



A Cool Chunk of Change

Incentivized efficiency upgrades deliver measurable energy savings for Canadian grocer

In an effort to offset rising energy costs, a leading supermarket chain commissioned a detailed energy analysis and performed a series of energy efficiency measures (EEMs) on a typical grocery store in its fleet: a 45,000 square-foot, 20-year-old unit in southwestern Ontario.

The grocer also sought to take advantage of the Independent Electricity System Operator's (IESO) — formerly Ontario Power Authority (OPA) — saveONenergy Incentive Program, using the Equipment Replacement Incentive Initiative (ERII) to offset investment costs. To do so, they engaged Renteknik Group (www.renteknikgroup.com) — experts in energy optimization and management, and an experienced consultant with the saveONenergy incentive programs — to lead the effort.

To start the project, Renteknik installed its ClimaCheck (<http://home.climacheck.com>) data collection and analyzing

system, gathering extensive baseline data on the system operation and identifying preliminary EEM opportunities. Renteknik then looked to Emerson Climate Technologies for real-world ways to improve efficiencies in the store's legacy refrigeration system.

The store in question utilized a common refrigeration architecture, consisting of low- and medium-temperature parallel rack systems running on 10 Copeland™ semi-hermetic compressors. With a cooling capacity of 1,000,000 BTU, the system had historically consumed approximately 950,000 kWh of electricity per year.

Toward the end of 2012, Renteknik began the meticulous process of establishing an energy consumption baseline from which to evaluate refrigeration system efficiencies — a critical first step for launching a Measurement and Verification (M&V) program and demonstrating efficiency gains which could later qualify for the saveONenergy incentives.

Stepped M&V Process Culminates in Equipment Upgrades

Renteknik employed a stepped approach toward achieving efficiency improvements through a series of EEMs. The first step was to fine-tune the system as it stood. This meant optimizing every set point in the supermarket, cleaning condensers and replacing any damaged components — without making any material changes to the system itself.

Renteknik performed these basic EEMs for 11 months, while closely monitoring system performance through the real-time ClimaCheck online portal. When any piece of the refrigeration system drifted outside of desired efficiency ranges, Renteknik's monitoring system detected it and alerted the store on how to restore efficiency. Using these adjustments alone, the store achieved an 18 percent reduction in energy costs in the refrigeration system and qualified them to receive saveONenergy incentives. These preliminary EEMs, while impressive, did not represent all the achievable energy savings associated with system improvements and minor capital upgrades that would meet the Simple Payback threshold required and maximize, for the long-term, sustainable energy efficiency improvements.

To take the store to the next level of energy efficiency, Renteknik recommended compressor upgrades on two weaker units that it had detected — one on the low-temperature side and the other on the medium-temperature rack. They selected two Copeland Discus™ digital compressors because of their ability to retrofit refrigeration systems with precise variable-capacity, load-matching capabilities.

But before engaging the new compressors' full digital potential, Renteknik needed to measure the improvements to the system with the compressors alone (without engaging their variable capacity capabilities). Using the established energy baseline from the preliminary EEMs, they were able to demonstrate a 4 percent energy improvement just by swapping compressors.

The last step of the EEM was to engage the new compressors' digital retrofit capabilities. In this configuration, each digital compressor serves as the lead compressor in the parallel rack. Their ability to vary capacity to precisely match the refrigeration load provides ongoing energy efficiency gains while reducing compressor cycling and associated wear and tear. Renteknik determined that this final step netted an additional 12 percent savings. Combined with the initial 4 percent energy improvement from the new compressors, this qualified the store for additional saveONenergy ERII incentives.

The Proof Is in the Payback

After three months of M&V on the variable capacity Copeland Discus digital compressors, Renteknik verified a reduction in annual energy consumption of 122,965 kWh as shown in Table 1 — a 16 percent reduction in energy costs — and an annual savings of \$17,215. At the saveONenergy incentive rate of \$0.10 per kWh, the reduction also translated into an incentive payout of \$12,297. Combined incentives on the entire EEM efforts surpassed \$30,000 and produced in excess of \$40,000 in annual energy savings at the current electricity rate.

| Item | Energy Savings kWh/Year | OPA Incentive | Annual Savings |
|--------------|-------------------------|------------------|------------------|
| Rate | | \$0.10/kWh | \$0.140/kWh |
| LT | 47,390 | \$ 4,739 | \$ 6,635 |
| MT | 75,575 | \$ 7,558 | \$ 10,580 |
| TOTAL | 122,965 | \$ 12,297 | \$ 17,215 |

Table 1: Summary of energy savings, OPA incentives and annual operating savings

Table 2 demonstrates the project costs and the return on investment (ROI) with (and without) the saveONenergy incentives. At a projected annual savings of \$17,215, the simple payback without incentives is 1.4 years, including Renteknik's energy consulting and M&V costs. The additional saveONenergy incentives cut the ROI time in half. Renteknik's M&V program clearly demonstrates the energy savings potential of Copeland's variable-capacity digital compressor retrofit.

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| Total Project Cost | \$ 24,592 |
| OPA Incentive (Max 50% of Costs) | \$ 12,296 |
| Net Project Cost | \$ 12,296 |
| Estimated Annual Savings | \$ 17,215 |
| Simple Payback <u>With</u> Incentives | 0.7 Years |
| Simple Payback <u>Without</u> Incentives | 1.4 Years |

Table 2: Summary of project costs, OPA incentives, annual operational savings and ROI calculations

The supermarket chain is currently deploying the digital compressor retrofit approach in other stores. Because of the success of this trial, whenever a compressor needs to be replaced, they will upgrade their system with a Copeland Discus digital compressor. 🌐