



Exhibition Place

**Energcare Centre
GreenSmart Energy Performance Report
2016 - 2018**



A GreenSmart Energy Initiative



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INTRODUCTION

Exhibition Place, as part of the 2017 – 2019 Strategic Plan, has set a goal to reduce the environmental impact of operations and businesses. 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 2016, 2017 and 2018.

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 2018, Enercare Centre applied for LEED EBOM recertification of the Enercare Centre.

In the 2016 Energy Performance Report, the following directions were set to improve the energy efficiency of the Enercare Centre:

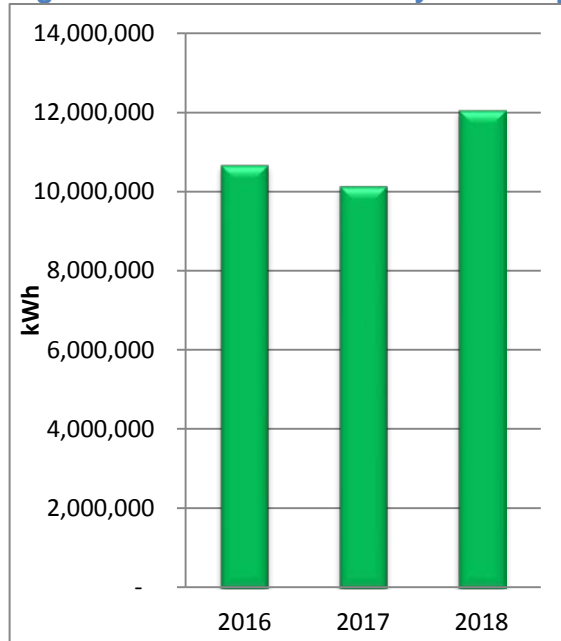
- Investigate feasibility to switch halogen lights that are located at south side of exhibit hall exits to LED lights
- Improve existing lighting policy in order to save energy
- Use both Johnson Controls and Encelium systems to optimize lighting in the exhibit halls
- Partial reduction of lights in 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

TOTAL ELECTRICAL CONSUMPTION

Figure 1 compares the total net electricity consumption of Enercare Centre over the reporting period 2016, 2017 and 2018. Please note that kWh attributed to Coca Cola Coliseum, Beanfield or Hotel X as part of the District Energy system has been deducted from the following figures.

Figure 1 – Total Net Electricity Consumption



| Years | % Increase |
|---------------|------------|
| 2018 vs. 2017 | 19% |
| 2018 vs. 2016 | 13% |
| 2017 vs. 2016 | -5% |

FACTORS CONTRIBUTING TO INCREASES:

- Weather temperatures play an important role in the electricity consumption of Enercare Centre. During the summer the cooling plant is a large part of the Enercare Centre's electrical load and consumes more electricity in warmer/humid weather. There was a total was 499 CDDs recorded for 2018 opposed to 350 in 2017 and 562 in 2016. In addition, Roof de-icing and snow melting devices are part of Enercare Centre's electrical load and consume more electricity in cold weather and during the snow season. Weather temperature in the winter months of 2018 (January, February, March) was Cooler by 1.6°C and 1.4°C respectively compared to 2017 and 2016 as shown in Figure 5.
- The District Energy System is a large and complicated project, while significant effort has gone into applying methods to meter and track energy use associated with Hotel X; there are still some parts of the DES that are not yet metered (such as the boiler pumps on the 3rd floor ECC). Efforts to better understand and track the consumption associated with the DES will take place in 2019 which will include additional metering.

MONTHLY ELECTRICAL CONSUMPTION

Figure 2 compares the monthly electricity consumption of Enercare Centre over the reporting period 2016, 2017 and 2018. Please note that kWh attributed to Coca Cola Coliseum, Beanfield or Hotel X as part of the District Energy system has been deducted from the following figures.

Figure 2 – Monthly Electrical Consumption

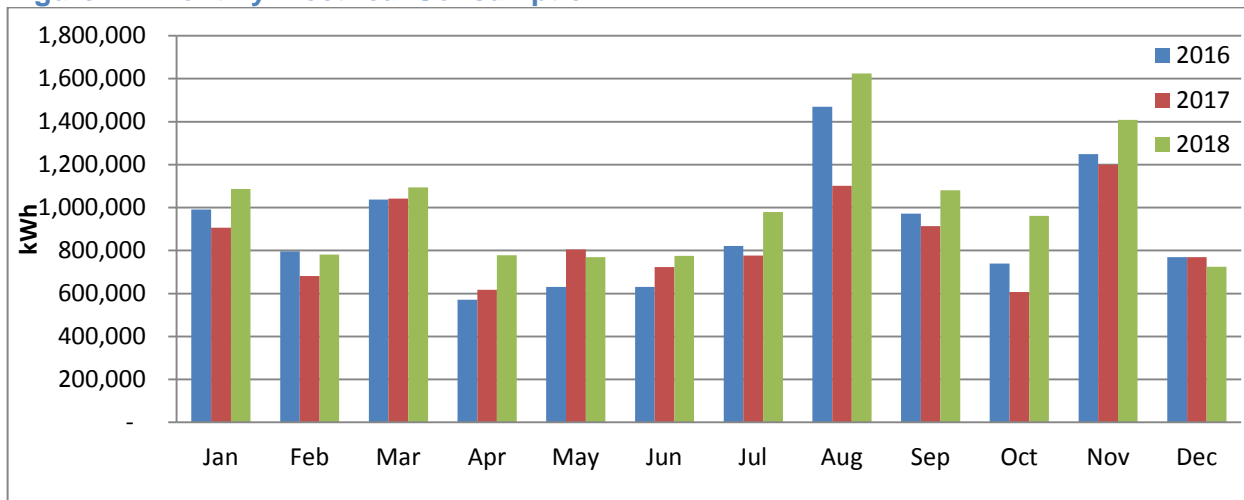


Figure 3 compares building power loads against total monthly show days for the reporting years 2016, 2017 and 2018. In both Figure 3 and 4, the days listed may reflect multiple events in different areas of the Enercare Centre.

Figure 3 – Building Power Loads vs. Show Days

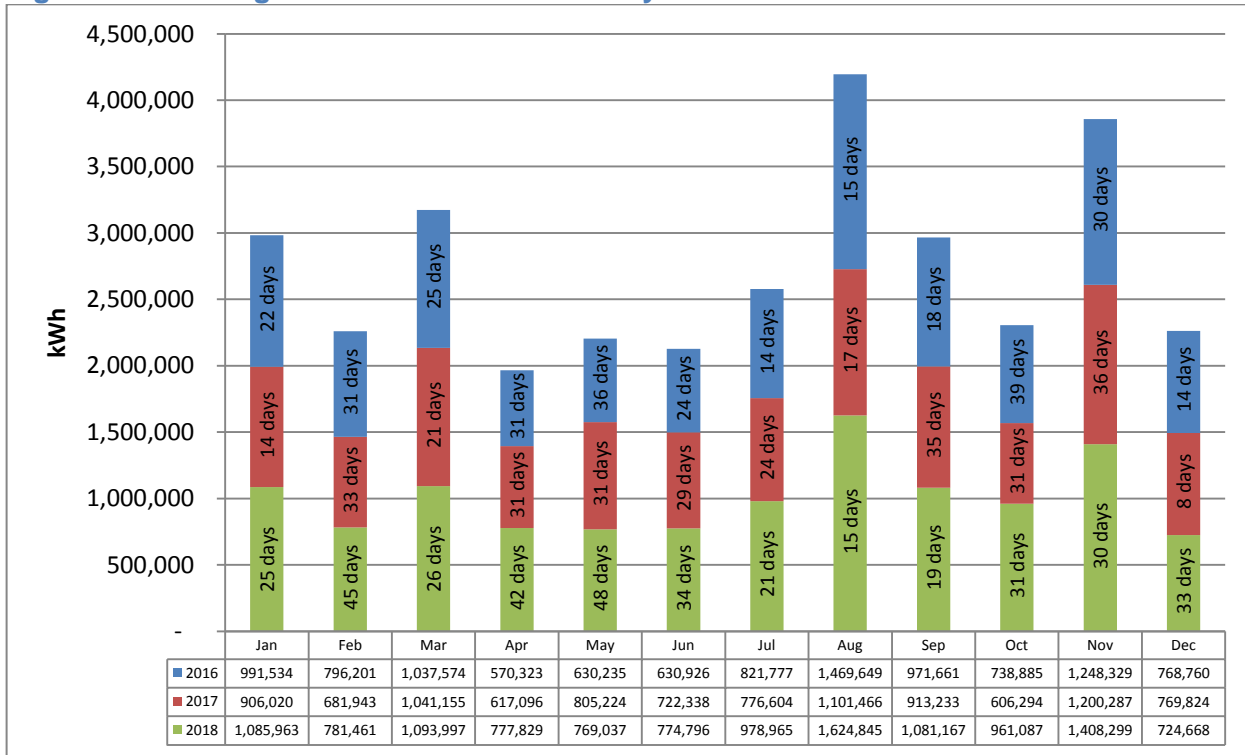


Figure 4 shows a comparison of building power loads against activity days (combined move-in / show days / move-out days) for the reporting year 2016, 2017 and 2018.

Figure 4 – Building Power Loads vs. Activity Days

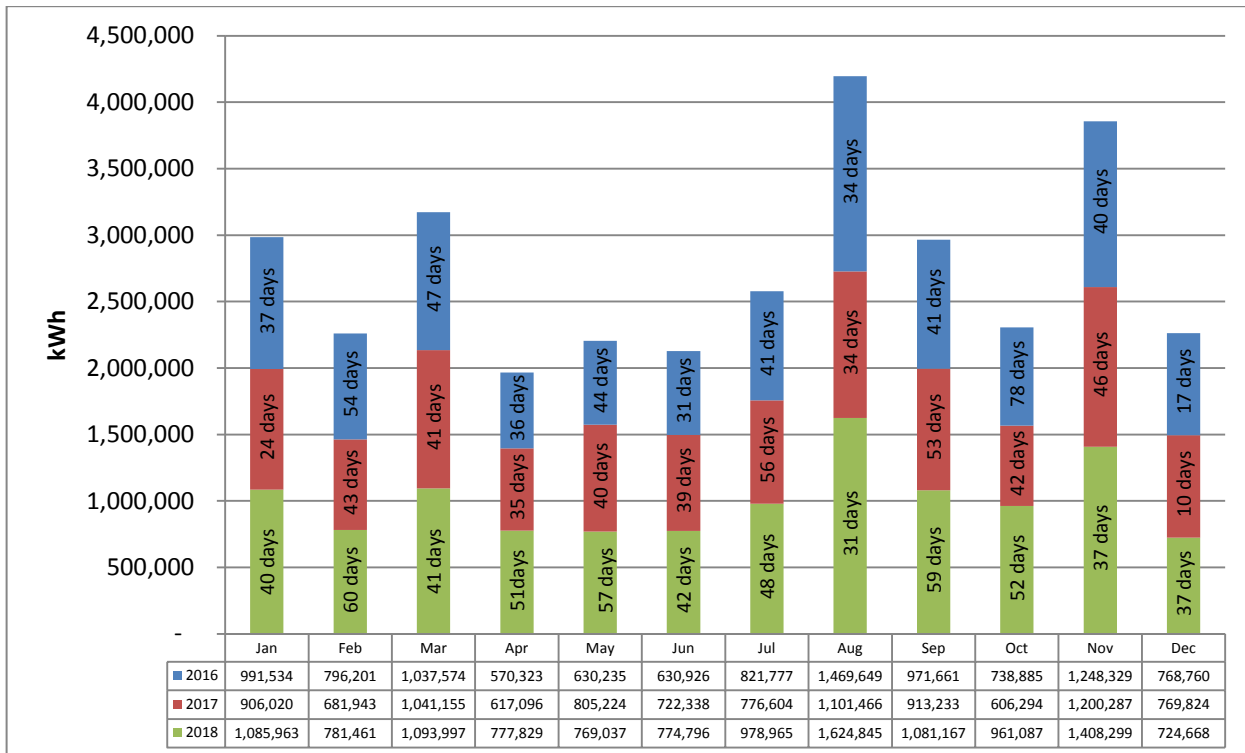


Figure 5 below shows the comparison of the average temperature for 2016, 2017 and 2018

Figure 5 – Average Temperature for 2016, 2017 and 2018

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| 2016 | -2 | -1 | 4 | 6 | 16 | 20 | 21 | 24 | 20 | 13 | 8 | -1 |
| 2017 | -1 | -1 | 0 | 10 | 12 | 19 | 22 | 21 | 19 | 14 | 5 | -4 |
| 2018 | -4 | -1 | 1 | 5 | 17 | 20 | 23 | 24 | 19 | 10 | 2 | 1 |

Figure 6 below shows the comparison of the recorded for 2016, 2017 and 2018

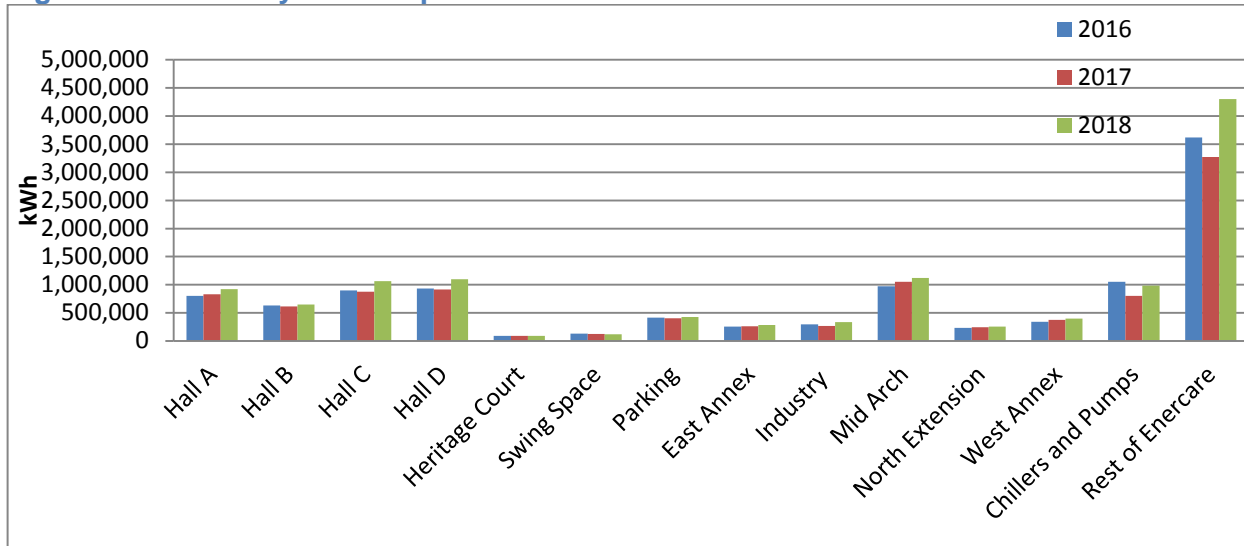
Figure 6 – CDDs for 2016, 2017 and 2018

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| 2016 | 0 | 0 | 0 | 0 | 43 | 80 | 180 | 184 | 70 | 5 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 | 2 | 61 | 117 | 85 | 76 | 8 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 | 40 | 62 | 139 | 170 | 81 | 7 | 0 | 0 |

ELECTRICAL ENERGY DISTRIBUTION

Figure 7 compares the electricity consumption distribution of Enercare Centre for the reporting period.

Figure 7 – 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 areas used exclusively by Maple Leaf Sports & Entertainment (MLSE) on the first and second floor which is not sub metered.
- The energy used for supplying Chilled water to Hotel X and Coca-Cola Coliseum has been deducted from the “Chillers and Pumps” Category.
- The “Rest of Enercare” category is the largest sector of energy used in the Enercare Centre and represents 34% and 32% of the total building load in 2016 and 2017 respectively, and 36% in 2018. Some of the areas that are not sub metered are:
 - Mechanical rooms (Chillers, Pumps, Fans etc.)
 - Search lights in the Towers
 - Cooling towers
 - 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. Additional sub meters are to be installed in 2019 with the purpose of allowing additional studies to be done to determine if any conservation measures can be put in place for these areas.

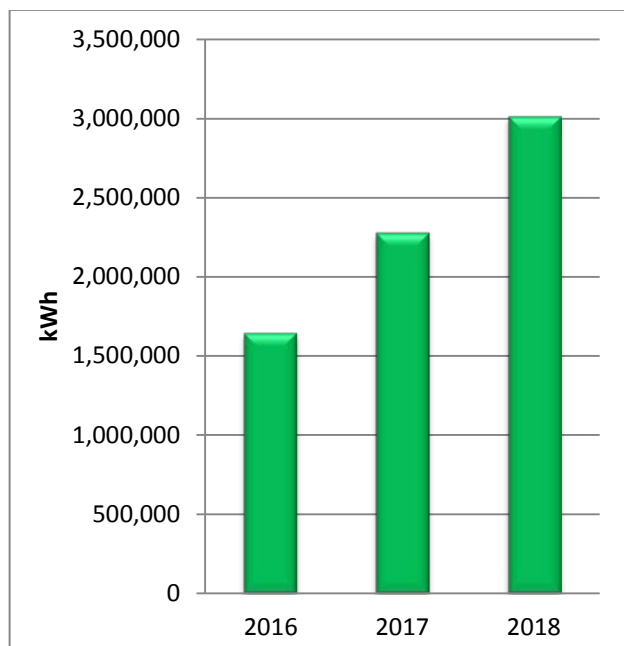
NATURAL GAS CONSUMPTION

Figure 8 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 8 – Comparison of Total Gas Consumption



| Years | % Increase |
|---------------|------------|
| 2018 vs. 2017 | 32% |
| 2018 vs. 2016 | 83% |
| 2017 vs. 2016 | 38% |

Note:

- Gas consumed in order to supply hot water to Hotel X and Beanfield Centre has been deducted from the Enercare Centre meter.

Figure 9 compares the monthly gas consumption of the Mid Arch meter over the reporting period 2016 – 2018 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 heating degree days (HDD) and therefore more energy is required to heat the facility.

Figure 9 – Mid Arch Meter Monthly Consumption Comparison

| Month | 2016 (m ³) | 2016 HDD | 2017 (m ³) | 2017 HDD | 2018 (m ³) | 2018 HDD |
|--------------|------------------------|--------------|------------------------|--------------|------------------------|--------------|
| Jan | 119,991 | 588 | 105,041 | 575 | 176,577 | 694 |
| Feb | 122,963 | 558 | 108,606 | 476 | 162,737 | 507 |
| Mar | 121,927 | 450 | 117,122 | 538 | 142,313 | 424 |
| Apr | 75,037 | 295 | 28,854 | 245 | 124,563 | 393 |
| May | 118,82 | 120 | 678 | 158 | 88,479 | 71 |
| Jun | 733 | 21 | 905 | 20 | 67,204 | 13 |
| Jul | 533 | 0 | 251 | 0 | 36,287 | 0 |
| Aug | 567 | 0 | 465 | 6 | 2,377 | 0 |
| Sep | 497 | 18 | 435 | 39 | 1,488 | 39 |
| Oct | 2,269 | 175 | 1,355 | 123 | 54,197 | 266 |
| Nov | 21,415 | 299 | 43,853 | 372 | 66,690 | 455 |
| Dec | 108,217 | 552 | 135,623 | 679 | 140,027 | 498 |
| Total | 586,032 | 3,075 | 543,189 | 3,231 | 1,062,939 | 3,358 |

- Mid Arch gas consumption increased by 96% in 2018 compared to 2017. This is primarily due to the significantly increased use of the Mid Arch Steam Turbine.
- 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 2018 (January, February, March) was cooler by an average of 1.6°C compared to 2017.

Figure 10 compares the monthly gas consumption of Enercare Centre over the reporting period 2016 – 2018 by Heating Degree Day (HDD).

Figure 10 – Enercare Centre Meter Monthly Consumption Comparison by HDD

| Month | 2016 (m ³) | 2016 HDD | 2017 (m ³) | 2017 HDD | 2018 (m ³) | 2018 HDD |
|--------------|------------------------|--------------|------------------------|-------------|------------------------|--------------|
| Jan | 166,478 | 588 | 259,709 | 575 | 238,400 | 694 |
| Feb | 152,429 | 558 | 173,694 | 476 | 136,321 | 507 |
| Mar | 106,906 | 450 | 267,283 | 538 | 272,264 | 424 |
| Apr | 75,974 | 295 | 125,261 | 245 | 194,857 | 393 |
| May | 36,988 | 120 | 96,718 | 158 | 119,839 | 71 |
| Jun | 26,101 | 21 | 35,491 | 20 | 53,646 | 13 |
| Jul | 14,608 | 0 | 23,783 | 0 | 111,375 | 0 |
| Aug | 12,480 | 0 | 142,137 | 6 | 38,942 | 0 |
| Sep | 14,566 | 18 | 30,983 | 39 | 75,818 | 39 |
| Oct | 39,394 | 175 | 47,496 | 123 | 138,318 | 266 |
| Nov | 168,943 | 299 | 241,308 | 372 | 231,924 | 455 |
| Dec | 219,498 | 552 | 261,783 | 679 | 313,646 | 498 |
| Total | 1,034,365 | 3,075 | 1,705,647 | 3231 | 1,925,349 | 3,358 |

In 2018, the natural gas consumption in the Enercare Centre increased by 13% compared to 2017. One of the causes for this was due to the increased use of the cogeneration plant to generate electricity for Hotel X which opened for business in the Spring 2018. In 2018, co-generator produced 301% more electricity than 2017. The co-gen is powered by natural gas and more electrical generation requires more gas consumption. However, the electricity produced by co-generation-helped to offset hydro use by an additional 3,168,987 kWh in 2018 compared to 2017.

Another reason why gas consumption increased in 2018 can be attributed to the increased number of show days in 2018 compared to 2017 as shown in Figure 3. The number of show days in 2018 was higher by 59 days compared to 2017. In general, the more show days that there are, the more catering is required. As a result, the kitchen was used more often and therefore more natural gas was consumed.

GREENHOUSE GASES

The City of Toronto has established aggressive targets to reduce Greenhouse Gas (GHG) emissions as set out in Figure 11 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 6 –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 12 and the total greenhouse gas emissions is shown in Figure 13.

Figure 7 – 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 |
| 2016 | 2,605 | 3.7 | 0.67 | 3,304 | 2.5 | 0.02 |
| 2017 | 2,475 | 3.5 | 0.64 | 4,572 | 3.5 | 0.03 |
| 2018 | 2,943 | 4.2 | 0.76 | 6,043 | 4.6 | 0.04 |

Figure 8 – Total Green House Gas Emissions

| Year | CO ₂ | NO _x | SO _x |
|------|-----------------|-----------------|-----------------|
| | Ton | Ton | Ton |
| 2016 | 5,909 | 6.22 | 0.69 |
| 2017 | 7,046 | 7.00 | 0.67 |
| 2018 | 8,987 | 8.78 | 0.80 |

HYDRO EXPENSE

The total hydro consumption consists of: Enercare, East Annex, MidArch, Industry Building, North Extension, West Annex but excludes consumption for the DES as well as the electricity produced by the cogeneration plant or Back Pressure Steam Turbine as this is generated on site and not purchased from the grid.

The total hydro cost for the consumption noted above is shown in Figure 14.

Figure 9 – Hydro Cost

| Year | Total | Average Rate per kWh | Total |
|------|-------------|----------------------|---------------|
| | Consumption | | Hydro Expense |
| | [kWh] | | \$ |
| 2016 | 10,675,855 | 0.1417 | 1,512,769 |
| 2017 | 10,141,484 | 0.1293 | 1,311,264 |
| 2018 | 12,062,113 | 0.1285 | 1,549,982 |

GAS EXPENSES

Enercare Centre natural gas consumption is tracked by five separate meters on a monthly basis: Enercare Centre, North Extension, Mid Arch, Industry Building, and East Annex.

The Enercare gas meter reflects the consumption of the kitchen, Co-Generation and Enercare Centre. It also includes gas usage of the 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 the DES to Hotel X; however the gas consumed as a result of supplying hot water to the Hotel has been deducted for the purpose of this report.

The Mid Arch gas meter shows the gas consumption of the three steam boilers located in MidArch.

Total gas consumption is shown in Figure 8 and the cost of that consumption is shown in Figure 15.

Figure 10 – Gas Cost

| Year | M3 | Average Rate/M3 | \$ |
|------|-----------|-----------------|---------|
| 2016 | 1,646,360 | 0.2431 | 400,230 |
| 2017 | 2,277,904 | 0.2592 | 590,433 |
| 2018 | 3,011,171 | 0.2314 | 696,785 |

REDUCTION INITIATIVES STATUS UPDATE

Listed below is a status update on reduction initiatives undertaken as identified in the 2014 – 2016 Enercare Centre GreenSmart Energy Performance Report, and additional reduction initiatives taken.

| | DESCRIPTION | STATUS UPDATE |
|---|--|--|
| 1 | Investigate feasibility and incentives to switch halogen lights that are located at south side of exhibit hall exits to LED lights | Not completed in 2016, Will continue to investigate options in 2019. |
| 2 | Improve existing lighting policy in order to save electrical energy, while in compliance with the building code | Staff are reviewing and, where required, modifying the existing lighting policy on a continuous basis. |
| 3 | Use both Johnson Controls and Encelium systems to control lighting use for emergency, show move-in, event and move-out | Both Johnson Controls and Encelium systems are actively utilized to control lighting levels with a focus on Energy Conservation. |
| 4 | Partial reduction of lights in garage emergency exit tunnel | Every second fluorescent bulb was removed while still being in compliance with the building code. |
| 5 | Replace metal halide hall pot lights with LED | Not yet completed and will continue to investigate options in 2019. |
| 6 | Replace strip fluorescent lights of west galleria with LED | Not yet completed, efforts to complete ongoing in 2019 |
| 7 | Install timer and auto close device on door #29 | Not yet completed but planned to complete in 2019. |
| 8 | Remove or change out the tower search lights with LED | Search lights are still on the ECC towers, but consideration will be given to not replacing at end of life |

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 2019 to help us meet this goal.

- Replace strip lights in galleria with energy efficient fixtures
- Investigate feasibility of LED retrofit in ECC parking garage
- Achieve LEED EBOM recertification for Enercare Centre
- Review lighting policies to better optimize energy management
- 48 new CARMA meters are to be installed in 2019 to better monitor and understand the effect that the District Energy System has on the building's energy consumption.
- Investigate feasibility of installing VFDs for the exhibit hall supply fans.