

Allan Gardens High Efficiency Boiler and Heating System Retrofit



Facility Profile

Allan Gardens, gifted to the Toronto Horticultural Society in 1858 and later purchased by the City, started as a unique publicly accessible oasis of green in a rapidly expanding downtown core. Later it achieved renown for its landmark buildings including the glass domed Palm House. Today the site comprises of six interconnected greenhouses covering over 1500 m² (16,000 ft²) with “climates” ranging from desert to rain forest..

In 2000 the City of Toronto realized that the aging conservatory was in need of an overhaul. As part of heating system upgrade three options were evaluated:

- 1) retain steam system but upgrade distribution;
- 2) convert to hot water heating with standard efficiency boilers;
- 3) convert to hot water heating with high-efficiency condensing boilers. Option 3 was chosen because it promised long term savings and lower greenhouse gas emissions.

Boiler and Heating System Retrofit Implementation

Retrofit work completed at Allan Gardens is as follows:

- High Efficiency boilers and trim installed
- Steam piping and insulation; piping and insulation in green houses
- Ridge & side vent system, palm house vent system
- Integrated boiler & van controls; pump starters & controls
- New zone hydronic heating pumps

Project Summary	
Project commencement	Nov 2003
Total project cost (incl. grants):	\$640,547
Estimated cost avoidance:	\$21,140/yr
Simple payback period:	30 years
Estimated natural gas savings:	85,000 m ³ /yr
Total system efficiency:	90 %
Estimated CO ₂ emission reduction:	158 tonnes/yr
Project Funding: City of Toronto, Enbridge	

Three Gasmaster GMI 1.5 high-efficiency condensing boilers provide a combined heating input of 4,500 MBh. A new Priva Greenhouse controls system offers improved control of ventilation air and humidity levels. High output Stelrad units allow high output heating with lower water temperature. Galvanized piping provides erosion proof distribution and planting beds have been re-positioned to provide ready access to radiator maintenance. Novitherm reflective panels, installed behind the radiation units, reflect heat into the space and avoid heat transfer through greenhouse walls to the outside.

Benefits of Boiler and Heating System Retrofit

- The new heating system greatly reduces energy use and greenhouse gas emissions while improving climate control.
- The new controls enable the complete separation of the facility into six heating zones, each with its own pump, which ensures the integrity of the distinct growing climates. As an added bonus the boilers are vented with their own stacks, saving money on rebuilding the old stack.
- The new system not only delivers environmentally friendly performance at lower costs, it is also making possible an exciting expansion of the facility and a new use.
- One of the new boilers will service an additional greenhouse being relocated from the University of Toronto to Allan Gardens as an educational facility for hosting school events and getting children interested in horticulture.