



**CASE STUDY**

**Bayer Inc.**  
 Energy Performance



**\$59,700**  
 annual savings

**18%**  
 reduced consumption

**6.3**  
 years payback

“Sustainability is woven into everything they do at and climate change is a big concern...”

“The Modern Niagara Group saw an opportunity to provide an innovative cooling solution for Bayer’s head office that would meet a number of important goals.”

Bayer Inc. (Bayer) is a Canadian subsidiary of Bayer AG, an international research-based group with core businesses in health care, crop science and innovative materials.

**ENERGY EFFICIENCY – ICE CHILLER PROJECT**

Bayer’s mission statement is Science for a Better Life, and for Bayer this includes balancing economic growth with environmental and social responsibility. Sustainability is woven into everything they do at and climate change is a big concern, and even before considering the Ice Chiller project, they had implemented a number of environmentally sustainable initiatives at their Canadian head office location including a green roof on one warehouse and a white roof on the other. They implemented



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## Operation Schedule:

- **7:00 p.m.** - Ice Chiller is turned on to make ice overnight
- **6:00 a.m. - 10:45 a.m.** – Mechanical chiller is used to cool the building to ensure ice is conserved for peak cooling hours
- **10:45 a.m. to 7:00 p.m.** – Ice-chilled water is used to cool the building



green bins long before they became mainndstream, and use light sensors in all of their buildings to reduce electricity consumption.

### The Opportunity

Bayer's Toronto head office had three aging, energy-intensive chillers that needed replacing. Two of the chillers were 30 years old and supplied cooling to the six-story office building and east side of the low rise building. The third chiller serving the west side of the low rise building was 15 years old. The combined cooling capacity was 800 tons and the system itself was quite oversized.

The Modern Niagara Group (a team of mechanical contracting and service companies providing design, installation and maintenance of plumbing, heating, air conditioning, refrigeration and process systems) saw an opportunity to provide an innovative cooling solution for Bayer's head office that would meet a number of important goals:

- Reducing Bayer's energy consumption
- Improving the reliability of their cooling system
- Reducing operational costs

Shifting power consumption from peak periods is an ongoing objective of electricity providers and financial incentives are offered to organizations who pursue load-shifting solutions. Incentives available to Bayer included an initial rebate of \$711,360 from the Ontario Power Authority (OPA) and Toronto Hydro, which is calculated at \$800 per kilowatt for load reduction between 11:00 a.m. and 5:00 p.m., offsetting some of the capital costs of the project.

### The Solution

The recommendation was to replace the older chillers with an Ice Chiller system. The key factor contributing to energy reduction is that the Ice Chiller system utilizes load shifting by using energy in off-peak hours. The system creates and stores large blocks of ice overnight when demand on Ontario's electricity system is low (nuclear, hydro, and wind generate the vast majority of power during this time). During high-demand daytime hours (where natural gas and coal powered electricity generation is used to meet demand), the ice created overnight is used to cool the building. The new Ice Chiller system was fully installed as of June 2012.

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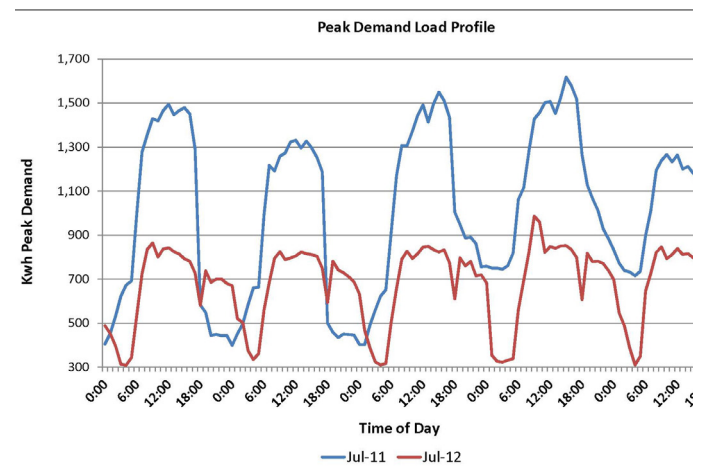
“In its first summer of use, the Ice Chiller system reduced Bayer’s electricity consumption by 18 per cent compared to the previous year ...

...with 50% peak power reduction and \$59,700 per year in energy savings.”

**The Results**

In its first summer of use, the Ice Chiller system reduced Bayer’s electricity consumption by 18 per cent compared to the previous year with 50% peak power reduction and \$59,700 per year in energy savings (includes peak load savings). In addition, despite high seasonal temperatures, the backup system was not required once. The original estimated Return of Investment was eight years, but once implemented, this was reduced to 6.3 years.

The graph to the right is a representation of the actual peak load draws for the entire facility at Bayer, 77 Belfield Road from Monday to Friday for July 2011 before the new system and July 2012, after the new system was installed. The blue line shows how a typical cooling load increases as the outdoor air temperature increases. The red line shows a typical 50% reduction in peak load from 11am to 5pm because the cooling load is shifted to off peak hours. While overall energy consumption is reduced by 18%, the benefit to hydro is the 50% reduction in peak energy required during the hours when the Ontario hydro grid is at its peak, thereby helping to reduce the maximum hydro generating load required to supply power to the grid.



**Key Contributors to Success**

- 1) **Ample Space** – Bayer had enough space to complete the installation indoors resulting in less capital costs to build another structure to house the ice storage system (used an old storage and pump room).
- 2) **Customer trust** – Modern Niagara Group is professional and very diversified. They handled all their heating, air conditioning and plumbing needs and have a big work pool to pull from for a project like the Ice Chiller and were able to meet Bayer’s tight deadline.

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**Conclusion**

Bayer's experience with the Ice Chiller has been overwhelmingly positive. The Ice Chiller system meets our needs both financially and in terms of sustainability. They are able to cool their building just as well as with energy intensive mechanical chillers, but with a significant reduction in power consumption and cooling costs. With its Ice Chiller, Bayer's shown that keeping cool doesn't have to mean using a lot of electricity and can have significant environmental benefit.



*Before Picture*

**Ice Chiller Features:**

- Closed loop system (water does not need to be replenished)
- Water contains an algacide to prevent algae growth
- 35% glycol solution is used to prevent water from freezing – optimal balance between minimizing risk of water freezing and least amount of energy required to chill the water
- Delivers the required cooling to all spaces for uniform temperature and employee comfort
- Deliver 42 degree (farenheight) water to the building to provide cooler air to the space which increases existing air handling unit



*After Picture*