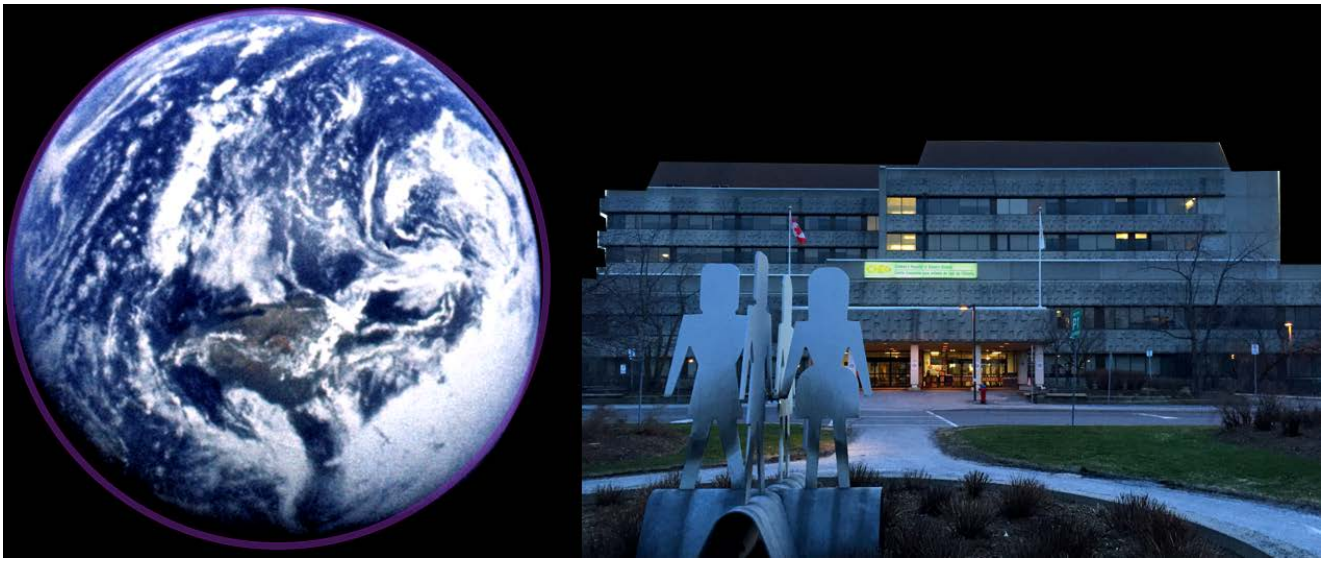
# CONSERVATION AND DEMAND ENERGY MANAGEMENT PLAN

# CHILDREN'S HOSPITAL OF EASTERN ONTARIO

## June 2021



### OUR VISION

*"Best Life for every child and youth"*

### OUR MISSION

*"We provide exceptional care and advance how children, youth and families obtain it through partnership, research and education"*

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# A. EXECUTIVE SUMMARY

The Ontario Regulation 507/18 (formerly 397/11) was established to help public agencies better understand their energy usage, develop conservation plans to guide energy savings and demonstrate government leadership in conservation. This report fulfils the reporting requirements of the Energy Reporting and Conservation and demand Management Plans, Ontario Regulation 507/18 providing the Hospital with a framework to support continued energy, sustainability and green initiatives within the built environment as well as operations and programs. Implementation of all initiatives will be subject to future budget approvals.

# B. INTRODUCTION

The Energy Reporting and Conservation and Demand Energy Management Plans was undertaken to respond to the Green Energy Act, Ontario Regulation 397/11 made under the Green Energy Act, 2009 and published on August 25, 2011. The O. Reg 397/11 was later replaced with the Ontario regulation 507/18 and published on December 14, 2018, requiring all public agencies to prepare an Energy Reporting and Conservation and Demand Management Plans.

The energy conservation and demand management plan is composed of two parts as follows:

1. A summary of the public agency's annual energy consumption and greenhouse gas emissions for its operations.
2. A description of previous, current and proposed measures for conserving and otherwise reducing the amount of energy consumed by the public agency's operations and for managing the public agency's demand for energy, including a forecast of the expected results of current and proposed measures.

The overall goal of the Children's Hospital of Eastern Ontario (CHEO) Conservation and Demand Energy Management Plan is to promote responsible stewardship of natural resources. This is desirable on several fronts;

- Reducing CHEO's operating expenses from lower utility bills
- Conserving a finite resource – fossil fuels
- Limiting the environmental impact from greenhouse gas emissions (CO2)

## *CHEO*

CHEO was conceived in the late 1960's and opened its doors to the Eastern Ontario and Western Quebec communities in May 1974. It was planned prior to the 1973 oil crisis when energy prices were low relative to today's scenario. Building Codes and Canadian Standards Association (CSA) standards related specifically to healthcare have moved forward significantly in the last 40 years to reflect the new reality of higher energy costs such that a 'new' CHEO if built today would be a more energy efficient lower cost facility to operate. CHEO is continually striving to improve its energy performance against a backdrop of energy costs escalating ahead of general inflationary trends.

The CHEO complex together with the CHEO Research Institute comprises the following interconnected footprint of buildings and associated wings. See Table 1 below.

**TABLE 1: CHEO, ASSOCIATED WINGS AND CHEO RESEARCH INSTITUTE FOOTPRINT (WITHOUT CTC).**

| Address | Use | Square Footage | Number of Stories | Built (yr.) |
|---|---|---|---|---|
| CHEO Main Building | Hospital | 397,020 | 7 | 1974 |
| Max Keeping Wing | Clinics, offices & labs | 67,000 | 3 | 2002 |
| Garry Cardiff Wing | PICU, NICU, ER, Clinics | 85,200 | 3 | 2009 |
| Research Institute 1 | Offices & labs | 30,000 | 3 | 1992 |
| Research Institute 2 | Clinics, offices & labs | 33,630 | 4 | 2004 |
| | **Total Area** | **612,850** | | |

## *CTC*

In 2016 CHEO amalgamated with the Ottawa Children Treatment Center (OCTC) under its portfolio. This added entity is now referred to the Children Treatment Centre (CTC). A 9,663 square foot extension was constructed in 2017. The CTC complex comprises the following interconnected footprint of buildings and associated wings. See Table 2 below.

**TABLE 2: CTC FOOTPRINT.**

| Address | Use | Square Footage | Number of Stories | Built (yr.) |
|---|---|---|---|---|
| Children Treatment Center (CTC) | Treatment Center / School | 31,921 | 1 + Penthouse (Mechanical room) | 1973 |
| | Administrative Office | 1,019 | | |
| | Workshop | 1,019 | | |
| | CTC Annex (Treatment & Administrative) | 9,663 | 1 | 2017 |
| | **Total Area** | **43,621** | | |

Total square footage for both CHEO and CTC = **656,451 sq. ft**

## *OHSC*

The Ottawa Health Science Center site comprises CHEO, The Ottawa Hospital General Campus, The University of Ottawa School of Medicine. The site is bulk invoiced by Hydro Ottawa and is also invoiced for thermal energy from TransAlta Corporation. CHEO receives the invoices for Hydro, as well as Steam and Medium Temperature Hot Water (MTHW), pay for the invoices and then re-invoice all partners. A Technical Advisory Committee (TAC) with members from all partner's deal with common issues for the site. In 2011 the TAC committee had sub-metering installed to measure each partner's electricity consumption as well as their MTHW and steam consumption. They then engaged a third party, Comsatec, to collect data from all meters, re-allocate losses and provide CHEO accounting with details to assist in invoicing all partners.

Most interval meters were not installed until mid-2011.

In 2015 the entire electrical vault was replaced in a new structure to allow for future expansion. This caused requirements for metering changes as well as reprogramming to provide accurate invoicing.

In addition, Comsatec also started collecting invoices from Utilities (Electricity, Water and Natural Gas) in 2015 to provide full audit capability on reporting. Refer to Appendices A to C along with Graphs A to B for details on monthly consumption from 2012 to 2019 for all energy commodities consumed at CHEO and CTC. Data provided in this report comes from Comsatec's Database.

CHEO and CTC spend around $3.3M per year on utilities. Approximately 37% of that amount relates to thermal energy usage; steam and medium temperature hot water, 48% for Electricity and 15% for water. Refer to Table 3 for 2019 breakdown.

**TABLE 3: 2018 ENERGY CONSUMPTION AND COSTS FOR CHEO & CTC**

| | 2019 Data for CHEO + CTC | | | | |
|---|---|---|---|---|---|
| | **Consumption** | | **Cost** | **%** | |
| Electricity | 17,011,061 | kWh | $1,573,189 | 47.7% | |
| Hot Water | 57,906 | GJ | $795,440 | 24.1% | 37.4% |
| Steam | 24,889 | GJ | $437,881 | 13.3% | |
| Water | 110,671 | $M^3$ | $488,857 | 14.8% | |
| | | **Total ($)** | **$3,266,973** | | |

# C. HISTORICAL ENERGY USE

## *Thermal Energy*

CHEO do not operate their own thermal energy plant. There are no boilers in the facility. All thermal energy (steam & medium temperature hot water) is purchased on a long term agreement from the TransAlta Corporation who own and operate a combined heat and power plant located adjacent to the CHEO building. The agreement with TransAlta runs until January 1, 2024. The facility is currently negotiating with TransAlta to extend the agreement for 5 years with an option of an additional 5 years until the end January 1, 2029. TransAlta have a contract with the Independent Electricity System Operator (IESO) to sell electrical energy from the plant into the Provincial grid.

(Note: TransAlta supplies thermal energy to all facilities on the Ottawa Health Sciences Corporation [OHSC] site comprising CHEO, The Ottawa Hospital General Campus; The University of Ottawa School of Medicine)

Steam is primarily used for sterilization and humidification. Medium temperature hot water (MTHW) is used for building heating systems and domestic hot water production. Appendix A provides the thermal energy consumption on a monthly basis for the periods 2012 to 2019, as well as Graphic A for illustration. Note that CHEO has all the data from 2012 onwards whereas the CTC only has data from 2016 onwards.

In 2019 Approximately 69.9% of thermal energy usage is MTHW and 30.1% is steam usage.

The monthly Steam Consumption for CHEO and CTC from 2012 to 2019 is presented in Table 4.

**TABLE 4: CHEO + CTC STEAM CONSUMPTION (GJ).**

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Jan | 3,065 | 2,269 | 2,053 | 2,739 | 2,734 | 2,776 | 2,950 | 3,291 |
| Feb | 2,994 | 2,207 | 1,668 | 2,609 | 2,628 | 2,775 | 2,754 | 2,952 |
| Mar | 2,674 | 2,409 | 2,077 | 2,538 | 2,407 | 3,172 | 3,236 | 2,997 |
| Apr | 2,701 | 1,672 | 1,641 | 1,691 | 2,089 | 2,058 | 2,733 | 2,203 |
| May | 1,746 | 883 | 1,184 | 1,291 | 1,638 | 1,667 | 1,795 | 1,787 |
| Jun | 1,131 | 784 | 1,198 | 1,546 | 1,335 | 1,374 | 1,634 | 1,562 |
| Jul | 890 | 782 | 1,297 | 1,580 | 1,570 | 1,559 | 1,674 | 1,498 |
| Aug | 963 | 783 | 1,307 | 1,580 | 1,538 | 1,159 | 1,522 | 1,321 |
| Sep | 827 | 778 | 944 | 1,322 | 1,499 | 965 | 1,034 | 1,037 |
| Oct | 1,729 | 851 | 1,193 | 1,355 | 1,803 | 1,248 | 1,810 | 1,648 |
| Nov | 1,854 | 1,079 | 1,463 | 1,416 | 2,022 | 2,427 | 2,353 | 1,892 |
| Dec | 2,048 | 2,138 | 2,231 | 1,632 | 2,774 | 2,950 | 3,133 | 2,701 |
| **Total** | **22,622** | **16,635** | **18,256** | **21,299** | **24,037** | **24,130** | **26,628** | **24,889** |

Data from CTC is included in this table from 2016 onwards and increases the consumption by approximately 3,000 GJ per year. In addition, steam consumption at CHEO also increased from 2015 as well.

The total Medium Temperature Hot Water (MTHW) consumption for CHEO from 2012 to 2019 is presented in Table 5 (Note that CTC does not consume MTHW).

**TABLE 5: CHEO MTHW (GJ)**

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Jan | 6,052 | 6,216 | 6,926 | 8,038 | 6,382 | 5,989 | 8,308 | 9,299 |
| Feb | 4,341 | 5,410 | 5,370 | 8,106 | 6,195 | 5,483 | 6,138 | 7,256 |
| Mar | 3,778 | 4,336 | 5,240 | 5,073 | 4,844 | 6,268 | 5,494 | 5,611 |
| Apr | 3,025 | 3,349 | 3,636 | 3,220 | 3,870 | 3,664 | 4,509 | 3,895 |
| May | 3,573 | 3,218 | 3,211 | 2,939 | 3,073 | 3,751 | 3,473 | 3,579 |
| Jun | 3,138 | 3,102 | 2,594 | 2,728 | 2,805 | 3,409 | 3,295 | 3,432 |
| Jul | 2,863 | 2,926 | 2,601 | 2,611 | 3,009 | 3,342 | 3,055 | 3,186 |
| Aug | 3,011 | 3,011 | 2,708 | 2,628 | 3,015 | 3,463 | 2,986 | 3,562 |
| Sep | 2,989 | 3,349 | 2,679 | 2,634 | 3,013 | 3,109 | 3,202 | 3,615 |
| Oct | 2,990 | 3,462 | 3,036 | 3,459 | 3,504 | 3,838 | 4,147 | 3,418 |
| Nov | 3,974 | 4,127 | 3,980 | 1,394 | 3,671 | 5,058 | 6,161 | 5,115 |
| Dec | 5,426 | 6,262 | 5,087 | 4,113 | 6,109 | 8,308 | 8,004 | 5,938 |
| **Total** | **45,160** | **48,768** | **47,068** | **46,943** | **49,490** | **55,682** | **58,772** | **57,906** |

Consumption for MTHW has increased since 2016. This in part is anticipated to be related to weather conditions. Future reports will include degree days which should provide a better representation on energy consumption.

## *Electrical*

Electricity is purchased at high voltage from Ottawa Hydro. Consumption patterns and totals for the period 2012 to 2019 are shown in Table 6. Appendix B presents all of the data as well as Graphic B for illustration.

Note that CTC's consumption was added as of January 2016. CTC's annual consumption is approximately 350,000 kWh/yr.

The data indicates that energy conservation measures since 2012 have been successful in that the total consumption in 2019 which includes CTC is still lower that the 2012 consumption. The data also shows a steady decline in consumption from 2012 until CTC was added.

**TABLE 6: CHEO + CTC (KWH)**

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| **Jan** | 1,282,696 | 1,304,008 | 1,281,895 | 1,305,070 | 1,306,435 | 1,290,476 | 1,315,060 | 1,380,834 |
| **Feb** | 1,203,249 | 1,189,589 | 1,155,596 | 1,189,832 | 1,223,205 | 1,164,931 | 1,167,000 | 1,207,446 |
| **Mar** | 1,331,266 | 1,276,256 | 1,222,978 | 1,290,868 | 1,310,778 | 1,290,565 | 1,270,760 | 1,263,195 |
| **Apr** | 1,265,894 | 1,266,113 | 1,222,978 | 1,256,870 | 1,339,360 | 1,268,850 | 1,240,135 | 1,233,708 |
| **May** | 1,591,917 | 1,541,848 | 1,468,458 | 1,526,802 | 1,504,414 | 1,447,875 | 1,570,262 | 1,397,579 |
| **Jun** | 1,690,998 | 1,620,206 | 1,609,567 | 1,558,493 | 1,605,800 | 1,633,898 | 1,638,895 | 1,580,785 |
| **Jul** | 1,833,593 | 1,870,903 | 1,688,614 | 1,803,032 | 1,830,419 | 1,818,617 | 1,925,108 | 1,917,471 |
| **Aug** | 1,843,811 | 1,726,335 | 1,659,318 | 1,745,174 | 1,896,675 | 1,754,644 | 1,941,630 | 1,759,113 |
| **Sep** | 1,539,833 | 1,488,006 | 1,500,280 | 1,639,010 | 1,605,885 | 1,663,979 | 1,674,817 | 1,528,158 |
| **Oct** | 1,389,029 | 1,394,948 | 1,377,582 | 1,289,684 | 1,362,568 | 1,459,561 | 1,364,541 | 1,298,185 |
| **Nov** | 1,264,274 | 1,221,872 | 1,292,689 | 1,226,504 | 1,240,758 | 1,301,308 | 1,228,627 | 1,209,765 |
| **Dec** | 1,279,224 | 1,262,398 | 1,292,689 | 1,223,018 | 1,266,170 | 1,282,759 | 1,266,565 | 1,234,822 |
| Totals | 17,515,784 | 17,162,482 | 16,772,644 | 17,054,355 | 17,492,467 | 17,377,462 | 17,603,400 | 17,011,062 |

## *Water*

In 2015 Comsatec started collecting water usage data for CHEO. Refer to Appendix C for the break-down of the consumption per building. Table 7 below gives the total water consumption for CHEO.

**TABLE 7: CHEO WATER CONSUMPTION (CUBIC METERS)**

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| Jan | 8,677 | 6,085 | 5,551 | 3,354 | 2,963 |
| Feb | 7,637 | 5,597 | 5,203 | 3,035 | 6,871 |
| Mar | 8,439 | 6,485 | 9,231 | 3,252 | 7,128 |
| Apr | 10,890 | 5,282 | 5,830 | 3,154 | 7,354 |
| May | 10,078 | 6,798 | 8,570 | 4,329 | 8,311 |
| Jun | 10,748 | 8,714 | 9,744 | 5,753 | 10,507 |
| Jul | 8,945 | 9,842 | 10,130 | 7,611 | 13,027 |
| Aug | 8,651 | 9,578 | 11,128 | 8,041 | 13,413 |
| Sep | 8,750 | 8,903 | 6,614 | 5,177 | 15,051 |
| Oct | 6,889 | 6,808 | 5,356 | 6,743 | 9,534 |
| Nov | 6,213 | 6,248 | 3,946 | 3,425 | 8,584 |
| Dec | 5,737 | 5,685 | 5,075 | 2,823 | 7,928 |
| Totals | **101,654** | **86,025** | **86,378** | **56,697** | **110,671*** |

Note*: Our main incoming water meter was found to be defective in early 2019. Therefore, take note that the water consumption numbers for 2018 are inaccurate and should have been in the range of 83,000 m3 based on the water consumption levels of 2016 and 2017.

In combining all energy components and converting energy units to a common MJ and then using a MJ per area of building (square feet) a clear energy reduction is seen from 2012 to 2014. Then the added CTC load in 2016 increases the MJ/ft2. (See Table 8.)

**TABLE 8: ENERGY INTENSITY AND METRICS**

| | Thermal | | Electrical | | | Total MJ | Total MJ/ft$^2$ |
|---|---|---|---|---|---|---|---|
| | Total MJ/YR | MJ/ft$^2$ | Total KWh/YR | eMJ/YR | MJ/ft$^2$ | | |
| 2012 | 67,782,000 | 110.60 | 17,515,784 | 63,056,822 | 102.89 | 130,838,822 | 213.50 |
| 2013 | 65,403,000 | 106.72 | 17,132,482 | 61,676,935 | 100.64 | 127,079,935 | 207.37 |
| 2014 | 65,324,000 | 106.59 | 16,772,644 | 60,381,518 | 98.53 | 125,705,518 | 205.12 |
| 2015 | 68,242,000 | 111.36 | 17,054,355 | 61,395,678 | 100.18 | 129,637,678 | 211.54 |
| 2016 | 73,527,000 | 113.68 | 17,384,682 | 62,584,856 | 96.76 | 136,111,856 | 210.44 |
| 2017 | 79,812,000 | 121.58 | 17,270,385 | 62,173,388 | 94.71 | 141,985,388 | 216.29 |
| 2018 | 85,400,000 | 130.09 | 17,494,932 | 62,981,755 | 95.94 | 148,381,755 | 226.04 |
| 2019 | 82,795,000 | 126.13 | 17,011,062 | 61,239,823 | 93,29 | 144,034,823 | 219.41 |

*Where the total square footage used in this table are:*

2012 to 2016 = 612,830 ft$^2$ CHEO

2016 to 2017 = 646,788 ft$^2$ CHEO + CTC

2017 to 2019 = 656,451 ft$^2$ CHEO + CTC + CTC Annex

*Converting factor used:*

1 MJ = 0.277777778 KWh

With the addition of CTC the thermal energy consumption has increased. The consumption data are however not weather compensated using degree day information.

# D. ENERGY CONSERVATION PLAN

CHEO's conservation plan is made up of four key elements:

- Baseline Energy Performance
- Identifying Potential Conservation Opportunities
- Implementing Improvement Measures
- Evaluating the Plan and Measuring Results

## *Baseline Energy Performance*

CHEO is a 40 year old facility and over 2/3rds (~400,000 $ft^2$) of its space is original construction. Conceived and built in a time when energy was relatively cheap (pre-1973 oil crisis) it has by modern standards an inefficient building envelope.

CHEO needs to benchmark its energy consumption with similar vintage hospitals to plan for future energy saving initiatives. For the purpose of this plan 2011 to 2013 data will be used to establish baselines for thermal and electrical energy performance. See Table 4, 5 and 5 in the above section

Comsatec is monitoring CHEO's consumption and plans to incorporate degree days to normalize data within the next 2 years.

## *Identifying Potential Conservation Opportunities*

Identifying conservation opportunities continues to be a continuous performance improvement objective. CHEO has an active 'Green Team' drawn from all departments of the hospital which meet regularly to develop ideas and actions for reducing the environmental impact of the hospital and acting in a more sustainable manner.

Each year the Conservation Plan will be updated with the prioritized projects approved using CHEO's capital infrastructure planning process. Many such opportunities exist to reduce the environmental impact of CHEO's operation as the examples below illustrate.

## *Implementing Improvement Measures*

Since 2014, CHEO has completed the following projects:

- Renovation of an inpatient unit with replacement of 5 VAV boxes incorporating DDC control systems
- Total renovation of the 3rd floor daycare surgery suite (~$10M) which included replacing all the lighting systems and HVAC controls.
- Replacement of thermal heat wheel recovery systems on 2 of the 8 main air handling systems (100% fresh air)
- Ongoing lighting conversion to LED and successfully participating in Ottawa Hydro incentives program.
- Replacement of a high energy use 1997 Magnetic Resonance Imaging (MRI) diagnostic machine which has an anticipated electrical energy saving of 10-15% in 2015.
- Undertaking a long range Master Plan for the CHEO site over a 5 to 20 year timeframe. This plan will include the adaptation; replacement and upgrading of the existing building portfolio balanced against emerging demographic trends in pediatric medicine in the Eastern Ontario catchment area served by CHEO. Energy efficiency and operating costs of the facilities will be a key component of the plan.

- Incorporate within our procurement processes evaluation of carbon and/or Green impact analysis.
- Replacement of the Electrical Vault for the Smyth Site (vault is used by CHEO, TOH, University of Ottawa and Ottawa Children's Treatment Centre) completed in 2015.
- Annual roofing replacement. When roof replacement occurs the facility automatically increases membrane insulation on roofing systems.
- Code compliancy, replaced all steam pressure relief valves (PRV's)
- High Pressure Flash Tank has been venting low pressure steam to atmosphere for over 20 years. A heat exchanger was installed and this low pressure steam is now pre-heating domestic cold water intake. This is reducing use of Medium Temperature Hot water.
- CHEO introduced a distributed Siemens Apogee DDC building management system in 1991 which is progressively replacing the original pneumatic controls systems throughout the building. Every renovation or remodeling project incorporates replacement of the pneumatic controls. Approximately 1/3rd of the original 1974 building has been completed. All the newer building additions are fully DDC such that overall approximately **65%** of the facility has DDC controls. Increasing penetration of DDC into the older HVAC systems will be a priority for the hospital.

## *Planned Projects over the next few years*

As a part of the Green Program, all the systems throughout the hospital buildings will be subjected to evaluations, which eventually lead to the re-engineering and optimization of the system. Facilities primary initiatives for short term (less than a 1year), medium terms (1-2years) and long term (2-5 years) planning include the following:

**Short term (on-going)**

1. Avoid simultaneous heating and cooling, summer SAT reset from 14C to 16C)
    - Reset supply air temperature at the air handling unit (AHU) from 14C to 16C and the AHU will be composed of a new control sequence base on Enthalpy.
2. Bypass around the heating and cooling coils to remove seasonal pressure drop in AHUs.
    - Duct by pass complete with automated dampers removing pressure differential across coils (Heating/Cooling) depending on winter/summer operation as well as a bypass on the heat recovery wheel for the shoulder season. The fan horse power will be reduced significantly resulting in lower power consumption
3. Shut down all steam humidification system during the summer period (mid-April to mid-Oct)
    - During the spring, summer and fall all the humidification system will be offline. This means the steam header inside the air handling units will not contribute unwanted heat.

4. Global adjustment and Demand response initiatives (5 peaks load shedding coincidently with IESO) load shedding 550 KW reduction for one hour. See Graph 1 on page 14 for results.

    - The CHEO campus will coincidently reduce demand (power) during the 5 Ontario demand peaks.

5. Control sequence optimization; Heating system, cooling system, AHU system, chillers COP.

    - Continuous dialogue/implementation with Instrumentation dept to refine and develop innovative control sequence strategy.

6. Parking and street lighting retrofit from HID to Smart LED

    - New LED light will improve the light quality, lower maintenance, reduce power consumption.

7. Cooling tower DCW evaporation grant

    - Pursue City of Ottawa waste water exemption for the evaporation for cooling tower water.
    -

**Medium terms (1-5years) See Table 9 for more details on page 15**

8. Variable frequency drives in all Fans, pumps and cooling towers

    - All fans, pumps, cooling towers will be upgraded with the latest innovative technology with variable speed drive, controls and remote monitoring. This will allow for more precise control and increase energy saving and reduce maintenance (wear and tears) and allow for predictive maintenance.

9. New Metering infrastructure, DCW, DHW, circuit metering for Electricity of major equipment, Htg and clg meters on each buildings.

    - Install revenue grade digital meters, circuit metering, magflow, turbine, wireless/hardwire electricity meter etc for measuring and verification purposes. Allowing for future programs such as social engagement between dept to achieve energy target and positive feedback.

10. Global adjustment and Demand response initiatives (5 peaks load shedding coincidently with IESO); automate the GA system for load shedding 500KW reduction for one hour. See Graph 1 on page 14 for results.

    - The CHEO campus on an annual basis will continue to improve the GA peak demand initiative coincidently with the 5 Ontario demand peaks.

**Medium terms (1-5years) Cont'd**

11. Primary and secondary Corridors, stairwell lighting and all mechanical rooms upgrade to smart LED.
    - T8 re-lamping to LED will be gradually implemented improving the quality of lighting and maintenance and energy reduction at CHEO.

12. Installation of more efficient water fixtures and low flush touchless fixtures in office space and none clinical area

13. CHEO or OHSC; GA/DR3 Peak shaving initiatives (fully funded by 3rd party with a 50/50% split benefit over 10yrs) or installed ice bank for load shedding as well as an emergency back-up, gen set option, battery bank.

14. Pilot a Smart Intelligent Building Auditor (SIBA), Lighting and building automation system integration, Kitchen lighting retrofit

**Long term (10-15 years)**

- Re-engineering of HVAC systems
- Re-engineering of heated/chilled water systems
- Cont'd Installation of more efficient water fixtures and low flush touchless fixtures in office space and none clinical area
- Replacement of old equipment with more efficient ones
- Addition of energy recovery systems wherever beneficial
- Business continuity plan and address point of failure.
- Addressed deferred maintenance such as cooling towers, chillers, pumps, AHUs and other MNE infrastructure for the next 20 yrs
- System control optimization and re-commissioning of the entire buildings.

Deep energy retrofits/back-fits refer to projects that reduce a building's energy consumption by 40% or more, and thus represent the CHEO most aggressive energy reducing initiative. These projects form the major part of the Eco Prosperity Plan. The scope of these projects includes the re-commissioning of the entire building. The following is a summary of the short, medium and long term energy interventions.

Other measures that are in the process to be implemented with more modern and more efficient system.

1) Replacement of 5 walk-in coolers
    - These have been running water to drain for past 45 years
    - Planning to have the design self-ready by end of 2019-2020 Fiscal year.
2) Medical Air System and Dryer replacement
    - Triplex system replaced with newer technology
3) Elevator Replacement program

- Replacing all elevators with open source systems

4) Air Handler Upgrades
    - VFD upgrades 7 & 8 air handlers (expected up to 50% savings)
5) Replacing Catheterization Laboratory and Interventional Suite
6) CTC Conversion to LED throughout their Facility
7) Max Keeping Wing conversion to LED
8) Steam trap audit

## *Evaluating the Plan and Measuring Results*

CHEO will continue to provide the Energy consumption profiles and will track their Greenhouse Gas Emissions. Additionally CHEO will strive to set reporting processes on:

- Current and proposed measures conserving, reducing, and managing demand for energy
- Annually update current and proposed measures and targeted results
- Report on improvement initiatives with corresponding results

CHEO is committed to ensure the "Plan" continues to evolve and improve over the next five years. The Master Planning exercise currently being undertaken will provide the needed foundation to plan all "buildings" for the future and their related energy consumption

Result of our Global adjustment initiative and our commitment to address increasing cost of utility and energy waste.

We are committed as an organization to minimize our electrical peak when it coincides with Ontario's provincial electrical peak.

This program will allow CHEO to generate significant electrical cost savings. We are currently monitoring the Ontario Electricity peak and executing demand peak reductions accordingly, without impacting comfort or use of space.

The top 5 peaks of Ontario, over the year determine our electrical rate and therefore bills. When we help Ontario reduce their peak, we also reduce our share of the cost to Ontario, hence share in the electrical cost savings for Ontario through this effort.

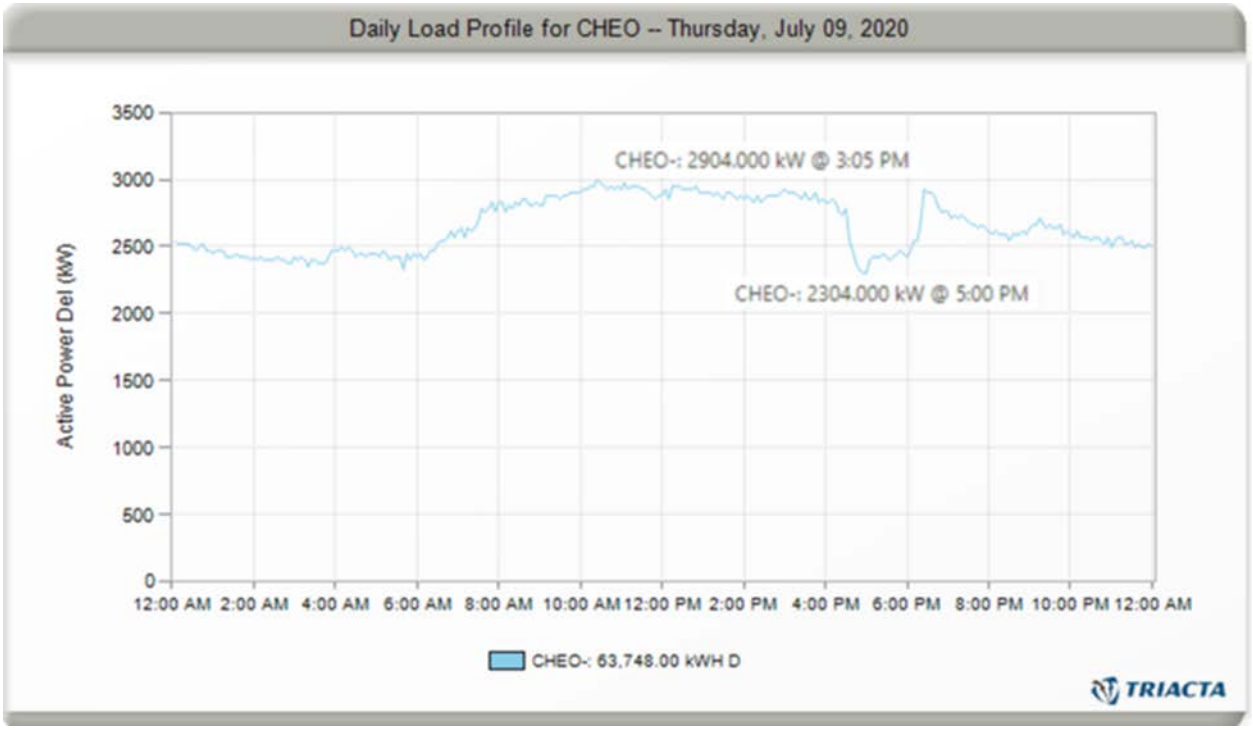
This year's target 2020 is a 200kW reduction, for a duration of one-hour, coincident with Ontario's 5 peaks.

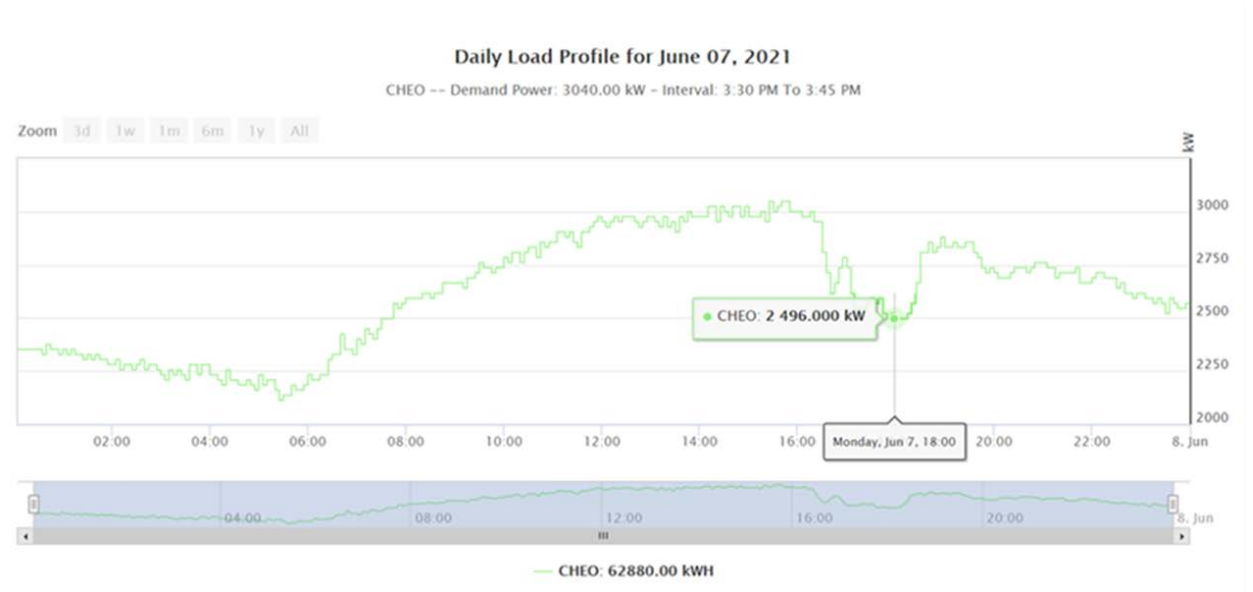
So far, we have doubled and then tripled this target. Below is the result of this measure on July 09, 2020 at 5Pm.

This peak demand reduction is about 20% over the one hour. In other words, we reduced our power consumption to the equivalent of 600 homes, over this period.

The target of a 200KW reduction represent a saving to CHEO of $120,000 annually.

**Graph 1: Global Adjustment Initiatives at CHEO. RESEULTS**



**CHEO, Facilities and Planning**
**FISCAL YEAR**
**Table 3.2 : Actual-Energy Consumption and Costs, CO2 EMISSIONS**
**RESULT ACHEIVED**

DATA ENTRY
FORMULAS

| | | Actual → | | | | PROJECTION → | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2017/18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 2024-25 |
| **Total floor area [m2]** | | 61,008 | 61,008 | 61,008 | 61,008 | 61,008 | 61,008 | 61,008 | 61,008 |
| **Total Energy Consumption [GJ]** | | 174,490 | 183,417 | 170,897 | 160,998 | 155,246 | 148,129 | 136,195 | 124,122 |
| **Total GHG Emission [tonnes CO2 eq]** | | 6,339 | 6,746 | 6,268 | 5,849 | 5,622 | 5,348 | 4,845 | 4,378 |
| **2. "Scope 2" Emissions** | | | | | | | | | |
| **[Indirect emissions created on behalf of the entity]** | | | | | | | | | |
| Utilities | | | | | | | | | |
| 3.1 Electricity | | | | | | | | | |
| Electricity Consumption [kWh] | | 17,384,311 | 17,702,055 | 16,594,068 | 16,018,066 | 15,568,066 | 14,968,066 | 14,268,066 | 13,268,066 |
| Electricity Consumption [GJ] | | 62,584 | 63,727 | 59,739 | 57,665 | 56,045 | 53,885 | 51,365 | 47,765 |
| GHG Emissions | **Total CO2 eq [tonnes]** | 695 | 708 | 664 | 641 | 623 | 599 | 571 | 531 |
| 3.2 Domestic Water-Associated Consumption | | | | | | | | | |
| Water Consumption [m3] | | 86,378 | 56,697 | 115,363 | 110,107 | 106,804 | 103,600 | 100,492 | 97,477 |
| Electricity Consumption (City of Ottawa) [kWh] | | 30,664 | 20,127 | 39,288 | 39,088 | 37,915 | 36,778 | 35,675 | 34,604 |
| Diesel Consumption (City of Ottawa) [L] | | 371 | 244 | 476 | 473 | 459 | 445 | 432 | 419 |
| Electricity/Diesel Consumption [GJ] | | 125 | 82 | 160 | 159 | 154 | 150 | 145 | 141 |
| GHG Emissions | **Total CO2 eq [tonnes]** | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 |
| 3.3 Miscellaneous Source: Steam from Natural Gas | | | | | | | | | |
| Steam & MTHW Consumption [GJ] | | 79,812 | 85,400 | 79,253 | 73,666 | 70,719 | 67,183 | 60,465 | 54,419 |
| Natural Gas Required Energy Consumption [m3] | | 2,965,814 | 3,173,464 | 2,945,041 | 2,737,428 | 2,627,931 | 2,496,535 | 2,246,881 | 2,022,193 |
| Equivalent Energy Consumption [GJ] | | 111,782 | 119,608 | 110,999 | 103,174 | 99,047 | 94,094 | 84,685 | 76,216 |
| GHG Emissions | CO2 [tonnes] | 5,608 | 6,001 | 5,569 | 5,176 | 4,969 | 4,721 | 4,249 | 3,824 |
| | CH4 [tonnes CO2 eq] | 2.30 | 2.47 | 2.29 | 2.13 | 2.04 | 1.94 | 1.75 | 1.57 |
| | N2O [tonnes CO2 eq] | 30.34 | 32.46 | 30.13 | 28.00 | 26.88 | 25.54 | 22.99 | 20.69 |
| | **Total CO2 eq [tonnes]** | 5,641 | 6,036 | 5,601 | 5,207 | 4,998 | 4,748 | 4,274 | 3,846 |
| **Indirect Emissions TOTAL** | | | | | | | | | |
| Equivalent Energy Consumption [GJ] | | 174,700 | 183,627 | 171,159 | 161,260 | 155,508 | 148,391 | 136,457 | 124,384 |
| GHG Emissions | CO2 [tonnes] | 6,339 | 6,761 | 6,288 | 5,868 | 5,642 | 5,368 | 4,865 | 4,398 |

Prepared by: Faizal Sudoollah., P. Eng

Verified by: Trevor Stewart., P. Eng

15-Jun-21

# APPENDIX A

Below is the thermal energy consumption data on a monthly basis for the periods 2015 to 2020, as well as Graphic A for illustration.

## CHEO MEDIUM TEMPERATURE Hot Water (GJ)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2015** | 8,038 | 8,106 | 5,073 | 3,220 | 2,939 | 2,728 | 2,611 | 2,628 | 2,634 | 3,459 | 1,394 | 4,113 | **46,943** |
| **2016** | 6,382 | 6,195 | 4,844 | 3,870 | 3,073 | 2,805 | 3,009 | 3,015 | 3,013 | 3,504 | 3,671 | 6,109 | **49,490** |
| **2017** | 5,989 | 5,483 | 6,268 | 3,664 | 3,751 | 3,409 | 3,342 | 3,463 | 3,109 | 3,838 | 5,058 | 8,308 | **55,682** |
| **2018** | 8,308 | 6,138 | 5,494 | 4,509 | 3,473 | 3,295 | 3,055 | 2,986 | 3,202 | 4,147 | 6,161 | 8,004 | **58,772** |
| **2019** | 9,299 | 7,256 | 5,611 | 3,895 | 3,579 | 3,432 | 3,186 | 3,562 | 3,615 | 3,418 | 5,115 | 5,938 | **57,906** |
| **2020** | 6,577 | 6,625 | 6,141 | 4,000 | 4,720 | 3,378 | 2,936 | 3,070 | 3,400 | 3,893 | 3,687 | 5,340 | **53,767** |

## CHEO STEAM (GJ)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2015** | 2,739 | 2,609 | 2,538 | 1,691 | 1,291 | 1,546 | 1,580 | 1,580 | 1,322 | 1,355 | 1,416 | 1,632 | **21,299** |
| **2016** | 2,283 | 2,210 | 2,015 | 1,826 | 1,469 | 1,236 | 1,529 | 1,526 | 1,432 | 1,555 | 1,727 | 2,333 | **21,141** |
| **2017** | 2,319 | 2,350 | 2,737 | 1,767 | 1,514 | 1,313 | 1,248 | 1,127 | 892 | 1,054 | 2,131 | 2,544 | **20,996** |
| **2018** | 2,544 | 2,416 | 2,882 | 2,415 | 1,621 | 1,468 | 1,511 | 1,513 | 790 | 1,680 | 2,185 | 2,904 | **23,929** |
| **2019** | 3,016 | 2,754 | 2,820 | 2,037 | 1,593 | 1,385 | 1,352 | 1,137 | 831 | 1,503 | 1,721 | 2,497 | **22,646** |
| **2020** | 3,072 | 2,542 | 2,415 | 2,425 | 2,021 | 681 | 685 | 653 | 640 | 1,060 | 1,690 | 2,245 | **20,129** |

## CHEO TOTAL MEDIUM TEMPERATURE HOT WATER AND STEAM (GJ)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2015** | 10,777 | 10,715 | 7,611 | 4,911 | 4,230 | 4,274 | 4,191 | 4,208 | 3,956 | 4,814 | 2,810 | 5,745 | **68,242** |
| **2016** | 8,665 | 8,405 | 6,859 | 5,696 | 4,542 | 4,041 | 4,538 | 4,541 | 4,445 | 5,059 | 5,398 | 8,442 | **70,631** |
| **2017** | 8,308 | 7,833 | 9,005 | 5,431 | 5,265 | 4,722 | 4,590 | 4,590 | 4,001 | 4,892 | 7,189 | 10,852 | **76,678** |
| **2018** | 10,852 | 8,554 | 8,376 | 6,924 | 5,094 | 4,763 | 4,566 | 4,499 | 3,992 | 5,827 | 8,346 | 10,908 | **82,701** |
| **2019** | 12,315 | 10,010 | 8,431 | 5,932 | 5,172 | 4,817 | 4,538 | 4,699 | 4,446 | 4,921 | 6,836 | 8,435 | **80,552** |
| **2020** | 9,649 | 9,167 | 8,556 | 6,425 | 6,741 | 4,059 | 3,621 | 3,723 | 4,040 | 4,953 | 5,377 | 7,585 | **73,896** |

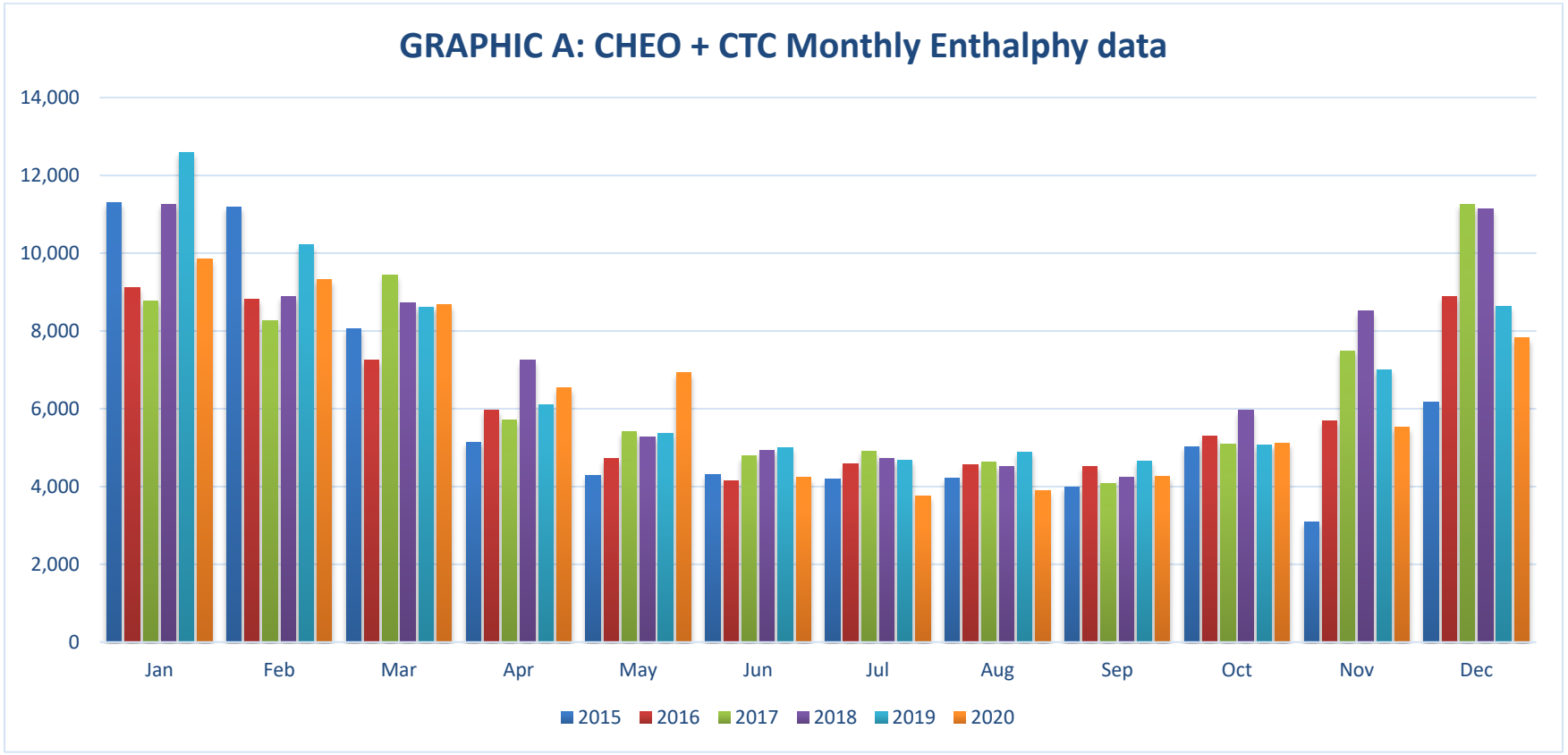
## CTC STEAM (GJ)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2015** | 533 | 472 | 439 | 234 | 58 | 28 | 6 | 3 | 37 | 220 | 290 | 416 | **2,736** |
| **2016** | 451 | 418 | 392 | 263 | 169 | 99 | 41 | 12 | 67 | 248 | 295 | 441 | **2,896** |
| **2017** | 457 | 425 | 435 | 291 | 153 | 61 | 311 | 32 | 73 | 194 | 296 | 406 | **3,134** |
| **2018** | 406 | 338 | 354 | 318 | 174 | 166 | 163 | 9 | 244 | 130 | 168 | 229 | **2,699** |
| **2019** | 275 | 198 | 177 | 166 | 194 | 177 | 146 | 184 | 206 | 145 | 171 | 204 | **2,243** |
| **2020** | 208 | 153 | 131 | 104 | 180 | 173 | 131 | 176 | 230 | 166 | 160 | 232 | **2,044** |

## Total Enthalpy CHEO + CTC

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2015** | 11,310 | 11,187 | 8,050 | 5,145 | 4,288 | 4,302 | 4,197 | 4,211 | 3,993 | 5,034 | 3,100 | 6,161 | **70,978** |
| **2016** | 9,116 | 8,823 | 7,251 | 5,959 | 4,711 | 4,140 | 4,579 | 4,553 | 4,512 | 5,307 | 5,693 | 8,883 | **73,527** |
| **2017** | 8,765 | 8,258 | 9,440 | 5,722 | 5,418 | 4,783 | 4,901 | 4,622 | 4,074 | 5,086 | 7,485 | 11,258 | **79,812** |
| **2018** | 11,258 | 8,892 | 8,730 | 7,242 | 5,268 | 4,929 | 4,729 | 4,508 | 4,236 | 5,957 | 8,514 | 11,137 | **85,400** |
| **2019** | 12,590 | 10,208 | 8,608 | 6,098 | 5,366 | 4,994 | 4,684 | 4,883 | 4,652 | 5,066 | 7,007 | 8,639 | **82,795** |
| **2020** | 9,857 | 9,320 | 8,687 | 6,529 | 6,921 | 4,232 | 3,752 | 3,899 | 4,270 | 5,119 | 5,537 | 7,817 | **75,940** |

## GRAPHIC A: CHEO + CTC MONTHLY ENTHALPY DATA



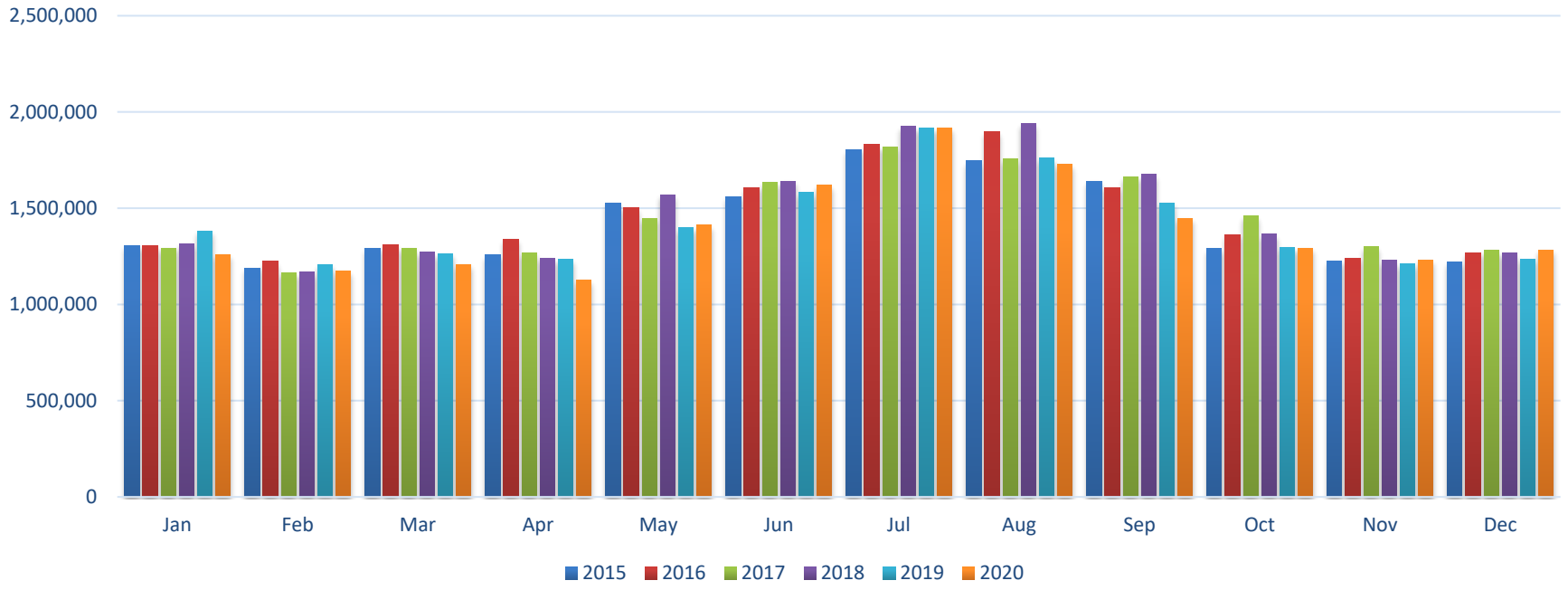
# APPENDIX B

Below is the electricity consumption data for CHEO and CTC for the period 2015 to 2020. Graphic B illustrates the totals consumption for CHEO+CTC.

## CHEO and CTC KWh

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2015** | 1,305,070 | 1,189,832 | 1,290,868 | 1,256,870 | 1,526,802 | 1,558,493 | 1,803,032 | 1,745,174 | 1,639,010 | 1,289,684 | 1,226,504 | 1,223,018 | **17,054,355** |
| **2016** | 1,306,435 | 1,223,205 | 1,310,778 | 1,339,360 | 1,504,414 | 1,605,800 | 1,830,419 | 1,896,675 | 1,605,885 | 1,362,568 | 1,240,758 | 1,266,170 | **17,492,467** |
| **2017** | 1,290,476 | 1,164,931 | 1,290,565 | 1,268,850 | 1,447,875 | 1,633,898 | 1,818,617 | 1,754,644 | 1,663,979 | 1,459,561 | 1,301,308 | 1,282,759 | **17,377,463** |
| **2018** | 1,315,060 | 1,167,000 | 1,270,760 | 1,240,135 | 1,570,262 | 1,638,895 | 1,925,108 | 1,941,630 | 1,674,817 | 1,364,541 | 1,228,627 | 1,266,565 | **17,603,400** |
| **2019** | 1,380,834 | 1,207,446 | 1,263,195 | 1,233,708 | 1,397,579 | 1,580,785 | 1,917,471 | 1,759,113 | 1,528,158 | 1,298,185 | 1,209,765 | 1,234,822 | **17,011,062** |
| **2020** | 1,258,834 | 1,173,575 | 1,208,571 | 1,126,796 | 1,411,528 | 1,619,810 | 1,916,517 | 1,727,171 | 1,447,964 | 1,291,425 | 1,230,514 | 1,281,559 | **16,694,264** |

## GRAPHIC B: CHEO AND CTC KWh



APPENDIX C- Below is the water usage data for all of CHEO buildings (or accounts).

| BLDG Name | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| CHEO 1 | January | 7,070 | 4,572 | 4,045 | 1,524 | 1,265 | 1,740 | 1,454 |
| | February | 6,080 | 4,165 | 3,809 | 1,346 | 1,319 | 1,938 | 1,690 |
| | March | 6,760 | 4,731 | 7,286 | 1,500 | 1,457 | 1,616 | 1,587 |
| | April | 9,150 | 3,896 | 4,236 | 1,398 | 1,560 | 850 | 1,978 |
| | May | 7,590 | 4,880 | 6,206 | 1,972 | 2,221 | 1,379 | 2,526 |
| | June | 8,447 | 6,162 | 7,039 | 2,496 | 4,133 | 6,378 | |
| | July | 6,242 | 7,326 | 7,187 | 3,933 | 6,096 | 5,462 | |
| | August | 6,001 | 6,419 | 7,848 | 4,586 | 5,906 | 7,569 | |
| | September | 6,103 | 6,243 | 3,799 | 2,725 | 5,055 | 6,463 | |
| | October | 4,954 | 4,790 | 2,801 | 2,931 | 3,526 | 5,911 | |
| | November | 4,628 | 4,560 | 2,038 | 1,688 | 2,983 | 3,457 | |
| | December | 4,306 | 4,086 | 1,667 | 1,338 | 2,184 | 2,586 | |
| Total | | 77,331 | 61,830 | 57,961 | 27,437 | 37,705 | 45,349 | 9,235 |

| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| Research I | January | 200 | 100 | 100 | 120 | 119 | 98 | 54 |
| | February | 100 | 100 | 100 | 142 | 125 | 119 | 60 |
| | March | 200 | 200 | 197 | 144 | 122 | 88 | 57 |
| | April | 100 | 100 | 98 | 131 | 122 | 34 | 64 |
| | May | 100 | 100 | 126 | 154 | 128 | 40 | 173 |
| | June | 200 | 200 | 119 | 129 | 126 | 98 | |
| | July | 100 | 100 | 156 | 122 | 116 | 57 | |
| | August | 200 | 100 | 115 | 131 | 107 | 52 | |
| | September | 100 | 100 | 115 | 85 | 126 | 57 | |
| | October | 100 | 200 | 122 | 162 | 114 | 80 | |
| | November | 200 | 100 | 125 | 136 | 129 | 70 | |
| | December | 100 | 100 | 114 | 110 | 101 | 98 | |
| Total | | 1,700 | 1,500 | 1,487 | 1,566 | 1,435 | 891 | 408 |

| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| CHEO 2 | January | 0 | 454 | 353 | 402 | 338 | 445 | 449 |
| | February | 370 | 348 | 318 | 361 | 293 | 430 | 445 |
| | March | 314 | 373 | 423 | 395 | 363 | 429 | 457 |
| | April | 356 | 300 | 312 | 382 | 498 | 456 | 492 |
| | May | 1,123 | 415 | 485 | 442 | 530 | 533 | 546 |
| | June | 501 | 568 | 590 | 544 | 657 | 1,534 | |
| | July | 735 | 655 | 741 | 386 | 985 | 1,068 | |
| | August | 759 | 885 | 912 | 428 | 1,105 | 1,216 | |
| | September | 840 | 764 | 764 | 389 | 971 | 1,004 | |
| | October | 648 | 648 | 653 | 973 | 782 | 791 | |
| | November | 458 | 500 | 453 | 397 | 600 | 639 | |
| | December | 411 | 370 | 2,100 | 315 | 534 | 531 | |
| Total | | 6,515 | 6,280 | 8,104 | 5,414 | 7,656 | 9,076 | 2,389 |

| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| Max Keeping Wing | January | 0 | 0 | 0 | 207 | 221 | 194 | 125 |
| | February | 0 | 0 | 0 | 199 | 227 | 238 | 158 |
| | March | 0 | 0 | 243 | 213 | 256 | 225 | 147 |
| | April | 0 | 0 | 202 | 214 | 257 | 99 | 158 |
| | May | 0 | 0 | 319 | 238 | 250 | 110 | 198 |
| | June | 0 | 0 | 334 | 256 | 240 | 266 | |
| | July | 0 | 0 | 275 | 469 | 212 | 126 | |
| | August | 0 | 0 | 246 | 450 | 200 | 114 | |
| | September | 0 | 0 | 250 | 306 | 240 | 135 | |
| | October | 0 | 0 | 237 | 472 | 240 | 145 | |
| | November | 0 | 0 | 227 | 246 | 252 | 149 | |
| | December | 0 | 0 | 205 | 208 | 206 | 146 | |
| Total | | 0 | 0 | 2,538 | 3,478 | 2,801 | 1,947 | 786 |

| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| Research II | January | 117 | 109 | 113 | 111 | 97 | 215 | 181 |
| | February | 112 | 119 | 141 | 107 | 101 | 197 | 193 |
| | March | 115 | 131 | 137 | 114 | 156 | 195 | 184 |
| | April | 104 | 111 | 119 | 108 | 134 | 147 | 189 |
| | May | 140 | 148 | 166 | 192 | 143 | 168 | 220 |
| | June | 195 | 199 | 192 | 367 | 168 | 418 | |
| | July | 198 | 181 | 187 | 474 | 502 | 279 | |
| | August | 146 | 194 | 198 | 414 | 646 | 334 | |
| | September | 162 | 186 | 151 | 269 | 527 | 291 | |
| | October | 132 | 125 | 156 | 377 | 328 | 232 | |
| | November | 112 | 128 | 135 | 126 | 205 | 213 | |
| | December | 105 | 119 | 106 | 98 | 205 | 196 | |
| Total | | 1,638 | 1,750 | 1,801 | 2,757 | 3,212 | 2,885 | 967 |

| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| Garry Cardiff Wing | January | 1,080 | 850 | 940 | 990 | 923 | 901 | 810 |
| | February | 975 | 865 | 835 | 880 | 1,010 | 974 | 819 |
| | March | 1,050 | 1,050 | 945 | 886 | 1,004 | 889 | 897 |
| | April | 1,180 | 875 | 863 | 921 | 899 | 706 | 1,106 |
| | May | 1,125 | 1,255 | 1,268 | 1,331 | 1,042 | 852 | 998 |
| | June | 1,405 | 1,585 | 1,470 | 1,961 | 1,542 | 2,440 | |
| | July | 1,670 | 1,580 | 1,584 | 2,227 | 1,753 | 1,386 | |
| | August | 1,545 | 1,980 | 1,809 | 2,032 | 2,133 | 1,659 | |
| | September | 1,545 | 1,610 | 1,535 | 1,403 | 1,482 | 1,030 | |
| | October | 1,055 | 1,045 | 1,387 | 1,828 | 1,014 | 766 | |
| | November | 815 | 960 | 968 | 832 | 886 | 678 | |
| | December | 815 | 1,010 | 883 | 754 | 1,120 | 271 | |
| Total | | 14,260 | 14,665 | 14,487 | 16,045 | 14,808 | 12,552 | 4,630 |

| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| | January | 0 | 0 | 0 | 0 | 0 | 3,570 | 3,418 |
| | February | 0 | 0 | 0 | 0 | 3,796 | 3,597 | 3,477 |
| | March | 0 | 0 | 0 | 0 | 3,770 | 3,558 | 3,461 |
| | April | 0 | 0 | 0 | 0 | 3,884 | 3,396 | 3,556 |
| | May | 0 | 0 | 0 | 0 | 3,997 | 3,593 | 3,645 |
| | June | 0 | 0 | 0 | 0 | 3,641 | 7,450 | |
| | July | 0 | 0 | 0 | 0 | 3,363 | 3,636 | |
| | August | 0 | 0 | 0 | 0 | 3,316 | 3,544 | |
| | September | 0 | 0 | 0 | 0 | 6,650 | 3,593 | |
| | October | 0 | 0 | 0 | 0 | 3,530 | 3,598 | |
| | November | 0 | 0 | 0 | 0 | 3,529 | 3,564 | |
| | December | 0 | 0 | 0 | 0 | 3,578 | 3,600 | |
| Total | | 0 | 0 | 0 | 0 | 43,054 | 46,699 | 17,557 |

| GRAND TOTAL | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|
| | **January** | 8,467 | 6,085 | 5,551 | 3,354 | 2,963 | 7,163 | 6,491 |
| | **February** | 7,637 | 5,597 | 5,203 | 3,035 | 6,871 | 7,493 | 6,842 |
| | **March** | 8,439 | 6,485 | 9,231 | 3,252 | 7,128 | 7,000 | 6,790 |
| | **April** | 10,890 | 5,282 | 5,830 | 3,154 | 7,354 | 5,688 | 7,543 |
| | **May** | 10,078 | 6,798 | 8,570 | 4,329 | 8,311 | 6,675 | 8,306 |
| | **June** | 10,748 | 8,714 | 9,744 | 5,753 | 10,507 | 18,584 | 0 |
| | **July** | 8,945 | 9,842 | 10,130 | 7,611 | 13,027 | 12,014 | 0 |
| | **August** | 8,651 | 9,578 | 11,128 | 8,041 | 13,413 | 14,488 | 0 |
| | **September** | 8,750 | 8,903 | 6,614 | 5,177 | 15,051 | 12,573 | 0 |
| | **October** | 6,889 | 6,808 | 5,356 | 6,743 | 9,534 | 11,523 | 0 |
| | **November** | 6,213 | 6,248 | 3,946 | 3,425 | 8,584 | 8,770 | 0 |
| | **December** | 5,737 | 5,685 | 5,075 | 2,823 | 7,928 | 7,428 | 0 |
| **Grand Total** | | 101,444 | 86,025 | 86,378 | 56,697 | 110,671 | 119,399 | 35,972 |