



Exhibition Place

**Energicare Centre
GreenSmart Energy Performance Report
2014 - 2016**



A GreenSmart Energy Initiative



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INTRODUCTION

Exhibition Place, as part of the 2014 – 2016 Strategic Plan has set a goal to reduce the impact of our operations and our business on all aspects of the environment. To meet this goal, we recognize the critical importance of improving the efficiency of existing buildings and reducing our energy consumption.

Three of the main steps towards reducing energy consumption are as follows;

- Firstly, ensure we have systems in place to improve efficiency of our energy use.
- Secondly, effectively track energy use to understand existing conditions and trends in order to forecast for the future to improve efficiencies.
- Thirdly, produce clean energy using solar, wind, geothermal and waste steam to reduce our greenhouse gas emissions.

This report covers the energy use for Enercare Centre (ECC) for calendar years 2014, 2015 and 2016.

Enercare Centre was constructed and opened in 1997 and is the largest exhibition centre in Canada and the 6th largest in North America with 599,703 sq. ft. of contiguous exhibit floor space. From an energy consumption perspective, the gross floor space of the complex consists of 1,282,820 sq. ft. of new space completed in 1997. This space is joined to 602,240 sq. ft. of heritage space built in 1922.

Since its opening, Exhibition Place has undertaken several initiatives within the Enercare Centre to reduce its energy load. Some of these initiatives include the following:

- Energy efficiency retrofits
- Energy policies
- HVAC retrofits
- Water savings programs

In 2014, Enercare Centre achieved LEED Gold EBOM certification and was the first exhibition centre in Canada to achieve this designation.

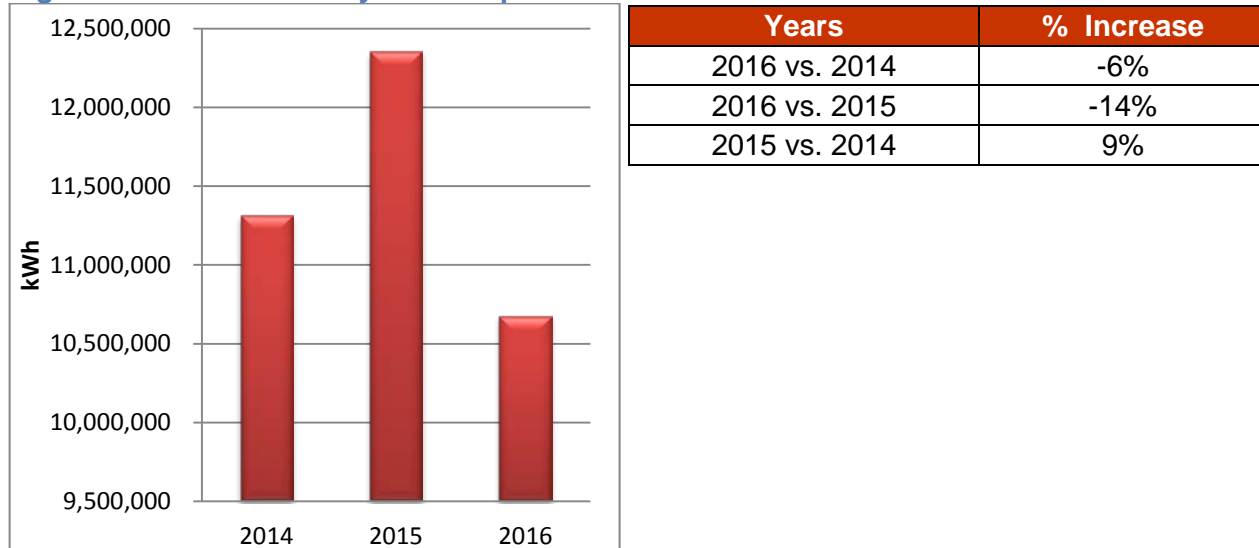
In the 2015 Energy Performance Report, the following directions were set to improve the energy efficiency of the Enercare Centre:

- Optimize the minimum level required for emergency lights
- Investigate removing search lights, as they consume a huge amount of electricity
- Use the Encelium system, instead of the Johnsons Control system to control lighting use
- Change the tunnel lights in the garage to LED
- Investigate third floor hallway lighting energy reduction
- Optimize winter temperature in the parking garage
- Complete the automation of the rapid roll-up doors to prevent the loss of air conditioning and heat conditioning air

TOTAL ELECTRICAL CONSUMPTION

Figure 1 compares the total electricity consumption of Enercare Centre over the reporting period 2014, 2015 and 2016.

Figure 1 – Total Electricity Consumption



FACTORS CONTRIBUTING TO DECREASES:

- Weather temperatures play an important role in the electricity consumption of Enercare Centre. Roof de-icing and snow melting devices are part of Enercare Centre electrical load and consume more electricity in cold weather and during the snow season. Weather temperature in the winter months of 2016 (January, February, March) was warmer by 7°C and 5°C respectively compared to 2015 and 2014 as shown in Figure 5.
- The conversion of the 450 watt lighting in the Halls of Enercare Centre to higher energy efficiency 159 watt LED lighting was completed in December 2015, the full savings of these new LED fixtures is reflected in 2016 electrical consumption decrease.

MONTHLY ELECTRICAL CONSUMPTION

Figure 2 compares the monthly electricity consumption of Enercare Centre over the reporting period 2014, 2015 and 2016.

Figure 2 – Monthly Electrical Consumption

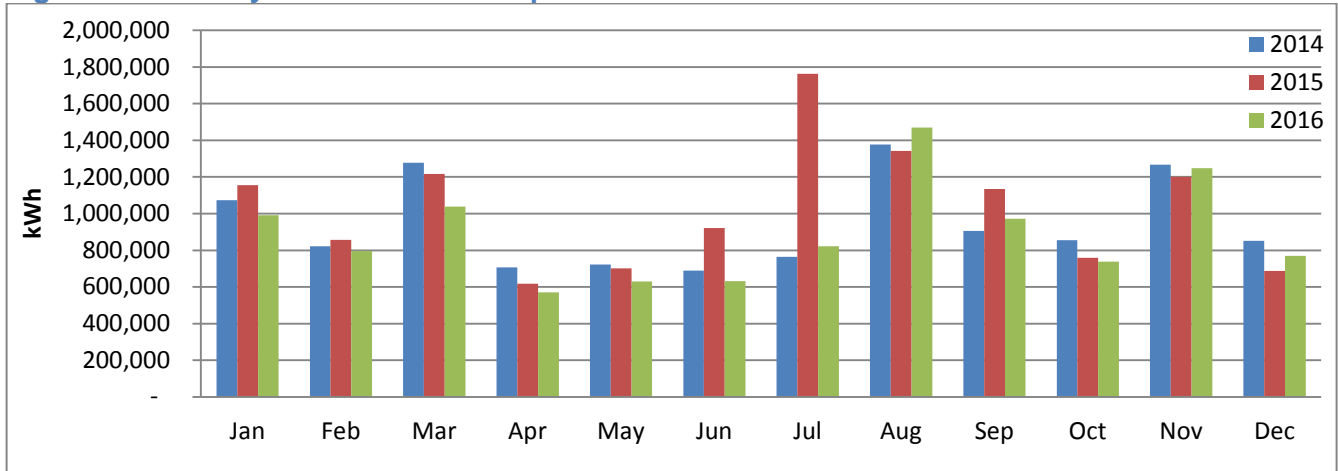


Figure 3 compares building power loads against total monthly show days for the reporting years 2014, 2015 and 2016. In both Figure 2 and 3, the days listed may reflect multiple events in different areas of the Enercare Centre.

Figure 3 – Building Power Loads vs. Show Days

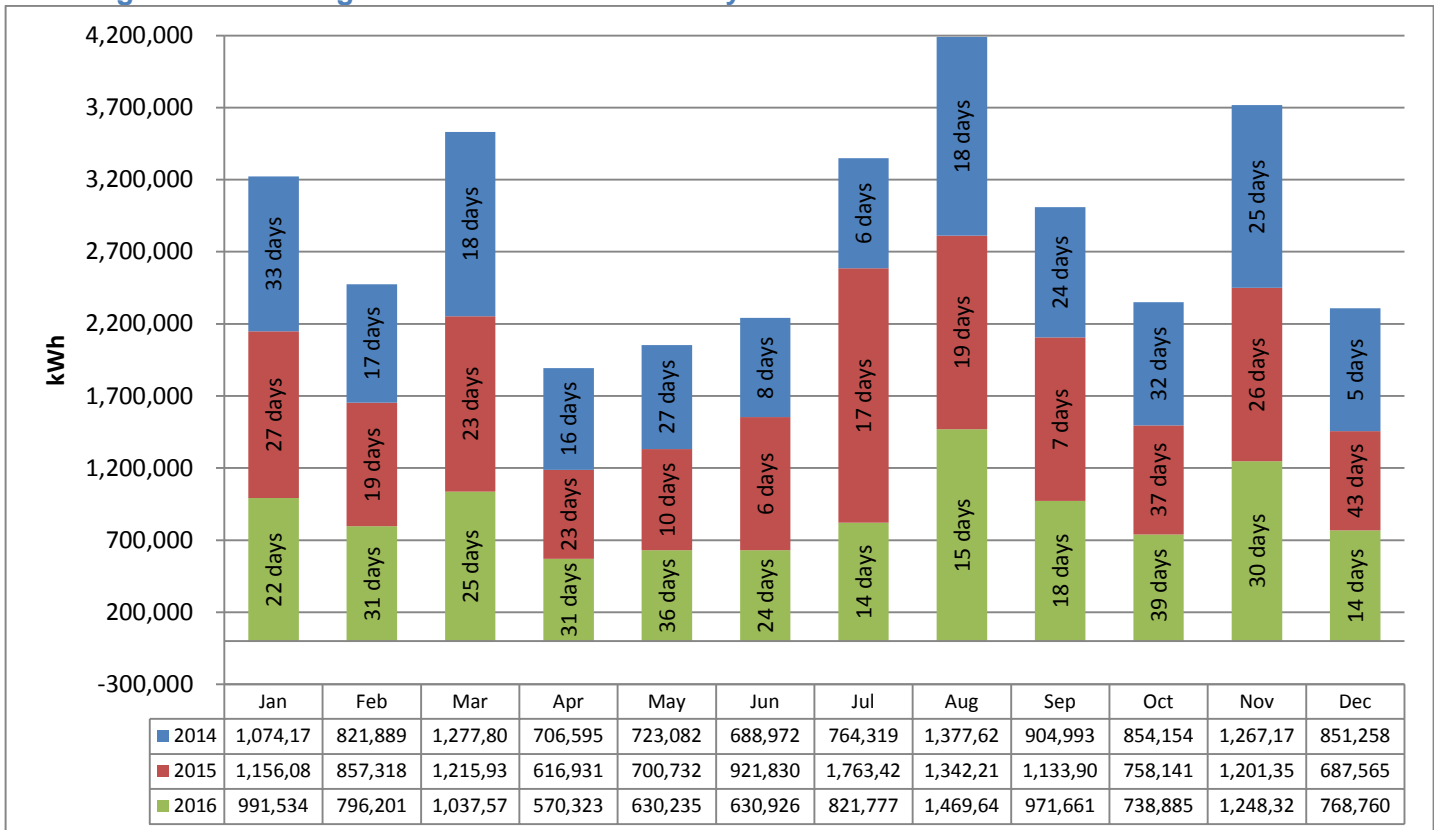


Figure 4 shows a comparison of building power loads against activity days (combined move-in / show days / move-out days) for the reporting year 2014, 2015 and 2016.

Figure 4 – Building Power Loads vs. Activity Days

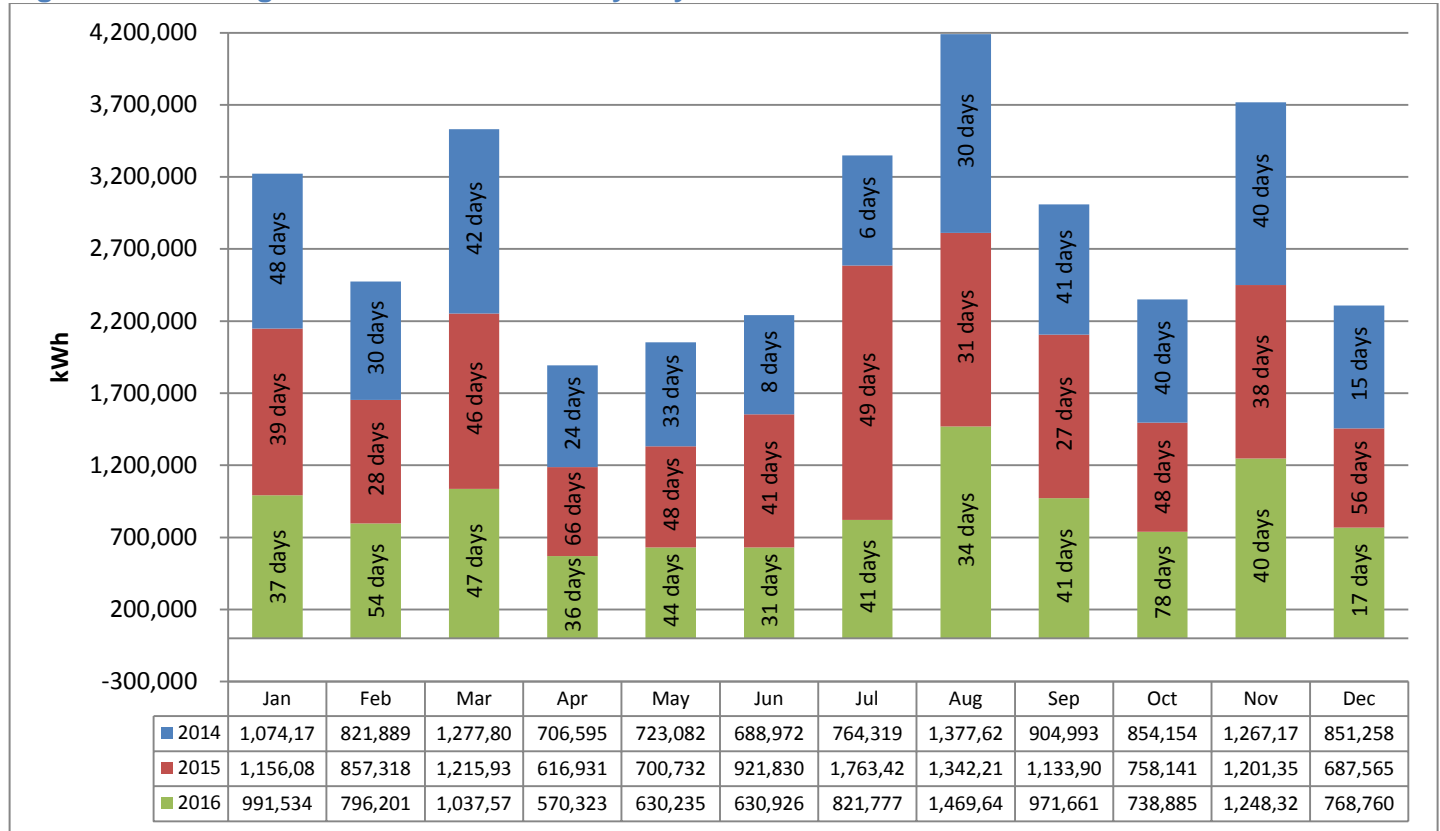


Figure 5 below shows the comparison of the average temperature for 2014, 2015 and 2016

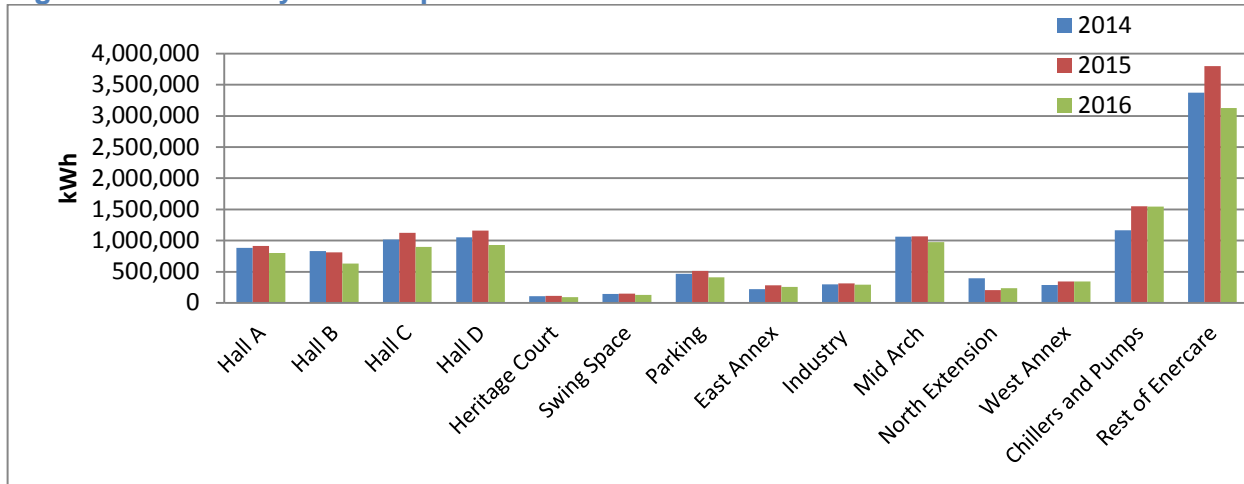
Figure 5 – Average Temperature for 2014, 2015 and 2016

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2014	-6	-6	-3	7	15	20	21	21	17	12	3	1
2015	-8	-13	-2	8	16	18	22	21	20	10	7	4
2016	-2	-1	3	5	14	19	22	24	20	13	8	0

ELECTRICAL ENERGY DISTRIBUTION

Figure 6 compares the electricity consumption distribution of Enercare Centre for the reporting period.

Figure 6 – Electricity Consumption Distribution



Note:

- Part of Mid Arch consumption includes the corporate offices of the Royal Agricultural Winter Fair (RAWF) and electricity usage in these offices is not sub metered.
- Part of West Annex consumption is the storage usage for Maple Leaf Sports & Entertainment (MLSE) on the first and second floor which is not sub metered.
- The “Rest of Enercare” category is the largest sector of energy used in the Enercare Centre and represents 30% and 31% of the total building load in 2014 and 2015 respectively, and 29% in 2016. Some of the areas that are not sub metered are:
 - Mechanical rooms
 - Search lights in the Towers
 - Kitchen
 - One of the concessions
 - Cooling towers
 - Chiller 4
 - Roof De-icing system
 - Roof Snow Melting system
 - Salons and meeting / board rooms used by events and staff
 - Offices
 - Elevators and Escalators
- Because these loads are not separately sub-metered the end use cannot be determined. More studies should be done to specify all the areas/devices that are not sub metered to determine if any conservation measures should be put in place.

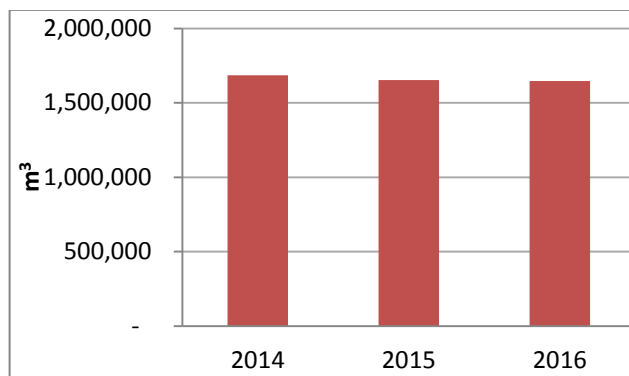
NATURAL GAS CONSUMPTION

Figure 7 compares the total gas consumption of Enercare Centre over the reporting period. The Natural Gas Consumption of the Enercare Centre is tracked monthly by the following five meters:

- Enercare Centre
- North Extension
- Mid Arch
- Industry Building
- East Annex

The entire base heating of the Enercare Centre is provided by Natural Gas with electric fans used to distribute this heat.

Figure 7 – Comparison of Total Gas Consumption



Years	% Increase
2016 vs. 2015	0%
2016 vs. 2014	-2%
2015 vs. 2014	-2%

Figure 8 compares the monthly gas consumption of the Mid Arch meter over the reporting period 2014 – 2016 by Heating Degree Day (HDD).

A heating degree day (HDD) is a way to measure how cold it has been over a 24 hour period. It is determined by calculating the mean daily temperature for the day and subtracting it from a base temperature. Degree days are a good way to keep track of how much demand there has been for energy needed to heat buildings. The colder it is outside, the more degree days (HDD) and the more energy required to heat buildings.

Figure 8 – Mid Arch Meter Monthly Consumption Comparison

Month	2014 (m ³)	2014 HDD	2015 (m ³)	2015 HDD	2016 (m ³)	2016 HDD
Jan	114,907	649	123,303	792	119,991	670
Feb	114,996	677	147,428	857	122,963	588
Mar	124,984	619	122,116	616	121,927	476
Apr	70,257	312	80,562	314	75,037	395
May	20,511	117	525	89	11,882	143
Jun	0	7	729	34	733	24
Jul	0	2	671	4	533	0
Aug	0	4	120	4	567	0
Sep	0	56	188	31	497	26
Oct	2,228	203	1,776	250	2,269	195
Nov	75,211	440	44,490	345	21,415	338
Dec	106,754	514	88,391	430	108,217	607
Total	629,848	3,600	610,299	3,766	586,032	3,464

- Mid Arch gas consumption decreased by 4% in 2016 compared to 2015. This was mainly due to the warmer winter in 2016.
- The Mid Arch gas meter shows the gas consumption of the three boilers located in Mid Arch and also the gas usage of the boiler that heats the corporate offices of the Royal Agricultural Winter Fair.
- The natural gas consumption is heavily dependent on weather and events that require the use of natural gas. The warmer it is outside, the less energy is required to heat buildings. Again, as noted in Figure 5, the weather temperature in the winter months of 2016 (January, February, March) was warmer by an average of 7°C compared to 2015.

Figure 9 compares the monthly gas consumption of Enercare Centre over the reporting period 2014 – 2016 by Heating Degree Day (HDD).

Figure 9 – Enercare Centre Meter Monthly Consumption Comparison by HDD

Month	2014 (m ³)	2014 HDD	2015 (m ³)	2015 HDD	2016 (m ³)	2016 HDD
Jan	181,342	649	235,620	792	166,478	670
Feb	188,611	677	200,950	857	152,429	588
Mar	226,357	619	228,970	616	106,906	476
Apr	82,759	312	76,682	314	75,974	395
May	15,571	117	26,421	89	36,988	143
Jun	3,723	7	7,890	34	26,101	24
Jul	2,198	2	7,681	4	14,608	0
Aug	4,547	4	3,495	4	12,480	0
Sep	11,117	56	2,046	31	14,566	26
Oct	25,851	203	33,247	250	39,394	195
Nov	175,440	440	122,143	345	168,943	338
Dec	124,073	514	84,818	430	219,498	607
Total	1,041,589	3,600	1,029,963	3,766	1,034,365	3,464

In 2016, the natural gas consumption in the Enercare Centre increased by 0.4% compared to 2015. One of the causes was the electricity production using co-generation. In 2016, co-generator produced 8% more electricity than 2015. The co-generator is powered by natural gas and more electrical generation requires more gas consumption. However, the electricity produced by co-generation helps to offset hydro use by 7,792 kWh.

The increase in gas consumption was due to the fact that Exhibition Place switched the 450 watt exhibit hall lights to 159 watt lights. Typically, 80% of energy into lights is dissipated as heat, as this was no longer available additional heat is required.

Another reason why gas consumption increased was the increase in show days for April, May and September as shown in Figure 3. Number of show days of 2016 was higher by 45 days compared to 2015 for the months of April, May and September. In general, the more show days there are, the more catering is required. As a result, the kitchen was used more often and more gas was consumed.

DISTRICT ENERGY SYSTEM

The District Energy System (DES) is a thermal energy distribution system for multiple buildings and consists of a heating and cooling central plant within the Enercare Centre and a thermal network of pipes connecting groups of buildings.

Through the Air Handling Units in the Enercare Centre, the DES provides cooling by supplying chilled water to Enercare Centre, Beanfield Centre, Ricoh Coliseum and Hotel X. In 2015 and 2016, the total of 538,816 and 606,020 Ton-Hour of chilled water was provided by the DES to Enercare Centre. The increase was mainly due to the increase in temperature in the summer months. As noted in Figure 5, the weather temperature in the summer months of 2016 (July, August, September) was hotter by an average of 1°C compared to 2015. The Air Handling Units use electrical power and all the electricity consumed to make the chilled water and transport it across the grounds for the DES is recorded under the Enercare data.

The DES also provides heating and/or hot water to Enercare Centre, Beanfield Centre and Hotel X. The baseline natural gas consumption is averaged at 111,200 m³. For the years 2014, 2015 and 2016, heating and hot water consumption was not separately metered, as it is part of the Enercare Centre total gas consumption as reported in Figure 7. In the fall of 2016, meters were installed to record all hot water consumption.

GREENHOUSE GASES

The City of Toronto has established aggressive targets to reduce Greenhouse Gas (GHG) emissions as set out in Figure 10 below. The primary greenhouse gases are carbon dioxide (CO₂), sulphur oxides (SO_x), nitrous oxide (NO_x), water vapor, methane and ozone. As an agency of the City of Toronto, Exhibition Place both tracks its GHG emissions and aims to reduce them to help meet the City target.

Figure 10 –The City of Toronto's Emission Reduction Targets

	Air Quality Contaminants (2004 Baseline)	Greenhouse Gases (1990 Baseline)
2012	20%	6%
2020	--	30%
2050	--	80%

The City of Toronto has developed a greenhouse gas and air quality inventory program that has the primary purpose of tracking the progress of the City Community and the City Government (the latter as a subset of the City Community) towards achieving its adopted greenhouse gas and air quality emission reduction targets outlined above. The targets set by the City are absolute targets rather than relative targets, meaning they are independent of population growth or decline, economic growth or decline, or weather variability (e.g., hot summers that lead to more electricity consumption for air conditioning, and cold winters that lead to more natural gas consumption for space heating). The targets apply equally to the City Community and the City Government alike, but progress toward achieving the targets is cumulative. If a sector within the City Community overachieves it may be offset by a sector that underachieves, and vice versa. Equally, if a Division or agency of City Government overachieves it will offset those that do not.

Greenhouse gas emissions in CO₂, NO_x and SO_x from electricity and gas use in the Enercare Centre is shown in Figure 11 and the total greenhouse gas emissions is shown in Figure 12.

Figure 11 – Green House Gas Emissions

Year	Electricity			Gas		
	CO ₂	NO _x	SO _x	CO ₂	NO _x	SO _x
	Ton	Ton	Ton	Ton	Ton	Ton
2014	2,760	3.9	0.7	3,382	3	0.02
2015	3,015	4.3	0.8	3,319	3	0.02
2016	2,605	3.7	0.7	3,304	3	0.02

Figure 12 – Total Green House Gas Emissions

Year	CO ₂	NO _x	SO _x
	Ton	Ton	Ton
2014	6,142	6.64	0.73
2015	6,333	6.95	0.79
2016	5,909	6.22	0.69

HYDRO EXPENSE

The total hydro consumption is shown in Figure 6 and consists of Enercare, East Annex, MidArch, Industry Building, North Extension, West Annex and all electricity consumption for DES.

The total hydro cost for the consumption noted above is shown in Figure 13.

Figure 13 – Hydro Cost

Year	Total	Average Rate per kWh	Total
	Consumption		Hydro Expense
	[kWh]		\$
2014	11,312,031	0.1106	1,251,111
2015	12,355,425	0.1181	1,459,176
2016	10,675,855	0.1396	1,490,349

GAS EXPENSES

The total Natural Gas Consumption is tracked by five meters monthly: Enercare Centre, North Extension, Mid Arch, Industry Building, and East Annex.

Enercare gas meter shows the consumption of the kitchen, Co-Generation and Enercare Centre. It also includes gas usage of District Energy System (DES) located on the third floor of Enercare Centre that provides heating for Enercare Centre and part of Beanfield Centre, as well as domestic hot water for Enercare Centre. Heating and domestic hot water is also supplied by DES.

The Mid Arch gas meter shows the gas consumption of the three boilers located in MidArch and also the gas usage of the boiler used to heat the corporate offices for the RAWF.

Total gas consumption is shown in Figure 7 and the cost of that consumption is shown in Figure 14.

Figure 14 – Gas Cost

Year	M3	Average Rate/M3	\$
2014	1,685,087	0.273	460,029
2015	1,653,463	0.330	545,643
2016	1,646,360	0.331	545,274

REDUCTION INITIATIVES STATUS UPDATE

Listed below is a status update on reduction initiatives undertaken as identified in the 2013 – 2015 Enercare Centre GreenSmart Energy Performance Report, and additional reduction initiatives taken.

	DESCRIPTION	STATUS UPDATE
1	Upgrade existing District Energy System to add additional boiler and to provide heating and cooling to the new hotel	Additional boiler is added. District Energy System started to provide heating and cooling to Hotel X since June 2016. Installed a high efficiency 450 ton smart chiller
2	Optimize the minimum level required for emergency lights	Emergency lighting level was measured and compared to building code. Improved lighting policy will be revised in 2017
3	Investigate removing search lights, as they consume a huge amount of electricity	Search lights are still on the ECC towers, but consideration will be given to not replacing at end of life
4	Use the Encilium system, instead of the Johnsons Control system to control lighting use	Event move-In lighting level was measured and compared to building code. Improved lighting policy will be revised in 2017
5	Change the tunnel lights in the garage to LED	Tunnel lights were switched from 32W to 25W
6	Investigate third floor hallway lighting energy reduction	Third floor hallway lighting was modified to have every third light on, i.e., two thirds of the lights are off
7	Optimize winter temperature in the parking garage	Adjusted make-up air unit temperature supply for minimum heat setting without causing water pipelines to freeze
8	Complete the automation of the rapid roll-up doors to prevent the loss of air conditioning and heat conditioning air through roll up doors	A timer was installed for door #28 located at the north side of Industry Building to ensure the door closes automatically. Klaxen Horn alarms were installed on emergency stop buttons for roll-up doors #20, 28 and 40 to stop the emergency button from being used to keep the doors open. In addition, card swipe is added for doors #20 and #40 to limit use to authorized personnel only

FUTURE DIRECTIONS

Increasing the efficiency of existing electrical systems and energy consumption are key steps towards Exhibition Place's energy reduction goal. The following projects are targeted for 2017 to help us meet this goal.

- Investigate feasibility and incentives to switch halogen lights that are located at south side of exhibit hall exits to LED lights
- Improve existing lighting policy in order to save electrical energy, while in compliance with the building code
- Use both Johnson Controls and Encelium systems to control lighting use for emergency, show move-in, event and move-out
- Partial reduction of lights in garage emergency exit tunnel
- Replace metal halide hall pod lights with LED
- Replace strip fluorescent lights of west galleria with LED
- Install timer and auto close device on door #29
- Remove or change out the tower search lights with LED