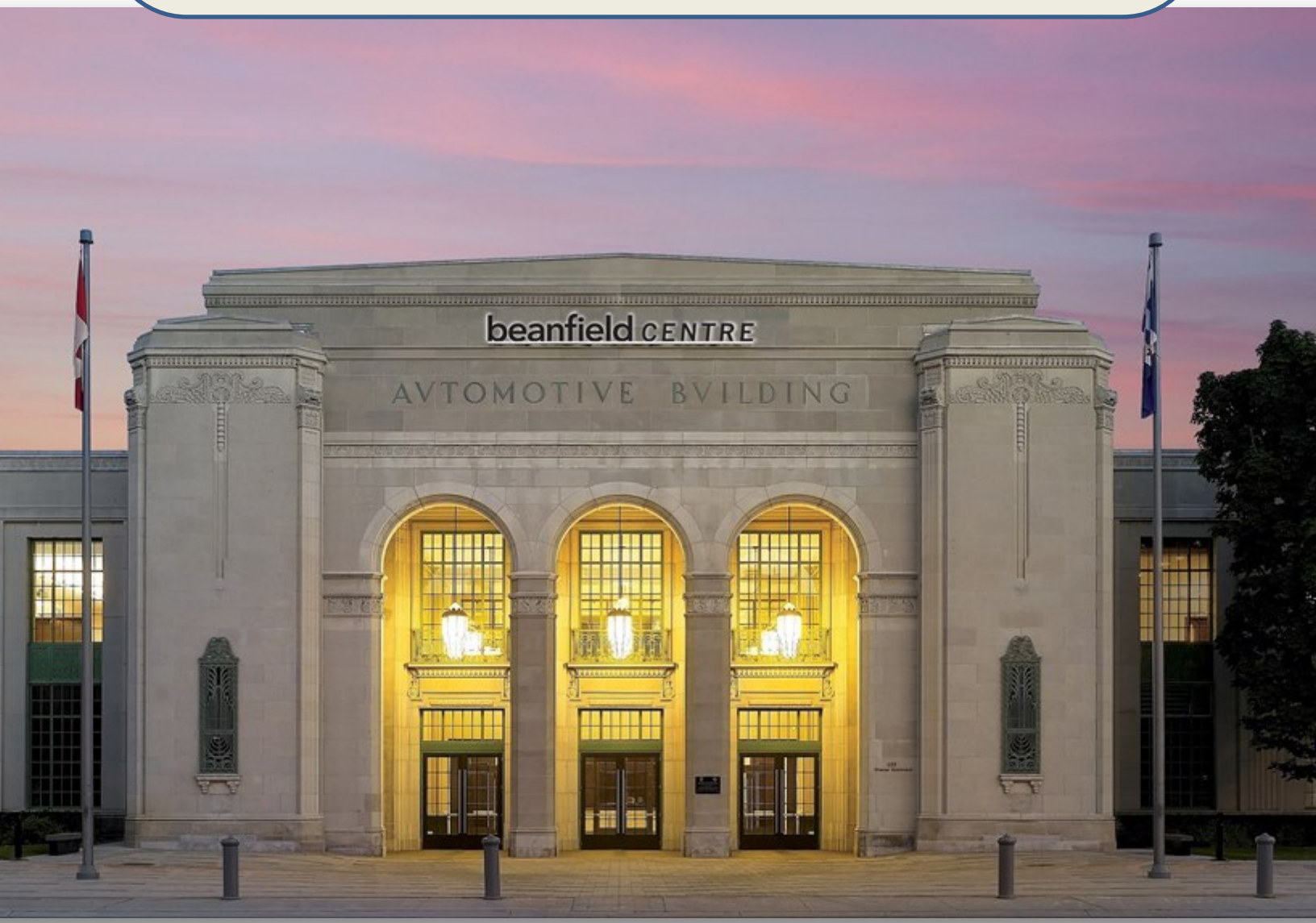
Exhibition Place

Beanfield Centre

GreenSmart Energy Performance Report

2016 - 2018



A GreenSmart Energy Initiative

GreenSmart

TABLE OF CONTENTS

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 the Beanfield Centre (formerly the Allstream Centre) for calendar years 2016, 2017 and 2018.

This facility was the former Automotive Building constructed in 1929 and designated a heritage structure under the Ontario Heritage Act. In 2009, the Automotive Building underwent $56.0M of renovations and reopened as the first conference centre in Canada certified as LEED Silver. Beanfield Centre consists of 20 meeting rooms and a 43,900 sq. ft. ballroom with full kitchen amenities.

In the Energy Performance Report 2014 – 2016, the following directions were set to improve the energy efficiency:

- More accurately calculate and allocate to Beanfield Centre the consumption of the DES related directly to Beanfield to understand total consumption.
- Decrease lighting levels, escalator use and other energy consuming systems, during non-priority periods.
- Upgrade building lighting to more efficient LED technology. The objective of this lighting retrofit is to replace the existing compact fluorescent lamps (CFL) with LED in Beanfield Centre. There are 420 lights to be replaced; they are mainly located in the second floor meeting rooms.

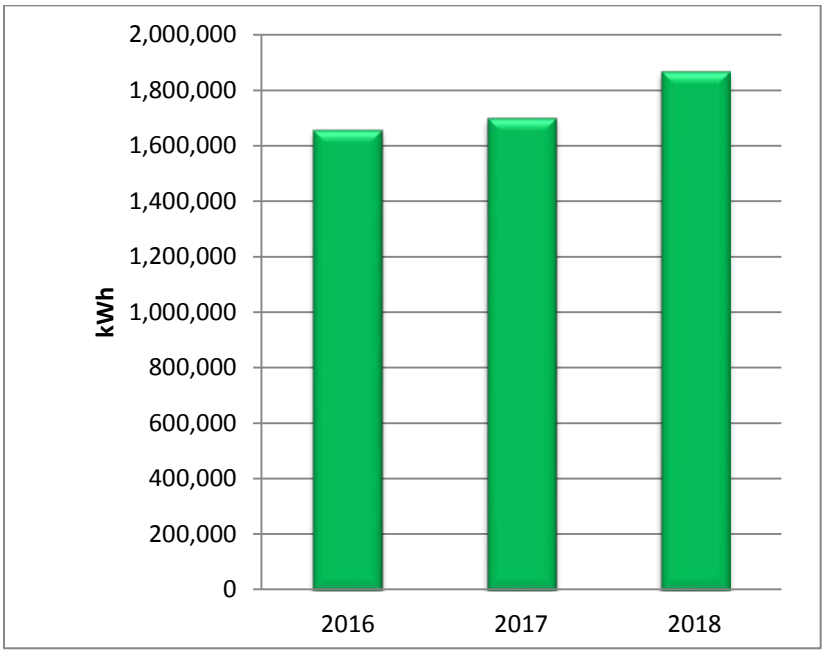
ELECTRICAL CONSUMPTION

Figure 1 below compares the total yearly electricity consumption and the total monthly electricity consumption (Figure 2) for the Beanfield Centre over the reporting period 2016, 2017 and 2018.

The electrical consumption includes the following:

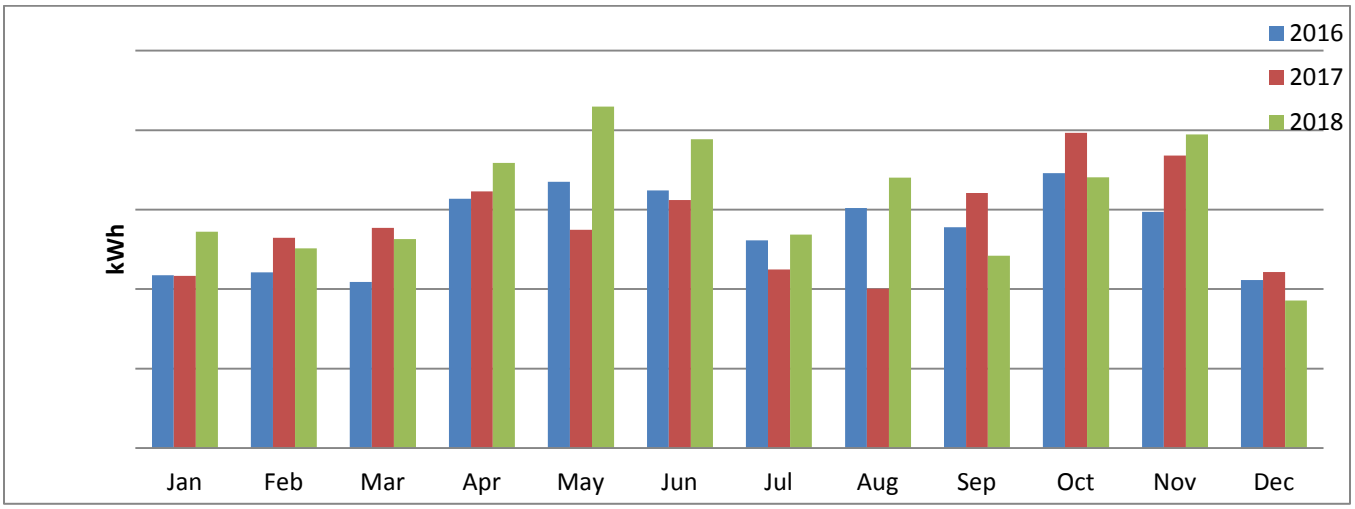
- Kitchen
- Building Power and Systems
- Heat Pumps
- Roof Top Units

Figure 1 – Yearly Electricity Consumption Comparison



Years	% Increase
2018 vs. 2017	10%
2018 vs. 2016	13%
2017 vs. 2016	3%

Figure 2 – Monthly Electricity Consumption Comparison

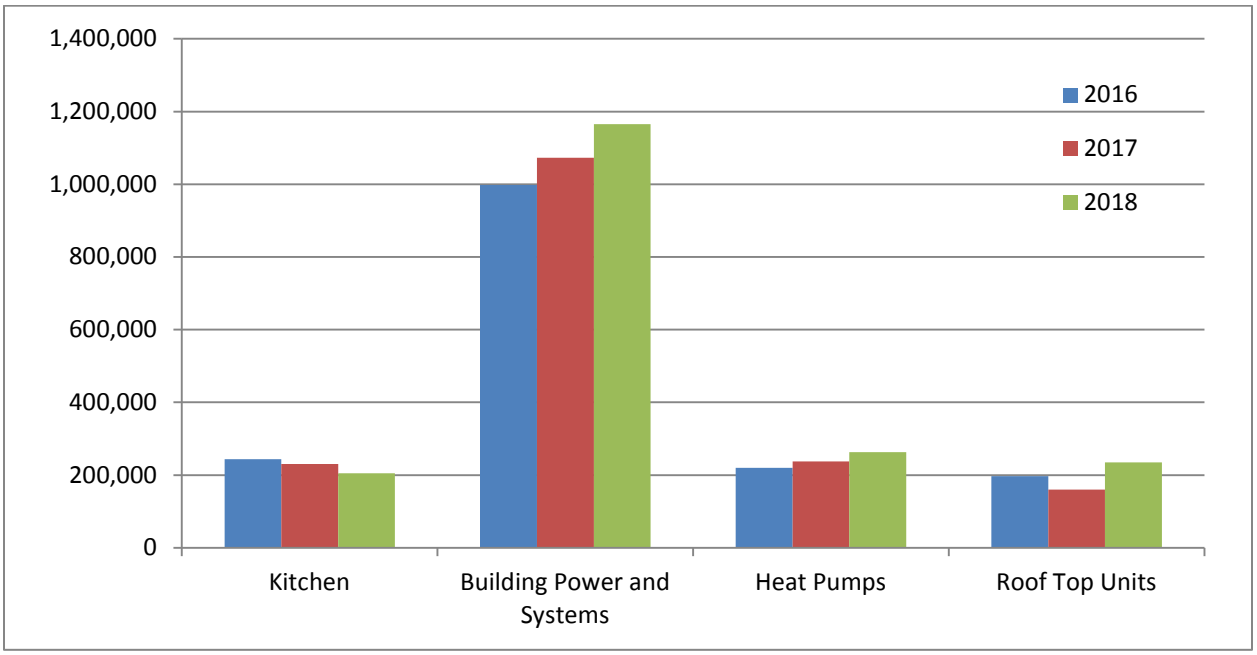


ELECTRICAL ENERGY DISTRIBUTION

Figure 3 illustrates the total electricity consumption distribution of the Beanfield Centre over the reporting period.

Total consumption of Beanfield Centre is calculated by combining the electrical loads measured by the sub-meters at Kitchen, Building Power and Systems, Heat Pumps and Roof Top Units.

Figure 3 – Electricity Consumption Distribution



BUILDING POWER AND SYSTEMS

Figure 4 shows the monthly breakdown of the Building Power and Systems monthly electricity consumption which is the highest category of consumption in the Centre. Show power and plug loads, elevators and escalators are included in this category.

The consumption in this category is dependent on the occupancy of the building and hours of operation. Building Power and Systems consume approximately 62% of total building electricity usage. Generally, the more events / visitors that are in the Beanfield Centre on any given day, the higher the electrical load will be. This is expected because as the number of people increases, the fans and pumps consumption need to increase accordingly to service the extra load along with room lighting and plug use.

The baseline consumption of the building corresponds to unoccupied weekend days or no show days at about 1,200 kWh/day for Building Power and Systems shown in Figure 4.

Figure 4 – Comparison of Building Power and Systems Electric Consumption (kWh)

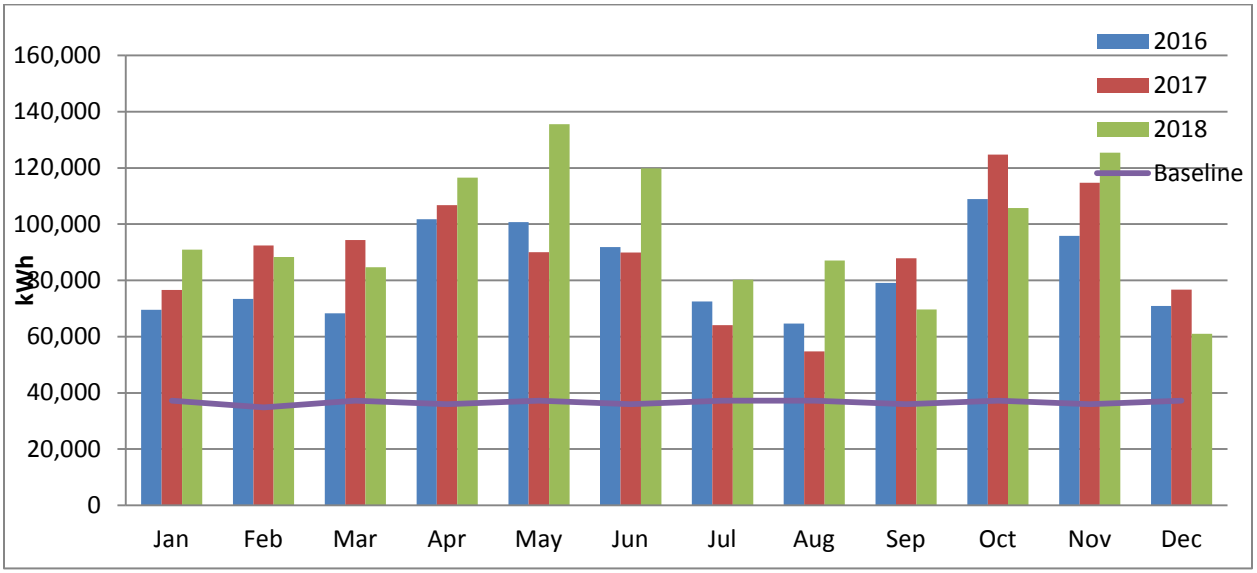


Figure 5 below compares the number of the show days in a month over the reporting period.

As mentioned above, the consumption is dependent on the occupancy of the building and hours of operation. Each event is unique and not necessarily comparable. An event may be held over several days, occupy more space and as a result use more Building Power and Systems compared to the other shows that may have the same duration but occupy less space.

Figure 5 – Comparison of Activity Days in a Month

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	18	19	19	38	31	38	18	11	26	46	39	18	321
2017	15	28	17	39	29	37	19	7	32	57	50	12	342
2018	13	23	13	36	36	34	15	8	17	33	43	9	280

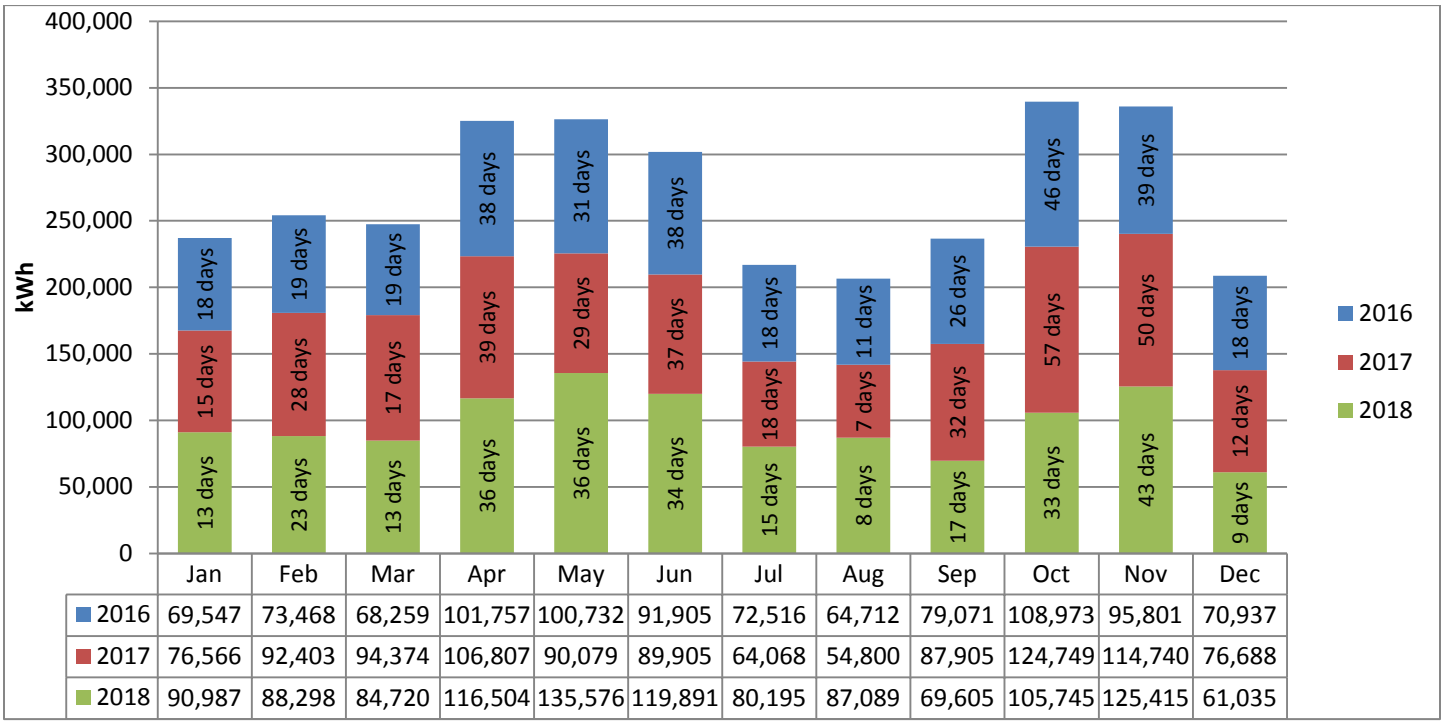
Figure 6 shows the percentage of Building Power and Systems consumption increase and decrease over the reporting period.

Figure 6 – Building Power and System Loads

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2017 vs 2016 (% increase)	10%	26%	38%	5%	-11%	-2%	-12%	-15%	11%	14%	20%	8%
2018 vs 2017 (% increase)	19%	-4%	-10%	9%	51%	33%	25%	59%	-21%	-15%	9%	-20%

The electrical consumption of the Building Power and Systems increased from 2018 over 2017 by 9% although the number of event days decreased by 18% from 2018 over 2017. Electrical consumption is up in part due to the carpet replacement project that took place in August of 2018 (lighting and ventilation were required to complete the project). Figure 7 shows the effect of Building Power and System loads against number of activity days in a month.

Figure 7 – Building Power Loads vs. Activity days



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	69,547	73,468	68,259	101,757	100,732	91,905	72,516	64,712	79,071	108,973	95,801	70,937
2017	76,566	92,403	94,374	106,807	90,079	89,905	64,068	54,800	87,905	124,749	114,740	76,688
2018	90,987	88,298	84,720	116,504	135,576	119,891	80,195	87,089	69,605	105,745	125,415	61,035

WEATHER TEMPERATURE AS A FACTOR CONTRIBUTING TO ENERGY CONSUMPTION INCREASE

- As shown in Figure 3 the highest consumption in the Beanfield Centre is Building Power and Systems. Weather temperature has a direct effect on the performance of these systems.
- Heat pumps consume approximately 14% of total electricity use of the building. Heat pumps consumption in 2018 decreased by 14% and 8%, respectively compared to 2017 and 2016.
- Weather temperature in the summer months of 2018 (July, August, September) was hotter by 1.5°C compared to 2017 and cooler by 0.6°C compared to 2016 as shown in 8 below. In addition, there was 499 CDDs recorded for 2018 opposed to 350 in 2017 and 562 in 2016.
- Temperature affects boiler gas consumption. However, outside temperature is independent of kitchen use and domestic hot water requirements as they are dependent on occupancy.

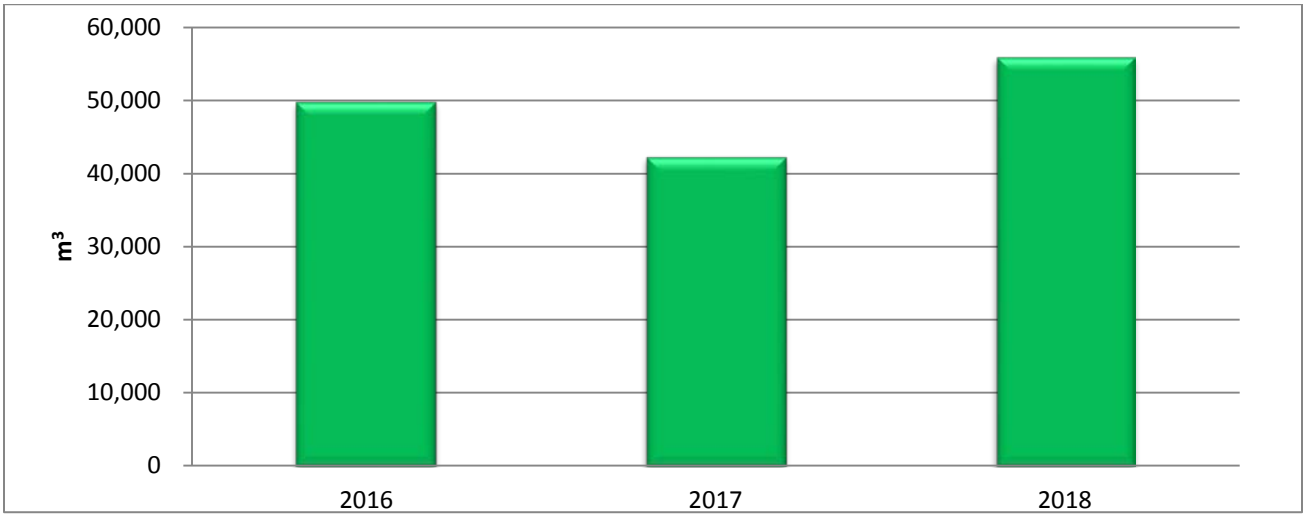
Figure 8 – Comparison of Average Temperature (°C)

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

NATURAL GAS CONSUMPTION

Figure 9 and 10 compare the total and monthly natural gas consumption over the reporting period. Natural gas is used in the Beanfield Centre in the Kitchen for food preparation and also by the Boilers for heat. In addition, natural gas is used to supply heat to the Ballroom Air Handling Units, as well as the building's make-up air units from the District Energy System. The natural gas consumption is heavily dependent on weather and events that require the use of natural gas.

Figure 9– Comparison of Total Gas Consumption by Year



The weather temperature in the winter months of 2018 (January, February, March) was Cooler by 1.6°C and 1.4C, respectively, compared to 2017 and 2016. Building heating boiler gas consumption in 2016 increased by 57% and 6% compared to 2017 and 2016. This increase is largely in part due to the cooler winter months in 2018. Kitchen gas consumption also increased by 18% from both 2017 and 2016, as shown in Figure 11 on the next page.

Figure 10 – Comparison of Gas Consumption (m^3) by Months for 2016 – 2018

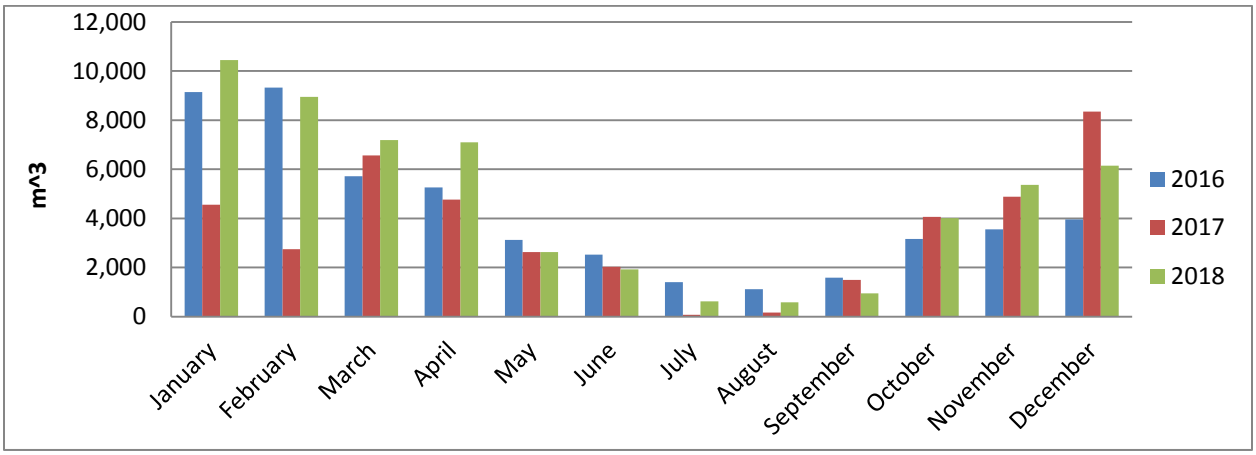


Figure 11 – Comparison of Kitchen Gas Consumption (m^3) by Months for 2016 – 2018

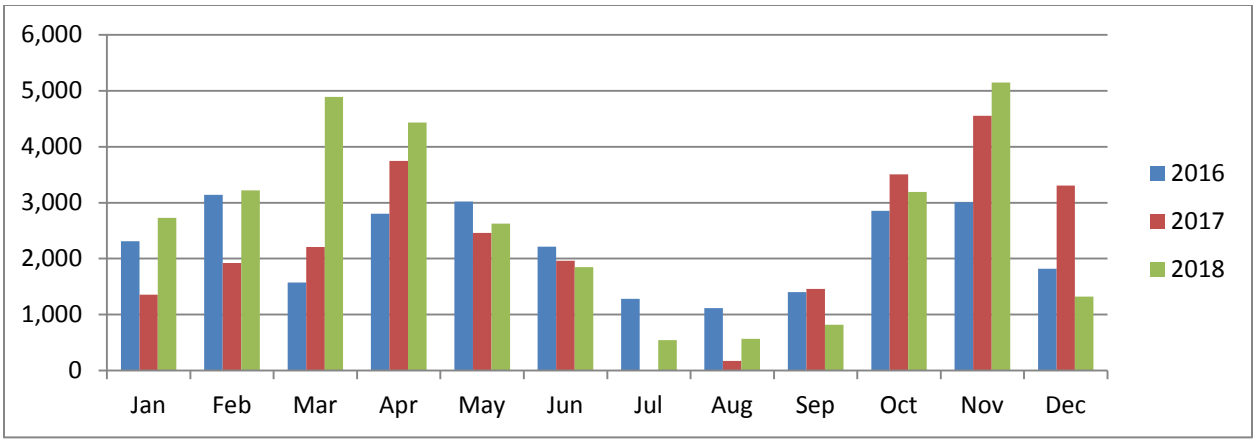


Figure 12 compares the monthly boiler gas consumption of Beanfield Centre over the reporting period 2016 – 2018 by Heating Degree Day (HDD).

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 degree days (HDD) and the more energy required to heat buildings.

Figure 8 – Monthly Boiler Gas Consumption and Heating Degree Day

Month	2016 (m^3)	2016 HDD	2017 (m^3)	2017 HDD	2018 (m^3)	2018 HDD
Jan	6,834	588	3,202	575	7,724	694
Feb	6,189	558	826	476	5,731	507
Mar	4,142	450	4,361	538	2,304	424
Apr	2,458	295	1,020	245	2,672	393
May	106	120	165	158	8	71
Jun	311	21	74	20	82	13
Jul	122	0	74	0	85	0
Aug	0	0	0	6	17	0
Sep	187	18	34	39	130	39
Oct	303	175	560	123	818	266
Nov	546	299	334	372	226	455
Dec	2,133	552	5,037	679	4,825	498
Total	**23,331**	**3,075**	**15,688**	**3,231**	**24,622**	**3,358**

GREENHOUSE GASES

The City of Toronto has established aggressive targets to reduce Greenhouse Gas (GHG) emissions as set out in Figure 14 below. The primary greenhouse gases are carbon dioxide (CO2), sulphur oxides (SOx), nitrous oxide (NOx), 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 9 – 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 of City Government overachieves it will offset those that do not.

Greenhouse gas emissions in CO2, NOx and SOx from electricity and gas use in the Beanfield Centre is shown in Figure 14 and the total greenhouse gas emissions is shown in Figure 15.

Figure 10 – Green House Gas Emissions

Year	Electricity			Gas		
	CO2	NOx	SOx	CO2	NOx	SOx
	Ton	Ton	Ton	Ton	Ton	Ton
2016	404.7	0.577	0.104	100.1	0.076	0.000592
2017	414.8	0.592	0.107	85.0	0.164	0.000503
2018	455.7	0.650	0.118	112.3	0.085	0.000664

Figure 11 – Total Green House Gas Emissions

	Co2	NOx	SOx
Year	Ton	Ton	Ton
2016	504.7	0.653	0.105
2017	499.8	0.656	0.108
2018	568.0	0.735	0.118

HYDRO EXPENSES

The total hydro costs of Beanfield Centre is shown in Figure 16 and consists of the electrical loads of the Kitchen, Building Power and Systems, Heat Pumps and Roof Top Units but does not attribute any hydro costs from the DES supply.

Figure 12 – Hydro Cost

Year	Total Consumption [kWh]	Rate Average Rate per Kwh $	Hydro Consumption $	Pure Green Purchase $	Total Hydro Expense $
2016	1,658,160	0.1417	234,961	16,000	250,961
2017	1,700,019	0.1293	219,812	16,000	235,812
2018	1,867,634	0.1285	239,991	16,000	255,991

GAS EXPENSES

The total gas consumption cost is shown in Figure 17 and consists of the boiler and the kitchen located in the Beanfield Centre but does not attribute any gas costs associated with the DES supply.

Figure 13 – Gas Cost

Year	$	M3	Average Rate/M3
2016	12,125	49,878	0.243
2017	10,976	42,347	0.259
2018	12,950	55,963	0.231

REDUCTION INITIATIVES STATUS UPDATE

Listed below is a status update on reduction initiatives undertaken as identified in the 2014 – 2016 Beanfield Centre GreenSmart Energy Performance Report.

No	DESCRIPTION	STATUS UPDATE
1	More accurately calculate and allocate to Beanfield Centre the consumption of the DES related directly to Beanfield to understand total consumption.	Beanfield DES-related consumption is now accumulated and analyzed on a monthly basis.
2	Decrease lighting levels, escalator use and other energy consuming systems, during non-priority periods.	Escalator/lighting schedules are based on request from SEM / clients / AODA requirements and balanced against our Energy Procedure
3	Upgrade building lighting to more efficient LED technology. The objective of this lighting retrofit is to replace the existing compact fluorescent lamps (CFL) with LED in Beanfield Centre. There are 420 lights to be replaced; they are mainly located in the second floor meeting rooms.	420 lights were replaced with LEDs in phase 1 of the lighting retrofit project. Phase 2 includes an additional 890 lights to be replaced and is slotted to be completed in 2019

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.

- Phase 2 of the lighting retrofit project for pot lights is expected to be completed in 2019
- Review policies/procedures relating to shutting down building equipment when building is not occupied.
- Investigate energy efficient means of cooling A/V rooms throughout the building.
- Investigate feasibility of upgrading the building's CO2 monitoring system to minimise fresh air requirements.
- Investigate feasibility of obtaining LEED Existing Building Operations & Maintenance (EBOM) certification for Beanfield Centre