



enerworks
Solar Heating and Cooling

Case Study: Oxford Gardens Solar Cooling Project

Introduction: Canada's Largest Solar Thermal Cooling and Heating Installation. Awarded by the dena Solar Roofs Program for Foreign Market Development 2009/10.

Background: Oxford Gardens is a recently renovated retirement home in Woodstock, Ontario. This 9,900 square meter building has 112 residents and 101 individual suites. A 90 ton chiller is currently used to air condition the facility and 3,000 litres of hot water are used on a daily basis. The home features a swimming pool, theatre, sunroom and large gardening and outdoor area.

Aims & Objectives: The client was committed to investing in an industry leading project which uses solar heating and cooling in the facility. Oxford Gardens strives to achieve a superior living experience through spiritual, physical and environmental improvements to the facility.

The solar heating system provides heating to the main heating system, the pool and domestic hot water used in the facility. During the cooling season the solar heat which is normally used for heating is diverted to run a 30 ton (105KW) Yazaki absorption chiller to cool the building.

Both the building owner and the residents were very enthusiastic about the project and it's construction phases. Many of the residents were thrilled at the thought of their home as one of the most innovative in North America.

Approach: The planning took almost 12 months to run performance simulations, engineering roof load calculations and mechanical designs.

Enerworks involved all trades and engineering staff in the process of design to capture cost savings ideas and cost avoidance consequences to changes. The result of this was close to \$200,000 in savings of materials and labor for the project.

The construction phase took 11 weeks from the first roof penetration to the inauguration day November 11, 2010 when the system was running. Some additional time was required for insulation completion as the project contains more than 4000ft of piping that was used in the project.

Challenges: One of the biggest challenges for this project was retrofitting such a large project on an existing building. The roof in particular posed structural concerns that delayed engineering approval for more than 6 months and alternate designs were proposed.

Ultimately the structural (wind loading) was resolved by placing the collectors on a 15 degree slope. The collectors were then designed with the tubes horizontal and the absorber plate was rotated to 30 degrees from it's original position. The result is a 45 degree assembly with a 15 degree wind load.

This design prevented us from using flat plate or heat pipe collectors as only direct flow heat pipes would provide the energy and orientation required. One of Enerworks' main benefits is to be able to offer many different products to suit the project.

Enerworks also determined that a custom control was needed which could be replicated on similar future projects to drive down cost. The Enerworks Solar Cooling Controller was the result. This system has the ability for remote monitoring and system control as well as back up systems control for power or equipment failure.





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Successes: During the first full cooling season the facility saved more than 50,000 peak KW hours. With some modifications for the second season we expect this number to be closer to 100,000 KW hours of peak electricity offset by the air conditioning system.

The facility also saw natural gas reduction of 50% in the summer months and at the same time we were producing chilled water for the air conditioning.

During the colder seasons (October November - April & May) there are many days the heating system does not come on until well into the evening (if at all) because the solar system has collected and stored so much energy.

Conclusion: *This project is a significant success as there are not many solar cooling projects in North America and it is working as designed.*

The customer has already received a tremendous amount of publicity and marketing on the project and they are so pleased with the system that all future Oxford Gardens retirement homes will be solar ready to avoid structural concerns in the future.

