City of Belleville

5-Year Corporate Energy Conservation and Demand Management Plan

July 2019

Prepared in co-operation with VIP Energy Services, Inc.

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Introduction – Executive Summary

Background

The City of Belleville's Energy Conservation and Demand Management (ECDM) Plan was developed in response to Ontario Regulation 507/18 which requires all public sector organizations to complete an update to their original 2014 ECDM Plan by July 1, 2019. In response to this regulatory requirement, as well as rising energy costs, the City of Belleville has developed this Energy Conservation and Demand Management (ECDM) Plan. This comprehensive Plan is the most effective method of identifying energy conservation opportunities, selectively implementing the best projects and then measuring their effectiveness. The Plan has been developed to protect the interests of our constituents and ensure that the City of Belleville obtains the best possible value from our operating budgets. In addition to meeting our regulatory obligations, the City believes that a strong commitment to energy conservation and a reduction of energy use is demonstrated evidence of our belief in becoming a more sustainable community while operating in a cost-effective manner that respects the value of taxpayer dollars.

Purpose of the Plan

The 5-Year Corporate Energy Conservation and Demand Management Plan is designed to guide the City of Belleville towards a more energy-efficient future. The policies, practices and energy conservation measures identified illustrate the importance the City places on acting responsibly towards energy consumption through the wise use of resources in City operations.

To enhance our understanding of energy use and return on investment through conservation, this document contains a thorough review of the measures implemented since the creation of the original plan, issued on July 1, 2014. Since then, the City has initiated several substantial energy projects, yielding significant savings results including:

- City-wide street lighting replacements (2017)
- Arena and sports facility LED lighting conversions (2017-19)
- Yardman expansion and LED lighting upgrade (2017)
- Operations equipment and controls upgrades (throughout Plan period)

The wise and efficient use of energy are two of the lowest cost options for meeting energy demands. They also provide many other environmental, economic and social benefits, including reducing greenhouse gas (GHG) emissions, cost avoidance and savings. Along with the primary benefits, the responsible use of energy also promotes local economic development opportunities, energy system reliability, improved energy supply security and reduced-price volatility.

Following the path of our previous ECDM Plan, this document is a continuation of a process involving the:

- Integration of establishing and evaluating a baseline for performance to be measured against;
- Reviewing the effectiveness of previous conservation efforts while setting future performance goals and objectives;
- Continuous improvement through identification of energy conservation potential;
- Strategic alignment of improvement measure implementation and fiscal constraints; and,
- Evaluation, measurement and communication of results achieved.

The Plan takes advantage of internal expertise as well as all available external financial incentives and rebates currently being offered to support the implementation of energy savings ideas. The current energy picture for the City of Belleville and our future Vision, Goals and Objectives are outlined in 2.0 Energy Conservation and Management Policy. Our strategic focus areas are discussed in detail and our 5-year Action Plan is laid out.

1.0 Historic Energy Performance

Historical Energy Usage

Effectively managing energy requires the creation of a robust energy monitoring strategy. Establishing an accurate energy baseline is an essential first step in this process. This baseline assists with energy conservation and greenhouse gas reduction target setting, energy procurement and budgeting, bill verification, energy awareness, and the selection and assessment of potential energy projects. The City of Belleville, similar to many other communities, relies on utility bills to establish this energy baseline.

Throughout the previous plan period, several changes to the City's building fleet have taken place. These include:

- Facilities removed:
  - Firehalls 2 and 3
  - Irish Hall – 16 Church St.
  - 254 Cannifton Road (archives are now located in the Library)
  - Belleville Water (195 College) occupants moved out in March/April 2018

- Facilities added:
  - Firehalls 1, 3 and 5
  - Transit Garage – 400 Coleman
  - 31 Wallbridge
  - CAA Centre
  - Operations Buildings – 181, 181A, 183A, 179 Pinnacle St.

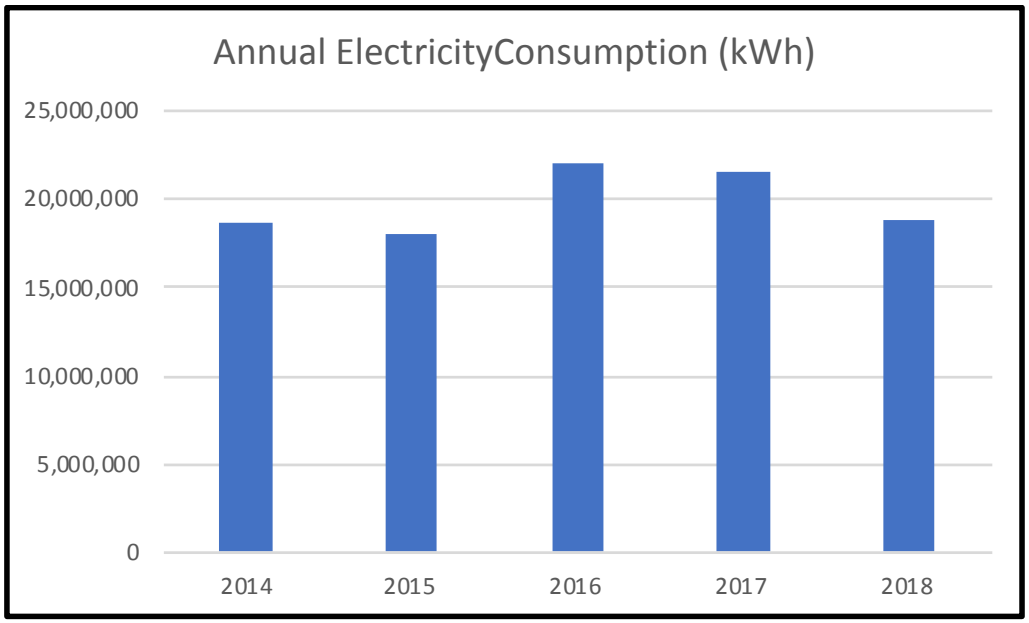
To evaluate the effectiveness of the City's previous energy conservation measures, the year 2013 was chosen as the base year for measurement; this aligns with the Ministry of Energy's Regulation 507/18 requirements for reporting. Overall, the City's consumption in 2013 was 18.1 million kWh of electricity and 958,000 m^3 of natural gas. This usage equates to spending $1.8 million for electricity and $340,000 for natural gas for the year (2013). The breakdown of energy use by facility type is captured in Figure 1-1.

Figure 1-1 – Energy Use by Facility Type in 2013

Facility Type	Electricity Use (1,000's kWh)	Natural Gas Use (1,000's m3)
Administrative offices and related facilities, including municipal council chambers	1069.03	95
Community centres	144	17
Cultural facilities	89	11
Facilities related to the treatment of sewage	3,269	138
Facilities related to the treatment of water	3,870	123
Fire stations and associated offices and facilities	158	34
Gyms and indoor courts for playing tennis, basketball or other sports	5	-
Indoor ice rinks	4,248	12
Indoor recreational facilities	3,940	328
Police stations and associated offices and facilities	367	22
Public libraries	438.07	57.03
Storage facilities where equipment or vehicles are maintained, repaired or stored	527.65	119.21

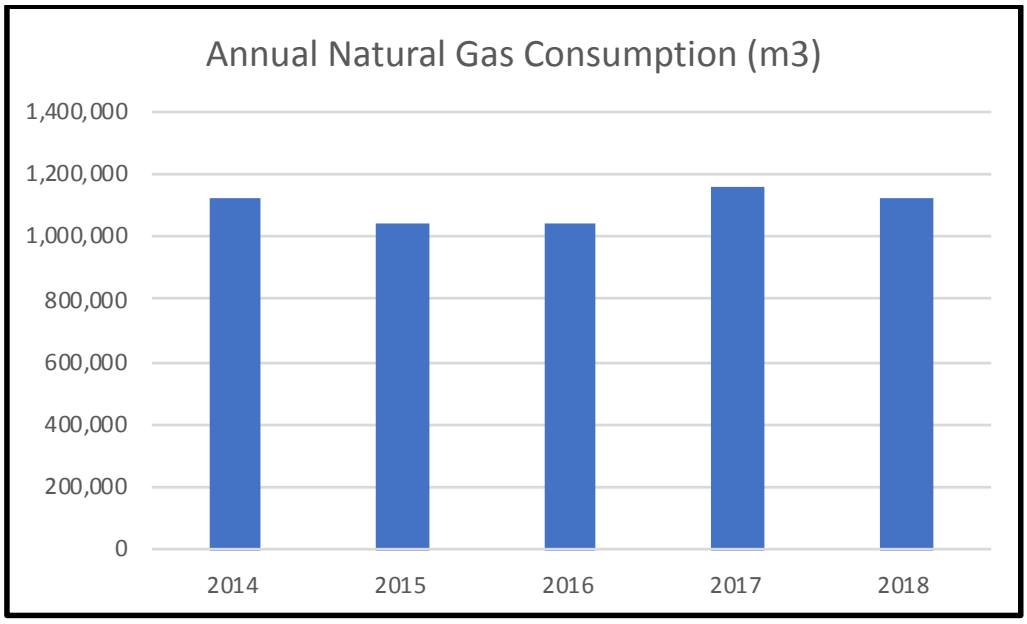
For comparative purposes, the raw energy consumption breakdowns by year since the original baseline for the City are outlined in Figure 1-2 and Figure 1-3.

Figure 1-2 – Electricity Use (2014 – 2018)



Electricity use was approximately 18,700,000 kilowatt hours in 2014, 18,100,000 in 2015, 22,000,000 in 2016, 21,600,000 in 2017 and back down to approximately 18,800,000 in 2018.

Figure 1-3 – Natural Gas Use (2014 – 2018)

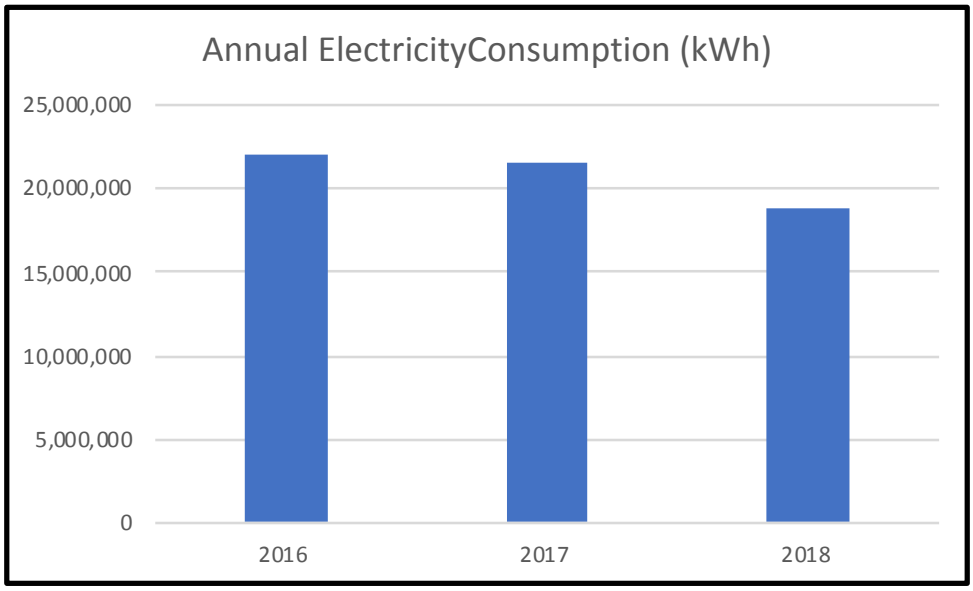


Natural gas consumption was approximately 1,123,000 cubic metres in 2014, 1,038,000 in 2015, 1,045,000 in 2016, 1,156,000 in 2017 and 1,125,000 in 2018.

City of Belleville Energy Baseline Analysis

In the original ECDM Plan, the City set a target of a 5% reduction in energy consumption over the 5-year term of the Plan (2014-2019). The data above illustrates that the City did not meet this target. However, examining the 2016 to 2018 period, the City has achieved a 14% reduction in raw electricity consumption after a period of increased consumption from 2014 to 2016. This indicates that more recent efforts to reduce consumption are having a significant impact. Figure 1-4 compares the annual consumption in kilowatt hours between 2016, 2017, and 2018. Consumption was approximately 22,000,000 kWh in 2016, 21,600,000 kWh in 2017, and 18,800,000 in 2018.

Figure 1-4 – Electricity Consumption 2016 to 2018 (kWh)



Energy Conservation Project Successes

Since the creation of the last 5-Year ECDM Plan, the City has initiated significant investments in energy efficiency and energy-cost reduction. These projects include:

Facility-Related Projects

- Arena and sports facility LED lighting conversions (2017-19)
- Yardman expansion and LED lighting upgrade (2017)
- Operations equipment and controls upgrades (throughout Plan period)

City-Wide Street Lighting

In 2017 the City of Belleville embarked on a major street lighting retrofit across the City. This project included the replacement of over 4,000 HPS street lights.

Savings and Incentives

In all, the City of Belleville received incentives of over $45,000 for facility-related projects and an additional $386,000 for the street lighting initiatives. These projects have created a combined energy savings of over 2.8 million kWh (258,000 kWh for facilities and 2,569,202 kWh for street lighting) avoiding $345,000 in energy costs.

2.0 Energy Conservation and Management Policy

Our Commitment

The City of Belleville remains committed to allocating staff and financial resources to develop and implement this Energy Conservation and Demand Management (ECDM) Plan to reduce energy consumption and lessen its environmental impact. As an organization, we value the notion of protecting taxpayer interests through efficient operations and creating a more sustainable community.

We are committed to managing energy responsibly and will use energy efficiency practices throughout all of our facilities, fleet, operations and equipment wherever it is cost effective to do so.

Our Vision

The City of Belleville will endeavour to minimize energy consumption, costs, and carbon emissions by continuously improving its energy management practices without compromising the level of service delivery to the community.

Our Goals and Objectives

As part of our 2019 ECDM Plan, the City will focus on several strategies to achieve specific goals and targets with regards to energy management. We have re-examined our past objectives and are re-committing to this updated version.

1. Reduce energy intensity in City facilities by 5% by 2024 compared to our revised base year (2018).

2. Enhance our culture of conservation through training and outreach to staff, building users and outside contractors. Through targeted training and knowledge-sharing, City employees will be empowered to reduce energy consumption.

3. Create a comprehensive corporate energy management policy by re-examining key existing business practices to include energy efficiency standards and energy management best practices.

4. Expand our monitoring and tracking program for energy use by providing up-to-date energy information to make energy consumption

visible to everyone in the Corporation and support facility/management decision-making.

5. Deliver energy cost savings through the identification and implementation of processes, programs and projects that will reduce energy consumption.
    - Re-assess and benchmark the top energy consuming facilities across the Corporation (2019)
    - Review previously identified energy savings opportunities by reviewing past energy audits and plan to renew energy audits and analysis of the capital asset renewal program. (Ongoing)
    - Review and/or enhance standard operating and maintenance procedures to include energy conservation best practices. (Ongoing)
    - Seek funding for energy-related projects from various sources to enhance the payback and reduce implementation costs. (Ongoing)

Strategic Action Plan

To achieve our new ECDM Plan, the City will employ three strategic actions designed to ensure a positive outcome over the next 5 years. These key strategies support the delivery of our Goals and Objectives.

Strategy 1. Corporate Practices

Develop Corporate policies and practices that support the energy conservation effort and show leadership and commitment within the Corporation and community.

- Energy Management Team: Roles, Responsibilities and Accountability
- Energy Procurement

Strategy 2. Education, Awareness & Outreach

Provide the guidance, leadership and framework necessary to empower employees and develop a culture of conservation.

- Energy Skills Training Program
- Energy Awareness Campaign
- Feedback System for Employee Suggestions, including Recognition Program
- Employee Brainstorming Sessions

Strategy 3. Energy Conservation Action Plan and Energy Information Management

Continually identify and deliver energy conservation processes, programs and projects in all areas of the Corporation (facilities, fleet, equipment, water plants etc.). Demonstrate sound operating and maintenance practices to complement the energy efficiencies implemented through the capital asset renewal program. Employ a robust Energy Information Management System to ensure that all conservation activities are measured and verified to ensure the City receives and maintains specified energy reductions and savings.

Energy Conservation Action Plan

- Key facility energy audits and re/retro-commissioning studies
- Asset renewal plan and energy conservation project delivery
- Standard facility operations procedure review

Energy Information Management

- Maintenance of the online energy monitoring and reporting system (electricity and natural gas)
- Regular Energy Use Review presentations for senior leadership, accountable staff and energy users
- Reporting requirements for Regulation 507/18 (formerly 397/11)
- Consistent updates and review of key performance indicators (KPIs) / Benchmarking
- Standardize and implement project measurement and verification

3.0 Strategy 1: Energy Management Corporate Practices

The City of Belleville will focus on implementing corporate practices, including key personnel deployment, to ensure a strong focus on energy management and savings. These efforts remain a key component of our renewed ECDM Plan.

The Energy Management Team: Roles and Responsibilities

Energy Sponsor: Property Supervisor

The Energy Sponsor is ultimately responsible for creating budgets, securing spending authority and resources for the program and is the highest-ranking management person on the Energy Management Team. This role is responsible for setting and/or legitimizing the program's high-level goals and objectives, keeping track of major project activities and approving resources and funding for the team and its approved projects.

Energy Education & Outreach Coordinator: Green Programs Coordinator/Public Education

The Education & Outreach Coordinator will coordinate meetings, set agendas, and help the Energy Management Team maintain momentum, particularly when barriers arise. The Education & Outreach Coordinator will assist in the development and implementation of the Education, Awareness and Outreach program and will be responsible for ensuring that the monitoring and tracking systems for energy are accurate and complete.

Corporate Energy Management Team

The Corporate Energy Management Team functions on a strategic level to set energy management and conservation expectations for each of the facilities, develop metrics for tracking overall energy improvement, and build accountability for energy management activities. As a group, the team supports and monitors the energy management initiatives (processes, programs, and projects) at the various facilities and across the Corporation.

The Energy Management Team currently includes the following positions:

- Property Supervisor
- Green Programs Coordinator/Public Education
- Special Projects Manager

Actions: Continue to seek cross-departmental membership and support for the Energy Management Team. Continue to meet regularly to discuss the Energy Management Program to ensure implementation of new savings ideas, as well as maintain the positive momentum built over the past 5 years.

Energy Procurement

The City continues to utilize the natural gas procurement service provided by Local Authority Services (LAS). This program provides options for fixed-price natural gas procurement services to maintain predictable natural gas commodity costs. In addition, the program permits the City to work together with a large number of other municipal entities throughout the province to create bulk-buying power to leverage aggregated energy purchasing opportunities.

Actions: Continue to review the LAS program annually and evaluate the City's level of participation. Review potential alternative programs for merit and analyze the net result of participation annually.

4.0 Strategy 2: Education, Awareness and Outreach

The City will create a functional Education, Awareness and Outreach program to assist with the maintenance of a culture of conservation. This will be achieved by raising the level of awareness, understanding and general knowledge amongst staff regarding energy spending, usage and conservation. The City will use a combination of outreach and engagement strategies as well as hands-on training to enhance our energy reduction efforts. Energy will be encouraged to be a regular agenda item at staff meetings, when appropriate, to solicit new ideas for reduction of energy use, promote continued awareness of the cost of energy and ensure that energy conservation remains a key consideration for all City employees.

The Education, Awareness and Outreach program will endeavour to keep employees informed on the City's energy reduction efforts and current performance while also giving the Energy Management Team a better understanding of how building users consume energy and identify opportunities for improvement.

The program is comprised of the following focus areas:

Energy Skills Training Program

The Energy Skills Training Program is a vehicle for City employees to continue to develop a general awareness and understanding of current energy use within City facilities as well as skills to identify opportunities for improvement. The Training Program will target employees whose day-to-day tasks and/or decisions can have a significant impact on energy consumption. It will combine both general knowledge training and hands-on experience to gain maximum benefit.

Employee Brainstorming Sessions are an important part of the Energy Skills Training Program and will be used to generate new ideas for energy conservation. As regular users and managers of City facilities, our employees are one of the City's most valuable resources to both generate and implement our energy conservation strategies.

Energy Awareness Training Program

The Energy Awareness Training Program will be developed to provide consistent energy conservation messaging throughout all departments using Community-Based Social Marketing (CBSM) techniques to engage all users

of City facilities. Specific methods could include conservation tips, eye-catching posters, and other relevant marketing tools.

Feedback System for Employee Suggestions

The City will implement a feedback system to encourage employees and facility users to provide input and ideas. The messages can be sent to a specific address and are forwarded to members of the Energy Management Team in order to ensure prompt response. The Energy Management Team members can engage relevant employees to ensure that all suggestions are captured and explored, and employees are recognized for ideas that translate into real energy savings

Actions: Review available energy training opportunities both generally (i.e. all staff) and for specific facilities (i.e. water plant). Establish and maintain at least annual Outreach and Engagement efforts to keep energy conservation 'top-of-mind' for staff and stakeholders.

5.0 Strategy 3: Energy Conservation Activities and Information Management

Energy Conservation Action Plan

The Energy Conservation Action Plan forms the blueprint for implementing energy conservation and cost saving measures. The City has created a list of potential projects based on previous facility energy audits, capital replacement plans and detailed knowledge of each facility's functional operations. The below action plans have been created to guide the City of Belleville through this process based on a prioritized implementation schedule. All available incentives and funding sources will be explored to minimize the implementation cost of each measure. In addition to the measures shown, the City anticipates that further energy audits, completed over the next 5 years, will augment the list of available energy conservation measures.

The City's five-year implementation strategy is outlined in Figure 5-1. The strategy highlights measures scheduled for completion as part of our ongoing maintenance program along with measures that require further investigation to determine feasibility based on economic and operational considerations. The year in which we anticipate a measure will be implemented is identified in Figure 5-1 by an X.

Figure 5-1 – Implementation Strategy of Measures

Implementation Measure	2019	2020	2021	2022	2023
Lighting: High-efficiency Lighting Systems (T-8, T-5, CFL, LED)	X	X	X	X	X
Lighting: Outdoor Lighting		X			
Lighting: Occupancy Sensors		X	X		
HVAC: Efficient Boilers (near condensing)			X	X	
HVAC: Energy Efficient HVAC Systems	X	X	X	X	X
HVAC: Energy Efficient Rooftop Units					
HVAC: High-efficiency Domestic Hot Water			X		X

Implementation Measure	2019	2020	2021	2022	2023
HVAC: VFD	X	X			
Controls: Building Automation Systems – New		X			
Controls: Building Automation Systems – Upgrade			X		
Building Envelope: New Roof	X	X	X	X	X
Building Envelope: New Windows					
Energy Audits: Engineering Audit	X	X	X	X	X
Training and Education: Targeted Building Operator Training	X	X	X	X	X
Training and Education: Energy Benchmarking Program	X	X	X	X	X
Training and Education: Building Automation Training (site specific)		X			
Training and Education: Development of Training and Awareness Programs for Energy Conservation	X	X	X	X	X
Training and Education: Detailed information on Building Operational Costs	X	X	X	X	X
Training and Education: Detailed information on Energy Consumption	X	X	X	X	X

Actions: Maintain a schedule of energy audit renewals to ensure that our list of measures is up-to-date and that previous measures are still functional and providing savings. Perform periodic reviews of available incentives and stay up-to-date on potential sources of funding to offset the implementation costs of the proposed future measures. Review the list of measures at least annually and update as necessary.

Energy Information Management

Online Energy Monitoring and Reporting System

The City of Belleville has implemented an online system for managing and reporting its energy consumption (electricity and natural gas). The motivation for this effort is the notion that "you can't manage what you are not aware of". By making our energy usage visual, and up-to-date, all personnel with access to the information can benefit from understanding the nature of energy use in their facilities, as well as the impact their actions or inactions have on the City's overall energy cost and budgeting. This information is also key in evaluating the potential of new conservation projects as well as measuring the effectiveness of initiatives already taken.

Actions: Continue to gather and upload energy data into the Energy Information Management System regularly and analyze the data for patterns and savings opportunities.

Energy Management Presentations for the Community, Council, Accountable Staff and Energy Users

To gain traction for the initiatives within this Plan and ensure that the City of Belleville reaches its stated reduction targets, it is imperative that information regarding energy usage and cost, as well as the City's energy conservation plans and projects, are well understood and top of mind of everyone from front-line employees to senior department heads and City Council. This broad awareness will lead to additional buy-in and support for the City's continued efforts to reduce its energy usage and spending.

Actions: Make energy a key topic at staff and senior management meetings as well as provide an update on energy use and conservation to Council, at least annually.

Key Performance Indicators (KPI's) and Monitoring and Verification

To ensure momentum continues, and the City of Belleville receives value-for-money with regards to its energy conservation efforts, a rigorous program of establishing KPI's and then monitoring and verifying ongoing savings is an essential element of this Plan. By establishing agreed upon KPI's, as suggested in Figure 5.2, and then performing regular and frequent monitoring, not only will City personnel be able to verify that savings expected from various projects is achieved but that the savings continue for the duration of the project or retrofit's useful life. This practice will protect

the City's investments as well as provide transparency and support for successful savings initiatives.

Figure 5.2 – KPI Suggestions

Facility Type	Energy KPIs	Measured Variables
Cultural Facilities, Indoor Recreational Facilities and Community Centres	Baseline Electricity (Summer / Winter / Shoulder Season) • kWh / month • Peak kW / month Baseline Natural Gas • m^3 / month Other Energy Sources	• Daily Weather • Occupancy Rates / month • Sheet rentals / month
Facilities Related to Treatment or Pumping of Water or Sewage	Baseline Electricity (Summer / Winter / Shoulder Season) • kWh / month • Peak kW / month Baseline Natural Gas • m^3 / month Other Energy Sources	• Daily Weather (Temperature and Rainfall) • m^3 treated water or waste water / day
Administrative Offices	Baseline Electricity (Summer / Winter / Shoulder Season) • kWh / month • Peak kW / month Baseline Natural Gas • m^3 / month Other Energy Sources	• Daily Weather

Public Libraries	Baseline Electricity (Summer / Winter / Shoulder Season) • kWh / month • Peak kW / month Baseline Natural Gas • m^3 / month Other Energy Sources	• Daily Weather • Occupancy
Fire Stations and Associated Offices	Baseline Electricity (Summer / Winter / Shoulder Season) • kWh / month • Peak kW / month Baseline Natural Gas • m^3 / month Other Energy Sources	• Daily Weather • Occupancy
Storage Facilities	Baseline Electricity (Summer / Winter / Shoulder Season) • kWh / month • Peak kW / month Baseline Natural Gas • m^3 / month Other Energy Sources	• Daily Weather
Street Lighting	Electricity	• Number of Lights
Recreation and Outdoor Lighting	Baseline Electricity (Summer / Winter / Shoulder Season) • kWh / month • Peak kW / month	• Occupancy or Rentals / Month • Opening / Closing Dates
Fleet	Baseline Diesel Use Baseline Gasoline Use	• Number of Vehicles • km driven / month

Actions: Review all conservation initiatives to understand the most appropriate monitoring and verification process. Review the project savings at pre-defined regular intervals and report outcomes to senior management/City Council.

Ongoing Ontario Regulation 507/18 Reporting

In addition to completing this Plan, the City of Belleville is required to submit annual energy consumption and greenhouse gas emissions templates to the appropriate Ministry of Energy portal. Gathering and recording monthly energy invoices are necessary to complete these reports.

Actions: Complete all required regulatory reporting by July 1 of each year.