Town of Newmarket
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2019 Energy Conservation and Demand Management Plan

Information Report to Council

Report Number: 2019 -14

Department(s): Public Works Services, Corporate Communications

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Date: December 17, 2019

In accordance with the Procedure By-law, any member of Council may make a request to the Town Clerk that this Report be placed on an upcoming Committee of the Whole agenda for discussion.

Purpose

The purpose of the Town of Newmarket's Energy Conservation and Demand Management Plan is to develop a framework for Newmarket to understand the historical impact of its operations on greenhouse gas (GHG) emissions, and to take action by setting GHG reduction targets.

Background

The Town entered into an RFP evaluation for consulting services to develop a Five Year Conservation and Demand Management Plan.

Efficiency Engineering was the successful proponent after submitting a bid proposal to provide a five-year Conservation and Demand Management Plan.

Efficiency Engineering developed an energy Conservation and Demand Management Plan to address the facets of energy consumption in twelve of the town's municipal buildings. Internal audits were completed on the buildings to establish a benchmark for a building's existing energy intensity performance relative to other similar buildings, identifying potential energy efficiency projects and establishing a GHG emissions reduction target.

Discussion

The CDM Plan looks at what we have done, where we are going and what we plan to do to better manage energy consumption in our buildings.

The CDM Plan involves establishing a baseline for performance to be measured against. It sets future performance goals and objectives and involves continuous improvement through identification of energy conservation potential.

Energy savings can be realized by:

1. Turning off lights and appliances
2. Shutting off heaters in the summer
3. Establishing efficient usage times
4. Establishing efficient production requirements

These actions coupled with energy efficient capital and operating process improvements through project implementation are key components in addressing energy consumption in town municipal buildings.

An Energy and Conservation Demand Management Plan is the sum of measures planned and carried out to achieve the objective of using the least possible energy while maintaining comfort levels. Actions for efficient use of energy are focused on energy conservation, energy recovery, energy substitution, and corporate goals and objectives.

Energy audits were conducted on twelve Town municipal buildings. The audits provided energy profiles for each of the selected buildings identifying energy consumption amounts, measures already implemented to reduce energy usage, and recommended energy reduction measures for the buildings moving forward. The Town has the potential to realize an energy reduction of 15.6% and a GHG emission reduction of 15.4% over the next five years.

The Conservation and Demand Management Five-Year Plan report will be posted on the Town's website for public viewing.

Conclusion

Effectively managing energy requires implementing appropriate energy monitoring procedures. Newmarket is well positioned to meet Ontario Regulation 507/18 for all public sector agencies to comply with mandatory reporting requirements and submitting a five-year CDM Plan with the completed energy audits.

Business Plan and Strategic Plan Linkages

The Conservation and Demand Management Plan addresses Council's strategic priority of maintaining long term financial sustainability and reducing energy costs. Having a CDM Plan is important to the Town's image to show it has a plan in place to efficiently manage the energy consumption of its buildings.

Consultation

Efficiency Engineering met with the town's CDM plan representatives to give an overview of their findings and recommendations. The CDM Plan was distributed and reviewed with representatives from Central York Fire, Newmarket Library and the Town Offices.

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Human Resource Considerations

There are no human resource considerations.

Budget Impact

There are capital and operating costs associated in meeting and reducing future energy costs of town municipal buildings. Staff will bring forward any recommended projects and programs through future draft budget submissions for Council's consideration.

Attachments

2019 Five-Year CDM Plan

Contact

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Approval

Harry VanWensem, Manager, Facility Services, Public Works Services, Development & Infrastructure Services Department

Chris Kalimootoo, Director, Public Works Services, Development & Infrastructure Services Department

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Conservation & Demand Management Plan

Town of Newmarket

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1 Introduction

The Ontario Provincial Government has committed to helping public agencies better understand and manage their energy consumption. As part of this commitment, Ontario Regulation 507/18 requires public agencies, including municipalities, municipal service boards, school boards, universities, colleges and hospitals to report on their energy consumption and greenhouse gas (GHG) emissions annually beginning in 2013, to develop and implement energy Conservation and Demand Management (CDM) Plans starting in 2014, and to update these plans every five years.

The purpose of the Town of Newmarket Energy Conservation and Demand Management Plan is to develop a framework for Newmarket to understand the historical impact of its operations on greenhouse gas (GHG) emissions, and to take action by setting GHG reduction targets. The first objective of this report is the development of an energy Conservation and Demand Management Plan that addressed the facets of energy consumption in the town's municipal buildings. This includes the development of a GHG emissions inventory, benchmarking the building's existing energy intensity performance relative to other similar buildings, identifying potential energy efficiency projects, and establishing a GHG emissions reduction target.

Energy efficiency and conservation are two of the lowest cost options for meeting energy demands, while providing many other environmental, economic and social benefits, including reducing greenhouse gas (GHG) emissions, cost avoidance and savings. Along with the aforementioned benefits, energy efficiencies and conservation also promote local economic development opportunities, energy system reliability, improved energy supply security, and reduced-price volatility.

There are a variety of low cost/no cost initiatives available to Newmarket's municipal buildings, which can jump-start energy consumption and dollar savings. Simple actions such as turning lights and appliances off, shutting off heaters in the summer, establishing efficient usage times, efficient production requirements, and many other actions can result in energy savings. Such actions, along with energy efficient capital and operating process improvements and project implementation, are key components which are outlined within the energy Conservation and Demand Management Plan (CDM Plan).

This CDM Plan is the culmination of a non-linear process involving the:

- Integration of establishing a baseline for performance to be measured against,
- Setting of future performance goals and objectives,
- Continuous improvement through identification of energy conservation potential,
- Strategic alignment of measure implementation and fiscal constraints, and evaluation, measurement and communication of results achieved.

This CDM Plan contains three perspectives: historical, current and future. It looks at "what we have done", "what we are doing", and "what are we planning to do".

2 Conservation & Demand Management Plan Overview

2.1 The Big Picture

Sustainability is a concept which meets the needs of the present without compromising the ability of future generations to meet their own needs. This is sometimes referred to as the "triple bottom line".

ENVIRONMENTAL SUSTAINABILITY:
MANAGING THE EFFECTS OF HUMAN ACTIVITY SO THAT IT DOES NOT PERMANENTLY HARM THE NATURAL ENVIRONMENT.

ECONOMIC SUSTAINABILITY:
MANAGING THE FINANCIAL TRANSACTIONS ASSOCIATED WITH HUMAN ACTIVITIES SO THAT THEY CAN BE SUSTAINED OVER THE LONG TERM WITHOUT INCURRING UNACCEPTABLE HUMAN.

SOCIAL/CULTURAL SUSTAINABILITY:
ALLOWING HUMAN ACTIVITY TO PROCEED IN SUCH A WAY THAT SOCIAL RELATIONSHIPS BETWEEN PEOPLE AND THE MANY DIFFERENT CULTURES AROUND THE WORLD ARE NOT ADVERSELY AFFECTED OR IRREVERSIBLY DEGRADED.

An Energy Conservation and Demand Management Plan is the sum of measures planned and carried out to achieve the objective of using the minimal possible energy while maintaining the comfort levels (in offices or dwellings) and production rates (in factories). It can be applied to any process or building where energy use is required. To make an efficient use of the energy and, as a consequence, to save it, the actions are focused on:

- Energy Conservation,
- Energy Recovery,
- Energy Substitution,
- Corporate Goals and Objectives, and
- Corporate Fiscal Management.

2.2 Analysis and Benchmarking

It is important to recognize the value of benchmarking and comparison as a starting point. By examining a building's current energy consumption patterns and comparing them with others, a better understanding of the opportunities and the pitfalls of energy conservation and sustainability planning as experienced by other public agencies is gained. This exposure, combined with the information gleaned from the energy audits, will allow Newmarket to focus on strategies that have been proven successful elsewhere and can be tailored to the unique nature of each building.

It is apparent that energy conservation is being considered and implemented in most Public Sectors across Ontario and Canada. As well, the insights gained through their experiences with energy conservation can be used as a springboard to further Newmarket's sustainability strategies to encompass both operational and policy improvements. Many public agencies are taking their understanding of environmental issues and conservation beyond energy consumption and recycling, by addressing the more complex issues of water management, heat island effect, and light pollution, to name a few.

2.3 Regulatory Requirements

Under Ontario Regulation 507/18, all public sector agencies must comply with mandatory reporting requirements. As of 2013, all energy consumption at the town's facilities had to have been recorded and submitted to the Ministry annually. As of 2014, all public sector buildings had to have submitted a 5-Year CDM Plan which encompassed measures taken to date with results, as well as a five-year plan for further energy conservation measures to be implemented. For 2019, a new 5-Year CDM Plan must be undertaken.

Newmarket is well positioned to meet this requirement as energy audits were completed at most facilities in the first half of 2019. These audits have resulted in a compiled list of energy reduction projects. This update to the CDM Report reflects the potential impacts of these measures on the building's energy usage. This report serves as Newmarket's CDM Plan and will help assist the town to meet all of its mandatory reporting requirements.

2.4 Key Factors and Constraints

It is important to both Newmarket's future and to its image in the public at large to understand the value of a comprehensive CDM Plan. Many people around the world are beginning to embrace the notion that the earth's environment and precious resources need to be conserved. However, the necessary changes will not happen overnight. To be successful, a comprehensive energy management plan should embrace long-term thinking, taking advantage of "low hanging fruit" to achieve immediate cost savings which will be redirected to more complex projects involving higher initial costs with larger net benefits.

Public agencies should realize that each of their circumstances are unique and may not lend themselves to 'boiler plate' solutions used in many private sector segments. Those who have met their goals have utilized the advantages of the unique physical and non-physical attributes of their facilities, including green power generation on large flat roofs and community gardens on their large properties. While it is easy to be focused on the larger solutions, even seemingly small efforts can make a major long-term impact on the overall goal. A good example of this is Energy Awareness training which encourages Staff to take simple and effective actions such as turning off lights and computers when not in use.

Ongoing professional development is also a key factor in the success of a CDM Plan to ensure that Staff Members understand their role within the greater goal. The CDM Plan and accompanying education should be a required part of their daily activities.

While realities of budget restrictions are an important consideration in any planning activity, it is possible to achieve energy savings while adhering to the financial constraints of a publicly-funded system. It is clear that new technology and ideology changes have produced continued operational cost reductions while improving indoor comfort and environmental sustainability. These cost saving projects can often fund themselves by avoiding the use of previously allocated funds. As long as the savings are reinvested, these improvements can continue for the foreseeable future, ensuring a sustainable process.

3 Energy Baseline and Current Energy Performance

Effectively managing energy requires implementing appropriate energy monitoring procedures. The establishment of an accurate energy baseline is essential in this process. It will assist with setting energy conservation and greenhouse gas reduction targets, energy procurement and budgeting, utility bill verification, energy awareness, and the selection and assessment of potential energy projects.

In 2018, the Town of Newmarket completed a strategic detailed energy audit project. The audits include a detailed analysis of historical consumption and demand information as well as a thorough site survey of the facilities by qualified energy auditors. Based on the auditors' surveys, a detailed equipment list and an energy consumption breakdown was created, as well as a comprehensive list of potential energy conservation measures for each facility.

This list of energy conservation measures is reviewed and prioritized on an ongoing basis. This allows a comprehensive strategy to be employed to select conservation measures which are most appropriate for implementation. The overall strategy incorporates energy cost reductions, greenhouse gas reductions, the need for capital or equipment renewal and annual budgets. This Plan will be updated to reflect both the scope of each measure as well as its impact on each building's energy consumption.

Energy performance of each building is highlighted in the following sections as the energy utilization index (EUI). The EUI is a means of comparing the energy performance of similar buildings (or buildings within a portfolio). This is done by converting the energy consumption of the building to a common unit (either kWh or gigajoules (GJ)) and dividing it by the floor area. A lower EUI indicates a better performing building. The tables below show both imperial (ekWh/ft^2) and metric (GJ/m^2) EUI values.

3.1 Baseline Performance (2013)

The baseline data used for this analysis is based off of utility data from 2013. Based on this information, the baseline energy performance may be represented by a normalization analysis.

Building Name	Area (ft^2)	Electricity (kWh)	Natural Gas (m^3)	GHG Emissions (kg)	EUI (ekWh/ft^2)	EUI (GJ/m^2)
Town Hall	80,316	1,263,951	92,047	237,995	27.6	1.07
Operations Centre	65,000	812,814	133,662	294,465	33.7	1.31
Youth Centre	20,700	224,572	54,123	114,008	37.8	1.47
Community Centre	62,540	95,122	22,013	46,559	5.2	0.20
Ray Twinney Complex	123,437	2,707,633	491,469	1,068,681	63.0	2.44
Magna Centre	216,000	7,653,494	458,916	1,254,156	57.4	2.22
Old Town Hall[1]	12,862	N/A	N/A	N/A	N/A	N/A
Senior's Meeting Place	15,200	193,358	18,281	44,384	25.1	0.97
Public Library	35,000	537,729	36,552	96,299	26.1	1.01
Fire Station 4-1	10,416	216,185	16,018	41,227	36.6	1.42
Fire Station 4-2	12,201	408,970	11,379	42,057	43.1	1.67
Fire Training Centre	53,334	60,679	20,207	41,407	5.0	0.20
Totals	**707,006**	**14,174,508**	**1,354,667**	**3,281,238**	**39.8**	**1.54**

[1]Old Town Hall was not documented in 2013 as the building was closed for major renovations.

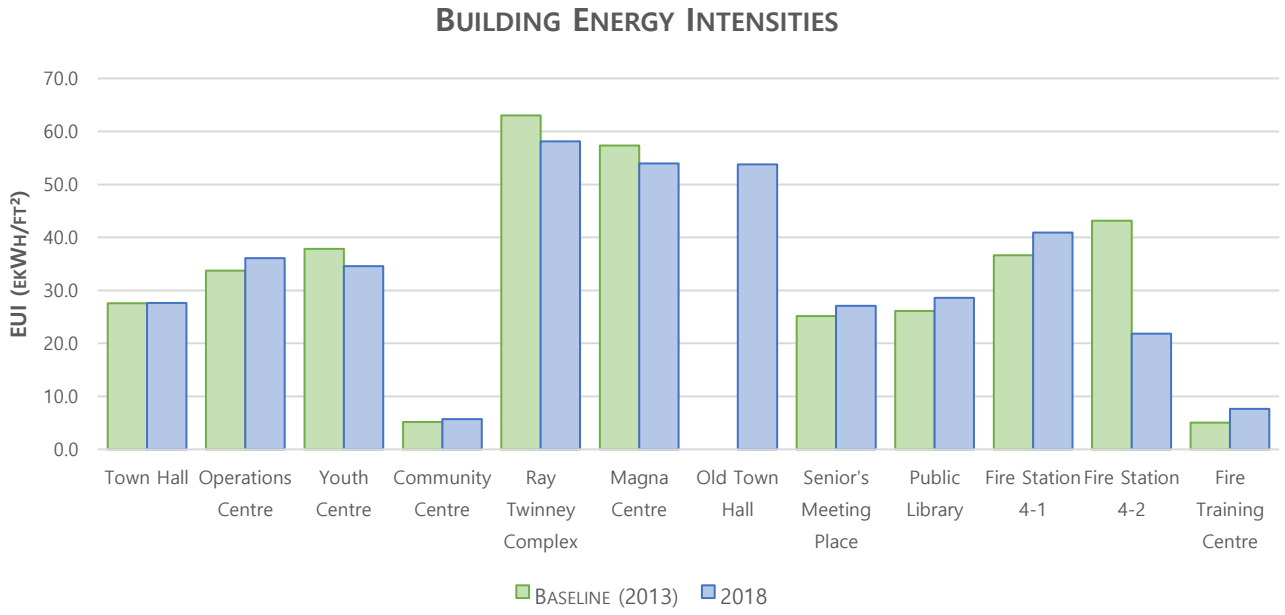
3.2 Current Reporting Period (2018)

It is imperative to understand the energy characteristics of each facility. By understanding these values, baselines can be established and future retrofits and improvements to the buildings can be monitored and tracked to ensure that the intended benefits are fully realized. Energy consumption for the 2018 reporting period has been compiled. This inventory took into account the electricity and natural gas consumption of all of the applicable Newmarket municipal facilities. This data is taken directly from the local distribution company (LDC) and has not been weather normalized.

Building Name	Area (ft^2)	Electricity (kWh)	Natural Gas (m^3)	GHG Emissions (kg)	EUI ($ekWh/ft^2$)	EUI (GJ/m^2)
Town Hall[1]	80,316	1,063,548	112,095	266,046	27.6	1.07
Operations Centre	65,000	848,491	144,888	317,567	36.1	1.40
Youth Centre	20,700	217,732	48,286	102,582	34.6	1.34
Community Centre	62,540	86,395	26,115	53,912	5.7	0.22
Ray Twinney Complex	123,437	2,763,440	427,552	950,093	58.1	2.25
Magna Centre	216,000	6,986,928	452,752	1,209,122	54.0	2.09
Old Town Hall	12,862	234,988	44,250	95,780	53.8	2.08
Senior's Meeting Place	15,200	167,995	23,613	53,241	27.1	1.05
Public Library[1]	35,000	557,793	42,874	109,307	28.6	1.11
Fire Station 4-1[1]	10,416	201,901	21,720	51,341	40.9	1.59
Fire Station 4-2[1]	12,201	96,702	16,421	36,019	21.8	0.85
Fire Training Centre[1]	53,334	78,415	31,766	64,244	7.6	0.30
Totals	**707,006**	**13,304,328**	**1,392,332**	**3,309,255**	**39.1**	**1.52**

[1]2018 electricity data was not available for these buildings. 2017 electricity data was used in place.

The following chart shows how energy consumption for each building has changed between the baseline period and the current reporting period.



4 Newmarket Building Energy Profiles

The following section summarizes the findings in the energy audit reports. The energy audit reports provide more detail about each prospective energy efficiency measure. The executive summaries from each building's audit reports can be found in Appendix B.

4.1 Newmarket Town Hall

Newmarket Town Hall, or the Municipal Offices, provides the residents of Newmarket with many services including licensing and permits, by-law inquires, parking enforcement, etc.

Address:	395 Mulock Dr., Newmarket, ON L3Y 4X7
Building Type:	Administrative Offices
Floor Area:	80,316 ft²
Operational Hours:	M-F: 8:30AM to 4:30PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Town Hall	1,063,548	112,095	266,046	27.6	1.07

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- A high efficiency, water-source heat pump loop for heating and cooling
- Supplement heating with high-efficiency lead vertical coil tube boiler
- Recovery of heat from exhaust air streams to pre-heat supply air streams via heat recovery ventilators
- Waterless urinals
- LED lighting in the main lobby and the exterior parkade.
- Building automation controls

The following table highlights planned energy reduction measures for Town Hall moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Upgrade to LED Retrofit Lamps	17	52,978	0	0	2,649
Upgrade to LED Fixtures	16	46,254	0	0	2,313
Install Lighting Controls	0	5,704	0	0	285
Install VFD on Air Handling Unit	0	102,249	12,001	0	27,902
Totals	**33**	**207,185**	**12,001**	**0**	**33,149**

4.2 Robert N. Shelton Operations Centre

Newmarket Operations Centre provides the residents of Newmarket with garbage tags, blue and green bins, composters, etc. It also stores the town's fleet of vehicles, equipment, and grows the vegetation that is planted through the municipality. This facility was constructed in 2010 and is certified LEED Silver.

Address:	1275 Maple Hill Ct. Newmarket, ON L3Y 9E8
Building Type:	Vehicle/Equipment Storage
Floor Area:	65,000 ft²
Operational Hours:	M-F: 7:30AM to 4:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Operations Centre	848,491	144,888	317,567	36.1	1.40

As a LEED silver building, energy efficiency was at the forefront of its design. There are a wide variety of initiatives that were incorporated into its design to help reduce energy consumption including the following:

- A high efficiency, ground-source heat pump loop for heating and cooling.
- A solar thermal system for preheating domestic hot water.
- A condensing boiler for supplemental domestic hot water heating.
- Low-wattage T5 lighting throughout most of the facility
- A green roof
- A solar photovoltaic system
- Building automation controls

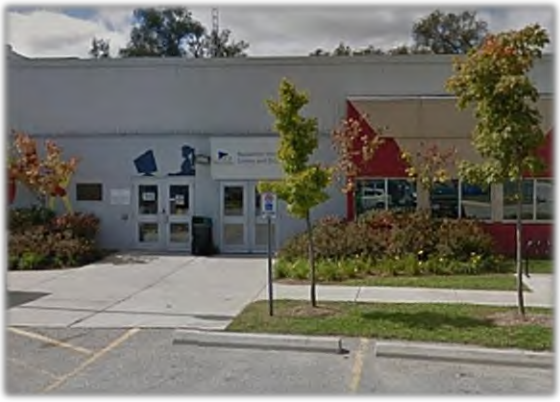
Solar Thermal System

The following table highlights planned energy reduction measures for the Operations Centre moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	CO_2e (kg)
Set Heat Pumps to Auto	0	3,000	0	0	150
Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	200	70	380
Install Vending Machine Controls	0	2,000	0	0	100
Control Unit Heaters in Truck Bay with BAS	0	0	12,000	0	22,788
Upgrade to LED Lighting	180	89,000	0	0	4,450
Totals	**180**	**94,000**	**12,200**	**70**	**27,868**

4.3 Recreation Youth Centre & Sk8 Park

The Youth Centre is a recreation centre that offers a skate park, gymnasium for sports, and a variety of games such as pool and air hockey.



Address:	56 Charles St., Newmarket, ON L3Y 3V8
Building Type:	Recreation Centre
Floor Area:	20,700 ft²
Operational Hours:	M-W: 4:00PM to 9:00PM Th, F: 4:00PM to 10:00PM Sat: 9:00AM to 2:00PM, 4:00PM to 9:00PM Sun: 9:00AM to 2:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Youth Centre	217,732	48,286	102,582	34.6	1.34

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- High efficiency rooftop units
- High efficiency heat pumps for the offices
- Exterior LED lighting

The following table highlights planned energy reduction measures for the Youth Centre moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Install Vending Machine Controls	0	2,871	0	0	144
Install Ultra-Low Flow Faucet Aerators in Washrooms	0	1,286	0	47	64
Upgrade Interior Fixtures to LED	87	49,577	0	0	2,479
Install Lighting Controls	0	4,958	0	0	248
Add Electric Baseboard Heaters to BAS	0	3,490	0	0	174
Implement Demand Control Ventilation on RTUs	0	2,895	7,477	0	14,343
Install Instantaneous Hot Water Heater	0	797	0	0	40
Totals	**87**	**65,874**	**7,477**	**47**	**17,492**

4.4 Newmarket Community Centre & Lions Hall

The Community Centre is a banquet hall that can be rented out for social functions such as parties or meetings. There is also an outdoor fountain that converts to an ice rink during the winter months.

Address:	200 Doug Duncan Dr., Newmarket, ON L3Y 3Y9
Building Type:	Cultural Facility
Floor Area:	62,500 ft²
Operational Hours:	M-F: 9:00AM to 5:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Community Centre	86,395	26,115	53,912	5.7	0.22

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- An instantaneous domestic hot water heater
- LED lighting pot lights
- High efficiency rooftop units for heating and cooling
- Building automation controls

The following table highlights planned energy reduction measures for the Community Centre moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	290	98	551
Install Vending Machine Controls	0	1,908	0	0	95
Upgrade Interior Fixtures to LED	0	17,502	0	0	875
Install Lighting Controls	0	3,500	0	0	175
Upgrade Exterior Fixtures to LED	0	1,911	0	0	96
Install VFD on Cooling Tower Fan	0	7,117	0	0	356
Totals	**0**	**31,938**	**290**	**98**	**2,148**

4.5 Ray Twinney Recreation Complex

Ray Twinney is a recreation centre containing a two-pad arena and natatorium. The natatorium houses a lap pool as well as a tot pool and a hot tub. The pool operates all year while the rinks operate between September and May.

Address:	200 Doug Duncan Dr., Newmarket, ON L3Y 3Y9
Building Type:	Cultural Facility
Floor Area:	123,437 ft²
Operational Hours:	M: 5:30AM to 8:00PM Tu-Th: 5:30AM to 7:00PM F: 5:30AM to 10:00PM Sat, Sun: 7:00AM to 4:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Ray Twinney	2,763,440	427,552	950,093	58.1	2.25

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- High efficiency dehumidification units for the ice rinks
- Low-e ceiling in Rink 2
- Lower flood water temperature to 130°F
- Heat recovery system for the pool ventilation

The following table highlights planned energy reduction measures for Ray Twinney moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Reduce Flood Water Temperature to 120°F	0	4,811	2,429	0	4,853
Install Low-Flow Shower Heads in Changerooms	0	0	17,417	3,105	33,075
Install Ultra-Low Flow Faucet Aerators	0	0	162	324	308
Install Liquid Pool Cover	0	18,264	4,031	0	8,568
Install Pool Make-Up Water Controllers	0	0	4,791	3,575	9,097
Upgrade to LED Retrofit Lamps	14	58,698	0	0	2,935
Upgrade to LED Fixtures	43	182,050	0	0	9,103
Install Lighting Controls	0	3,817	0	0	191
Implement Floating Head Pressure Controls	0	81,103	0	0	4,055
Install Low-E Ceiling for Arena 1	0	81,788	0	0	4,089
Implement Grey Water Flooding	0	0	0	1,632	0
Install VFDs on Filter Pumps	0	60,052	0	0	3,003
Implement Cold Water Flooding	0	14,428	7,286	0	14,558
Totals	**57**	**505,010**	**36,115**	**8,636**	**93,834**

4.6 Magna Centre

Magna Centre is a recreation centre containing an Olympic- sized rink and three NHL-sized rinks. Two rinks operate year-round. The others operate between September and May. Magna Centre also contains a natatorium which houses a large lap pool as well as a shallow leisure pool, both of which operate year-round. Other amenities include a gymnasium, a running track, and a fitness studio.

Address:	800 Mulock Dr., Newmarket, ON L3Y 3Y9
Building Type:	Recreation Centre
Floor Area:	216,000 ft²
Operational Hours:	M-F: 6:00AM to 10:00PM Sat, Sun: 7:00AM to 9:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Magna Centre	6,986,928	452,752	1,209,122	54.0	2.09

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- LED lighting in many of the common areas
- Solar photovoltaic system
- Heat reclamation off of the refrigeration plant for in-floor heating, snow melt, and DHW preheat
- Building automation controls

The following table highlights planned energy reduction measures for the Magna Centre moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	CO_2e (kg)
Lower Leisure Pool Water Temperature	0	39,322	8,137	0	17,417
Install a Liquid Pool Cover	0	22,350	4,795	0	10,222
Install Vending Misers	0	19,678	0	0	984
Install VFDs on Pool Filter Pumps	0	37,493	0	0	1,875
Install Pool Waste Heat Recovery Control System	0	0	26,162	1,260	49,681
Implement Floating Head Pressure Controls	0	186,258	0	0	9,313
Lighting Controls: Install Occupancy Sensors	0	15,624	0	0	781
Lighting Upgrade: LED Lamps	115	61,683	0	0	3,084
Lighting Upgrade: LED Fixtures	58	34,768	0	0	1,738
Cold Water Flooding	0	63,086	32,605	0	65,071
Implement Demand Control Ventilation on AHUs	0	0	8,350	0	15,858
Totals	**173**	**480,263**	**80,048**	**1,260**	**176,025**

4.7 Old Town Hall

Old Town Hall is an art gallery and auditorium. The facility underwent a considerable expansion and renovation beginning in 2010 and completed in 2015.

Address:	460 Botsford St., Newmarket, ON L3Y 3Y9
Building Type:	Cultural Facility
Floor Area:	12,862 ft²
Operational Hours:	Tu-F: 4:00PM to 8:00PM Sat: 11:00AM to 2:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Old Town Hall	234,988	44,250	95,780	53.8	2.08

Many energy efficiency measures went into the design of the new renovations including:

- High-efficiency condensing boilers for heating
- LED lighting throughout the building
- High efficiency rooftop units for heating and cooling
- Building automation controls

The following table highlights planned energy reduction measures for Old Town Hall moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Upgrade to LED Retrofit Lamps	47	24,577	0	0	1,229
Implement Demand Control Ventilation	0	633	8,174	0	15,554
Install Rooftop Unit Staging Controls	0	3,750	0	0	188
Install VFD on AHU-1 Supply Fan	17	12,428	0	0	621
Upgrade to LED Fixtures	24	9,821	0	0	491
Totals	**89**	**51,210**	**8,174**	**0**	**18,082**

4.8 Senior's Meeting Place

Senior's Meeting Place is an activity centre catered to individuals 55 years and older. The facility provides Classes, workshops and hall rentals.

Address:	474 Davis Dr., Newmarket, ON L3Y 2P3
Building Type:	Cultural Facility
Floor Area:	15,200 ft²
Operational Hours:	M-F: 8:30AM to 10:00PM Sat: 9:00AM to 12:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Senior's Meeting Place	167,995	23,613	53,241	27.1	1.05

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- An instantaneous domestic hot water heater
- LED lighting throughout the building
- Building automation controls

The following table highlights planned energy reduction measures for Senior's Meeting Place moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	159	50	302
Install Vending Machine Controls	0	963	0	0	48
Add Electric Baseboard Heaters to BAS	0	6,606	0	0	330
Implement Demand Control Ventilation on RTUs	0	1,046	3,914	0	7,486
Totals	**0**	**8,615**	**4,074**	**50**	**8,167**

4.9 Public Library

The Newmarket Public Library provide books, movies and games for residents of Newmarket. The facility also hosts book clubs and computer workshops.

Address:	438 Park Ave., Newmarket, ON L3Y 1W1
Building Type:	Public Library
Floor Area:	35,000 ft²
Operational Hours:	Tu-Th: 9:30AM to 9:00PM F, Sat: 9:30AM to 5:00PM Sun: 1:00PM to 5:00PM

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Public Library	557,793	42,874	109,307	28.6	1.11

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- High-efficiency rooftop units
- LED exterior lighting

The following table highlights planned energy reduction measures for the Public Library moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Install Ultra-Low Flow Faucet Aerators in Washrooms	0	6,822	0	236	341.1
Upgrade to LED Retrofit Lamps	5	18,745	0	0	937.3
Upgrade to LED Fixtures	13	47,191	0	0	2,360
Install a Building Automation System	0	47,813	1,821	0	5,849
Replace Windows	0	0	13,003	0	24,693
Totals	**17**	**120,570**	**14,824**	**236**	**34,179**

4.10 Fire Station 4-1

Fire Station 4-1 is a fire hall located on the eastern part of Newmarket.

Address:	984 Gorham St., Newmarket, ON L3Y 1L8
Building Type:	Fire Station
Floor Area:	10,416 ft²
Operational Hours:	24/7/365

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Fire Station 4-1	201,901	21,720	51,341	40.9	1.59

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- Building automation controls
- LED exterior lighting

The following table highlights planned energy reduction measures for Fire Station 4-1 moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Turn off Radiant Tube Heaters in the Summer	0	0	370	0	702
Add Electric Baseboard Heaters to BAS	0	6,134	0	0	307
Upgrade to LED Fixtures	0	30,658	0	0	1,533
Install Lighting Controls	0	3,066	0	0	153
Replace R22 RTUs with ERVs	0	0	5,500	0	10,445
Totals	**0**	**39,858**	**5,870**	**0**	**13,140**

4.11 Fire Station 4-2

Fire Station 4-2 is a fire hall located on the western part of Newmarket.

Address:	125 McCaffrey Rd., Newmarket, ON L3X 1K3
Building Type:	Fire Station
Floor Area:	12,201 ft²
Operational Hours:	24/7/365

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Fire Station 4-2	96,702	16,421	36,019	21.8	0.85

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- Radiant in-floor heating in the truck bay
- Condensing domestic hot water heater
- High-efficiency rooftop units
- LED exterior lighting

The following table highlights planned energy reduction measures for Fire Station 4-2 moving forward and the expected annual savings from each measure.

Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	110	35	209
Upgrade to LED Fixtures	0	22,333	0	0	1,117
Install Lighting Controls	0	2,233	0	0	112
Totals	**0**	**24,566**	**110**	**35**	**1,437**

4.12 Fire Training Centre

The Fire Training Centre is an office building that also provides training to new recruits. It is also currently acting as a fire station.

Address:	623 Timothy St., Newmarket, ON L3Y 1R3
Building Type:	Fire Station
Floor Area:	53,334 ft²
Operational Hours:	24/7/365

The types of energy used at the facility include electricity and natural gas. The following table summarizes the energy consumption and GHG emissions of the facility in 2018.

Building Name	Electricity (kWh)	Natural Gas (m³)	GHG Emissions (kg)	EUI (ekWh/ft²)	EUI (GJ/m²)
Fire Training Centre	78,415	31,766	64,244	7.6	0.30

To help reduce energy consumption at this facility, the Town of Newmarket has already incorporated the following measures:

- Radiant in-floor heating in the truck bay
- High-efficiency rooftop units

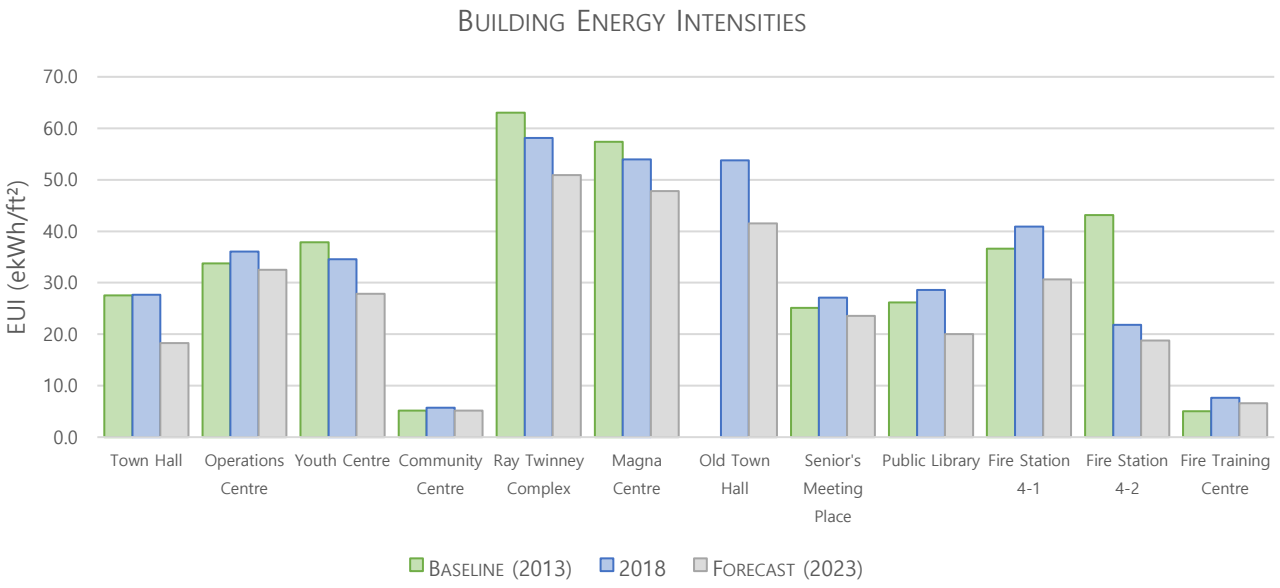
The following table highlights planned energy reduction measures for Fire Training Centre moving forward and the expected annual savings from each measure.

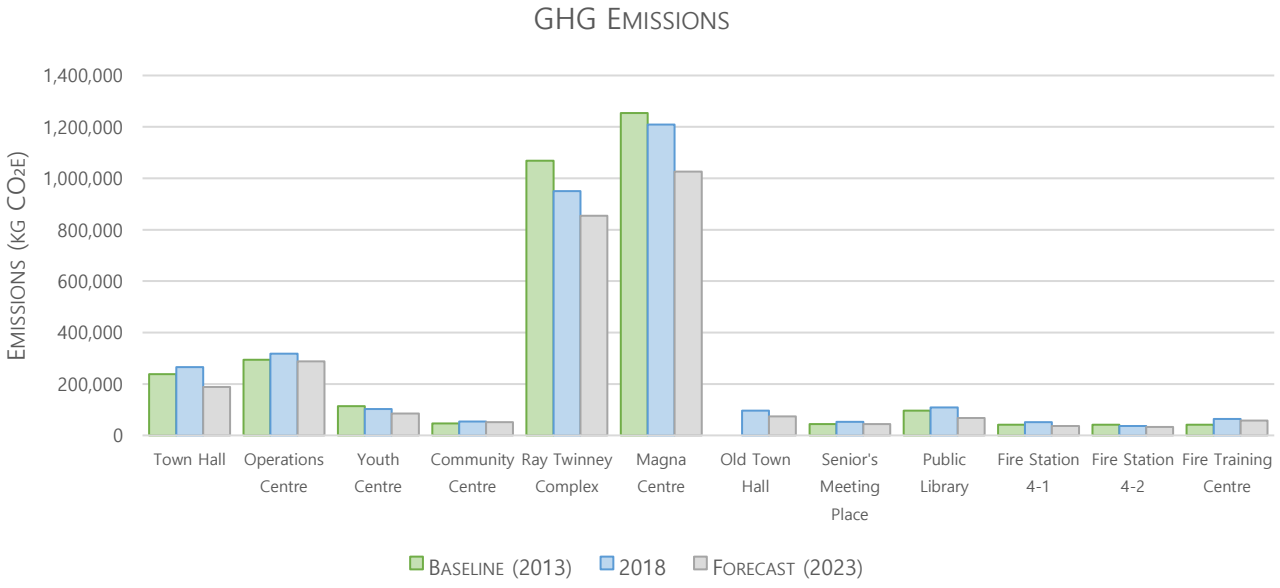
Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	CO_2e (kg)
Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	106	32	201
Install Programmable Thermostats for HVAC	0	0	2,519	0	4,784
Upgrade Exterior Fixtures to LED	0	2,190	0	0	110
Upgrade Interior Fixtures to LED	0	20,167	0	0	1,008
Install Lighting Controls	0	2,611	0	0	131
Totals	**0**	**24,968**	**2,625**	**32**	**6,233**

5 Energy Forecast

Over the next five years, the Town of Newmarket has to the potential to reduce their electricity consumption by **1,600,000 kWh**, their natural gas consumption by **183,000 m³**, and their greenhouse gas emissions by **500,000 kg of CO_2e**. This is an energy reduction of **15.6%** and a GHG emission reduction of **15.4%.**

The following charts show how each building energy and GHG emissions will reduce over the next five years.





APPENDIX A

MASTER TABLE OF MEASURES

Energy Conservation Measure Summary Report

Energy Savings			Utility Savings				Emissions	Financials								
Building	Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR	Include in Total?
Town Hall	1	Upgrade to LED Retrofit Lamps	17	52,978	0	0	2.6	$7,974	$45,911	$2,649	5.8	5.4	4.8	$78,179	22.9%	Yes
Town Hall	2	Upgrade to LED Fixtures	16	46,254	0	0	2.3	$8,263	$139,615	$2,313	16.9	16.6	12.5	($15,008)	6.0%	Yes
Town Hall	3	Install Lighting Controls	0	5,704	0	0	0.3	$593	$2,797	$0	4.7	4.7	4.1	$6,888	27.0%	Yes
Town Hall	4	Install VFD on Air Handling Unit	0	102,249	12,001	0	27.9	$13,624	$26,186	$1,070	1.9	1.8	1.7	$186,884	61.4%	Yes
Town Hall	5	Replace BAS System and Schedule Equipment	0	73,025	10,508	0	23.6	$10,214	$321,482	$0	31.5	31.5	19.3	($163,879)	0.4%	Yes
Town Hall	6	Install High Efficiency Heating Boiler	0	0	8,997	0	17.1	$2,249	$91,322	$4,000	40.6	38.8	10.4	($2,383)	6.5%	Yes
Town Hall	7	Install a 150kW Solar PV System	270	183,205	0	0	9.2	$21,241	$540,000	$0	25.4	25.4	16.0	($190,036)	3.0%	Yes
Operations Centre	1	Set Heat Pumps to Auto	0	3,000	0	0	0.2	$300	$100	$0	0.3	0.3	0.3	$5,236	348.7%	Yes
Operations Centre	2	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	200	70	0.4	$300	$300	$0	1.0	1.0	0.9	$4,898	121.2%	Yes
Operations Centre	3	Install Vending Machine Controls	0	2,000	0	0	0.1	$200	$600	$0	3.0	3.0	2.5	$2,957	43.3%	Yes
Operations Centre	4	Control Unit Heaters in Truck Bay with BAS	0	0	12,000	0	22.8	$3,000	$14,000	$0	4.7	4.7	4.4	$24,380	24.0%	Yes
Operations Centre	5	Upgrade to LED Lighting	180	89,000	0	0	4.5	$12,000	$89,000	$6,000	7.4	6.9	5.7	$117,312	19.4%	Yes
Youth Centre	1	Install Vending Machine Controls	0	2,871	0	0	0.1	$281	$1,000	$0	3.6	3.6	3.2	$3,589	34.5%	Yes
Youth Centre	2	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	1,286	0	47	0.1	$307	$135	$0	0.4	0.4	0.4	$4,824	243.9%	Yes
Youth Centre	3	Upgrade Interior Fixtures to LED	87	49,577	0	0	2.5	$5,449	$50,000	$2,900	9.2	8.6	7.0	$42,718	15.6%	Yes
Youth Centre	4	Install Lighting Controls	0	4,958	0	0	0.2	$485	$3,750	$300	7.7	7.1	5.9	$4,474	18.7%	Yes
Youth Centre	5	Add Electric Baseboard Heaters to BAS	0	3,490	0	0	0.2	$341	$3,500	$0	10.3	10.3	8.1	$2,078	13.0%	Yes
Youth Centre	6	Implement Demand Control Ventilation on RTUs	0	2,895	7,477	0	14.3	$2,003	$11,000	$1,121	5.5	4.9	4.6	$16,749	23.2%	Yes
Youth Centre	7	Install Instantaneous Hot Water Heater	0	797	0	0	0.0	$78	$1,650	$0	21.2	21.2	14.1	($376)	4.6%	Yes
Community Centre	1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	290	98	0.6	$447	$100	$0	0.2	0.2	0.2	$6,847	471.9%	Yes
Community Centre	2	Install Vending Machine Controls	0	1,908	0	0	0.1	$191	$650	$0	3.4	3.4	3.1	$2,468	35.9%	Yes
Community Centre	3	Upgrade Interior Fixtures to LED	0	17,502	0	0	0.9	$1,750	$25,000	$875	14.3	13.8	10.2	$4,477	9.2%	Yes
Community Centre	4	Install Lighting Controls	0	3,500	0	0	0.2	$350	$2,500	$240	7.1	6.5	5.5	$3,460	20.4%	Yes
Community Centre	5	Upgrade Exterior Fixtures to LED	0	1,911	0	0	0.1	$191	$2,200	$0	11.5	11.5	8.9	$923	11.5%	Yes
Community Centre	6	Install VFD on Cooling Tower Fan	0	7,117	0	0	0.4	$712	$9,000	$1,070	12.6	11.1	8.6	$3,701	11.9%	Yes

Energy Savings			Utility Savings				Emissions	Financials								
Building	Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR	Include in Total?
Ray Twinney	1	Reduce Flood Water Temperature	0	4,811	2,429	0	4.9	$1,107	$230	$0	0.2	0.2	0.2	$15,706	502.9%	Yes
Ray Twinney	2	Install Low-Flow Shower Heads in Changerooms	0	0	17,417	3,105	33.1	$16,960	$9,137	$0	0.5	0.5	0.5	$248,762	198.1%	Yes
Ray Twinney	3	Install Ultra-Low Flow Faucet Aerators	0	0	162	324	0.3	$1,357	$994	$0	0.7	0.7	0.7	$20,639	148.1%	Yes
Ray Twinney	4	Install Liquid Pool Cover	0	18,264	4,031	0	8.6	$2,905	$5,171	$0	1.8	1.8	1.7	$38,733	62.9%	Yes
Ray Twinney	5	Install Pool Make-Up Water Controllers	0	0	4,791	3,575	9.1	$15,712	$36,255	$0	2.3	2.3	2.1	$211,875	50.2%	Yes
Ray Twinney	6	Upgrade to LED Retrofit Lamps	14	58,698	0	0	2.9	$8,117	$48,720	$5,870	6.0	5.3	4.6	$82,559	23.7%	Yes
Ray Twinney	7	Upgrade to LED Fixtures	43	182,050	0	0	9.1	$23,263	$149,391	$18,205	6.4	5.6	4.9	$233,916	22.5%	Yes
Ray Twinney	8	Install Lighting Controls	0	3,817	0	0	0.2	$397	$1,713	$465	4.3	3.1	2.8	$5,234	38.5%	Yes
Ray Twinney	9	Implement Floating Head Pressure Controls	0	81,103	0	0	4.1	$8,427	$46,090	$0	5.5	5.5	4.7	$91,620	23.7%	Yes
Ray Twinney	10	Install Low-E Ceiling for Arena 1	0	81,788	0	0	4.1	$8,498	$54,373	$8,179	6.4	5.4	4.8	$89,242	23.3%	Yes
Ray Twinney	11	Implement Grey Water Flooding	0	0	0	1,632	0.0	$6,627	$45,853	$0	6.9	6.9	5.8	$60,451	18.9%	Yes
Ray Twinney	12	Install VFDs on Filter Pumps	0	60,052	0	0	3.0	$6,239	$49,258	$2,680	7.9	7.5	6.2	$55,389	17.8%	Yes
Ray Twinney	13	Implement Cold Water Flooding	0	14,428	7,286	0	14.6	$3,321	$52,320	$1,093	15.8	15.4	12.0	($3,425)	6.5%	Yes
Magna Centre	1	Lower Leisure Pool Water Temperature	0	39,322	8,137	0	17.4	$5,415	$300	$0	0.1	0.1	0.1	$80,981	1884.9%	Yes
Magna Centre	2	Install a Liquid Pool Cover	0	22,350	4,795	0	10.2	$3,120	$10,225	$0	3.3	3.3	3.4	$29,639	31.8%	Yes
Magna Centre	3	Install Vending Misers	0	19,678	0	0	1.0	$1,692	$7,635	$0	4.5	4.5	4.0	$20,018	28.1%	Yes
Magna Centre	4	Install VFDs on Pool Filter Pumps	0	37,493	0	0	1.9	$3,224	$25,331	$1,875	7.9	7.3	6.1	$29,232	18.3%	Yes
Magna Centre	5	Install Pool Waste Heat Recovery Control System	0	0	26,162	1,260	49.7	$11,657	$55,926	$3,924	4.8	4.5	4.1	$113,745	26.5%	Yes
Magna Centre	6	Implement Floating Head Pressure Controls	0	186,258	0	0	9.3	$16,016	$66,157	$0	4.1	4.1	3.7	$195,582	30.3%	Yes
Magna Centre	7	Lighting Controls: Install Occupancy Sensors	0	15,624	0	0	0.8	$1,343	$4,685	$345	3.5	3.2	2.9	$17,615	37.6%	Yes
Magna Centre	8	Lighting Upgrade: LED Lamps	115	61,683	0	0	3.1	$8,694	$36,828	$920	4.2	4.1	3.7	$99,091	29.6%	Yes
Magna Centre	9	Lighting Upgrade: LED Fixtures	58	34,768	0	0	1.7	$7,466	$68,416	$10,360	9.2	7.8	6.7	$49,653	15.6%	Yes
Magna Centre	10	Cold Water Flooding	0	63,086	32,605	0	65.1	$13,576	$96,269	$4,891	7.1	6.7	5.9	$101,556	17.9%	Yes
Magna Centre	11	Implement Demand Control Ventilation on Selected AHUs	0	0	8,350	0	15.9	$2,088	$22,330	$0	10.7	10.7	9.4	$4,378	9.5%	Yes
Old Town Hall	1	Upgrade to LED Retrofit Lamps	47	24,577	0	0	1.2	$4,116	$7,733	$2,458	1.9	1.3	1.2	$54,210	84.7%	Yes
Old Town Hall	2	Implement Demand Control Ventilation	0	633	8,174	0	15.6	$2,098	$12,142	$0	5.8	5.8	5.3	$14,889	19.5%	Yes
Old Town Hall	3	Install Rooftop Unit Staging Controls	0	3,750	0	0	0.2	$322	$3,855	$1,445	12.0	7.5	6.2	$2,850	17.8%	Yes

Energy Savings			Utility Savings				Emissions	Financials								
Building	Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR	Include in Total?
Old Town Hall	4	Install VFD on AHU-1 Supply Fan	17	12,428	0	0	0.6	$1,067	$11,667	$400	10.9	10.6	8.3	$6,166	12.6%	Yes
Old Town Hall	5	Upgrade to LED Fixtures	24	9,821	0	0	0.5	$1,890	$30,635	$982	16.2	15.7	12.3	($2,830)	6.2%	Yes
Senior's Meeting Place	1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	159	50	0.3	$231	$125	$0	0.5	0.5	0.5	$3,463	198.0%	Yes
Senior's Meeting Place	2	Install Vending Machine Controls	0	963	0	0	0.0	$94	$330	$0	3.5	3.5	3.1	$1,209	35.0%	Yes
Senior's Meeting Place	3	Add Electric Baseboard Heaters to BAS	0	6,606	0	0	0.3	$646	$5,141	$0	8.0	8.0	6.5	$5,412	16.8%	Yes
Senior's Meeting Place	4	Implement Demand Control Ventilation on RTUs	0	1,046	3,914	0	7.5	$1,003	$11,000	$0	11.0	11.0	9.5	$2,188	9.6%	Yes
Public Library	1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	6,822	0	236	0.3	$1,669	$178	$0	0.1	0.1	0.1	$26,806	988.4%	Yes
Public Library	2	Upgrade to LED Retrofit Lamps	5	18,745	0	0	0.9	$2,758	$15,096	$1,984	5.5	4.8	4.2	$29,027	25.9%	Yes
Public Library	3	Upgrade to LED Fixtures	13	47,191	0	0	2.4	$8,656	$84,025	$5,008	9.7	9.1	7.7	$48,415	13.4%	Yes
Public Library	4	Install a Building Automation System	0	47,813	1,821	0	5.8	$5,387	$133,681	$0	24.8	24.8	16.0	($47,137)	2.9%	Yes
Public Library	5	Replace Windows	0	0	13,003	0	24.7	$2,991	$258,180	$0	86.3	86.3	66.9	($219,919)	-8.9%	Yes
Fire Station 4-1	1	Turn off Radiant Tube Heaters in the Summer	0	0	370	0	0.7	$85	$100	$0	1.2	1.2	1.1	$988	89.6%	Yes
Fire Station 4-1	2	Add Electric Baseboard Heaters to BAS	0	6,134	0	0	0.3	$613	$4,500	$0	7.3	7.3	6.1	$5,524	18.1%	Yes
Fire Station 4-1	3	Upgrade to LED Fixtures	0	30,658	0	0	1.5	$3,066	$40,000	$1,533	13.0	12.5	9.5	$11,636	10.4%	Yes
Fire Station 4-1	4	Install Lighting Controls	0	3,066	0	0	0.2	$307	$2,500	$240	8.2	7.4	6.1	$2,750	18.0%	Yes
Fire Station 4-2	1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	110	35	0.2	$161	$75	$0	0.5	0.5	0.4	$2,430	229.6%	Yes
Fire Station 4-2	2	Upgrade to LED Fixtures	0	22,333	0	0	1.1	$2,233	$15,000	$1,117	6.7	6.2	5.3	$22,613	21.1%	Yes
Fire Station 4-2	3	Install Lighting Controls	0	2,233	0	0	0.1	$223	$2,500	$210	11.2	10.3	8.1	$1,360	13.0%	Yes
Fire Administration	1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	106	32	0.2	$147	$150	$0	1.0	1.0	1.0	$2,133	107.3%	Yes
Fire Administration	2	Install Programmable Thermostats for HVAC	0	0	2,519	0	4.8	$579	$1,000	$0	1.7	1.7	1.7	$6,412	61.9%	Yes
Fire Administration	3	Upgrade Exterior Fixtures to LED	0	2,190	0	0	0.1	$219	$3,000	$0	13.7	13.7	10.2	$579	9.3%	Yes
Fire Administration	4	Upgrade Interior Fixtures to LED	0	20,167	0	0	1.0	$2,017	$25,000	$1,008	12.4	11.9	9.1	$8,966	11.0%	Yes
Fire Administration	5	Install Lighting Controls	0	2,611	0	0	0.1	$261	$3,500	$300	13.4	12.3	9.3	$1,066	10.7%	Yes
	Totals:		**905**	**1,910,285**	**197,812**	**10,466**	**471.2**	**$312,602**	**$2,946,518**	**$98,029**	**9.4**	**9.1**		**$2,034,760**		

APPENDIX B

ENERGY AUDIT EXECUTIVE SUMMARIES

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at Newmarket Town Hall, 395 Mulock Drive, Newmarket, ON. The facility is an 80,316 ft² (7,464 m²), 1 story building. It serves primarily as an office space with council chambers. A small portion of the building is rented out to Rogers TV. The building construction consists of a brick veneer façade on re-enforced concrete block units for structural framing.

Heating to the building is currently supplied by one vertical coiltube boiler and two atmospheric boilers. Electric heat pumps connected to the hot water heating loop supply warm air to the space. Cooling to the building is serviced by electric heat pumps. The cooling tower supplies the heat pumps with chilled water, heat pumps run the chilled water through its coils, providing cool air to the space. Ventilation air is provided to the building via 1 large air handling unit and two heat recovery ventilators. Gas fired domestic hot water, an electric hot water heater tanks and an on demand electric hot water heater tank supply hot water to the buildings water fixtures.

Recent renovations on the building include the installation of a vertical coiltube heating boiler (2018) and a new DHW heating tank (2018).

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

Energy Savings Scenario

The following Opportunities are recommended based on their potential for utility savings.

Energy Savings		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Upgrade to LED Retrofit Lamps	17	52,978	0	0	2.6	$7,974	$45,911	$2,649	5.8	5.4	4.8	$78,179	22.9%
2	Upgrade to LED Fixtures	16	46,254	0	0	2.3	$8,263	$139,615	$2,313	16.9	16.6	12.5	($15,008)	6.0%
3	Install Lighting Controls	0	5,704	0	0	0.3	$593	$2,797	$0	4.7	4.7	4.1	$6,888	27.0%
4	Install VFD on Air Handling Unit	0	102,249	12,001	0	27.9	$13,624	$26,186	$1,070	1.9	1.8	1.7	$186,884	61.4%
Totals:		**33**	**207,185**	**12,001**	**0**	**33.1**	**$30,454**	**$214,509**	**$6,032**	**7.0**	**6.8**	**5.9**	**$256,943**	**18.5%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 29 ekWh/ft² (1.13 GJ/m²) to 24.9 ekWh/ft² (0.97 GJ/m²), or by 14.2%. The utility cost intensity will be reduced by $0.31/ft² ($3.32/m²), or 17.3%. Emissions will be reduced by 33.1 Tonnes of CO_2e, or 11.7%.

In addition to the Opportunities outlined in the Energy Savings Scenario, Efficiency Engineering has investigated the following measures. These Opportunities should be pursued once items in the Energy Savings Roadmap have been addressed.

Capital Upgrade

The following Opportunities are recommended based on the need for capital equipment replacement. The existing equipment is approaching its expected end of life. Replacement of the existing equipment with newer, more efficient technologies presents significant opportunities for energy savings.

Capital Upgrade		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
5	Replace BAS System and Schedule Equipment	0	73,025	10,508	0	23.6	$10,214	$321,482	$0	31.5	31.5	19.3	($163,879)	0.4%
6	Install High Efficiency Heating Boiler	0	0	8,997	0	17.1	$2,249	$91,322	$4,000	40.6	38.8	10.4	($2,383)	6.5%
	Totals:	**0**	**73,025**	**19,505**	**0**	**40.7**	**$12,463**	**$412,803**	**$4,000**	**33.1**	**32.8**	**18.3**	**($166,262)**	**1.1%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 24.9 ekWh/ft² (0.97 GJ/m²) to 21.5 ekWh/ft² (0.83 GJ/m²), or by 13.7%. The utility cost intensity will be reduced by $0.16/ft² ($1.67/m²), or 10.5%. Emissions will be reduced by 40.7 Tonnes of CO_2e, or 16.3%.

Renewable Energy

The following renewable energy Opportunity was analyzed as part of this report.

Renewable Energy		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
7	Install a 150kW Solar PV System	270	183,205	0	0	9.2	$21,241	$540,000	$0	25.4	25.4	16.0	($190,036)	3.0%
	Totals:	**270**	**183,205**	**0**	**0**	**9.2**	**$21,241**	**$540,000**	**$0**	**25.4**	**25.4**	**16.0**	**($190,036)**	**3.0%**

As a result of this Opportunity, the energy intensity of the building will be reduced from 21.5 ekWh/ft² (0.83 GJ/m²) to 19.2 ekWh/ft² (0.74 GJ/m²), or by 10.6%. The utility cost intensity will be reduced by $0.26/ft² ($2.85/m²), or 20.0%. Emissions will be reduced by 9.2 Tonnes of CO_2e, or 4.4%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

Limited Liability

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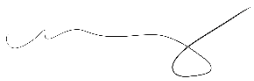
Acknowledgements

Report prepared by Graeme St.Clair

Report review by Carlin Sweeney, P.Eng., CEM



Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at the Newmarket Operations Centre, 1275 Maple Hill Ct., in Newmarket, ON. The facility is a 61,054 ft² (5,674 m²), 2 story building constructed in 2010. It serves as an office and a truck bay for the city's fleet. The building construction consists primarily of a brick veneer façade on re-enforced concrete block units for structural framing.

The operations centre is a LEED silver building with many energy efficient concepts built into its design including a ground-source heat pump system, a solar thermal system for domestic hot water, solar PV, and a green roof.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

Low Cost/No Cost

The following Opportunities are recommended based on their potential for low cost implementation. These measures can generally be implemented by building maintenance staff or service contractors without the need for detailed engineering.

Low Cost/No Cost		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Set Heat Pumps to Auto	0	3,000	0	0	0.2	$300	$100	$0	0.3	0.3	0.3	$5,236	348.7%
2	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	200	70	0.4	$300	$300	$0	1.0	1.0	0.9	$4,898	121.2%
3	Install Vending Machine Controls	0	2,000	0	0	0.1	$200	$600	$0	3.0	3.0	2.5	$2,957	43.3%
	Totals:	**0**	**5,000**	**200**	**70**	**0.6**	**$800**	**$1,000**	**$0**	**1.3**	**1.3**	**1.1**	**$13,091**	**97.2%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 36.8 ekWh/ft² (1.43 GJ/m²) to 36.7 ekWh/ft² (1.42 GJ/m²), or by 0.3%. The utility cost intensity will be reduced by $0.01/ft² ($0.15/m²), or 0.5%. Emissions will be reduced by 0.7 Tonnes of CO_2e, or 0.2%.

Energy Savings Scenario

The following Opportunities are recommended based on their potential for utility savings.

Energy Savings		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
4	Control Unit Heaters in Truck Bay with BAS	0	0	12,000	0	22.8	$3,000	$14,000	$0	4.7	4.7	4.4	$24,380	24.0%
5	Upgrade to LED Lighting	180	89,000	0	0	4.5	$12,000	$89,000	$6,000	7.4	6.9	5.7	$117,312	19.4%
	Totals:	**180**	**89,000**	**12,000**	**0**	**27.2**	**$15,000**	**$103,000**	**$6,000**	**6.9**	**6.5**	**5.5**	**$141,693**	**20.0%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 36.7 ekWh/ft² (1.42 GJ/m²) to 33.2 ekWh/ft² (1.29 GJ/m²), or by 9.6%. The utility cost intensity will be reduced by $0.25/ft² ($2.66/m²), or 9.4%. Emissions will be reduced by 27.7 Tonnes of CO_2e, or 9.2%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

Limited Liability

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Acknowledgements

Report prepared by Shawn McGarrity

Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at the Youth Centre, 56 Charles Street, in Newmarket, ON. The facility is a 28,000 ft² (2,600 m²), one-story (plus mezzanine) building. It serves primarily as a skatepark and gym with a multi-purpose room and computer room. The building construction consists of a brick veneer façade on re-enforced concrete block units for structural framing.

Recent renovations on the building include one (1) new R-410-A HVAC unit, two (2) heat pumps that provide heating and cooling to the two (2) offices in the mezzanine and an exterior lighting upgrade to LED wallpaks.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides an implementation roadmap focusing on energy savings and capital renewal. The plan has been compiled based on multiple criteria including:

- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following Energy Savings Roadmap:

Energy Savings Roadmap		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Install Vending Machine Controls	0	2,871	0	0	0.1	$281	$1,000	$0	3.6	3.6	3.2	$3,589	34.5%
2	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	1,286	0	47	0.1	$307	$135	$0	0.4	0.4	0.4	$4,824	243.9%
3	Upgrade Interior Fixtures to LED	87	49,577	0	0	2.5	$5,449	$50,000	$2,900	9.2	8.6	7.0	$42,718	15.6%
4	Install Lighting Controls	0	4,958	0	0	0.2	$485	$3,750	$300	7.7	7.1	5.9	$4,474	18.7%
5	Add Electric Baseboard Heaters to BAS	0	3,490	0	0	0.2	$341	$3,500	$0	10.3	10.3	8.1	$2,078	13.0%
6	Implement Demand Control Ventilation on RTUs	0	2,895	7,477	0	14.3	$2,003	$11,000	$1,121	5.5	4.9	4.6	$16,749	23.2%
7	Install Instantaneous Hot Water Heater	0	797	0	0	0.0	$78	$1,650	$0	21.2	21.2	14.1	($376)	4.6%
	Totals:	**87**	**65,874**	**7,477**	**47**	**17.5**	**$8,943**	**$71,035**	**$4,321**	**7.9**	**7.5**	**6.3**	**$74,056**	**17.4%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 26.2 ekWh/ft² (1.01 GJ/m²) to 21.1 ekWh/ft² (0.82 GJ/m²) and the utility cost intensity will be reduced by $0.32/ft² ($3.44/m²). Emissions will be reduced by 17.5 tonnes CO_2e, or 17%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

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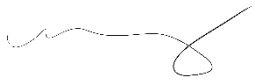
Report prepared by Carlin Sweeney, P.Eng., CEM



Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at the Community Centre, 200 Doug Duncan Dr., in Newmarket, ON. The facility is an 18,000 ft² (1,675 m²), one-story building. It serves primarily as a Community Centre with four (4) halls, an outdoor veranda and an outdoor pond with jets that is converted to a skating rink in the winter. The building construction consists of vinyl and wood siding on re-enforced concrete block units for structural framing.

Recent renovations on the building include new R410A rooftop units, exterior LED pot lights, and new instantaneous hot water heaters for domestic hot water and flood water.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides an implementation roadmap focusing on energy savings and capital renewal. The plan has been compiled based on multiple criteria including:

- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following Energy Savings Roadmap:

Energy Savings Roadmap		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	290	98	0.6	$447	$100	$0	0.2	0.2	0.2	$6,847	471.9%
2	Install Vending Machine Controls	0	1,908	0	0	0.1	$191	$650	$0	3.4	3.4	3.1	$2,468	35.9%
3	Upgrade Interior Fixtures to LED	0	17,502	0	0	0.9	$1,750	$25,000	$875	14.3	13.8	10.2	$4,477	9.2%
4	Install Lighting Controls	0	3,500	0	0	0.2	$350	$2,500	$240	7.1	6.5	5.5	$3,460	20.4%
5	Upgrade Exterior Fixtures to LED	0	1,911	0	0	0.1	$191	$2,200	$0	11.5	11.5	8.9	$923	11.5%
6	Install VFD on Cooling Tower Fan	0	7,117	0	0	0.4	$712	$9,000	$1,070	12.6	11.1	8.6	$3,701	11.9%
Totals:		**0**	**31,938**	**290**	**98**	**2.1**	**$3,640**	**$39,450**	**$2,185**	**10.8**	**10.2**	**8.1**	**$21,877**	**13.0%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 19.5* ekWh/ft² (0.76 GJ/m²) to 17.6 ekWh/ft² (0.68 GJ/m²) and the utility cost intensity will be reduced by $0.2/ft² ($2.18/m²). Emissions will be reduced by 2 tonnes CO_2e, or 4%.

*This intensity is based on the square footage of the building, not including outdoor features. It is also based on the electricity usage provided, which does not appear to include the whole facility. If using the electricity consumption determined based on audit findings, the intensity would be 29.4 (a more reasonable intensity based on the building equipment).

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

Limited Liability

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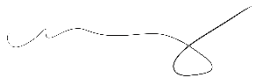
Report prepared by Carlin Sweeney, P.Eng., CEM



Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at Ray Twinney Recreation Complex, 100 Eagle St, in Newmarket, ON. The facility is a 123,437 ft^2 (11,472 m^2), single story building constructed in 1985. It serves primarily as a recreation centre with a two-pad arena and a natatorium. The building construction consists of a brick veneer façade on re-enforced concrete block units for structural framing.

The two main energy loads on the building are the refrigeration plant for the arenas, and the pool mechanical equipment. The arenas use two 100HP compressors and two 50HP compressors that are used from about September to May. The pool uses a large 30HP Dectron Dry-o-tron unit to control humidity levels in the pool area.

Other systems in the facility include two boiler plants – one for flood water and domestic hot water, the other for heating pool make-up water. Heating, cooling, and ventilation for the building is provided by ten rooftop units, two dehumidification units, and two make-up air units.

Lighting is primarily outdated linear fluorescent with some LED fixtures in various areas of the facility. Water fixtures are typically standard flow.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides a 5-year implementation plan focusing on energy savings and capital renewal. The five-year plan has been compiled based on multiple criteria including:

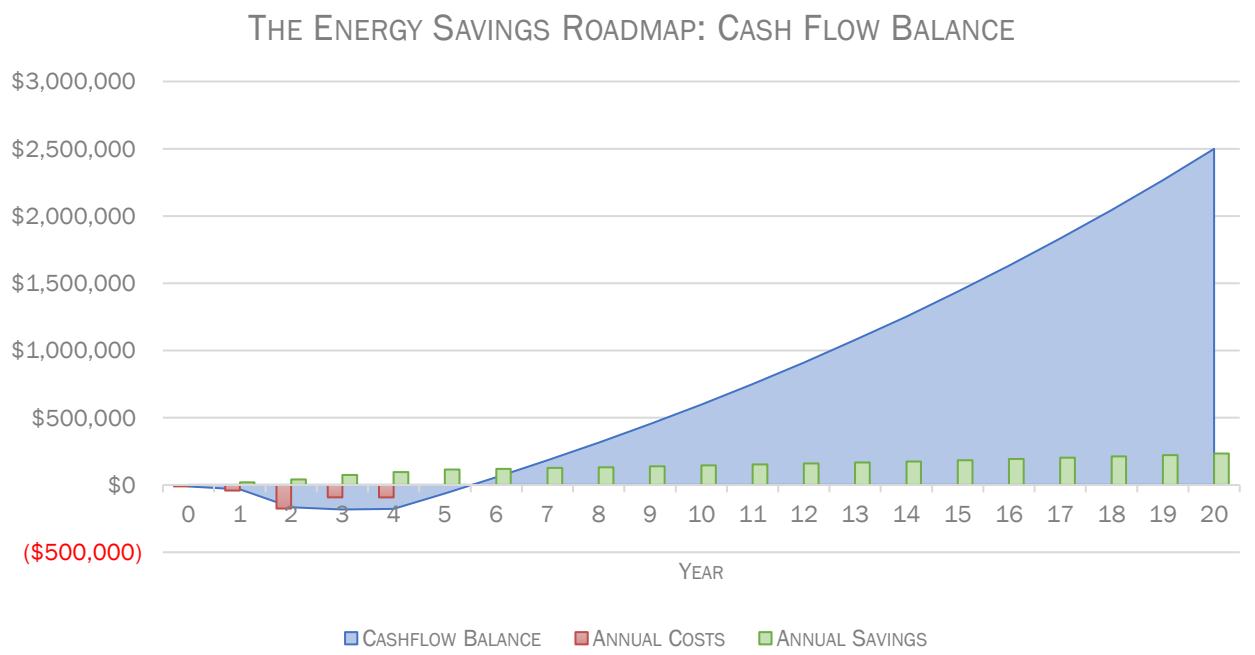
- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following 5-year Energy Savings Roadmap:

Energy Savings Roadmap		Utility Savings				Emissions	Financials								
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR	Year to Implement
1	Reduce Flood Water Temperature	0	4,811	2,429	0	4.9	$1,107	$230	$0	0.2	0.2	0.2	$15,706	502.9%	Year 1
2	Install Low-Flow Shower Heads in Changerooms	0	0	17,417	3,105	33.1	$16,960	$9,137	$0	0.5	0.5	0.5	$248,762	198.1%	Year 1
3	Install Ultra-Low Flow Faucet Aerators	0	0	162	324	0.3	$1,357	$994	$0	0.7	0.7	0.7	$20,639	148.1%	Year 1
4	Install Liquid Pool Cover	0	18,264	4,031	0	8.6	$2,905	$5,171	$0	1.8	1.8	1.7	$38,733	62.9%	Year 2
5	Install Pool Make-Up Water Controllers	0	0	4,791	3,575	9.1	$15,712	$36,255	$0	2.3	2.3	2.1	$211,875	50.2%	Year 2
6	Upgrade to LED Retrofit Lamps	14	58,698	0	0	2.9	$8,117	$48,720	$5,870	6.0	5.3	4.6	$82,559	23.7%	Year 3
7	Upgrade to LED Fixtures	43	182,050	0	0	9.1	$23,263	$149,391	$18,205	6.4	5.6	4.9	$233,916	22.5%	Year 3
8	Install Lighting Controls	0	3,817	0	0	0.2	$397	$1,713	$465	4.3	3.1	2.8	$5,234	38.5%	Year 3
9	Implement Floating Head Pressure Controls	0	81,103	0	0	4.1	$8,427	$46,090	$0	5.5	5.5	4.7	$91,620	23.7%	Year 4
10	Install Low-E Ceiling for Arena 1	0	81,788	0	0	4.1	$8,498	$54,373	$8,179	6.6	5.6	4.8	$89,242	23.3%	Year 4
11	Implement Grey Water Flooding	0	0	0	1,632	0.0	$6,627	$45,853	$0	6.9	6.9	5.8	$60,451	18.9%	Year 5
12	Install VFDs on Filter Pumps	0	60,052	0	0	3.0	$6,239	$49,258	$2,680	7.9	7.5	6.2	$55,389	17.8%	Year 5
	Totals:	**57**	**490,582**	**28,829**	**8,636**	**79.3**	**$99,608**	**$447,186**	**$35,399**	**4.5**	**4.1**	**3.7**	**$1,154,125**	**29.7%**	

As a result of these Opportunities, the energy intensity of the building will be reduced from 57.2 ekWh/ft² (2.22 GJ/m²) to 50.8 ekWh/ft² (1.97 GJ/m²), or by 11.2%. The utility cost intensity will be reduced by $0.76/ft² ($8.17/m²), or 17.9%. Emissions will be reduced by 79.3 Tonnes of CO_2e, or 8.5%.

Staging the implementation of these Opportunities over the next five years results in the following cash flow balance, annual utility savings, greenhouse gas reductions and paybacks:



5-Year Roadmap		Utility Savings				Emissions	Financials							
Year	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Low Cost & Water Fixtures Measures	0	4,811	20,008	3,429	38.2	$19,424	$10,362	$0	0.5	0.5	0.5	$285,107	200.0%
2	Pool Measures	0	18,264	8,822	3,575	17.7	$18,617	$41,426	$0	2.2	2.2	2.1	$250,608	51.8%
3	Lighting Measures	57	244,565	0	0	12.2	$31,776	$199,824	$24,540	6.3	5.5	4.8	$321,708	22.9%
4	Arena Measures	0	162,891	0	0	8.1	$16,924	$100,463	$8,179	5.9	5.5	4.8	$180,862	23.5%
5	Other Arena & Pool Measures	0	60,052	0	1,632	3.0	$12,867	$95,111	$2,680	7.4	7.2	6.0	$115,839	18.4%
	Totals:	**57**	**490,582**	**28,829**	**8,636**	**79.3**	**$99,608**	**$447,186**	**$35,399**	**4.5**	**4.1**	**5.5**	**$1,154,125**	**36.4%**

In addition to the Opportunities outlined in the 5-Year Energy Savings Roadmap, Efficiency Engineering has investigated the following measures. These Opportunities should be pursued once items in the Energy Savings Roadmap have been addressed.

Longer Payback

The Longer Payback *Scenario* consists of Opportunities that are not as financially attractive as the Energy Savings Scenario. These measures should be considered when equipment failure occurs or as Capital Renewal projects as equipment approaches its end of life.

Longer Payback		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
13	Implement Cold Water Flooding	0	14,428	7,286	0	14.6	$3,321	$52,320	$1,093	15.8	15.4	12.0	($3,425)	6.5%
	Totals:	**0**	**14,428**	**7,286**	**0**	**14.6**	**$3,321**	**$52,320**	**$1,093**	**15.8**	**15.4**	**12.0**	**($3,425)**	**6.5%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 50.8 ekWh/ft^2 (1.97 GJ/m^2) to 50.1 ekWh/ft^2 (1.94 GJ/m^2), or by 1.4%. The utility cost intensity will be reduced by $0.03/$ft^2$ ($0.29/$m^2$), or 0.8%. Emissions will be reduced by 14.6 Tonnes of CO_2e, or 1.7%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

Limited Liability

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Acknowledgements

Report prepared by Shawn McGarrity

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at the Magna Centre, 800 Mulock Drive, in Newmarket, ON. The facility is a 216,000 ft^2 (20,074 m^2), two story, multi-use recreational facility constructed in 2007. The facility is equipped with four ice pads, indoor leisure and lap pools, an indoor track and fitness facility.

The indoor pools are heated/maintained on a year-round basis. Two of the four arenas maintain ice year-round while ice on the remaining two pads is typically maintained from mid-August through the end of April.

A single mid-efficiency heating plant supplies heating and domestic hot water (DHW) to the entire facility with the exception of flood water heating. Supplemental heating and ventilation to specific areas of the facility is supplied by gas fired rooftop units.

The facility is equipped with a Cimco "Eco-chill" refrigeration plant. This plant reclaims heat from the compressors and utilizes it for under floor heating, the snow melt pit and to preheat incoming DHW.

All HVAC equipment at the facility is controlled and scheduled through a comprehensive HTS building automation system (BAS). The refrigeration plant for the arenas operates under a separate control system installed by Cimco.

The facility is also equipped with a large, rooftop mounted solar PV system which feeds power directly to the grid through the FIT Program.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides a 5-year implementation plan focusing on energy savings and capital renewal. The five-year plan has been compiled based on multiple criteria including:

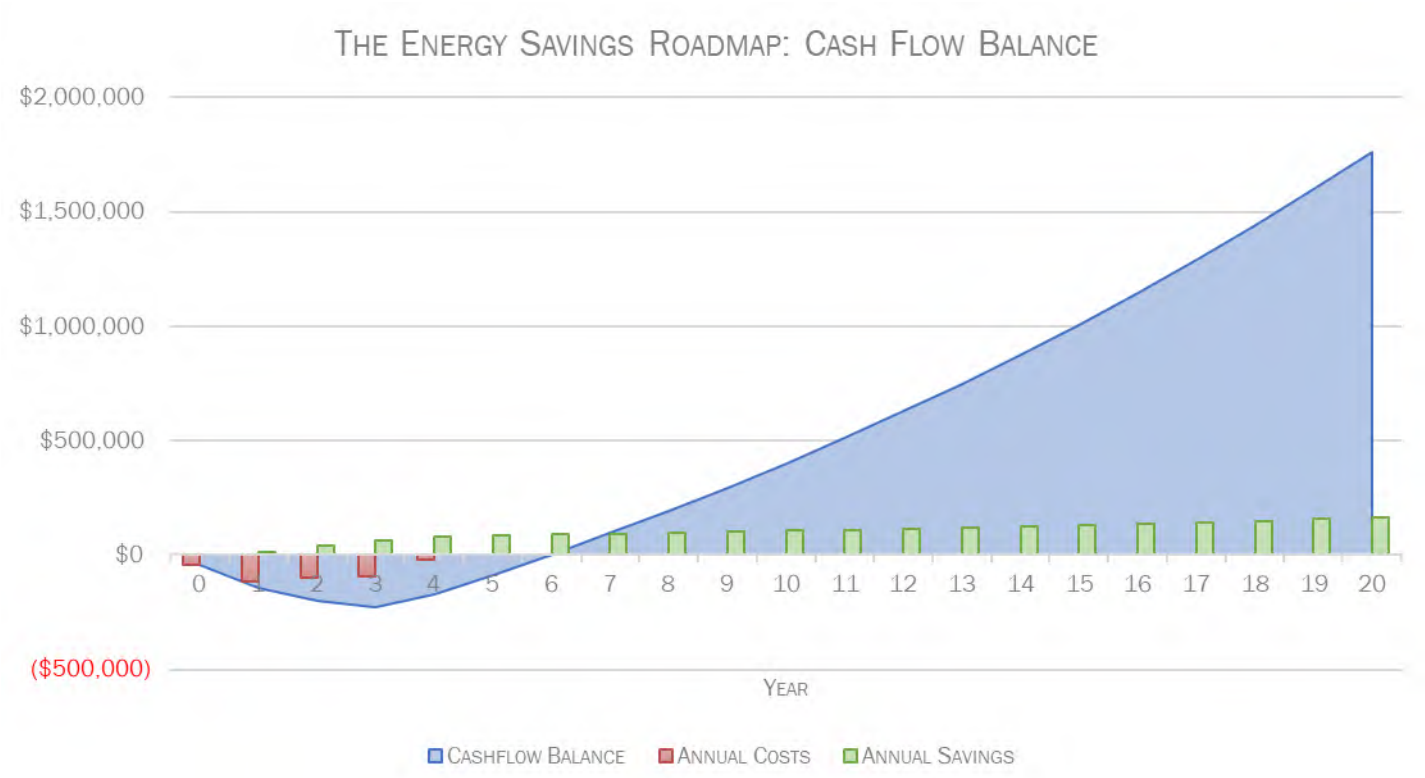
- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following 5-year Energy Savings Roadmap:

Energy Savings Roadmap		Utility Savings				Emissions	Financials								
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR	Year to Implement
1	Lower Leisure Pool Water Temperature	0	39,322	8,137	0	17.4	$5,415	$300	$0	0.1	0.1	0.1	$80,981	1884.9%	Year 1
2	Install a Liquid Pool Cover	0	22,350	4,795	0	10.2	$3,120	$10,225	$0	3.8	3.8	3.4	$29,639	31.8%	Year 1
3	Install Vending Misers	0	19,678	0	0	1.0	$1,692	$7,635	$0	4.5	4.5	4.0	$20,018	28.1%	Year 1
4	Install VFDs on Pool Filter Pumps	0	37,493	0	0	1.9	$3,224	$25,331	$1,875	7.9	7.3	6.1	$29,232	18.3%	Year 1
5	Install Pool Waste Heat Recovery Control System	0	0	26,162	1,260	49.7	$11,657	$55,926	$3,924	4.8	4.5	4.1	$113,745	26.5%	Year 2
6	Implement Floating Head Pressure Controls	0	186,258	0	0	9.3	$16,016	$66,157	$0	4.1	4.1	3.7	$195,582	30.3%	Year 2
7	Lighting Controls: Install Occupancy Sensors	0	15,624	0	0	0.8	$1,343	$4,685	$345	3.5	3.2	2.9	$17,615	37.6%	Year 3
8	Lighting Upgrade: LED Lamps	115	61,683	0	0	3.1	$8,694	$36,828	$920	4.2	4.1	3.7	$99,091	29.6%	Year 3
9	Lighting Upgrade: LED Fixtures	58	34,768	0	0	1.7	$7,466	$68,416	$10,360	9.2	7.8	6.7	$49,653	15.6%	Year 3
10	Cold Water Flooding	0	63,086	32,605	0	65.1	$13,576	$96,269	$4,891	7.1	6.7	5.9	$101,556	17.9%	Year 4
11	Implement Demand Control Ventilation on Selected AHUs	0	0	8,350	0	15.9	$2,088	$22,330	$0	10.7	10.7	9.4	$4,378	9.5%	Year 5
	Totals:	**173**	**480,263**	**80,048**	**1,260**	**176.0**	**$74,292**	**$394,102**	**$22,315**	**5.3**	**5.0**	**4.5**	**$741,491**	**24.4%**	

As a result of these Opportunities, the energy intensity of the building will be reduced from 55 ekWh/ft² (2.13 GJ/m²) to 48.9 ekWh/ft² (1.9 GJ/m²), or by 11.0%. The utility cost intensity will be reduced by $0.32/ft² ($3.4/m²), or 6.6%. Emissions will be reduced by 176 Tonnes of CO_2e, or 14.3%.

Staging the implementation of these Opportunities over the next five years results in the following cash flow balance, annual utility savings, greenhouse gas reductions and paybacks:



5-Year Roadmap		Utility Savings				Emissions	Financials							
Year	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Reset Leisure Pool Temp, Liquid Pool Cover, Vending Misers & VFD on Filter Pumps	0	118,843	12,931	0	30.5	$13,452	$43,490	$1,875	3.2	3.1	2.9	$159,870	37.4%
2	Pool Waste Heat Recovery System & Floating Head Pressure Control	0	186,258	26,162	1,260	59.0	$27,673	$122,083	$3,924	4.4	4.3	3.8	$309,327	28.7%
3	Lighting Upgrades & Occupancy Sensors	173	112,075	0	0	5.6	$17,504	$109,929	$11,625	6.3	5.6	5.0	$166,360	22.1%
4	Cold Water Flooding	0	63,086	32,605	0	65.1	$13,576	$96,269	$4,891	7.1	6.7	5.9	$101,556	17.9%
5	Demand Control Ventilation on AHUs	0	0	8,350	0	15.9	$2,088	$22,330	$0	10.7	10.7	9.4	$4,378	9.5%
	Totals:	**173**	**480,263**	**80,048**	**1,260**	**176.0**	**$74,292**	**$394,102**	**$22,315**	**5.3**	**5.0**	**6.0**	**$741,491**	**25.9%**

In addition to the Opportunities outlined in the 5-Year Energy Savings Roadmap, Efficiency Engineering has investigated the following measures. These Opportunities should be pursued once items in the Energy Savings Roadmap have been addressed.

Longer Payback

The Longer Payback *Scenario* consists of Opportunities that are not as financially attractive as the Energy Savings Scenario. These measures should be considered when equipment failure occurs or as Capital Renewal projects as equipment approaches its end of life.

Longer Payback		Utility Savings				Emissions	Financials								
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR	Year to Implement
12	Install High Efficiency Flood Water Boiler	0	0	5,129	0	9.7	$1,282	$43,179	$769	33.7	33.1	4.6	$1,164	7.8%	Year 6+
13	Water Conservation: Install Waterless Urinals	0	0	0	299	0.0	$1,216	$19,192	$0	15.8	15.8	11.5	$307	7.5%	Year 6+
	Totals:	**0**	**0**	**5,129**	**299**	**9.7**	**$2,498**	**$62,371**	**$769**	**25.0**	**24.7**	**8.5**	**$1,471**	**7.7%**	

As a result of these Opportunities, the energy intensity of the building will be reduced from 48.9 ekWh/ft² (1.9 GJ/m²) to 48.7 ekWh/ft² (1.89 GJ/m²), or by 0.5%. The utility cost intensity will be reduced by $0.01/ft² ($0.12/m²), or 0.3%. Emissions will be reduced by 9.7 Tonnes of CO_2e, or 0.9%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

Limited Liability

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Acknowledgements

Report prepared by Thomas Kitson, B.S.M.E., CEM

Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at Old Town Hall, 460 Botsford St. in Newmarket, ON. The facility is a 12,862 ft² (1,195 m²), 2 story building originally constructed in 1883 with later additions and renovations in the 1970s and more recently in 2015. It serves primarily as an art gallery and auditorium. The original building construction consists of a brick veneer façade on re-enforced concrete block units for structural framing. The new construction is largely constructed with curtain walls and some vinyl siding.

Heating is provided a small Buderus condensing boiler. This supplies heating to the perimeter zones in the facility. Supplemental heating, cooling and ventilation is supplied by a number of air handling units located inside the facility and on the roof.

This facility has undergone numerous energy efficiency initiatives as a result of its expansion in 2015. Lighting in most areas of the facility are LED. CFL pin-based fixtures (pot lights, wall sconces, etc.) are also used commonly.

All HVAC equipment is fairly new and are still in good operating condition. They are also all on the local building automation system and scheduled properly. All water fixtures in the washrooms are low-flow. Storm windows have also been installed on the windows in the original building to help reduce heat loss without altering its exterior look.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

Energy Savings Scenario

The following Opportunities are recommended based on their potential for utility savings.

Energy Savings		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Upgrade to LED Retrofit Lamps	47	24,577	0	0	1.2	$4,116	$7,733	$2,458	1.9	1.3	1.2	$54,210	84.7%
2	Implement Demand Control Ventilation	0	633	8,174	0	15.6	$2,098	$12,142	$0	5.8	5.8	5.3	$14,889	19.5%
3	Install Rooftop Unit Staging Controls	0	3,750	0	0	0.2	$322	$3,855	$1,445	12.0	7.5	6.2	$2,850	17.8%
4	Install VFD on AHU-1 Supply Fan	17	12,428	0	0	0.6	$1,067	$11,667	$400	10.9	10.6	8.3	$6,166	12.6%
	Totals:	**64**	**41,389**	**8,174**	**0**	**17.6**	**$7,603**	**$35,396**	**$4,303**	**4.7**	**4.1**	**3.7**	**$78,115**	**28.8%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 46.3 ekWh/ft² (1.79 GJ/m²) to 36.5 ekWh/ft² (1.41 GJ/m²), or by 21.1%. The utility cost intensity will be reduced by $0.44/ft² ($4.68/m²), or 18.4%. Emissions will be reduced by 17.6 Tonnes of CO_2e, or 22.6%.

Longer Payback

The Longer Payback *Scenario* consists of Opportunities that are not as financially attractive as the Energy Savings Scenario. These measures should be considered when equipment failure occurs or as Capital Renewal projects as equipment approaches its end of life.

Longer Payback		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
5	Upgrade to LED Fixtures	24	9,821	0	0	0.5	$1,890	$30,635	$982	16.2	15.7	12.3	($2,830)	6.2%
	Totals:	**24**	**9,821**	**0**	**0**	**0.5**	**$1,890**	**$30,635**	**$982**	**16.2**	**15.7**	**12.3**	**($2,830)**	**6.2%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 36.5 ekWh/ft² (1.41 GJ/m²) to 35.7 ekWh/ft² (1.38 GJ/m²), or by 2.1%. The utility cost intensity will be reduced by $0.07/ft² ($0.71/m²), or 3.4%. Emissions will be reduced by 0.5 Tonnes of CO_2e, or 0.8%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

Limited Liability

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Acknowledgements

Report prepared by Shawn McGarrity

Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at the Seniors' Meeting Place, 474 Davis Dr., in Newmarket, ON. The facility is an 18,000 ft² (1,675 m²), one-story building. It serves primarily as a seniors' recreation center with a computer room, games room, craft room, a lounge and commercial kitchen, five (5) halls and a woodworking area. The building construction consists of vinyl siding on re-enforced concrete block units for structural framing.

Recent renovations on the building include two (2) new R410A rooftop units, a complete interior and exterior LED lighting retrofit, a new instantaneous hot water heater, and a new BAS.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides an implementation roadmap focusing on energy savings and capital renewal. The plan has been compiled based on multiple criteria including:

- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following Energy Savings Roadmap:

Energy Savings Roadmap		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	159	50	0.3	$231	$125	$0	0.5	0.5	0.5	$3,463	198.0%
2	Install Vending Machine Controls	0	963	0	0	0.0	$94	$330	$0	3.5	3.5	3.1	$1,209	35.0%
3	Add Electric Baseboard Heaters to BAS	0	6,606	0	0	0.3	$646	$5,141	$0	8.0	8.0	6.5	$5,412	16.8%
4	Implement Demand Control Ventilation on RTUs	0	1,046	3,914	0	7.5	$1,003	$11,000	$0	11.0	11.0	9.5	$2,188	9.6%
	Totals:	**0**	**8,615**	**4,074**	**50**	**8.2**	**$1,974**	**$16,596**	**$0**	**8.4**	**8.4**	**7.2**	**$12,272**	**14.6%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 21.9 ekWh/ft² (0.85 GJ/m²) to 19 ekWh/ft² (0.74 GJ/m²) and the utility cost intensity will be reduced by $0.11/ft² ($1.18/m²). Emissions will be reduced by 8 tonnes CO_2e, or 16%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

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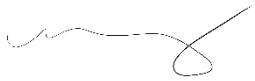
Acknowledgements

Report prepared by Carlin Sweeney, P.Eng., CEM



Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at the Newmarket Public Library, 438 Park Ave, Newmarket, Ontario. The facility is a 35,000 ft² (3,253 m²), 2 story building constructed in 1960's. The building construction consists of a brick veneer façade on re-enforced concrete block units for structural framing.

Heating is provided to the building by ten roof top units that operate based on thermostats found throughout the interior of the building. Supplementary heat is provided by electric baseboard heaters with manual controls. Cooling and ventilation are also supplied through the roof top units.

Domestic hot water is supplied to the building through a single electric domestic hot water heating tank.

Lighting within the building is primarilyT8 linear fluorescents and CFL pin-based lamps. The majority of these lamps and bulbs are found within pot lights and recessed troffers.

Recent renovations on the building include the installation of new roof top units.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

Energy Savings Scenario

The following Opportunities are recommended based on their potential for utility savings.

Energy Savings		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	6,822	0	236	0.3	$1,669	$178	$0	0.1	0.1	0.1	$26,806	988.4%
2	Upgrade to LED Retrofit Lamps	5	18,745	0	0	0.9	$2,758	$15,096	$1,984	5.5	4.8	4.2	$29,027	25.9%
	Totals:	**5**	**25,567**	**0**	**236**	**1.3**	**$4,427**	**$15,274**	**$1,984**	**3.5**	**3.0**	**2.8**	**$55,833**	**39.4%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 26.1 ekWh/ft² (1.01 GJ/m²) to 25.4 ekWh/ft² (0.98 GJ/m²), or by 2.8%. The utility cost intensity will be reduced by $0.1/ft² ($1.12/m²), or 5.4%. Emissions will be reduced by 1.3 Tonnes of CO_2e, or 1.4%.

Longer Payback

The Longer Payback *Scenario* consists of Opportunities that are not as financially attractive as the Energy Savings Scenario. These measures should be considered when equipment failure occurs or as Capital Renewal projects as equipment approaches its end of life.

Longer Payback		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
3	Upgrade to LED Fixtures	13	47,191	0	0	2.4	$8,656	$84,025	$5,008	9.7	9.1	7.7	$48,415	13.4%
4	Install a Building Automation System	0	47,813	1,821	0	5.8	$5,387	$133,681	$0	24.8	24.8	16.0	($47,137)	2.9%
5	Replace Windows	0	0	13,003	0	24.7	$2,991	$258,180	$0	86.3	86.3	66.9	($219,919)	-8.9%
	Totals:	**13**	**95,004**	**14,824**	**0**	**32.9**	**$17,034**	**$475,887**	**$5,008**	**27.9**	**27.6**	**18.3**	**($218,642)**	**1.1%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 25.4 ekWh/ft² (0.98 GJ/m²) to 18.3 ekWh/ft² (0.71 GJ/m²), or by 27.9%. The utility cost intensity will be reduced by $0.38/ft² ($4.11/m²), or 21.0%. Emissions will be reduced by 32.9 Tonnes of CO_2e, or 36.6%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

Limited Liability

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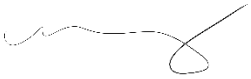
Acknowledgements

Report prepared by Graeme St.Clair

Report review by Carlin Sweeney, P.Eng., CEM



Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at Fire Station 4-1, 984 Gorham St., in Newmarket, ON. The facility is a 10,400 ft² (970 m²), two-story building. It serves primarily as a Fire Station, with a firetruck bay, fire prevention office, chief offices, and fire fighter quarters including, washrooms, lounge, kitchen, bedrooms, and a gym. The building construction consists of brick on re-enforced concrete block units for structural framing.

There have been no recent (within the last five (5) years) renovations on the building.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides an implementation roadmap focusing on energy savings and capital renewal. The plan has been compiled based on multiple criteria including:

- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following Energy Savings Roadmap:

Energy Savings Roadmap		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m^3)	Water (m^3)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Turn off Radiant Tube Heaters in the Summer	0	0	370	0	0.7	$85	$100	$0	1.2	1.2	1.1	$988	89.6%
2	Add Electric Baseboard Heaters to BAS	0	6,134	0	0	0.3	$613	$4,500	$0	7.3	7.3	6.1	$5,524	18.1%
3	Upgrade to LED Fixtures	0	30,658	0	0	1.5	$3,066	$40,000	$1,533	13.0	12.5	9.5	$11,636	10.4%
4	Install Lighting Controls	0	3,066	0	0	0.2	$307	$2,500	$240	8.2	7.4	6.1	$2,750	18.0%
Totals:		**0**	**39,858**	**370**	**0**	**2.7**	**$4,071**	**$47,100**	**$1,773**	**11.6**	**11.1**	**8.7**	**$20,898**	**11.8%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 38.4 ekWh/ft² (1.49 GJ/m²) to 34.3 ekWh/ft² (1.33 GJ/m²) and the utility cost intensity will be reduced by $0.39/ft² ($4.21/m²). Emissions will be reduced by 3 tonnes CO_2e, or 6%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

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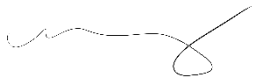

Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at Fire Station 4-2, 125 McCaffrey Rd., in Newmarket, ON. The facility is a 12,200 ft² (1,100 m²), one-story building. It serves primarily as a Fire Station, with a firetruck bay, chief offices, and fire fighter quarters including, washrooms, lounge, kitchen, bedrooms, and a gym and training room. The building construction consists of brick on re-enforced concrete block units for structural framing.

Recent renovations to the building include newer HVAC units (three internal units), installed in 2016 and an AO Smith condensing natural gas-fired domestic hot water heater tank, installed in 2014.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides an implementation roadmap focusing on energy savings and capital renewal. The plan has been compiled based on multiple criteria including:

- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following Energy Savings Roadmap:

Energy Savings Roadmap		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	110	35	0.2	$161	$75	$0	0.5	0.5	0.4	$2,430	229.6%
2	Upgrade to LED Fixtures	0	22,333	0	0	1.1	$2,233	$15,000	$1,117	6.7	6.2	5.3	$22,613	21.1%
3	Install Lighting Controls	0	2,233	0	0	0.1	$223	$2,500	$210	11.2	10.3	8.1	$1,360	13.0%
Totals:		**0**	**24,566**	**110**	**35**	**1.4**	**$2,618**	**$17,575**	**$1,327**	**6.7**	**6.2**	**5.3**	**$26,403**	**21.1%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 21.1 ekWh/ft² (0.82 GJ/m²) to 19 ekWh/ft² (0.73 GJ/m²) and the utility cost intensity will be reduced by $0.21/ft² ($2.31/m²). Emissions will be reduced by 1.4 tonnes CO_2e, or 4%.

Non-Financial Considerations

When implementing energy conservation measures, the health, safety and comfort of building occupants must always be considered. All recommendations within this report should be implemented according to local codes and regulations. Where applicable, additional training needs of staff are listed.

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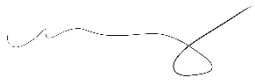

Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
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The Executive Summary

A comprehensive Energy Audit was performed by Efficiency Engineering at the Fire Training Centre, 623 Timothy St., in Newmarket, ON. The facility is a 18,800 ft² (1,700 m²), two-story building. It serves primarily as a Fire Training Centre, with a firetruck bay used for training purposes, offices, and fire fighter quarters including, washrooms, lounge, kitchen, and bedrooms. The facility will be used as a temporary fire station in a few months while one of the fire stations in the town is being renovated. After that, the facility may be re-purposed. The building construction consists of vinyl siding on re-enforced concrete block units for structural framing.

Recent renovations at the facility include two (2) new HVAC units installed in 2019.

Energy consumption, utility models and the equipment at the facility have been analyzed. Based on our findings, Efficiency Engineering recommends the following energy conservation Opportunities.

The Energy Savings Roadmap

The Energy Savings Roadmap provides an implementation roadmap focusing on energy savings and capital renewal. The plan has been compiled based on multiple criteria including:

- Energy savings
- Cost/benefit analysis
- The need for capital renewal
- Project costs, operating budgets and capital budgets
- Grouping Opportunities together to take advantage of economies of scale (e.g. groups of lighting measures) and/or lower mobilization costs for contractors (e.g. replacing heating and DHW boilers at the same time

Based on these criteria, Efficiency Engineering proposes the following Energy Savings Roadmap:

Master Measures		Utility Savings				Emissions	Financials							
Opp #	Opportunity	Demand (kW)	Electricity (kWh)	Natural Gas (m³)	Water (m³)	Tonnes of CO_2e	Annual Savings	Project Costs	Incentives	Simple Payback	SP Net Incentives	Capital Payback	NPV	IRR
1	Install Ultra-Low Flow Faucet Aerators in Washrooms	0	0	106	32	0.2	$147	$150	$0	1.0	1.0	1.0	$2,133	107.3%
2	Install Programmable Thermostats for HVAC	0	0	2,519	0	4.8	$579	$1,000	$0	1.7	1.7	1.7	$6,412	61.9%
3	Upgrade Exterior Fixtures to LED	0	2,190	0	0	0.1	$219	$3,000	$0	13.7	13.7	10.2	$579	9.3%
4	Upgrade Interior Fixtures to LED	0	20,167	0	0	1.0	$2,017	$25,000	$1,008	12.4	11.9	9.1	$8,966	11.0%
5	Install Lighting Controls	0	2,611	0	0	0.1	$261	$3,500	$300	13.4	12.3	9.3	$1,066	10.7%
Totals:		**0**	**24,968**	**2,625**	**32**	**6.2**	**$3,223**	**$32,650**	**$1,308**	**10.1**	**9.7**	**7.9**	**$19,157**	**13.3%**

As a result of these Opportunities, the energy intensity of the building will be reduced from 21 ekWh/ft² (0.81 GJ/m²) to 18.2 ekWh/ft² (0.7 GJ/m²) and the utility cost intensity will be reduced by $0.17/ft² ($1.85/m²). Emissions will be reduced by 6 tonnes CO_2e, or 10%.

Non-Financial Considerations

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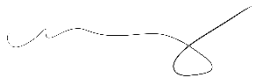

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