



## Fire Station #231

### 12.5 kW<sub>t</sub> Solar Water Heating System



#### BACKGROUND

The City of Toronto chose to install a 12.5 kW<sub>t</sub> Solar Water Heating System at Fire Station 231 to evaluate the performance of the technology and to showcase the City's environmental leadership. Installed in December 2006, the system is reducing the Fire Station's natural gas use for hot water heating.

#### MONITORING

Installed on site are two Kamstrup Multical 601 heat meters. One installed on the DHW line between solar tanks and auxiliary heater (Solar Energy Delivered) and the other on the piping connecting solar tanks to the solar heat exchanger (Solar Energy Collected).

#### FINANCIAL

The project received a grant from Natural Resources Canada's Renewable Energy Deployment Initiative. The remaining portion was financed through the City's Capital Budget.



#### STATUS

Although performance indicated normal operation for 2008/2009, both hot water consumption and delivered energy were reduced at Fire Hall 231 for 2010 and 2011. The system performed particularly poorly during the 2010/2011 winter. The reduction in hot water consumption along with reduction in delivered energy should be investigated further.

#### For more information, contact:

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#### Project Overview

Project Owner: City of Toronto  
Location: 740 Markham Road, Toronto, ON  
Building type and use: Fire Station  
System type: Solar Domestic Hot Water  
System power rating (kW thermal): 12.5  
Installation date: December 2006

#### System Configuration

Total Gross Collector Area (sq. meters): 17.892  
Total number of Collectors: 6  
Collector Manufacturer: Thermo Dynamics  
Collector Model: G32-P  
Number of Collectors: 6  
Thermal Storage Tank Manufacturer: Rheem  
Thermal Storage Tank Model: ST120 (435 litres)  
Number of Thermal Storage Tanks: 2  
Collector Fluid: Water  
Array Angle: 45 degrees from horizontal  
Azimuth: 15 degrees East  
String Configuration: Drain-back with 6 collectors in parallel

#### Annual Performance

2008/2009 Actual Performance: 654 kWh/kW

#### Financial

System Cost (including tax): \$40,631  
Grants: \$20,484  
Annual Savings: \$335\*  
Cost per kW (before grants): \$3,251  
Simple Payback (before grants): 121 years

#### Environmental Benefits

Estimated emission reduction: 2.1 tonnes CO<sub>2</sub>e /yr\*\*

\* based on a natural gas price of \$0.35 per m<sup>3</sup>

\*\* based on 1.879 kg CO<sub>2</sub>e /m<sup>3</sup>

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