduce energy consumption and costs.

Three hospital partners took part in this project:

- Nanaimo Regional General Hospital (NRGH), Island Health (VIHA), in British Columbia;
- The Hospital for Sick Children (SickKids) in Ontario; and
- University Health Network (UHN) in Ontario.

Energy consumption data were obtained from three types of MIE:

1. Computed Tomography (CT)
2. General Radiography (X-ray)
3. Magnetic Resonance Imaging (MRI)

Eight (8) testing events were undertaken with 100s of data points providing energy consumption data for low power energy modes, standby/idle power mode and active/scanning energy modes. The MIE were measured mostly over periods ranging from three (3) days to 11 days. Longer measurement periods allowed richer information about when and how frequently the equipment was used and enabled the calculation of estimated annual energy consumption and energy costs. Extended measurement periods also provided insights into energy reduction strategies that would not be available through the original testing protocol. The original testing protocol relied on 12 testing events each providing three data points which would have resulted in a total of only 36 data points.

Recommendations include the following:

- 1) Development of ENERGY STAR specification for MIEs.
 - a. This report identified that there are significant differences in the low power and scanning power modes within the equipment measured and in the energy consumption values reported literature.
 - b. Along with the direct energy use of MIE, ancillary energy consumption of all related ancillary equipment accompanying the MIE should also be assessed for reduction of energy use.
 - c. ENERGY STAR specification development is not a quick process, requiring government leadership, and may take several years to complete. There are however other options to help encourage reduction of MIE energy consumption that could be acted on more quickly and include the following:
- 2) Provision of purchasing guidelines for MIE which include energy aspects

- a. Including energy aspects in purchasing decisions is not currently part of the purchasing practices in Canadian hospitals. Convincing purchasers to include energy criteria would require education, guidance and provision of solid business case information for the decision makers.
 - b. The Green Public Procurement (GPP) initiative promoted in Europe estimates possible energy savings of 50% for MRI and CT, and 80% for X-rays.
- 3) Develop energy behaviour guidance directed at MIE users
- a. Turning MIE off or to low power mode is another consideration that could apply to CT's and X-rays (which can be turned off) and MRIs (where the equipment could be turned to lowest power mode). Guiding the MIE users on how to do this along with experts in MIE would be essential for energy related behaviour change.
- 4) Optimizing energy consumption of cooling requirements for MIE equipment
- a. Cooling system equipment are required to ensure critical environmental requirements are met for MIE but these can consume significant energy through, for example, the air handling units. Optimizing these systems along with the MIE energy use and power mode can result in energy savings.
- 5) Development of a Business Case for MIE purchasing personnel
- a. Cost information on MIE and ancillary equipment could be developed into a Business Case for equipment purchasers and hospital purchasing agents so that energy operating costs can be considered as part of the new equipment evaluation.
 - i. MRIs: Average costs to operate ranged from \$20,000 to \$30,000 per year just for the MRI. Adding in the ancillary energy from the equipment and cooling can bring this amount up considerably.
 - ii. CTs: Average costs to operate ranged from \$3,000 to \$6,000 per year, just for the CT equipment. Adding in the ancillary energy from the equipment and cooling can bring this amount up considerably. Many hospitals have more than one CT.
 - iii. X-rays: Average costs to operate ranged from \$100 per year when no scanning has taken place, and approximately \$400 when they are being used. These costs are just for the X-ray equipment. Adding in the ancillary energy from the equipment and cooling can bring this amount up considerably. Many hospitals have more than one X-ray which would increase the contribution of the total operating expense multifold.

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