



**CONSERVATION AND DEMAND ENERGY  
MANAGEMENT PLAN  
CHILDREN'S HOSPITAL OF EASTERN ONTARIO  
July 2014**



**OUR MISSION**

*"We help kids and families be their healthiest"*

**OUR VISION**

*"Our care will change young lives in our community  
our innovation will change young lives around the world"*

## **A. EXECUTIVE SUMMARY**

The Conservation and Demand Energy Management Plan fulfils the reporting requirements of the Green Energy Act, Ontario Regulation 397/11 providing the Hospital with a framework to support continued energy and sustainability 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 Conservation and Demand Energy Management Plan 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, requiring all public agencies to prepare an Energy Conservation and Demand Management Plan.

The Energy Plan has two parts:

- A listing of the annual energy consumption and greenhouse gas emissions for each of the public agency's facilities. The first listing was submitted on July 1, 2013 for the 2011 calendar year, and is due annually thereafter.
- A description of previous, current and proposed measures for reducing the public agency's energy consumption and a forecast of expected results. The first plan is the one herein, due July 1, 2014, and is due every five years thereafter.

The overall goal of the Children's Hospital of Eastern Ontario 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 (CO<sub>2</sub>)

CHEO spends around \$3M per year on energy. Approximately half of that amount relates to thermal energy usage; steam and medium temperature hot water and the other half is for electricity.

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.

Address	Use	Square Footage	Number of Storeys	Built
CHEO Main building	Hospital	397,000	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		612,830		

### C. HISTORICAL ENERGY USE

#### Thermal Energy

CHEO does not operate its 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 2023 with options for ongoing negotiated renewals. Transalta have a contract with the Ontario Power Authority (OPA) to sell electrical energy from the plant into the Provincial grid.

(note: Transalta supply 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 and the Ottawa Children’s Treatment Centre)

Steam is primarily used for sterilization and humidification. Medium temperature hot water (MTHW) is used for building heating systems and domestic hot water production. Tables 1 to 3 show thermal energy consumption (GJ) for the period 2011 to 2013. Approximately 70% of thermal energy usage is MTHW and 30% Steam usage.

#### Electrical

Electricity is purchased at high voltage from Ottawa Hydro. Consumption patterns and totals for the period 2011 to 2013 are shown in table 4 below.

#### Totals

Year	Thermal (GJ)	MJ/ft2	Electrical (kWh)	kWh/ft2
2011	63,775	104.1	17,569,391	28.7
2012	62,506	102.0	17,476,627	28.5
2013	66,316	108.2	17,126,758	27.9

Thermal energy consumption has remained fairly constant. The consumption data are however not weather compensated using degree day information. The severe winter of 2013 in the Ottawa region would undoubtedly account for some of the increased thermal load.

Electrical energy consumption is showing a downward trend which is in part due to the implementation of an Ottawa Hydro incentivized lighting retrofit program of fluorescent fixtures to T8 lamp/ballast combinations and halogen accent/spotlighting to LED replacements. This work is ongoing and is expected to yield additional year-on-year savings.

#### **D. ENERGY CONSERVATION PLAN**

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

- Baseline Energy Performance
- Setting targets benchmarked against peer organizations and current baseline
- 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<sup>2</sup>) 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 graphs on pages 6-8.

##### **Setting Targets for the Future:**

CHEO will establish the following targets:

- Reducing the facility thermal energy profile below the 3 year average for 2011 to 2013 of 104.8MJ/ft<sup>2</sup>
- Reducing the facility electrical energy profile below the 2013 benchmark of 27.9kWh/ft<sup>2</sup>
- Endeavouring to become one of the leading performers in energy efficiency in Pediatric healthcare in the province

##### **Identifying Potential Conservation Opportunities:**

Identifying conservation opportunities will 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.

- 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 c1974 building has been completed. All the newer building additions are fully DDC such that overall approximately 57% of the facility has DDC controls. Increasing penetration of DDC into the older HVAC systems will be a priority for the hospital.
- As a 24/7 operation the energy efficiency of the building envelope is a key component in controlling energy costs. Unlike commercial and institutional buildings, which have opportunities for night setback and weekend programming to conserve energy, hospitals have to maintain comfort conditions round-the-clock. The integrity and thermal efficiency of the 1974 building envelope is therefore a prime factor in energy usage. An engineering study of the overall building envelope (often referred to as a 'deep' energy retrofit program) is required.

### **Implementing Improvement Measures:**

Projects planned and approved for 2014/15 include:

- 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 will include 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)
- Continuing with the very successful Ottawa Hydro incentivized replacement of T12 lamps/ballasts with T8 fixtures.
- Replacement of a high energy use c1997 Magnetic Resonance Imaging (MRI) diagnostic machine which has an anticipated electrical energy saving of 10-15%
- Undertaking a long range Master Plan for the CHEO site over a 5 to 15 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)

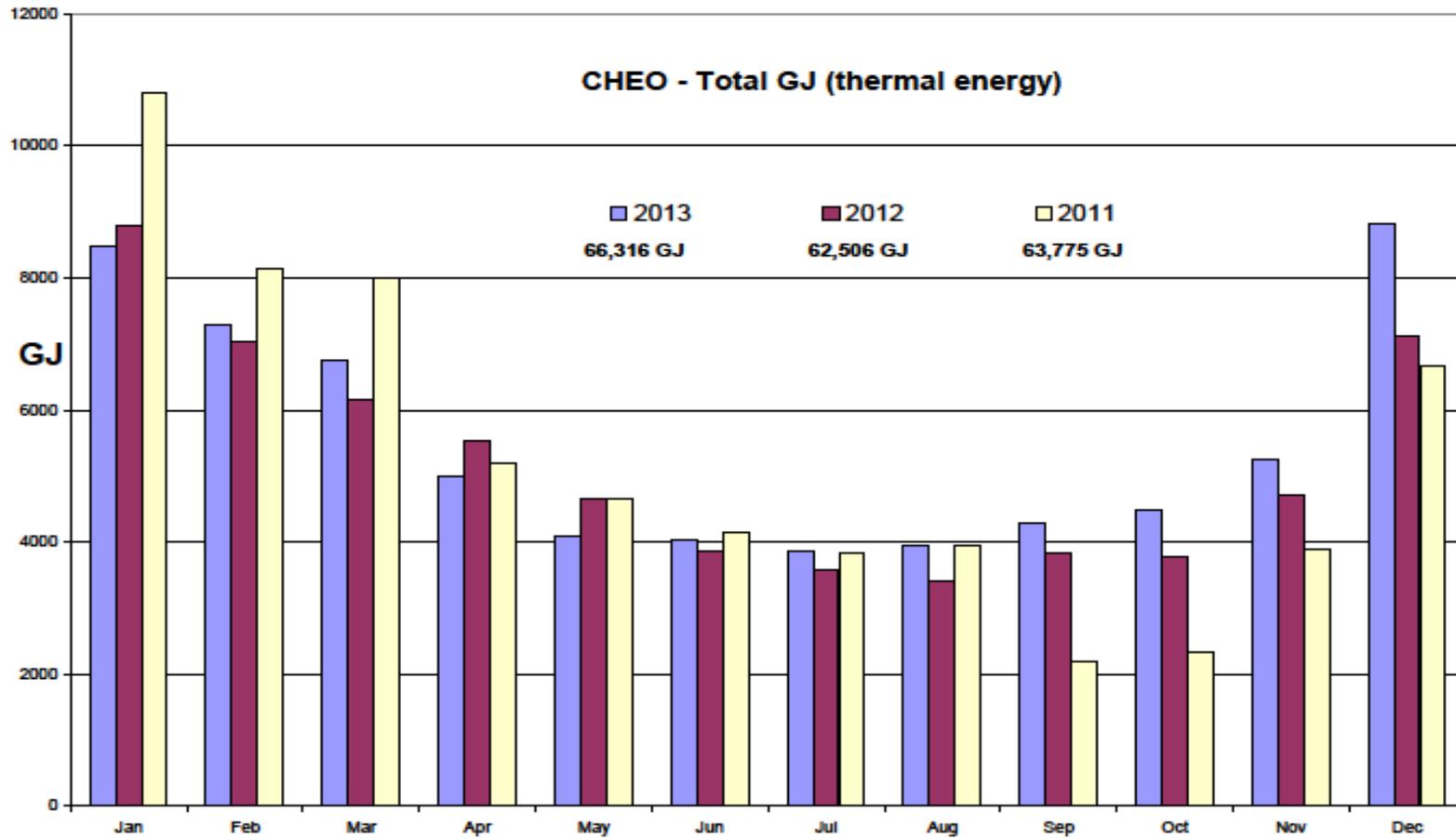
**Evaluating the Plan and Measuring Results:**

CHEO will provide the Energy and Greenhouse Gas Emissions Template required to be submitted by July 1st. For the first Conservation and Demand Energy Plan this will be the template submitted July 2019 with the 2017 results.

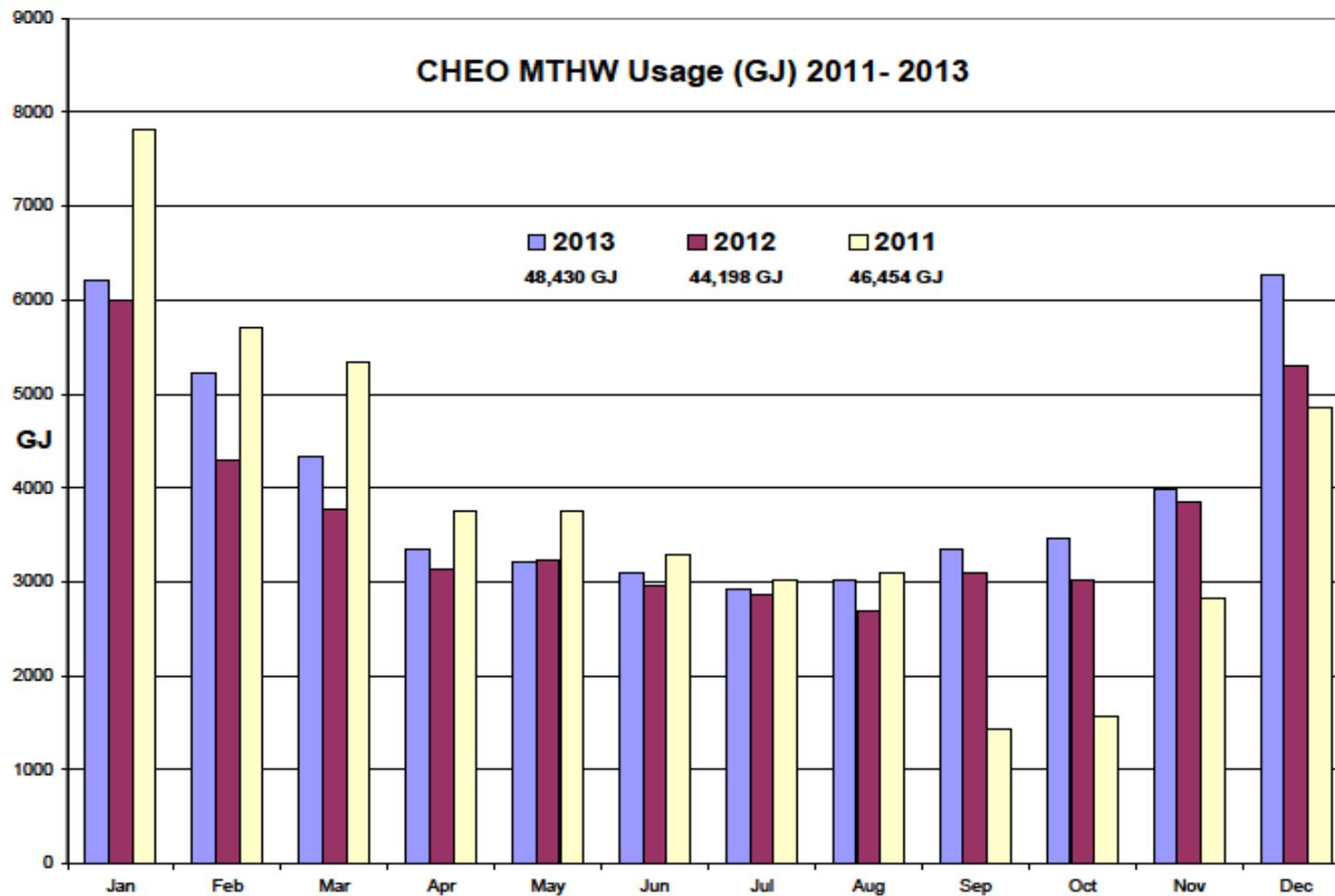
Additionally CHEO will report on:

- 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

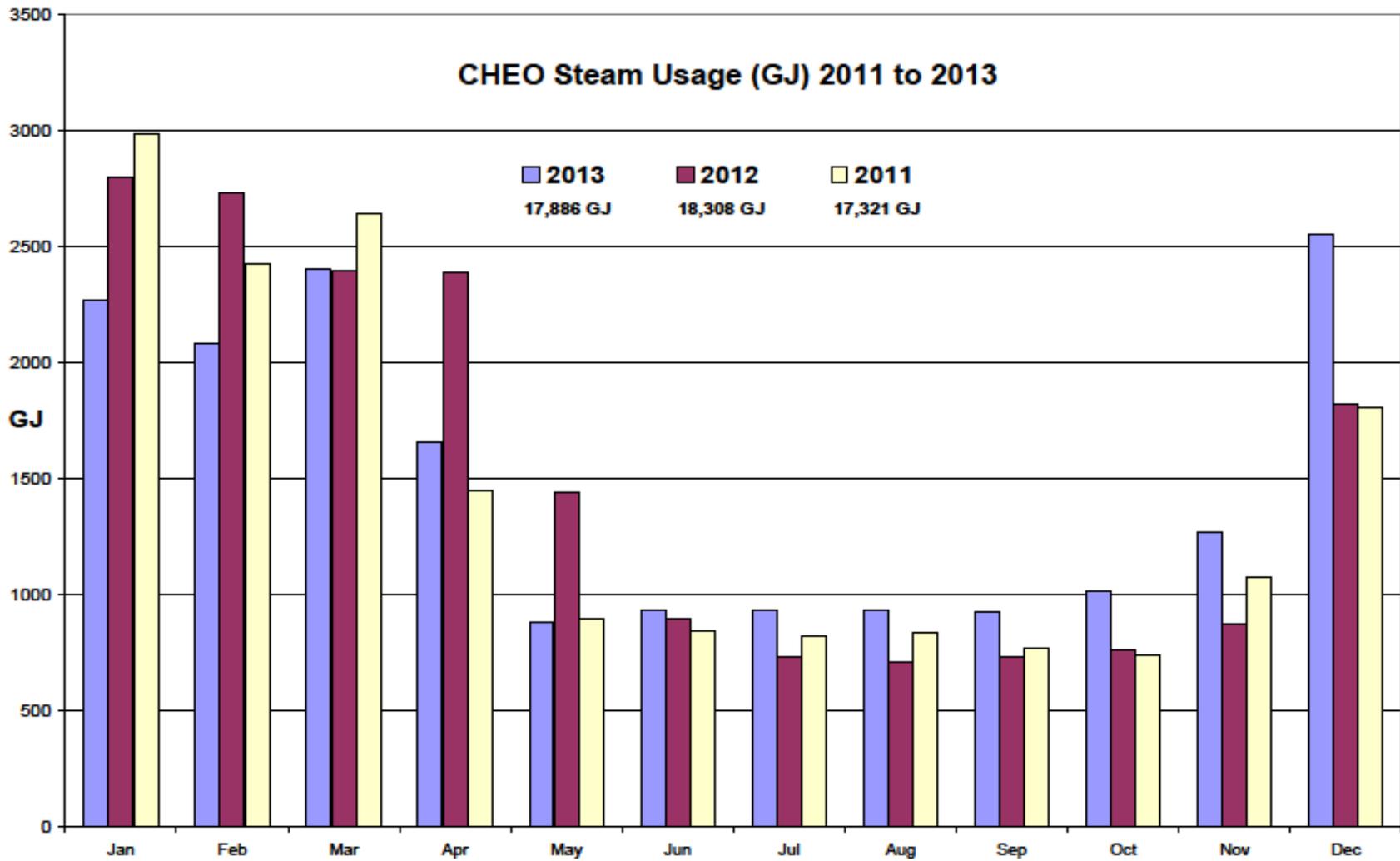
CHEO is committed to ensure the “Plan” continues to evolve and improve over the next five years. The Master Planning exercise to be undertaken in 2014/15 will provide the needed foundation to plan all “buildings” for the future and their related energy consumption.



**Table 1: CHEO Total Thermal Energy usage 2011 to 2013 (GJ)**



**Table 2: CHEO Total MTHW usage 2011 to 2013 (GJ)**



**Table 3: CHEO Total Steam usage 2011 to 2013 (GJ)**

CHEO - electricity consumption

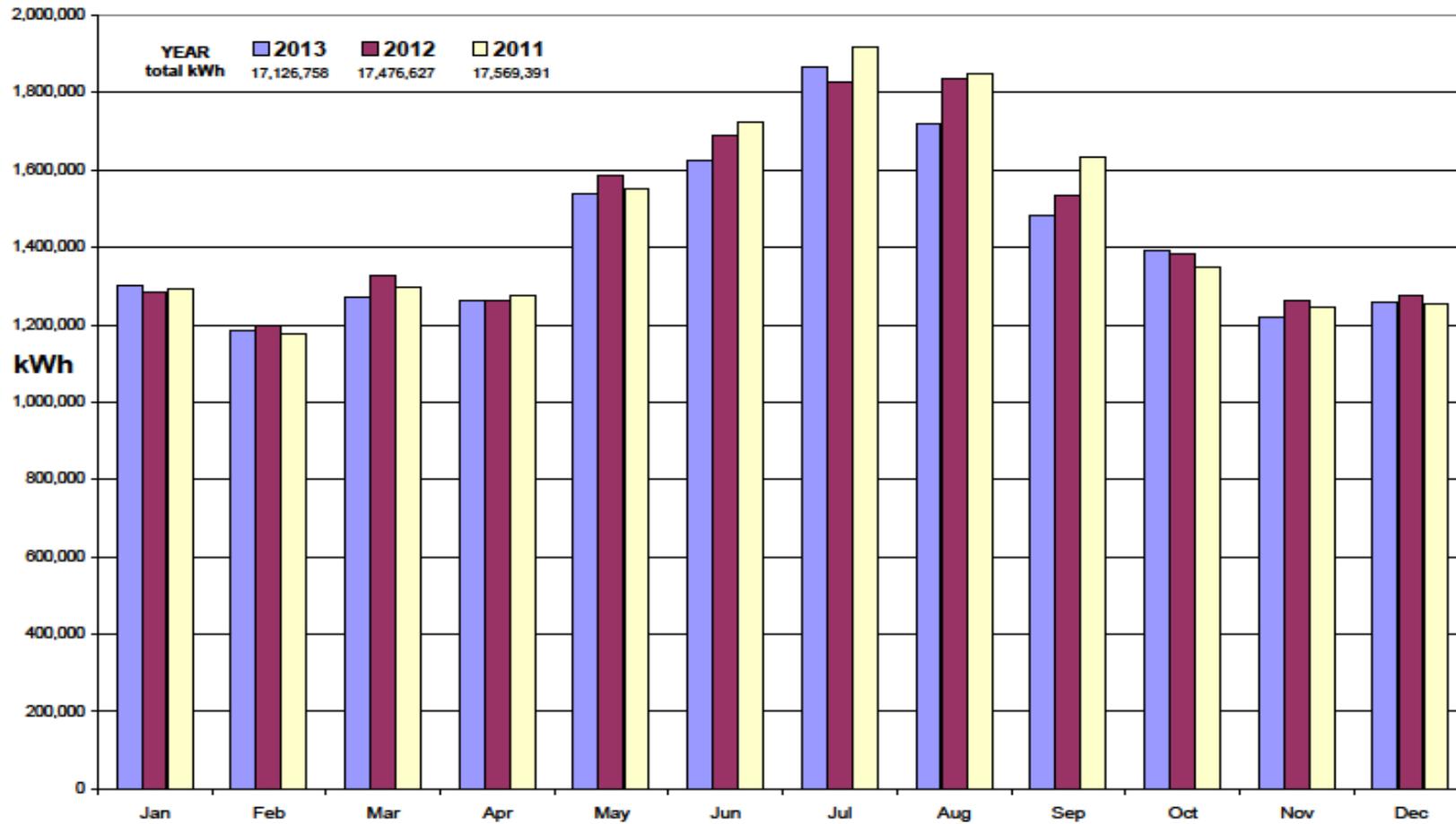


Table 4: CHEO Total Electricity usage 2011 to 2013 (kWh)