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## Energy Efficiency in Hospital Buildings

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### The Bottom Line on Conservation

In many respects, Ontario's businesses have led the way in creating a culture of conservation in the province. Companies, both large and small and across all sectors, are investing in energy saving and seeing the results in their bottom line. In 2014 alone, business conservation efforts through the IESO's saveONenergy programs resulted in almost 600 GWh of energy savings.

The business case for conservation is pretty clear - it cuts costs. But conservation also delivers broader benefits for all Ontarians - reducing the need to build new infrastructure and lowering the wholesale price of electricity. We are helping to make our province more competitive for business while also contributing to a cleaner environment.

That's why the province has moved to new a framework that puts conservation first before all other supply options. This opens up a myriad of opportunities for businesses that are able to shift or reduce their demand for electricity. Through the IESO's saveONenergy programs, there are numerous opportunities for businesses to reduce their overhead costs through retrofits, energy audits, lighting and equipment upgrades and participating in demand response.

However, this success depends on business, industry, associations and public agencies working together and combining their strengths to increase our conservation and business competitiveness.

Over the past four years, businesses have stepped up their conservation efforts - not only to capture cost savings but also capture the strategic value that conservation offers their organizations.

Now we must push further. The province has set new, more ambitious conservation targets. Our research shows there are many opportunities for us to work with businesses to achieve these results. We need to develop more comprehensive solutions - including the embedding of sound energy management practices within the core of business decisions.

*Building* aims to further this conversation. There are many dedicated individuals with great ideas about how to enhance our province's conservation capability.

To find out what conservation can do for your business, visit [saveonenergy.ca](http://saveonenergy.ca).

#### Terry Young

Vice-President, Conservation and Corporate Relations  
Independent Electricity System Operator



**Standing (L-R):** Kurt Rohmann, marketing manager, Independent Electricity System Operator (IESO); Peter Rowles, principal, ICF Canada; Chris Cuthbert, manager, Co-Generation and Energy, Hamilton Health Sciences; Jeff Weir, national CS business leader, Trane Canada; Mary Ann Breitigam, redevelopment manager, St. Joseph's Healthcare Hamilton; Steve Kemp, vice-president & partner, MMM Group Limited; Allan Dai, sustainability and environment program manager, Peter Gilgan Centre. **Seated (L-R):** John Maiorano, OISE / School of the Environment, University of Toronto; Predrag Majkic, program manager, energy management, Hospital for Sick Children; Peter Sobchak, editor, Building; Marion Fraser, president, Fraser & Company. **Not shown:** Brian Smith, chief conservation officer, Horizon Utilities; Christine Wickett, environmental sustainability coordinator, Sick Kids.



## An Energy-Efficient Hospital

**D**ue to the nature of their operations, hospitals have the highest energy intensity of all publicly funded facilities, according to data from Natural Resources Canada. Moreover, most hospitals were built 50 years ago, when energy efficiency was less of a focus. Yet, the big picture for hospitals in terms of the importance of energy efficiency is, indeed, big. According to a 2015 discussion paper released by Greening Health Care, "Ontario's hospitals can collectively deliver \$100 million per year in utility cost savings, while collecting a similar one-time amount in utility company incentives." The paper goes on to frame these savings as a compelling opportunity: "Over the next 10 years this redirected cash flow can help renew physical infrastructure while freeing up much-needed funds for front-line healthcare services."

### What it takes to drive forward the energy performance of healthcare facilities

Text and photos by David Lasker



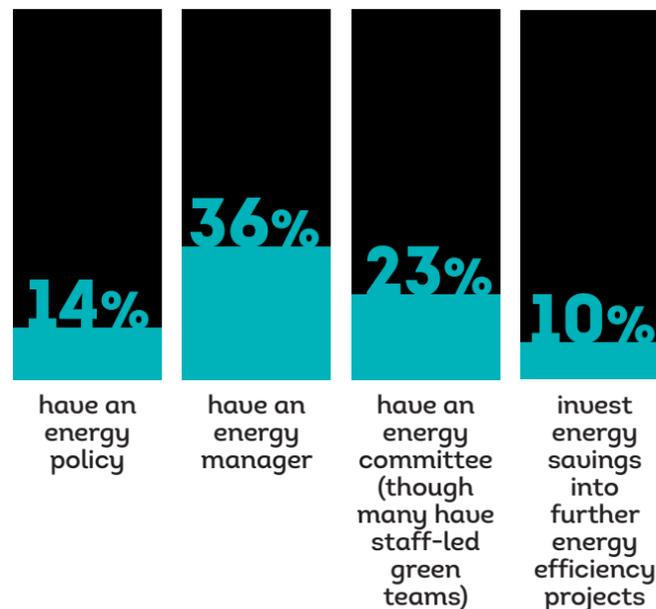


**Jeff Weir: “I would want to encourage every CEO to understand that pretty big gains on energy efficiency are possible today within their organizations...that will pay for themselves.”**



**Mary Ann Breitigam: “I think there’s some education involved so that we can let the entire organization understand that energy savings can be reintroduced into patient care, so that we’re not decreasing and cancelling programs.”**

## The Ontario hospital energy landscape



Source: Business Case for the Use of Green Revolving Funds in Ontario Hospitals

So how do hospitals save energy? To shed light on top strategies, *Building*, together with the Independent Electricity System Operator (IESO), convened a hospitals-focused roundtable in June comprising healthcare administrators, utility providers, consultants, engineers, researchers, equipment vendors and others. They discussed access to capital, setting baselines and the ability to accurately measure energy consumption, technological opportunities, and more. One question above all seemed to weigh on all the panelists’ minds: How do you get the CEO’s attention when electricity represents such a small percentage of a hospital’s overall operating budget?

“You need to have a champion who is going to be beating the drum constantly,” said Mary Ann Breitigam, redevelopment manager at St. Joseph’s Healthcare Hamilton. “From the frontline person all the way up... You have to have someone who knows their stuff [and] understands energy talking with the executive, talking with the managers.” Energy efficiency projects often compete for funding with expenditures for direct patient care, so Breitigam is working on a “culture change to identify that managing the facility efficiently is as important to patient care as the new equipment, the CT scanners and MRI cameras.”

Stories are emerging of Ontario hospitals making sizable reductions to their energy spend and these case studies can be effective tools for winning executive buy-in, she added. Other panelists pointed to the importance of leveraging a hospital’s broader role in its neighbourhood. “I really like the idea of... creating a green community,” said Peter Rowles, principal at ICF Canada. “We care about where we live so having leaders in municipal government and the local hospital—which the community will say is their hospital—[talking about conservation] would be outstanding.”

Breitigam agreed: “I think most hospital CEOs and the executive folks perceive the hospital as a part of the community. As we apply to the Ministry of Health for funding for projects, we need to talk about how we’re serving our community... So it would behoove us to look at... how we are improving the environment for the community.”

It’s also important to position energy savings as an avoidable cost, added Jeff Weir, national CS business leader with HVAC supplier Trane Canada. “I would want to encourage every CEO to understand that pretty big gains on energy efficiency are possible today within their organizations... that will pay for themselves,” Weir said. “So it’s a redirection of their existing utility budget, which they know they’ve got to pay until that building is torn down—and a portion of that is waste. So your team’s going to find that waste and use that to pay back the investments.”

In terms of drivers, panelists noted how energy efficiency awards seem to spur executive and employee engagement. Trophies for augmenting energy efficiency bestow recognition, accrue bragging rights and “get better public relations for the hospital by being more green,” said John Maiorano, a researcher at the University of Toronto’s School of the Environment, who is working on his PhD thesis in energy efficiency in Ontario hospitals.

The Hospital for Sick Children, for instance, won the 2014 Green Healthcare Award through the Ontario Hospital Association. The executive team also has a solid grasp of the benefits of energy efficiency, said Predrag Majkic, program manager, energy management with Sick Kids. The hospital currently has two energy managers on staff to identify and push conservation efforts forward. “The upper management from the CFO, CEO, even the director of facilities, all of them have sort of an energy background in terms of projects that they have done before,” said Majkic. “So for us, it was an easier task... to explain why we need some financing for some of the projects.”

Building the business case is an essential part of getting projects approved, the panelists agreed, noting the benefits of conservation run far deeper than dollar savings—improving patient and employee well-being and driving efficiencies across the organization. “These are the parameters that you can build into your life cycle business case,” said Rowles. “And it might be... avoided maintenance costs, it could be tax avoidance through accelerated [capital] depreciation. It could be allowances for externalities such as greenhouse gas emissions reductions, health and safety and community involvement... Then it’s not a question of waiting a year or two years to get budget approval... it’s got a green light.”

The group shared ideas and wins related to retrofits and upgrades, such as demand control ventilation, energy-efficient boilers, lighting sensors and other automated building systems, to reduce energy consumption. “Lighting has got some major improvements made with LED,” said Weir. “We just completely retrofitted an entire hospital to LED and the staff love it... it was actually really well received... It’s high impact, good, trustworthy savings for a long time,” he said.

One of the most significant energy innovations in healthcare is co-generation; also referred to as combined heat and power (CHP). CHP, according to a technical briefing by the Canadian Coalition for Green Health Care, captures energy that would normally be lost in power generation and uses it to provide heating and cooling. Kingston General Hospital (KGH), for instance, commissioned a 15-megawatt, \$25-million cogeneration facility in 2006 with its affiliate, Queen’s University. Two

## Powerful help: Incentives to bring ideas to reality

There are many reasons to focus on upgrading or modernizing systems for energy efficiency, ranging from reduced operating costs and increased sales to improved employee comfort and effectiveness. Fortunately, there are also incentives and rebates available to encourage businesses to take advantage of opportunities to improve efficiency and competitiveness, as well as non-financial tools and resources. In Ontario, these incentives and resources can be accessed through the saveONenergy program.



### Energy audits and engineering studies

This is often a first step for businesses looking to improve efficiency. They are used to identify opportunities for improvements and provide business cases. They can:

- Classify energy savings by potential project
- Identify potential non-energy related improvements including productivity, safety, yield, sales, etc.
- Identify the capital cost of the projects
- Summarize the return on your investment for each project and prioritize the projects based on capital cost, life cycle cost savings and non-energy related financial benefits. Use this to provide return on investment, savings to investment ratio, payback periods, etc.

- SaveONenergy can help cover the cost of audits. Once opportunities are identified with an audit, more detailed engineering studies can define what exactly is required and provide more accuracy on the potential savings and costs.



### Retrofits

Once a business is ready to upgrade to high-efficiency systems for lighting, HVAC systems, pumps, motors, fans and other plant equipment, funding is available through saveONenergy.



### Energy Managers

Energy manager resources may be available through local utilities’ Energy Manager Program.



### Energy Management Training

Businesses can receive a rebate worth up to half the cost of certified Energy Manager, Commissioning Agent and Measurement & Verification training.

Find out more at [saveONenergy.ca/business](http://saveONenergy.ca/business) or get your local electric utility to contact you at [saveONenergy.ca/get-started](http://saveONenergy.ca/get-started)

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natural gas-fired engines can supply enough electricity for the hospital and a portion of the university’s campus, according to the brief.

“The plant has provided the hospital with a reliable back-up power supply and savings from the project have offset operational costs,” said Chris Mackey, former director of facility engineering and maintenance, Kingston General Hospital, in the brief. “Co-gen allows KGH more assurance that patient care will not be impacted when electricity is not available for whatever reason—and we are able to do so in a more effective and energy efficient way.”

The roundtable group was also excited about technologies such as automatic fault detection, increasingly available in building automation systems, and its ability to continuously monitor systems at the local level for more efficient feedback. “Between your boiler, chiller and HVAC, that’s a lot of energy. And so it’s always looking at those HVAC systems and going, ‘Gee, you wanted it this temperature and you’ve got this outdoor temperature, so something’s not right with the damper linkage or the belt’. And it will actually calculate, on the spot, what that’s costing you per hour,” said Weir.

His comment tapped into one of the most significant calls to action for energy efficiency proponents in hospitals: getting



a reliable baseline on current energy consumption. Right now, energy costs are typically calculated per square foot, and it can be difficult to pinpoint areas where the greatest opportunities lie. “I think sub-metering would probably be the biggest single thing within healthcare you could do,” said Chris Cuthbert, manager, Co-Generation and Energy, Hamilton Health Sciences. “If each of the various silos within the hospital actually understood their consumption and was paying for it, instead of it all being just lumped into one big central budget then you would get that engagement.”

In a similar vein, the number one question for Allan Dai, sustainability and environment program manager at the Hospital for Sick Children’s Peter Gilgan Centre for Research and Learning, is how to convert the data from Sick Kids’ metering systems into useful business knowledge. “Every Monday, the first thing I do is open my metering interface. I’ve got six pages and each page has 40 meters; those meters feed me ratings at one-minute intervals. How do I translate this into business insight and into language that other people understand? There’s no software that can meet my requirement to collect the data, do the calculations, split them into department levels and translate into a dollar value. We’re probably pioneers.”

Turning data from sub-meters and other monitors into real business intelligence would help prioritize conservation projects and maintenance improvements, but it would also be potent for another reason—employee engagement. One panelist related the story of a university in the US aiming to raise awareness about energy efficiency. Administrators created a graphic display of a polar bear on an ice flow. As consumption of energy at the university increased, the polar bear would start to struggle in the water. The group agreed these kinds of visual dashboards can boost engagement around energy conservation.

The dashboard idea isn’t new, but some panelists noted it isn’t often used in hospitals. “But it only works on real time data from not just big picture, but also small areas, small silos... tiny little areas of energy usage,” said Peter Sobchak, editor of Building.

In addition to real-time empirical data, surveys and open-ended conversations with management and staff can collect valuable insight to help create baselines and goals, added Christine Wickett, environmental sustainability coordinator at The Hospital for Sick Children. “Secondly, review what the regulations are within the healthcare sector—and there are many,” she said. “They stem deeper if you really take the time to look at them, and some of them do require behavioral change and adaptation in your current workforce. Without looking at these regulations you’re not going to have as much [incentive] to go further with your executive team.”

Like others at the table, Wickett emphasized the importance of recognizing top energy savers by department. Training and feedback can go a long way too, especially if the key message isn’t just about cost savings, but the positive impact on patient care. At the individual level, turning off computers at night is one example of a small change that can amplify in impact when combined with other behavioural shifts.

Those initiatives should be shored up by a deeper change within hospitals, like linking capital planning and energy and facilities management — two departments that traditionally operate separately. In hospitals, energy management proponents often don’t know about new equipment purchases until they arrive at the shipping dock, observed Breitigam. “We’re just in the midst of sort of a facilities transformation project where we’re actually aligning the capital planning development and the building services department. So it’s going to be really under one umbrella... so that we are building for the future and building for their sustainability.”

Breitigam and her team are also aware they don’t yet have an energy policy, and they struggle with a challenge common to hospital facilities teams—lack of resources for energy management. “If you’re the manager of building services... you’re fighting fires, fighting floods, running around all day managing the facility. So there was just no way that you could also take on the energy management piece,” she said. “Without an embedded energy manager you can’t even get the low-hanging fruit.” She has posted for the position of an embedded energy manager and at the time of the discussion, was in the process of starting interviews.

Encouraging developments also include burgeoning efforts to implement green revolving funds for energy management, said U of T’s Maiorano. In *Business Case for the Use of Green Revolving Funds in Ontario Hospitals*, Maiorano sounded a theme, heartily seconded by the other panelists, for the energy manager to retain energy-efficiency savings in the department’s budget and re-invest in further savings. “You go to management and say, ‘We just need this money once. And then you don’t have to worry about us.’”

Steve Kemp, vice president & partner at MMM Group Limited, agreed: “It doesn’t make sense to keep going back and asking for approval for small pots of money that don’t really warrant the time of the CFO,” Kemp said. “But you [should] go in and say, ‘I want you to earmark \$10 or \$20 million in a revolving fund that funds only energy efficiency. I want that committed so that nobody can steal that money for other projects. And we’ll return 10, 15, 20, 25 per cent [cost avoidance].’”



Industry incentives like saveONenergy also have a role to play, added Wickett, as hospitals face ever-increasing budget pressures. “The cost of machines is going up, the costs of necessary medical instruments are going up and every hospital is suffering from that right now... So, if it’s going to be funded, it has to be funded through, for starters, government incentives... And then, after that, the savings potential from that work that’s being done.”

Some hospitals are looking to proven protocols such as ISO 50001 to galvanize efficiency efforts. Modeled after the ISO 9001 Quality Management System and the ISO 14001 Environmental Management System, ISO 50001, released in 2011, specifies the requirements for establishing, implementing, maintaining and improving an energy management system. Standards such as ISO 50001 spur a commitment among hospital staff and the executive to continuous improvement around energy efficiency.

Though conservation requires focus, tenacity and the savvy to engage and motivate all levels of staff and management, the group at the roundtable discussion demonstrated hospitals can and are conserving, to the benefit of patients, employees and their broader communities.

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