

Heating Plant Retrofit CMHC National Headquarters, C Building

Location:	700 Montreal Road, Ottawa, Ontario
Client:	Brookfield Global Integrated Solutions
Owner:	Canada Mortgage and Housing Corp.
Duration:	May 2017 - September 2017
Value:	\$350,000
Services:	Mechanical Engineering Electrical Engineering Structural Engineering
Awards:	ASHRAE Chapter Technology Award Ottawa Valley Chapter Commercial Buildings – Existing 2017 - 2018

The CMHC C Building is an 411,468 ft², eight-storey building comprised mostly of office space. The penthouse contains the main mechanical room which houses the cooling and heating plants and two air handling units. The basement level is split with a 17,000 ft² data center on one side and multi-purpose rooms on the other (storage rooms, mechanical and electrical rooms, and small office space). Below the basement, there are two levels of parking space.

The project involved:

- Replacing three non-condensing heating boilers having a total input of 10,500 x 10³ Btu/hr at the end of their expected life-cycle with five new high-efficiency condensing boilers;
- Replacing two secondary hot water circulating pumps with two new pumps equipped with high-efficiency motors and variable speed drives;
- Modifying the BAS to accommodate the above-noted changes including addition of a flow meter to help control the pumps; and
- Architectural and structural works: modifying the existing and providing new housekeeping pads and reconstructing the chimney walls.



Energy Efficiency

2017/2018 total overall savings: \$38,209.75

Summary of savings:

Electrical savings (40,011 kwh)*	\$6,169.70
Electrical consumption rebate	\$4,001.10 (Hydro Ottawa)
Natural gas savings (46,960 m ³)	\$13,449.34
Natural gas rebate (for high-efficiency condensing boilers)	\$14,589.61 (Enbridge)

*based on 2017 blended rate

Innovation

After studying the heating load profiles and occupancy schedule and discussing with the owner's representative, Jp2g selected two sizes of boilers. To accommodate seasonal variance in occupancy and heating loads, two boilers have an input of 1,000 x 10³ Btu/hr each, while three other boilers have an input of 2,000 x 10³ Btu/hr each.

The smaller-sized boiler is particularly useful in shoulder seasons when heating loads are low. This boiler can reach a low firing rate of 170 x 10³ Btu/hr, whereas the previous boiler plant only allowed a turn-down to 1,000 x 10³ Btu/hr. This significant improvement allows the customer to realize considerable savings in shoulder seasons by right-sizing the boiler load to suit what is needed for the building.

The larger-sized boiler can reach a low firing rate of 340 x 10³ Btu/hr and is very energy efficient when the building load is +/- 50% of the occupancy load.

A flow meter was installed on the main heating supply line to help control the heating pumps and has proven to be very effective. The boilers are controlled by built-in controllers which reset the heating loop supply temperature based on outdoor air temperature.

Environmental Impact

Yearly greenhouse gas (GHG) emissions are reduced by 192,036 kg of carbon dioxide (CO₂) equivalent, which is comparable to the annual energy use of 20.7 houses (in CO₂ emissions).

