DuctSox - First LEED-Certified Canadian Supermarket

First LEED-Certified Canadian Supermarket uses Solar, Fabric Duct and Heat Recovery

ST. PASCAL, Quebec—Canada's first LEED-certified supermarket is a showcase of green, sustainable HVAC/R technologies and a preview of energy efficiency that commercial buildings can implement now.

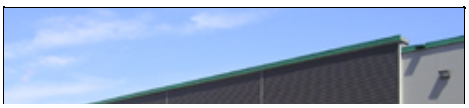
St. Pascal's IGA features solar heating, fabric ductwork, heat recovery, high efficiency compressor rack refrigeration, secondary glycol loop heat reclamation, and a host of other green technologies.

The heating equipment, for example, provides 100 percent of the store's space heating requirement with solar, heat recovery and fabric duct equipment and all three components were integral in LEED certification. Although this prototype store's heating equipment cost slightly more than conventional rooftop heating systems, refined systems in subsequent IGA store designs cost less. Add Canadian government energy incentives and the heating system offers a zero payback. The heating system is completely sustainable and uses no fossil fuels.

Developed and franchised by grocery retailer/food distributor, Sobeys Inc., a wholly-owned subsidiary of Stellarton, Nova Scotia-based, Empire Company Limited, the northeastern rural Quebec St. Pascal IGA is a combination of piecemeal sustainability experiments throughout the 1,300-store chain the last six years that are culminated into one facility. Sobeys' ongoing building and renovation program, which extends to approximately 30 stores annually, presents a good laboratory to test new technologies. "I believe it's the social responsibility of all engineers to suggest the implementation of these technologies to their management because we've proven these products are available, functional and cost-effective right now," said Simon Berube, P.Eng., senior director--engineering, Sobeys-Quebec, Quebec City. "Engineers consider two years or less a good payback on sustainable equipment, but this store was paid back from day one."

Attaining LEED (Leadership in Energy and Environmental Design)—a rating system by the Canadian Green Building Council, Vancouver, certification was remarkable since 20 of the 70 possible LEED points are more attuned to office buildings--such as credits for carpeting not using volatile organic compounds (VOC)--and not applicable to supermarket formats. Consulting engineer, Francois Dumas, P.Eng., Meconair, Quebec City, and Jean Tardif, LEED-AP, Atelier 21, Quebec City, were instrumental in LEED certification procedures.

All the components of the heating system, which are major contributors to LEED accreditation for example, are readily available and cost-effective via paybacks even if energy incentives aren't available. The store space heating consists of a wall-mounted solar thermal system by Enerconcept Technologies, Magog, Quebec; fabric ductwork by Ductsox Corp., Dubuque, Iowa; and heat recovery by a SmartRef Compressor Systems Control (CSC) system, Vaudreuil-Dorion, Quebec. Air conditioning is handled by a conventional high-efficiency DX air handling system by Carrier, Syracuse, N.Y., and uses the same fabric ductwork system.



The solar system is a 6-inch wide, 1,800-square-foot black metal box mounted to the store's southwest wall that heats outside air up to as much as 54°F above the outdoor ambient temperature. The solar

system draws in outside air through the bottom and the heated air ascends through a patented baffle system before it's delivered to the air handling system.

The DuctSox fabric duct helped toward gaining LEED credits because it's a recycled material, contains no VOCs, requires 40 to 60 percent less labor, is 90 percent lighter than metal, and provides the ultimate in indoor air quality (IAQ). Its linear vents, which run the entire length of the duct, disperses air more evenly than conventional metal duct/register systems, thus the air handler run times are shorter. "There aren't drafts or cold/hot spots associated with conventional registers and generally the IAQ in the store is better with fabric ductwork," said Berube. "In stores with metal duct/register systems, there are definitely drafts and patrons typically feel chilled in the refrigerated case aisles."

Heat from the compressor racks is recovered by a SmartRef Compressor Systems Control (CSC) system, and supplied to a plate heat exchanger to bring the solar heated air up to temperature set points.

The refrigeration system, which was installed along with other mechanical systems by mechanical contractor, Dube Refrigeration, Montreal, Quebec, features heat reclamation with a secondary glycol loop that reduces the store's refrigerants requirement by over 700 lbs., versus a similarly-sized conventional supermarket. "Some day we hope to eliminate all refrigerants from our new stores," said Berube.

The heating and refrigeration systems are just two green factors. The St. Pascal IGA also uses high efficiency T-5 fluorescent lighting, a parking lot catch-basin system that separates automotive oils from rainwater, and a complete building automation system for all mechanical equipment by Carrier Micro Thermal Technologies, Laval, Quebec.

While all the equipment offers very short competitive paybacks of less than a year, energy incentives brought paybacks to zero. For example, the store received $60,000 in subsidies from Natural Resources Canada (NRCan)—an arm of the government that ensures responsible development and use of natural resources. The store received the subsidy for surpassing the Model National Energy Code for Buildings (MNECB) standards by 47 percent. The MNECB has a minimum requirement to construct buildings that reflect today's rising energy and construction costs, technological innovation and energy concerns.

Another $105,000 in subsidies came from utility, Hydro-Quebec. "The initial subsidies were important prototypical factors in the St. Pascal store, but the sustainable technology in our following stores will bring more even more subsidies," said Berube.

Sobey's engineering department also requested refrigerated cases from ARNEG Canada, Lacolle, Quebec, to allow a rear energy recovery system to allow escaped cooled air to be drawn through specially perforated kick-plates, under the units and into a collection system.

While all the sustainable technology in new IGA stores has an environmental impact, it also makes the franchises more desirable to franchisees because they operate more cost-efficiently than the competition.

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