



Attachment #1

Region of Durham

Corporate Energy Conservation and Demand Management Plan, 2019 to 2024

Prepared by:

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1. Introduction

The Regional Municipality of Durham (the Region) is the largest geographical jurisdiction in the Greater Toronto Area (GTA), encompassing an area totaling 2,535 square kilometres. There are eight local municipalities within the Region's boundaries including: the cities of Oshawa and Pickering, the towns of Ajax and Whitby, the Municipality of Clarington and the northern rural townships of Brock, Scugog and Uxbridge. The Region is home to over 680,000 residents, the majority living in the urban municipalities along Lake Ontario's northern shore in Pickering, Ajax, Whitby, Oshawa and Clarington. The Region's Official Plan notes that the population is anticipated to increase to 894,575 by 2026 and 960,000 by 2031.

Regional services include transportation, water supply, sanitary sewerage, solid waste management and related public works, emergency services (e.g. Regional police, paramedic services, etc.), public health, social services (e.g. child care and family services, long-term care, social housing etc.) and transit services. The Region owns over 300 facilities supporting the delivery of its services.

Facility-related electricity needs are supplied by electrical distributors, including Hydro One Networks, Oshawa Public Utility Commission (PUC) Networks and Elexicon Energy (formerly Whitby Hydro and Veridian Connections which merged effective April 1, 2019). Natural gas requirements are supplied through Enbridge Gas Distribution (EGD). Fuel oil, propane and diesel fuel are provided through various fuel distributor contracts. Energy related expenditures are a significant operational cost. Excluding fleet-related fuel, the Region in 2018 incurred over \$28 million (including taxes) on energy related costs, utilizing approximately 1.1 million gigajoules (GJ) of billed energy.¹ It is estimated that 2018 energy use resulted in over 29,000 tonnes of associated greenhouse gas (GHG) emissions, measured in carbon dioxide-equivalent (CO₂e).

Over the course of the 2014 to 2019 Energy Conservation and Demand Management Plan (CDM Plan), endorsed by Regional Council on June 4, 2014 (Report #2014-J-17), Regional staff implemented a multitude of measures which enhanced energy efficiencies across program areas. These measures significantly improved processes and systems to ensure energy management remains a key consideration in day-to-day functions and planning activities. In addition to organizational measures put in place to further integrate energy efficiency into existing operations, as well as asset management, financial planning and budget processes, CDM-related initiatives are estimated to have resulted in the following energy and/or related cost and emissions savings benefits to the Region since 2014:

- Almost 37 million kWh and 12 million m³ in avoided electricity and natural gas usage, respectively (total energy avoidance of almost 0.6 million GJ and cost avoidance of over \$8 million²);

¹ The CDM Plan reports on all non-fleet directly billed energy for Regional facilities and operations, including York Region's share of Duffin Creek Water Pollution Control Plant (WPCP) for which Durham is billed and subsequently reimbursed by York Region.

² Assuming a uniform \$0.13/kWh for electricity saved and \$0.30/m³ for natural gas saved.

- Total emissions avoidance of over 23,000 tonnes of CO₂e due to energy usage reductions/avoidance;
- An additional \$10.6 million of electricity cost avoidance through peak demand curtailment initiatives by staff managing the largest end-use accounts; and,
- Approximately \$5.6 million received or to be received from senior government and/or local electrical and natural gas utilities.

This proposed 2019 to 2024 CDM Plan identifies additional measures and outlines next steps to continue improving and integrating energy management into financial planning, asset management programs and annual business plans and budgets, and building upon many successes realized to-date.

2. The Scope of Regional Energy-Consuming Assets

An overview of Regional operations falling within the scope of the 2019 to 2024 CDM Plan is outlined in Table 1 by operational area. The summary is an overview of 2018 year-end corporate assets utilizing energy based on end-use utility accounts for which the Region was directly responsible for billing at December 31, 2018.

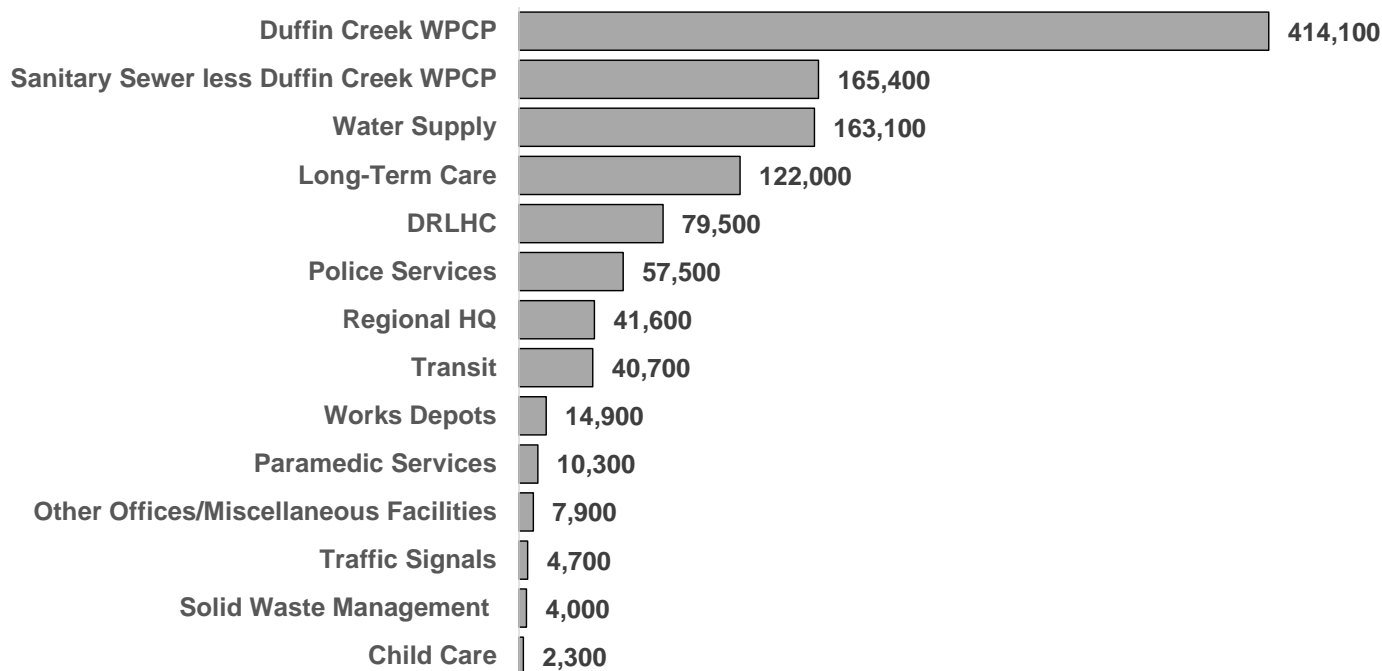
Table 1: Regional Asset Energy Account Profile by Operational Area (at December 31, 2018)¹

Operational Area		Description
Regional Facilities	Child Care Facilities	Five Regionally-owned child care centres with total combined Gross Floor Area (GFA) of just under 22,400 sq ft.
	Transit	Three Regionally-owned Transit maintenance facilities with total combined GFA of just under 188,000 sq ft.
	Solid Waste Management	Five Regionally-owned locations with total combined GFA of over 37,000 sq ft. (not including Materials Recovery Facility (MRF) or Durham York Energy Centre (DYEC) operated under contract). End-use accounts shared with Garrard Rd Water Pumping Station and Reservoir.
	Paramedic Services	Eight Regionally-owned stations and four leased facilities with total combined GFA of over 76,500 sq ft.
	Police Services	Eight Regionally-owned stations and five leased facilities with total combined GFA of over 362,000 sq ft.
	Long-Term Care	Four Regionally-owned LTC facilities with total combined GFA of over 717,000 sq ft.
	Social Housing	17 Durham Regional Local Housing Corporation (DRLHC) bulk-metered seniors buildings (just under 600,000 sq ft) and DRLHC family units in City of Oshawa (over 388,000 sq ft).
	Works Maintenance Depots	Five Regionally-owned Works Depots with total combined GFA of over 105,000 sq ft. (excluding salt/sand domes, sheds, etc).
	Regional HQ & Other Offices/Misc.	Two Regionally-owned facilities, including Regional Headquarters and 101 Consumer Dr. facility (Health and Traffic Operations) with total GFA of almost 407,700 sq ft. (not including parking garage). Additional leased space for Health and Social Services (several locations) with total GFA of over 61,600 sq ft. Smaller misc. account sq ft not included.
Transportation	Traffic Signals	Over 400 individually-billed traffic signal accounts.
Water Supply		14 water supply plants and well systems, 18 water pumping stations, 22 water storage facilities and other miscellaneous vertical infrastructure.
Sanitary Sewerage		11 wastewater treatment facilities (including Duffin Creek WPCP), 51 wastewater pumping stations and other miscellaneous vertical infrastructure.

¹ As per O.Reg 507/18, energy reporting covers energy usage for designated facilities and excludes fleet and other related energy uses.

As noted in Figure 1, the Duffin Creek wastewater system represents Durham’s largest billed share of total energy usage. Duffin Creek WPCP, including York share of plant expenditures, represents 96 per cent of total energy usage for the Duffin system as a whole. Water supply and sanitary sewer treatment and distribution operations as a whole combine to represent two-thirds (66 per cent) of total energy consumption.

Figure 1: 2018 Energy Usage by Operational Area (Total GJ)¹



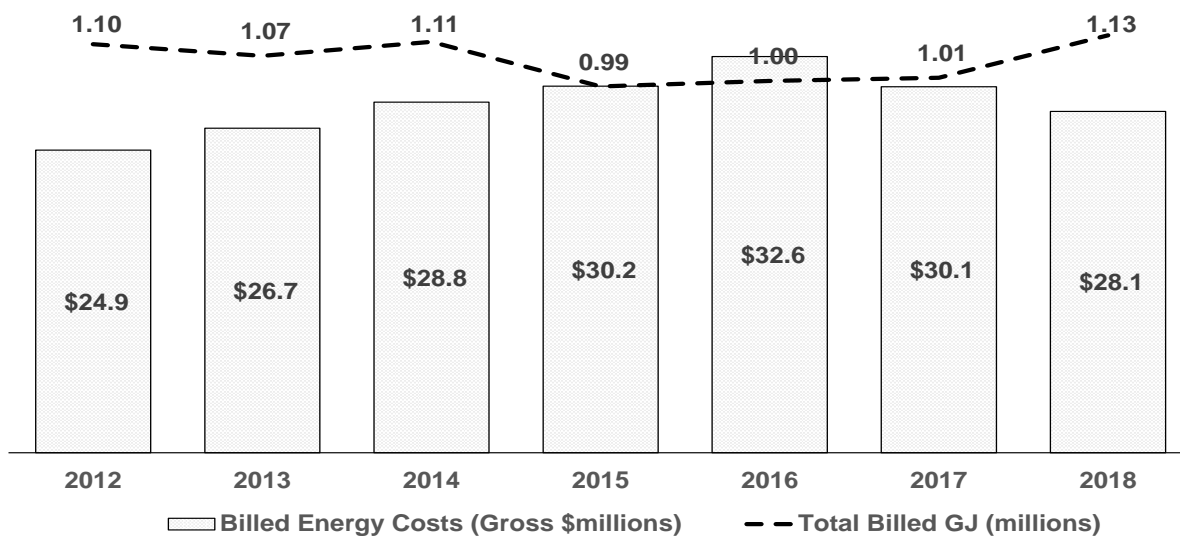
Other significant end-users include Long Term Care (LTC) facilities at approximately 11 per cent of corporate energy use, Durham Regional Police Services (DRPS) at five per cent and the Regional Headquarters (HQ) facility at approximately four per cent. Durham Regional Local Housing Corporation (DRLHC) multi-residential buildings and family units account for approximately seven per cent of billed energy use.²

The baseline year of 2012 was established to measure progress over the 2014 to 2019 CDM Plan time horizon. As indicated in Figure 2, total energy usage from 2012 to 2018 remained relatively flat, exhibiting less than a three per cent increase overall in absolute terms, despite the addition of new facilities and processes to meet the growing needs of the Region. Despite growth in Regional services and facilities over the 2012 to 2018 timeframe, the Region’s total annual energy consumption, once adjusted for York Region’s share of Duffin Creek WPCP, has declined by approximately one per cent on a per-capita basis over the 2012 to 2018 period.

¹ Duffin Creek WPCP energy usage is reported as gross billed and includes York Region’s share. Solid Waste Management does not include the Materials Recovery Facility (MRF) or Durham York Energy Centre (DYEC), as the Region does not receive direct utility billing for these accounts.

² The Region is responsible for all bulk-metered energy usage in multi-residential buildings and natural gas billings for family units. While electricity consumption for Durham Regional Local Housing Corporation (DRLHC) family units is the responsibility of tenants, the Region is responsible for energy consumption for vacated units and common areas. Regardless, the Region has employed numerous CDM initiatives at DRLHC family units where benefits would be realized at the tenant billing level.

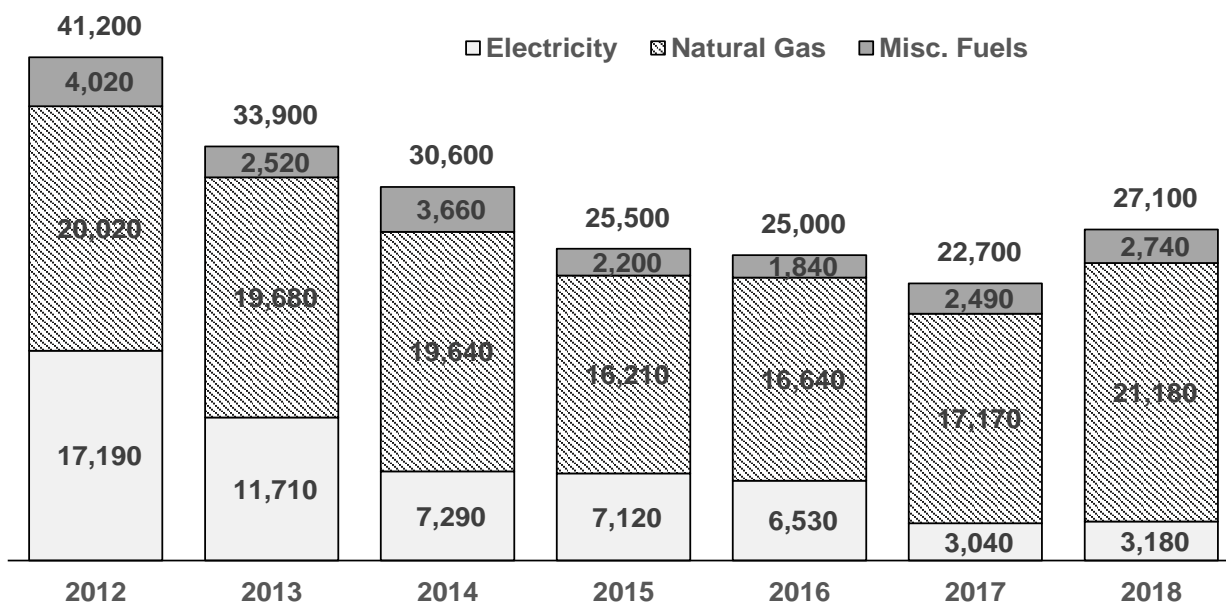
Figure 2: Total Facility Energy Expenditures and Usage (2012 to 2018)



Annual energy costs have declined since peaking in 2016, due in large part to continued decreases in natural gas pricing and impacts of the Industrial Conservation Initiative (ICI), in which nine large participating Regional end-use accounts curtailed electricity demand.

Facility emissions (Figure 3) declined from 2012 to 2017 but have since increased, largely due to higher natural gas and fuel oil consumption at Duffin Creek WPCP and new facilities (e.g. new DRT Maintenance Facility in Oshawa and Sunderland RDPS ambulance station). Furthermore, with actual energy use reported (not weather normalized), seasonal climate variations and enhanced heating and cooling demands from one year to next may also occur.

Figure 3: Total Facility Emissions by Fuel Type (2012-2018)



Additional technical metrics for energy performance and related costs over the 2012 to 2018 period are presented in Attachment #3 by operational program area.

3. CDM Plan Technical and Operational Measures: 2014 to 2019 Progress

Since 2014, Regional staff have implemented hundreds of initiatives that have yielded energy and related cost savings benefits. Corporate-wide initiatives have included, but are not limited to:

- Upgrading interior and exterior lighting to newer technologies (i.e. light-emitting diode or LED) and additional lighting controls;
- Energy efficient appliance upgrades at DRLHC family units and seniors' buildings;
- Upgrades to HVAC systems (make-up air units, exhaust fans, implementation of energy-recovery ventilators or ERVs), building-automation systems (BAS), boilers (both heating and domestic hot water) and roofs, windows, doors and insulation;
- Water pump refurbishments, replacements and optimization strategies;
- Construction of new energy-efficient Regional facilities;
- Peak demand curtailment for the largest end-use accounts/facilities; and,
- Digester gas utilization at wastewater treatment facilities.

Many of the initiatives completed, underway or in the process of planning/implementation have been identified through Regional staff review. Many initiatives were part of improvements to systems/processes and/or resulted from end-of-life asset replacements with more efficient units. The Region has also been successful over the previous five years in maximizing grant funding opportunities through senior government and utility programs (e.g. Home Assistance Program, Embedded Energy Manager Program).

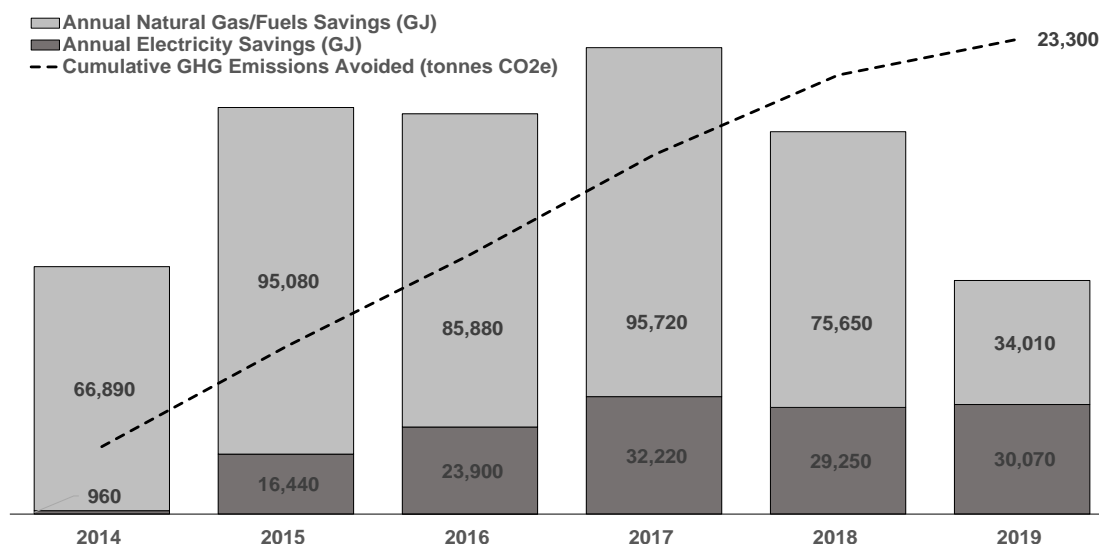
As shown in Figure 4 (and further detailed in Attachment #2), energy use avoidance, resulting from various measures since 2014, is estimated to have resulted in the following energy and/or related cost and emissions savings benefits to the Region:

- Avoided electricity usage of almost 37 million kWh and avoided natural gas usage of almost 12 million m³;
- Total energy avoidance of just under 0.6 million GJ and related cost avoidance of over \$8 million;¹
- Total emissions avoidance of over 23,000 tonnes of CO_{2e} due to energy usage reductions/avoidance;
- An additional \$10.6 million of electricity cost avoidance through peak demand curtailment initiatives by Regional staff managing the largest end-use accounts; and,

¹ Assuming a uniform \$0.13/kWh for electricity saved and \$0.30/m³ for natural gas saved. Given changes in electricity generation emission intensity over time, annual emissions avoidance in Attachment #2 summary tables reflected as peak year of annualized emissions. Figure 4 emissions avoidance is reflective of reduced emission intensity of electricity from 2014 to 2019.

- Approximately \$5.6 million received or to be received from senior government and/or local electrical and natural gas utilities (\$1.6 million through utilities, \$3.8 million from the Social Housing Apartment Improvement Program (SHAIP) and \$0.2 million from Clean Water and Wastewater Funding (CWWF) for Phase 2 of the Courtice WPCP IRR Study).

Figure 4: 2014 to 2019 (to date) CDM Initiatives – Energy and Emissions Avoidance



The estimates provided are conservative, given numerous initiatives are anticipated to have energy and cost savings benefits which have yet to be quantified. Further, CDM measures that have not been completed, are underway or planned for implementation may not be quantified due to the stage of project scoping or lack of information.

4. CDM Plan Organizational Measures: 2014 to 2019 Progress

Energy efficiency and conservation can also be enhanced through organizational (e.g. policy, procedural), behavioural (e.g. awareness, engagement) and technological (e.g. equipment) initiatives. The 2014 to 2019 CDM Plan identified several objectives and actions targeting behavioural and organizational elements, as well as the following goals:

1. Enhance corporate energy awareness, communications, engagement and information sharing, including educational opportunities for staff to foster a culture of conservation;
2. Investigate existing standards and potential for new energy-related standards to ensure an effective and consistent approach to operations, maintenance, asset management and procurement;
3. Per previous Council direction, continue to enhance energy-related performance measurement, to better understand energy usage variations and incorporate specific performance measures into individual business planning and budget documentation;

4. Further integrate energy conservation into existing business planning and asset management analysis, including strategic assessments of specific corporate options for 2015 to 2024 Business Planning and the leveraging of external grant funding opportunities;
5. Develop a corporate-wide five-year lighting retrofit strategy for consideration, including consolidation of the existing lighting inventory, options analysis, business case analysis and a comprehensive technically and financially feasible plan; and,
6. Complete a retrospective assessment of the approved 2014/15 Embedded Energy Manager program and provide future recommendations to Regional Council regarding potential implementation of similar programs across other Regional facilities and program areas.

The following sections outline the notable progress made in prioritizing energy efficiency and further integrating energy into existing processes.

2014 to 2019 Goal 1: Enhance Corporate Energy Awareness, Communications, Engagement and Information Sharing

Objectives:

- To engage Regional staff and enhance educational opportunities for staff and tenants and foster a 'culture of conservation.'
- To enhance Regional staff empowerment regarding energy management.
- To provide effective forums for recognition of energy conservation successes.
- To determine areas where improved information sharing is possible and facilitate interaction across operational areas regarding energy conservation measures (ECMs), experiences and results.

Progress/Updates:

- Ongoing role of the Energy Advisory Sub-Committee (include but not limited to):
 - Guide implementation, monitoring, progress and evaluation of energy assessments/audits and energy renewables recommendations and assist in the planning and approvals process for potential projects;
 - Implement, monitor and update the five-year CDM Plan and related reporting requirements;
 - Track implementation progress for ECM/water efficiency measures (WEM), advise on projects for review through business planning (BP) processes including the asset management (AM) process, reporting and approvals cycle, business case (BC) development of ECM/WEMs to consider implementation priority rankings for recommendations to senior management;
 - Estimate energy / water reduction and cost savings, as a result of implementation of EEM/WEM and consider measurement and verification (M&V) systems;
 - Assist with the BP and climate change (CC) reporting requirements (energy reporting, mitigation, adaptation and carbon footprint etc.);

- Recommend monitoring & targeting systems and make recommendations on EEM/WEM performance measures/ benchmarking;
- Report climate mitigation implications as part of the Climate Change Staff Working Group (CCSWG) and engage the CCSWG to gain feedback on potential mitigation initiatives across program areas;
- Assist in review of external funding opportunities and make recommendations to senior management on programs (e.g. SaveOnEnergy); and
- Increase Regional staff awareness of energy and water conservation benefits.
- Leveraged opportunities through local distribution companies (LDCs), Independent Electricity System Operator (IESO) and industry experts for information sessions/presentations to Regional staff. Broad staff participation in LDC hosted events, conferences and other training sessions.
- Staff participation in Clean Air Partnership Municipal Energy Managers Community of Practice (COP) forum (collaborative info sharing with peer municipalities).
- Internal communications regarding energy curtailments (not only related to the Class A ICI program communications through Technical Support, but also the communications within each respective facility/operational area, including Duffin Creek WPCP and Regional HQ).
- Communications and invitations to staff for participation in energy conservation seminars/events.

2014 to 2019 Goal 2: Investigate Existing and Potential for New Standards Related to Energy Efficiency

Objectives:

- Ensure where possible, a consistent approach to operations, maintenance, asset management and procurement as related to energy efficiency.
- Consider energy efficiency criterion at the earliest stages of a project.

Progress/Updates:

- For tender/Request-for-Proposals (RFP) specifications:
- For RFPs valued under \$60,000, include requirements for consultants to prepare baseline and anticipated energy performance, life-cycle analysis, designed energy performance and sub-metering design on applicable major capital projects.
- Base standard for design and construction of new construction projects includes:
 - Building Science Construction Services
 - Energy Modelling and Related Consulting Services
 - Enhanced Sustainable Design
 - Sustainable Design Certification (LEED).
 - Third Party Commissioning

- Utilization of Revit and Building Information Models (BIM)
- Building Condition Assessment
- Meeting requirements of ASHRAE 62.1, 90.1 and 189.2 (where applicable).
- Peak demand curtailment for Regional HQ – Predetermined heating, ventilation and air-conditioning (HVAC) equipment (air-handling units (AHUs), chillers, cooling towers) operated at reduced capacities or temporarily shut down. Operating sequence launched and controlled by Facilities staff through building automation system (BAS). Levels/trends for temperatures, relative humidity and CO₂ monitored in real time and adjustments made to mechanical equipment to ensure environmental conditions maintained within legislated levels or equipment requirements.
- Use of computerized maintenance management system (CMMS) system to improve preventative maintenance scheduling. Used to schedule, enact and track preventative maintenance activities to ensure systems adequately serviced at pre-established frequency.
- Calibration of equipment and performance of best practice maintenance. Periodic calibration of pressure sensors, temperature and CO₂ sensors to ensure efficient operation of building systems. Proper calibration of devices ensure building HVAC systems operate efficiently and at optimal energy performance.
- For commissioning on Facilities projects, developed guideline of standards includes recommendations such as:
 - When commissioning included on projects and who completes commissioning (design engineer, third-party agent or Regional staff),
 - Recommendations of types of systems that require commissioning and on system demonstration/training; and
 - Qualifications for commissioning parties and calibration of equipment.
- When preparing an RFP for Third Party agents, proposal templates have standard requirements which are based on the outlines identified of ASHRAE Guideline 0.
- Green Procurement Policy (Purchasing By-law 68-2000, S. 2.3, amended June 25, 2014)
- Requirement for energy management plan development now included in engineering process for design and construction of new water and wastewater facilities.

2014 to 2019 Goal 3: Enhance Energy Related Performance Measurements

Objectives:

- Improve the quality of data to better understand variations in consumption and performance over time.
- Continue to implement Council direction to incorporate energy specific performance measures into individual business plans and budget documentation to enhance the long term energy conservation and demand management planning process.

Progress/Updates:

- Annual energy use reports are prepared for every Regional facility and are consolidated by every major operational area
- Energy report cards are updated quarterly
- Regional energy management tool (REMT) prepared annually. Compare annual key performance indicators (KPIs) against 2012 baseline
- Annual energy and GHG emission reporting to Ministry for designated facilities per O.Reg 507/18 under the Electricity Act (formerly O.Reg 397/11 under the Green Energy Act)
- Electricity sub-metering has been expanded and standardized for new water and wastewater facilities
- Hourly load information captured for all large volume accounts (interval meter) through utility linked dashboard/portal access

2014 to 2019 Goal 4: Continue Integration of Energy Conservation into Existing Asset Management and Business Planning Processes

Objectives:

- Investigate and provide options, analysis and information for decision making and business case analysis.
- Further integrate energy efficiency considerations and continue to leverage external grant funding opportunities and programs.

Progress/Updates:

- Multi-disciplinary Asset Management Staff Working Group:
 - Consults with CCSWG and its Energy Advisory and Adaptation Sub-committees to ensure related efforts integrated into AM, risk management (RM) and BP.
 - Assessment of risk and climate impacts on an ongoing annual basis
 - Complies with AM planning regulation (O.Reg. 588/17) to consider climate vulnerabilities in AM planning, including adaptation opportunities and mitigation approaches.
- Works Department's Facilities, Design, Construction and Asset Management (DCAM) staff oversees Building Condition Assessments (BCAs) along with technical audits to capture facility condition and associated equipment:
 - Target completion of BCAs for all Regionally-owned facilities by 2023. To-date, ~70 per cent of Regionally-owned facilities have completed BCA.
 - To better manage these assessments and address future infrastructure needs to ensure services continue to be provided, the Region purchased and implemented a capital asset management and planning software system (CAMPs), Ameresco Asset Planner. This system assists with the collection, management, and reporting of BCA data as well as forecasting current and future needs.

- Priority directed towards facilities where age-based or other ratings identified the facility as being Poor and/or Very Poor and where completing BCAs within an asset group will complete the group as a whole.
- Where warranted, leverage LDC-offered resources for undertaking facility site assessments which serve to identify ECM opportunities (18 completed to-date across operational areas) or funding for completing Level 2/3 ASHRAE audits to supplement BCA information.
- Consultation with LDCs at undertaken at earliest stages to determine project application, post-project M&V requirements, savings and grant opportunities prior to implementation. Total cumulative LDC funding of almost \$1.5 million to-date.
- Communication between Works/Facilities project planners/managers and application reps (Regional staff/vendor) and/or LDCs assist with project coordination.

2014 to 2019 Goal 5: Develop a Corporate-wide Five-Year Lighting Retrofit Strategy

Objectives:

- Investigate and establish a lighting inventory for the Region's 300+ facilities.
- Works and Finance staff strategically analyze options and conduct business case analysis to determine and recommend a sustainable and technically and financially feasible five-year plan to upgrade the Region's lighting inventory.

Progress/Updates:

- Technological advances and continued decline in costs for advanced technologies (LED) have simplified options evaluation from cost and efficiency standpoint
- Improvements in energy performance made where fixtures can be reused, and bulbs swapped in the course of normal operating and maintenance activities. Numerous lighting retrofits completed Region-wide in last 2 to 3 years with equipment replacement undertaken with in-house resources
- Project paybacks have been shortened to just a few years, prior to consideration of LDC-offered program incentives
- Coordinated approach for assessing opportunities for small-to-mid range facilities through the Small Business Lighting Program (accounts <100kW)
 - Working group consisting of Police Services, Housing Services, Facilities, Technical Support and Finance; and
 - Assessment underway for over 20 locations in Oshawa PUC territory and over 30 mid-to-high priority locations across Veridian/Whitby Hydro (now jointly Elexicon Energy) and Hydro One territory (almost 50 additional lower priority locations identified for future consideration). ~10% of listed sites assessed to-date (as of early-February 2019). Program continuation through IESO following upload of CDM programs from LDCs.

2014 to 2019 Goal 6: Assess 2014/15 Embedded Energy Manager (EEM) Program for Potential Application at Other Sites/Programs

Objectives:

- Repeat program successes, where appropriate and beneficial.
- Share successes and challenges with other areas to enhance awareness and knowledge across program areas.
- Determine opportunities and constraints during implementation of EEM at Duffin Creek and consider future implementation and implications for other sites/programs.

Progress/Updates:

- EEM program covers up to 80% of salary costs plus additional training/other expenses. EEM program has been in place at the Duffin Creek WPCP since 2014
 - Target savings of 2,000 MWh have been exceeded every year. Cumulative avoided energy use of over 10,000 MWh
 - Manages ICI Class A peak demand management for facility resulting in over \$1 million in annual savings
 - Now a permanent staffing resource and also assist with project applications for other initiatives in Veridian service territory
- EEM Program expanded in 2019 for placement of resource for Regional facilities, including Regional Headquarters.
- While original partnership agreement between Oshawa PUC Networks and Whitby Hydro/Veridian (now jointly Elexicon Energy) would have allowed resource to work across service territories (all except Hydro One), with agreement being moved to IESO following upload from LDCs in early-2019, EEM will now be able to target electricity savings at Regional facilities across all respective LDC service territories.

5. Alignment with Regional Plans, Policies and Initiatives and Provincial Requirements

The recommended CDM Plan is aligned with other key corporate plans, policies and initiatives, including the Durham Region Strategic Plan. The updated five-year CDM plan is seen as a 'living document,' adapting to updated priorities as the Region moves forward and evolving as implementation options are further defined and assessed throughout the implementation period.

In 2004, Regional staff established a formal corporate asset management program and since 2007, energy use, expenditures and related GHG emissions have been tracked, assessed, reduced and reported. The Regional multi-departmental Climate Change Staff Working Group and its Energy Advisory Sub-committee coordinates efforts and leads energy conservation and demand management staff consultations and planning, under the leadership of a senior management steering committee.

Integration of energy management and climate mitigation and adaptation considerations into service delivery and infrastructure renewal planning is a directive of Regional Council to ensure energy management and conservation remain a priority. Staff from across program areas continue important work to improve energy efficiencies and conservation efforts and maximize related co-benefits from GHG emission reductions.

Consistent with both Regional Council direction and various provincial requirements, including Ontario Regulation 507/18 within the Electricity Act (formerly Ontario Regulation 397/11 within the Green Energy Act), progress on the Region's CDM Plan is regularly reported through the Region's annual financial and business planning and reporting processes (based on five-year operational plans and 10-year capital plans) and through the CDM Plan, submitted to the Province of Ontario every five years. The CDM Plan also adapts as required to other key opportunities and drivers, e.g. responding to technological changes, updated standards and best practice and to program offerings (e.g. senior government/utility programs, resources and incentives).

Successful energy management practices contribute to the achievement of broader corporate sustainability goals and objectives as outlined in other Regional plans, policies and directives. Core among these is the "Durham Region Strategic Plan" which sets Regional priorities based on consultations with the broader community. The Region is in the process of developing a new corporate Strategic Plan to lay out a new shared vision, direction and priorities for the Region going forward. The updated CDM Plan will evolve and remain in alignment with the identified priorities of the new Regional Council which will be highlighted in the new Strategic Plan.

The CDM Plan will also maintain alignment with other Regional planning documents which include, but are not limited to:

- Regional Official Plan;
- Region of Durham Community Climate Change Local Action Plan;
- Durham Community Energy Plan; and,
- Asset Management Plan.

A summary of how the CDM Plan and broader climate mitigation (GHG reduction) initiatives align with corporate policies and initiatives is outlined in Attachment #1.

6. CDM Plan Renewal for 2019 to 2024 – Renewed Areas of Focus

The CDM Plan renewal has been developed through multi-disciplinary strategic consultations under the guidance of senior management. These included key personnel across all major program areas plus feedback and guidance from the Climate Change Staff Working Group and its Energy Advisory Sub-Committee and asset management staff. Staff and senior management helped detail successes to-date and identified gaps and areas for improvement.

The resulting goals, objectives and actions in Table 2 primarily target behavioral and organizational elements. Measures through asset management planning, energy audits, facility assessments and studies will be considered through annual Financial Planning

and Budget processes. Attachment #2 also identifies projects approved through 2019 Business Plans and Budgets which are likely to produce energy-related benefits. Proposed initiatives are being assessed and may be further refined (cost estimates and implementation timelines subject to change). Regional staff will report to Regional Council, as required.

Table 2: 2019 to 2024 CDM Plan Goals and Objectives

Goal 1: Formalize a Corporate Network that Establishes Clear Lines of Authority and Accountability for Energy Management	
Objectives	Description
Establish a corporate energy network & organization chart, ensuring senior management involvement, communications & support	<ul style="list-style-type: none"> • Formalize processes for energy management, communications and reporting (vertical and horizontal alignments) • Clearly link key staff, asset management & steering committee, CCSWG, Energy Advisory Sub-Committee & Financial Planning//Budget staff
Establish energy user groups (EUGs) in key operational areas (e.g. HQ, DRPS, RDPS, LTC & DRLHC)	<ul style="list-style-type: none"> • Clear lines of communication, support & accountability • Build on successes (e.g. EEM initiative) • Identify prudent area-specific opportunities to build expertise, capacity & resources for decision-making • Institutionalize energy management into day-to-day activities • Formalize engagement with key staff & occupants to improve energy efficiencies & address behavioral issues
Implement energy objectives through asset management / life-cycle planning, financial planning and budget processes	<ul style="list-style-type: none"> • Improve linkages between design, capital & operations staff • Make energy efficiency an integrated consideration in how the Region designs, operates, maintains, refurbishes & replaces assets (e.g. energy management is not stand-alone or an ad hoc consideration) • Link considerations of water efficiency & conservation for facilities/operations given water is major source of energy use • Drive energy management priorities with effective feasibility/business case evaluations & performance measurement

Table 2: 2019 to 2024 CDM Plan Goals and Objectives (cont'd)

Goal 2: Enhance Corporate Energy Awareness, Education and Information Sharing	
Objectives	Description
<p>Formalize a process for the annual review, dissemination & coordination of capacity-building training opportunities, seminars, and subject-matter experts for staff</p>	<ul style="list-style-type: none"> • Identify and communicate training opportunities, info sessions/workshops (for operators, end-users and other employees) • Ensure broad availability to staff and maximize exposure • Prioritize offerings which can assist in day-to-day operations and can contribute towards staff requirements for annual training hours • Establish training content and objectives by area, with measurement possible through an Employee Energy Awareness/Education Index (hours training/employee/year) by major operational area to measure progress
<p>Improve communication and recognition of achievements through establishment of an Energy Communications Plan</p>	<ul style="list-style-type: none"> • Define communications objectives which will influence positive behavior and recognize and share successes etc. • Define target audience(s), the method/content of communications, scheduling/timing/frequency, areas of responsibility, etc. • Determine where potential performance/impacts can be measured • Improve the Insider energy data to maximize visibility & accessibility and assess opportunities for updated expanded information (e.g. project tracking or energy-related initiatives, success stories) • Formalize periodic reviews and communication of available senior government/utility grants and incentives • Ensure broad communications through Corporate Energy Management Network

Table 2: 2019 to 2024 CDM Plan Goals and Objectives (cont'd)

Goal 3: Standardize Approaches and Continue Integration of Energy Conservation into Asset Management, Financial Planning and Budget Processes	
Objectives	Description
Develop more comprehensive process for analysis of energy baselines and the identification of viable opportunities	<ul style="list-style-type: none"> • Plan energy audits concurrent with BCAs & develop a strategy to complete ASHRAE (min. Level 2) audits for priority facilities (i.e. largest users) • Assess the viability/prioritize the re-commissioning of existing facilities • Develop energy standards for new construction using a life-cycle approach for optimal building performance • Maintain a project-ready list for financial planning & to leverage energy incentive/grant opportunities (baselines required for business case)
Improve ongoing business case development through asset management planning	<ul style="list-style-type: none"> • Further integrate energy considerations into project scoping, design and selection decisions (i.e. consulting assignments/scope of work (SOW)) • Improve communication of evaluations to decision makers and the participation of expert staff (technical and financial) • Examine options for a uniform evaluation approach to energy initiatives, including review of alternative payback approaches • Continue to move to condition-based maintenance planning within asset management
Continue development & implementation of appropriate standards and standardized processes	<ul style="list-style-type: none"> • Standardize process for training, capacity, commissioning & O&M to support user groups (e.g. Facilities, DRPS, LTC) • Update “Made-in-Durham” design standards which consider energy efficiency best practices ahead of ASHRAE/Ontario Building Code (OBC) changes (e.g. “Net Zero” design standards and concepts, among others)

Table 2: 2019 to 2024 CDM Plan Goals and Objectives (cont'd)

Goal 4: Enhance Energy Monitoring, Performance Measurement and Reporting (2019 to 2024 Planning and Implementation)	
Objectives	Description
Improve building & equipment performance monitoring capabilities	<ul style="list-style-type: none"> • Monthly performance monitoring for better detection of negative trends & Improved sub and power meter coverage with on-time centralized feedback (integration of power monitoring to HQ server with software automation) • Establish a Metering/Monitoring Working Group to conduct gap analysis/needs assessment and make recommendations to senior management <ul style="list-style-type: none"> ○ Consult with user groups to identify needs/data/granularity requirements & conduct technical/financial review of available solutions and resource requirements ○ Determine how/where BAS systems could prudently be integrated into a central monitoring system ○ Prioritize large energy users (e.g. Regional Headquarters (HQ), largest police facilities, 101 Consumers Dr., LTC facilities, water and wastewater treatment plants, etc.)
Implement energy targets & performance measures	<ul style="list-style-type: none"> • Conduct energy audits to identify opportunities, reaffirm baselines and define optimal performance prior to establishing targets. • Develop estimate of required capacity investments to monitor and measure progress towards established targets • Consider targets within the context of other requirements, priorities & available resources ensuring targets are ambitious yet achievable (will vary by program area). • Ensure targets are SMART – Specific, Measurable, Achievable, Realistic & Time-bound. • Support targets and measurement with formalized monitoring, progress reporting and accountability frameworks • Consider intensity metrics that factor in growth/new facility & equipment requirements (e.g. best in class (top 25th percentile), intensity reductions from baseline, etc.) • Include water consumption/conservation metrics for Regional facilities/operations based on implications for energy usage

The Region's established business practices through which energy and other initiatives are prioritized, provide a strong foundation to support implementation of the most cost effective and value-added energy and conservation strategies over the forecast period and beyond. Sustainable decision making must consider the balance of social, environmental, technical, financial, economic, operational and regulatory considerations.

The Region's focus to-date has been on the enhancement of energy efficiency, including energy-efficient construction design standards as well as related maintenance practices and standards; electrical and mechanical system retrofits; and maximization of external grant funding available for energy efficiency initiatives. As outlined in Attachment #2, numerous initiatives have been completed, are underway or are in the planning process for implementation. Where possible, staff will continue to leverage available programs to further the Region's corporate energy conservation goals and objectives.

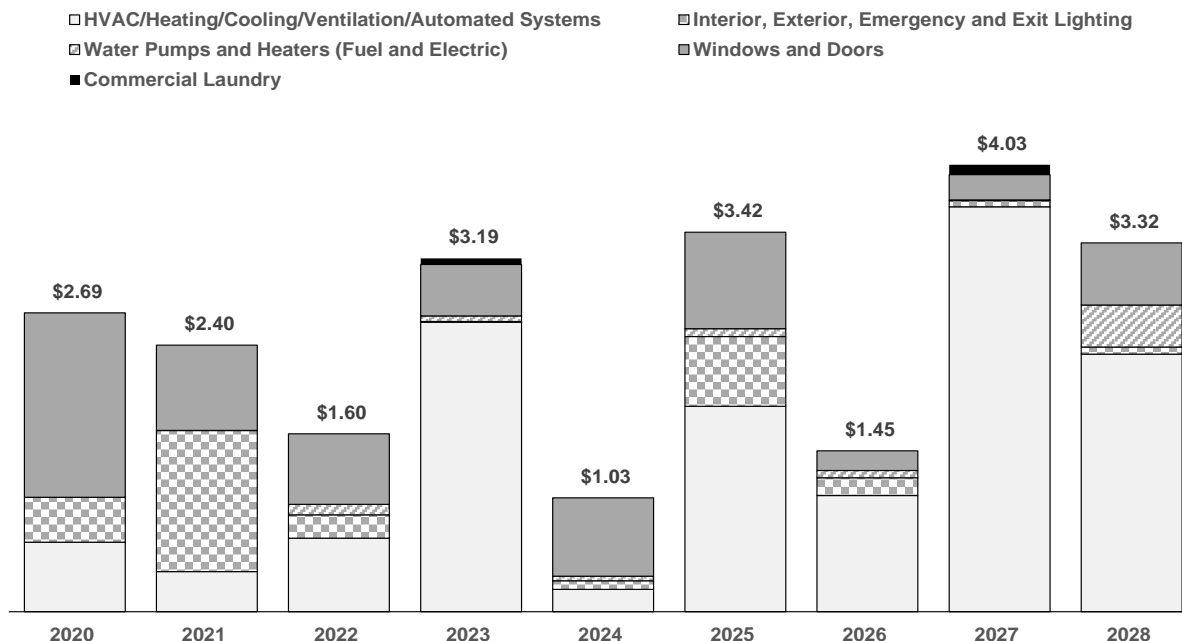
Regional staff have worked closely with electrical and natural gas local distribution companies (LDCs) to-date to leverage numerous programs, funding opportunities and technical resources. These have assisted with project identification and implementation, however many programs are only committed until the end of 2020 and electricity-related programs, now administered through the IESO, are uncertain given more-recent Province-wide changes to program offerings and roles of LDCs around CDM program delivery.

Future opportunities and implemented projects, as part of the renewed CDM Plan, are not defined to be project-specific by individual location and project, but rather, present a holistic view to opportunities identified through BCAs, audits, plans, studies and assessments. Evaluation and prioritization, including identified energy and GHG emission impacts, will take place through asset management, financial planning and budget processes as projects are further scoped and evaluated.

The Region is working towards completion of BCA's for all Regionally-owned facilities by 2023 (~70 per cent completed to-date). As part of its asset management planning process and for purposes of meeting requirements per Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure a capital asset management and planning software system (CAMPs) has been implemented, assisted by the collection, management, and reporting of BCA data and needs forecasting.

Evaluation of BCA information for completed facilities has identified numerous facility and equipment requirements over the life of the asset(s), many of which provide opportunities for enhancing energy efficiency. Figure 5 summarizes facility equipment components nearing end-of-life and recommended for replacement over the next nine years (post-2019). This does not address additional items identified for replacement in 2019 which have been approved as through the budget process or identified as priority post-2019.

Figure 5: Potential Technical Measures Identified through Asset Management Planning Process¹



Numerous opportunities have been identified to address equipment nearing end-of-life or where deemed feasible for early replacement due to operational or energy savings benefits (subject to business case). Examples include, but are not limited to:

- There still exist less-efficient, higher-wattage incandescent lighting across various locations where more efficient fixtures and bulbs would provide savings opportunities (e.g. LED conversion). Additional lighting controls are also being considered;
- LTC washers and dryers, significant energy users, are anticipated for replacement, as are several domestic hot water heaters and pumps (higher efficiency heaters can reduce heat losses);
- Replacement of windows and/or doors along with recommended maintenance (i.e. caulking, sealant, weather-stripping);
- Numerous HVAC related exhaust fans, make-up air units (MUA), fan and baseboard heaters, furnaces, building control systems, thermostats, air-conditioning units, boilers, chillers and other equipment components; and,
- Replacement, repair or mid-life refurbishment of BAS components.

The asset management planning process is based on a life-cycle approach. Investigation into options include energy usage and cost considerations among the balance of other factors considered in decision making (e.g. climate change). The practice of undertaking energy audits concurrent with BCAs will help the Region determine energy-related impacts and value-added options. Considerations will also be

¹ Values represent base replacement values and may not include additional cost elements such as engineering and contingency. Costs are for information purposes only and actual project costs may vary once scoped further.

made for utilization of standard equipment specifications, where appropriate (i.e. minimum energy factor (EF) for heaters, EnergyStar rating for products).

Regional staff continue to assess standards and principles for facilities and work areas with a goal to minimize building footprint requirements even as the Region continues to grow and services become more complex. Optimization principles were employed at Social Services offices at 200 John St., Oshawa. Modern workspace standards and space optimization options are under evaluation for other existing work areas and newly renovated facilities. Regional Headquarters (HQ) is the focus of a comprehensive review of space requirements, to identify immediate, interim and longer-term accommodation needs and optimization opportunities.

Facilities DCAM staff are developing new standards and principles for the use of administrative space. Energy management and facility demands are likely to evolve with the broader implementation of standards under a Master Accommodation Plan (MAP).

As part of the MAP work, the Region is undertaking a rationalization study for Works Maintenance Depot operations. The study will identify the most efficient accommodation and site utilization strategies to address immediate and long-term accommodation needs of the Region's Works Department. The review will include recommendations for strategic Works Depot locations over the long-term to ensure levels of service and improve effectiveness, with site master plans developed for future implementation.

As the Region strategically assesses ways to improve service delivery, staff will continue to ensure that energy conservation remains a central aspect of the organizational culture and best-practice decision-making, reporting and approvals processes as part of the renewed CDM Plan. Costs, benefits, and risks will be considered annually, and monitored and reported within the broader long-term planning and management processes with the goal of continuous improvement.

7. Additional Corporate Initiatives

The following sub-sections provide a summary of additional notable initiatives being undertaken or planned at the corporate level which relate to energy production and new construction design standards.

7.1 Renewable and Other Energy Generation

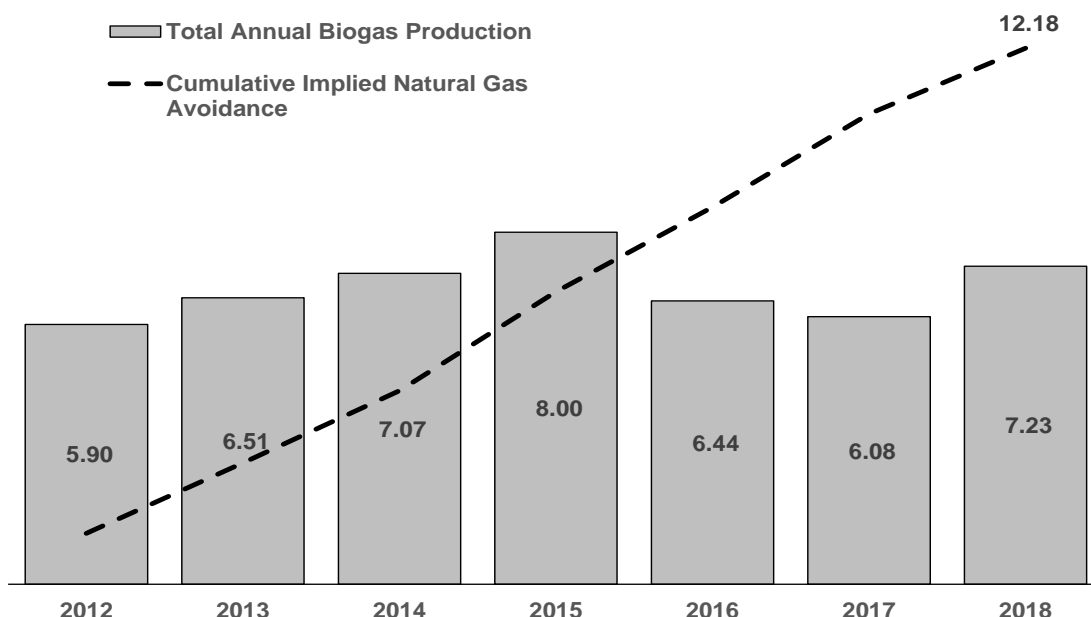
Biogas Generation and Utilization

Digester gas (biogas) is a by-product of the anaerobic digestion (AD) process at secondary wastewater treatment facilities. It is utilized in dual-fuelled boilers for process and internal heating purposes at several Regional wastewater treatment plants where digester gas has served to significantly displace natural gas usage, decrease flaring requirements and reduce energy costs.

Figure 6 demonstrates natural gas avoidance across five wastewater treatment facilities (including Duffin Creek WPCP). It is estimated that from 2012 to 2018 over 12 million cubic metres (m³) of cumulative natural gas usage has been displaced/avoided as a

result of the utilization of biogas in plant processes (i.e. dual-fired boilers). This equates to over 23,000 tonnes of CO₂e avoidance.

Figure 6: Total Wastewater Treatment Plant Biogas Production and Implied Natural Gas Avoidance Volumes (cubic metres, 2012 to 2018)¹



While emissions' avoidance from displaced fossil fuels is notable, there remains significant potential for further biogas utilization opportunities given an average of almost 65 per cent of all raw biogas produced across all five wastewater treatment facilities is flared. Options are being assessed through the Courtyce WPCP IRR Study (Phase 2) and forthcoming Duffin Creek WPCP IRR Study including consideration of biogas utilization for co-generation (combined heat-and-power), heat exchange based technologies, and/or generation of bio-fuel and/or bio-methane. Furthermore, CNG/RNG fueling options are being assessed to determine Regional fleet demands and opportunities for conversion to CNG/RNG fueled vehicles which emit fewer GHG emissions.

Staff recognize the potential for this renewable energy source and are in the midst of several concurrent activities involving assessment of various biogas utilization options – opportunities which continue to evolve with changes in the regulatory landscape in relation to available net metering options, clean fuel standards, carbon pricing regimes and opportunities for generation and marketability of carbon credits and related environmental-based instruments.

Given the timing of the CDM Plan 2019 to 2024 and the potential future role of biogas through wastewater treatment processes and/or organics management, updates to Regional Council will be provided as required with investment considerations assessed through existing annual business and long-term financial planning processes.

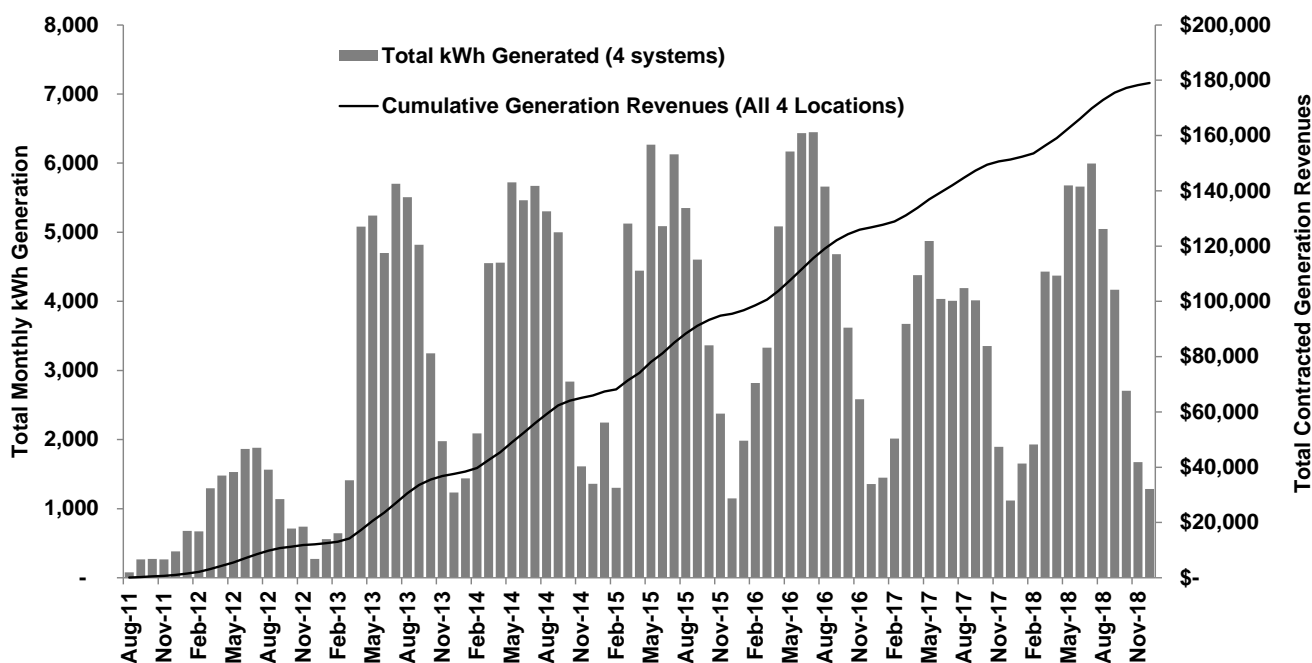
¹ Does not include 2019 year-to-date biogas production and implied natural gas avoidance (approximately 0.4 million m³ of implied natural gas offset).

Solar Photovoltaic (PV) Technologies

The Region has four active roof-top solar photovoltaic (PV) applications, each with 20-year micro Feed-in-Tariff contracts. Senior government funding assisted with the implementation of systems at DRLHC seniors' buildings (located at 850 Green St., Whitby (2011); 155 King St. E, Oshawa (2013); 439 Dean Ave., Oshawa (2013); and 315 Colborne St., Whitby (2013)).

Figure 7 provides solar PV systems' generation and revenues to year-end 2018. It is estimated the projects have provided over 280,000 kWh of clean electricity to the grid and almost \$180,000 in cumulative electricity revenue to the Region.¹ These solar projects are continuously monitored and data will be utilized to assist assessment of other potential solar PV-related initiatives.

Figure 7: Solar PV System Generation and Revenues (2011 to 2018)



Solar options and related technologies are assessed on a case-by-case basis as part of new building design, including technical and financial considerations and available program opportunities through the IESO and LDCs. While the Province moved away from standardized supply contracts, behind-the-meter net metering arrangements for solar PV technologies (and other generation technologies, such as Combined Heat and Power) remain options to offset facility load requirements. The Region examines renewable energy options for value-added, including environmental, technical, regulatory and financial considerations.

7.2 The Durham York Energy Centre (DYEC)

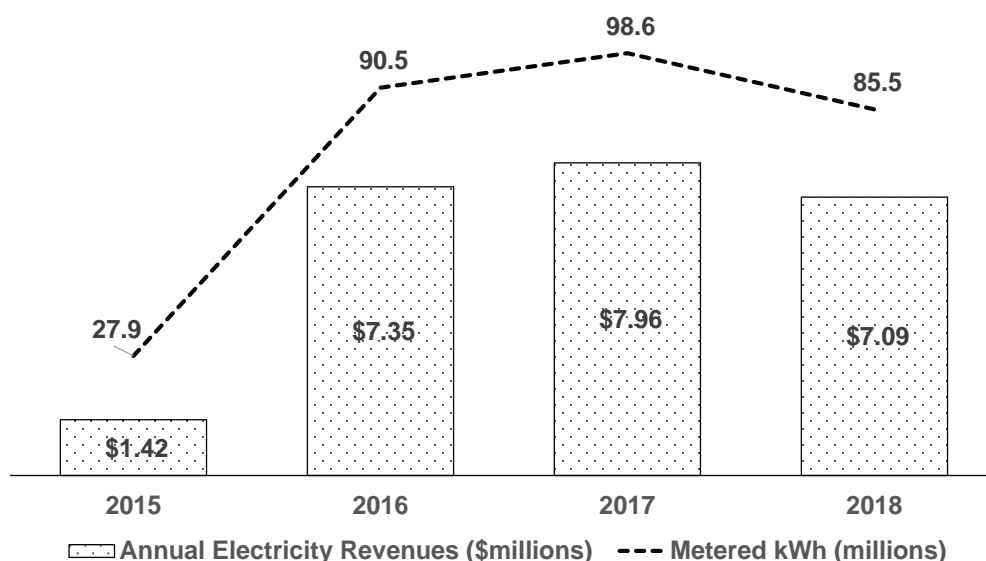
The Durham-York Energy Centre (DYEC), energy-from-waste facility (EFW) commenced processing waste in 2014 and achieved commercial operations in 2016.

¹ 850 Green St, Whitby receives revenues at \$0.802/kWh while the three other DRLHC locations receive \$0.549/kWh.

The facility has a regulatory capacity of 140,000 tonnes (Durham Region 110,000 tonnes and York Region 30,000 tonnes). The DYEC produces energy in-house to accommodate most of its day-to-day electricity and heating requirements. Purchased energy is relatively small and temporary in nature (i.e. facility start-up and shut-down requirements) and is billed directly to the operator.

The DYEC provides enough base load electricity to the grid to power approximately 10,000 households and generation revenues offset solid waste disposal costs. Figure 8 demonstrates that to year-end 2018, the DYEC generated over 300 million kWh of cumulative electricity to grid, providing just under \$24 million in pre-tax generation revenues (most under power purchase agreement with the IESO). Gross facility generation also offsets significant in-house energy requirements.

Figure 8: DYEC Annual Net Electricity Generation to Grid and Revenues



Other features of the DYEC include energy efficient white roofing applied to all administrative buildings and a zero-discharge water system. The facility re-uses process water for internal systems until it becomes quench water for ash residue at the end of the process. The solid waste fuel processed within the facility is considered biogenic and thus could also be considered renewable.

EFW technologies are recognized internationally by, among others, the US Environmental Protection Agency (EPA), the European Union, the International Panel on Climate Change (IPCC) and the World Economic Forum, as a source of GHG mitigation in contrast to landfill waste disposal options since uncollected fugitive landfill methane emissions are avoided.

7.3 Durham Construction Design Standards

The Region’s building standards ensure new facilities are built at a level comparable to or higher than Leadership in Energy and Environmental Design (LEED) Silver Certification, through construction to the American Society of Heating, Refrigerating,

and Air-Conditioning Engineers (ASHRAE) 90.1 (2007) Energy Standard. On a case by case basis, staff also consider elements of ASHRAE 189.1 (2009) for the design of new buildings. Within this approach the recently-completed Fairview Lodge attained LEED Gold certification.

While climate mitigation through energy efficiency is the focus of the CDM Plan, climate adaptation considerations have also been made for new facility design and construction. Recent construction projects, as well as major site and system renovations have also incorporated significant features which improve facility and site climate resiliency including, but not limited to:

- On-site stormwater management systems and controls;
- Water recovery systems and water loss control plans;
- Green irrigation systems and water efficiency fixture replacements; and,
- Building envelope and site improvements which mitigate erosion and/or flooding risk.

As part of the renewed CDM Plan, staff are undertaking a detailed review of design options and considerations for the purposes of developing and implementing a set of “made-in-Durham” design standards which consider energy efficiency best practices ahead of ASHRAE/Ontario Building Code (OBC) changes (e.g. “Net Zero” design standards and concepts, among others). Also, for the design and construction of new water supply and sanitary sewerage facilities, an energy management plan must now be developed as part of the engineering process and sub-metering capabilities are included as part of the design specifications.

8. Looking Forward

The Region’s CDM Plan will continue as a key tool to guide and improve the energy efficiency of the corporation while also helping to reduce GHG emissions. The Plan will ensure that energy conservation remains central to the Region’s culture and best-practice decision-making, reporting and approvals processes.

The 2019 to 2024 plan includes four overarching goals:

1. Formalize a corporate network that establishes clear lines of authority and accountability for energy management;
2. Enhance corporate energy awareness, education and information sharing;
3. Standardize approaches and continue integration of energy conservation into asset management, financial planning and budgets; and
4. Enhance energy monitoring, performance measurement and reporting.

Numerous concurrent activities are underway corporate-wide, including:

- Strategic Plan renewal;
- Formalization of the corporations strategic Asset Management Policy;
- Finalization of the Durham Community Energy Plan (DCEP); and

- Various strategic assessments related to renewable energy sources such as biogas from wastewater treatment facilities and potential through organics management;

Proposed strategic actions will be assessed and implemented throughout the planning period (2019 to 2024). The plan will set the context for the pending 2020 Business Planning and Budget cycle and multi-year economic and financial forecast (including through the Corporate Asset Management Plan and annual Servicing and Financing Studies across major program areas).

List of Acronyms

AC	Air-Conditioning
AD	Anaerobic Digestion
AHU	Air Handling Unit
AM	Asset Management
ASHRAE	American Association of Heating, Refrigerating, and Air-Conditioning Engineers
BAS	Building-Automation System
BCA	Building Condition Assessment
BP	Business Planning
CAMPs	Capital Asset Management and Planning Software
CC	Climate Change
CCSWG	Climate Change Staff Working Group
CDD	Cooling Degree Days
CDM	Conservation and Demand Management
CMMS	Computerized Maintenance Management System
CNG	Compressed Natural Gas
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide-equivalent
COP	Community of Practice
CWWF	Clean Water and Wastewater Funding
DCEP	Durham Community Energy Plan
DRLHC	Durham Regional Local Housing Corporation
DRPS	Durham Regional Police Service
DRT	Durham Region Transit
DYEC	Durham York Energy Centre
ECM	Energy Conservation Measure
EEM	Embedded Energy Manager
EF	Energy Factor
EFW	Energy-from-Waste
EGD	Enbridge Gas Distribution
EPA	Environmental Protection Agency
ERV	Energy-Recovery Ventilator
EUG	Energy User Group
EUI	Energy Use Intensity
GFA	Gross Floor Area
GHG	Greenhouse Gas
GJ	Gigajoule
GTA	Greater Toronto Area
GWP	Global Warming Potential
HAP	Home Assistance Program
HDD	Heating Degree Days
HQ	Headquarters
HVAC	Heating, Ventilation and Air-Conditioning
ICI	Industrial Conservation Initiative

List of Acronyms (cont'd)

IESO	Independent Electricity System Operator
IPCC	International Panel on Climate Change
IPS	Influent Pumping Station
IRR	Integrated Resource Recovery
KPI	Key Performance Indicators
kW	Kilowatt
kWh	Kilowatt-Hour
LDC	Local Distribution Company
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
LTC	Long-Term Care
MAP	Master Accommodation Plan
ML	Megalitre
MRF	Material Recovery Facility
MUA	Make-Up Air
MURB	Multi-Unit Residential Building
MW	Megawatt
MWh	Megawatt-Hour
M ³	Cubic Metre
M&V	Measurement and Verification
NIR	National Inventory Report
OBC	Ontario Building Code
O&M	Operations and Maintenance
PM	Performance Measure
PUC	Public Utility Commission
PV	Photovoltaic
RDPS	Region of Durham Paramedic Services
REMT	Regional Energy Management Tool
RM	Risk Management
RFP	Request-for-Proposal
RNG	Renewable Natural Gas
SAR	Second Assessment Report
SBL	Small Business Lighting
SHAIP	Social Housing Apartment Improvement Program
SMART	Specific, Measurable, Achievable, Realistic & Time-Bound
SOW	Scope of Work
Sq. ft.	Square-Feet
VFD	Variable Frequency Drive
WEM	Water Efficiency Measure
WPCP	Water Pollution Control Plant

CDM Plan Alignment with Corporate Plans, Policies and Initiatives

Strategic Document	Reference
<p><i>Growing Together, Reaching Further, Aspiring Higher: New Strategic Plan Durham Region: 2015-2019</i></p>	<p>Goal C: Healthy Environment and Sustainable Communities By 2019, Durham Region will have a healthier environment that is more resilient, adaptable and sustainable. (pg 18)</p> <ul style="list-style-type: none"> •Invest in efforts to mitigate and adapt to climate change to build resiliency across the Region •Demonstrate leadership in sustainable asset management and environmentally friendly practices <p>Goal D: Organizational Health & Service Excellence By 2019, Durham Region will continue to be financially healthy and well- managed, providing exceptional Regional service to address the needs of our growing community</p> <ul style="list-style-type: none"> •Deliver services in a financially prudent and sustainable manner •Demonstrate accountability and transparency by measuring performance and reporting on results •Focus on continuous improvement and innovation
<p><i>Region of Durham Asset Management Plan and O.Reg 588/17 under the Infrastructure for Jobs and Prosperity Act, 2015</i></p>	<ul style="list-style-type: none"> •Ensure both adaptation planning, and energy and water efficiency and conservation efforts, are integrated into Asset Management, Risk Management, Financial Planning and Budgets as part of best business practices. •The Region's approved vision, goals, objectives and action plans to address climate change risk (climate change adaptation) and mitigate impacts due to the corporate carbon footprint (climate mitigation) include the approved Corporate Adaptation Plan and Corporate Energy Conservation and Demand Management (CDM) Plan, respectively. •For O.Reg 588/17, Section 5, outlines how municipal AM Plan shall outline commitment to consider the actions that may be needed to address vulnerabilities to municipal infrastructure assets that may be caused by climate change in respect of such matters as, operations, such as increased maintenance schedules, levels of service, and lifecycle management, as well as related costs. •Should also consider adaptation opportunities to manage such climate vulnerabilities as well as mitigation approaches to climate change such as GHG emission reduction goals and targets, as well as disaster planning and contingency funding
<p><i>Region of Durham Official Plan</i></p>	<p>Section 2.2.5 - Development within the Region shall take into account "...reduction of energy consumption."</p> <p>Section 2.3.47 - Regional Council shall "...Recognize the potential implications of climate change and will continue to investigate and implement mitigation measures where appropriate" and "Promote more energy efficient buildings and infrastructure including retrofitting existing development to more energy efficient standards and support Councils of area municipalities that adopt official plan policies requiring higher energy efficient standards."</p>

CDM Plan Alignment with Corporate Plans, Policies and Initiatives (cont'd)

Strategic Document	Reference
<p>2012 Regional Climate Change Update and added to Purchasing By-Law 68-2000 (amended June 25, 2014), Section 2.3</p>	<p>"Departments will review the potential for, and where appropriate include, specifications in bid solicitations that provide for energy efficient products, durable and re-usable products, products that contain the maximum level of post-consumer waste and/or recyclable content, products that are compostable or biodegradable and, products that include the least toxins and packaging, without significantly affecting intended usage or life-cycle or impacting conformance to compliance standards. It is understood that cost analysis will be utilized as appropriate to ensure products continue to be affordable and competitively priced and to ensure consideration of a life-cycle approach."</p>
<p>2016 Regional Climate Change Update (Report #2016-COW-21, recommendation B)</p>	<p>"Initiatives related to corporate climate mitigation, energy efficiency and demand side management, renewables implementation and other Regional program initiatives to reduce energy & fuel usage and GHG emissions ... continue to be integrated into the annual Business Planning Cycle and the risk management, asset management and financial planning processes, with staff to continue to report to Council in the respective annual Servicing and Financing Studies and the Asset Management Plans, for the purposes of ensuring the Region is well-positioned to deal with potential impacts associated with climate change as it relates to the delivery of essential municipal services and infrastructure..."</p>
<p>2017 Regional Climate Change Update (Report #2017-COW-216, recommendation A)</p>	<p>"That initiatives and strategic investments related to corporate climate change mitigation (energy efficiency, renewable energy implementation and other initiatives to reduce energy/fuel usage and emissions) ... continue to be implemented through the Region's annual Business Planning Cycle including risk management, asset management and long-term financial planning processes to ensure a well-positioned and pro-active approach."</p>
<p>From Vision to Action: Region of Durham Community Climate Change Local Action Plan 2012</p>	<p>Page 12: "How can emissions be reduced?" Reducing energy consumption through energy conservation and efficiency. Possible energy strategies include:</p> <ul style="list-style-type: none"> • Stimulating the retrofit of buildings and processes to conserve energy. • Promoting energy-efficient new construction. • Promoting energy-efficient modes of transportation together with energy-efficient and alternative fuel vehicles. • Promoting and installing renewable forms of energy generation. • Designing our communities to reduce energy consumption and increasingly using community energy systems. • Emission reduction targets against 2007 community baseline (5% by 2015, 20% by 2020, 80% by 2050) <p>Goal: Support sustainable built environment (Encourage sustainable building technologies in new builds and retrofits)</p> <p>Goal: Reduce GHG emissions (Reduce energy through smart design and planning, Encourage and promote energy conservation)</p>
<p>Draft Durham Community Energy Plan</p>	<p>Seeks to accelerate the transition to a clean energy economy through use of energy more efficiently, moving from fossil fuels to electricity where possible, improving building energy performance and deploying renewable energy technologies, energy storage and electrifying vehicles</p>

2014 to 2019 Measures Completed or Underway/Planned: Child Care Facilities

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation Period	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Ajax Child Care Centre	22 Centennial Rd.	Ajax	Lighting Retrofit under saveONenergy SBL Program	\$ 1,650	2014 and onward	7,200 kWh	-	\$950	\$2,560	290 kg CO2e
			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
			Replacement of Built-Up Roof	\$ 106,959	2018 and onward	New roof with increased insulation. Anticipated energy and operation cost savings.				
			Condensing Unit Replacement	\$ 7,340	2018	Replacement with higher-efficiency unit. Anticipated energy and operational cost savings				
Edna Thomson Child Care Centre	156 Church St.	Clarington	Lighting Retrofit under saveONenergy SBL Program	\$ -	2014 and onward	3,600 kWh	-	\$470	\$1,800	150 kg CO2e
Lakewoods Child Care Centre	353 Chaleur Ave.	Oshawa	Lighting Retrofit under saveONenergy SBL Program	\$ 1,090	2014 and onward	7,450 kWh	-	\$970	\$2,100	300 kg CO2e
Lakewoods Child Care Centre			Facility site assessments through LDCs for ECM identification	\$ -	2018	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
Lakewoods Child Care Centre			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Pickering Child Care Centre	1262 Radom St.	Pickering	Lighting Retrofit under saveONenergy SBL Program	\$ 960	2014 and onward	10,000 kWh	-	\$1,300	\$1,940	400 kg CO2e
Pickering Child Care Centre			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Whitby Child Care Centre	501 Dunlop St E	Whitby	Lighting Retrofit under saveONenergy SBL Program	\$ 1,740	2014 and onward	5,400 kWh	-	\$700	\$2,300	220 kg CO2e
Whitby Child Care Centre			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				

2014 to 2019 Measures Completed or Underway/Planned: Social Housing

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions	
1529 Ritson Rd (DRLHC)	1529 Ritson Rd. S	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	1,500 kWh	-	\$200	\$400	55 kg CO2e	
1529 Ritson Rd (DRLHC)			Roof replacement	\$ 45,000	Underway/Planned	Anticipated energy and operational saving					
Linden/Poplar family Units (Oshawa)	Linden St./Poplar St.	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	17,200 kWh	-	\$2,240	\$4,900	630 kg CO2e	
351 Poplar St, Unit 5 (DRLHC) Family Unit			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)					
352 Linden St, Unit 5 (DRLHC) Family Unit											
359 Poplar St, Unit 5 (DRLHC) Family Unit											
360 Linden St, Unit 5 (DRLHC) Family Unit											
367 Poplar St, Unit 5 (DRLHC) Family Unit											
368 Linden St, Unit 5 (DRLHC) Family Unit											
375 Poplar St, Unit 5 (DRLHC) Family Unit											
376 Linden St, Unit 5 (DRLHC) Family Unit											

2014 to 2019 Measures Completed or Underway/Planned: Social Housing (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Beatrice Woods Seniors Building (DRLHC)	385 Beatrice Ave.	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	11,750 kWh	-	\$1,530	\$3,400	430 kg CO2e
			Exterior lighting retrofit	\$ 11,400	2015 and onward	6,000 kWh	-	\$780	\$2,000	220 kg CO2e
			Interior lighting retrofit	\$ 8,000	2015 and onward	19,300 kWh	-	\$2,500	\$2,000	700 kg CO2e
Brookside Apartments Seniors Building (DRLHC)	20 Perry St.	Uxbridge	Facility site assessments through LDCs for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	14,700 kWh	-	\$1,900	\$4,200	540 kg CO2e
			Emergency roof replacement	\$ 26,960	2015 and onward	Insulation was replaced concurrent to roof work. Anticipated energy benefits				
			Hot Water Tanks	\$ 13,363	2018 and onward	Improved natural gas efficiency and operational cost savings				
			Interior lighting retrofit	\$ 17,000	Underway/Planned	Anticipated energy and operational savings				
			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Bowling Green Towers Seniors Housing (DRLHC)	850 Green St	Whitby	Facility site assessments through LDCs for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			Domestic Hot Water System and Lighting Upgrades	\$ 689,000	Underway/Planned	Anticipated energy and operational savings				
			Make-Up Air Unit Replacement	\$ 251,000	Underway/Planned	Anticipated energy and operational savings				
Cedar/Carlton/Wasaga Family Units (DRLHC)	Wentworth St./Cedar St.	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	27,400 kWh	-	\$3,600	\$7,800	1,000 kg CO2e
Centre Seniors Building (DRLHC)	409 Centre St. S	Whitby	Facility site assessments through LDCs for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	9,700 kWh	-	\$1,300	\$2,800	360 kg CO2e
			Replace failed MUA unit - emergency	\$ 24,660	2017 and onward	Anticipated energy and operational savings given replacement with more efficient unit				
			Replacement / Relocation of Domestic Hot Water System	\$ 75,000	Underway/Planned	Anticipated energy and operational savings given replacement with more efficient unit				
Dean Heights Seniors Building (DRLHC)	439 Dean Ave.	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	8,800 kWh	-	\$1,100	\$2,500	320 kg CO2e
			Facility site assessments through LDCs for ECM identification	\$ -	2016	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
Fairport Lodge Seniors Building (DRLHC)	1330 Foxglove Ave.	Pickering	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	6,800 kWh	-	\$900	\$1,900	250 kg CO2e
			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
			Domestic Hot Water System and Lighting Upgrades	\$ 322,000	Underway/Planned	Anticipated energy and operational savings				
Harwood Manor Seniors Building (DRLHC)	655 Harwood Ave.	Ajax	Replacement of Make-Up Air Unit #4 and Exhaust Fans and ERV Implementation	\$ 134,000	2014 and onward	11,300 kWh	13,100 m3	\$5,400	\$72,300	25,300 kg CO2e
			Replacement of Make-Up Air Unit #1 and Exhaust Fans and ERV Implementation	\$ 134,500	2015 and onward	5,100 kWh	14,000 m3	\$4,900	\$79,500	26,800 kg CO2e
			Replacement of Make-Up Air Unit #2 and Exhaust Fans and ERV Implementation	\$ 230,600	2015 and onward	10,300 kWh	28,000 m3	\$9,700	\$75,200	53,600 kg CO2e
			Replacement of Make-Up Air Unit #3 and Exhaust Fans and ERV Implementation		2015 and onward					

2014 to 2019 Measures Completed or Underway/Planned: Social Housing (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Harwood Manor Seniors Building (DRLHC)	655 Harwood Ave.	Ajax	Building Envelop Leak Repair	\$ 14,768	2016 and onward	Anticipated energy and operational savings				
			Level 2 ASHRAE Energy Audit	\$ 10,700	2018 and onward	Detailed assessment for identification of CDM opportunities. Incentive/measure in amount of \$16,000				
			Replace Roof including replacement of insulation	\$ 831,000	Underway/Planned	Anticipated energy and operational savings				
			Domestic Hot Water Boiler and Lighting Upgrades	\$ 145,000	Underway/Planned	Anticipated energy and operational savings				
			Lighting retrofit			Major retrofitting of DRLHC senior building(s) through the Social Housing Apartment Improvement Program (SHAIP). Savings estimates of over 359,000 kWh and over 12,100 m3 annually (\$53,300 in annual operational savings) based on several identified measures. Listing of projects subject to change based on final project costing and prioritization.				
			Window replacements							
King Charles Court Seniors Building (DRLHC)	155 King St. E	Oshawa	Lighting retrofit	\$3.77 million	Underway/Planned	Major retrofitting of DRLHC senior building(s) through the Social Housing Apartment Improvement Program (SHAIP). Savings estimates of over 359,000 kWh and over 12,100 m3 annually (\$53,300 in annual operational savings) based on several identified measures. Listing of projects subject to change based on final project costing and prioritization.				
			Programmable thermostats for tenant units							
			Replace single glazed windows							
			Install cladding on building exterior							
			VFD booster pumps							
			Balcony and entrance door replacement							
			Canopied entrance and carpark overhang repair and insulation							
Level 2 ASHRAE Energy Audit	\$ 8,500	2017	Detailed assessment for identification of CDM opportunities. Incentive/measure in amount of \$4,250							
Kellett Manor Seniors Building (DRLHC)	327 Kellett St.	Scugog	Upgrade lighting, drop ceiling	\$ 21,770	2014 and onward	Anticipated energy and operational savings				
			Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	8,700 kWh	-	\$1,100	\$2,500	320 kg CO2e
			Replace Recirculating Line and Hall Lighting, asbestos abatement and Ceiling Demolition	\$ 160,398	Underway/Planned	Anticipated electricity and/or natural gas and operational savings				
			Relocation & Replacement of Domestic Hot Water Boiler	\$ 105,000	Underway/Planned	Anticipated electricity and/or natural gas and operational savings				
			Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Lakeview Harbourside Family Units (DRLHC)	Lakeview Park Dr./Ritson Rd. S	Oshawa	Ritson A/C	\$ 16,357	2014 and onward	Anticipated energy and operational savings				
			Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	115,000 kWh	-	\$15,000	\$32,900	4,200 kg CO2e
			Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
1499 Ritson Rd. S (DRLHC) Family Unit			Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							
1525 Ritson Rd. S, Unit 5 (DRLHC) Family Unit			Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							
Malaga Family Units (DRLHC)	Malaga Rd.	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	29,700 kWh	-	\$3,900	\$8,500	1,090 kg CO2e
			Basement insulation for 62 units through Enbridge's Home Winterproofing Program	\$ -	2018 and onward	-	13,500 m3	\$4,000	\$24,500	25,600 kg CO2e
			Ecobee Smart thermostat installation for 60 units through Enbridge's Home Winterproofing Program	\$ -	2018 and onward	Increased management of temperatures by tenants with consideration of occupancy. Potential for improved efficiency and awareness. Measure value across locations of \$16,800				
			Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
416 Malaga Rd (DRLHC) Family Unit			Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							
432 Malaga Rd. (DRLHC) Family Unit			Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							

2014 to 2019 Measures Completed or Underway/Planned: Social Housing (DRLHC) (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Nelson Seniors Building (DRLHC)	2 Nelson St.	Clarington	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	7,800 kWh	-	\$1,000	\$2,200	290 kg CO2e
			LED Lighting Retrofit	\$ 17,808	2016 and onward	Annual electricity savings and improved lighting efficiency				
			Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
	4 Nelson St.		Domestic Hot Water System	\$ 311,000	Underway/Planned	Anticipated energy and operational savings				
			Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	6,500 kWh	-	\$900	\$1,900	240 kg CO2e
			Emergency boiler replacement	\$ 14,559	2015 and onward	Anticipated electricity and/or natural gas and operational savings				
			Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Nevis/Lomond/Normandy Family Units (DRLHC)	Nevis Ave./Lomond St./Normandy St.	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	29,200 kWh	-	\$3,800	\$8,400	1,100 kg CO2e
Normandy Hall Seniors Building (DRLHC)	460 Normandy St.	Oshawa	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	10,800 kWh	-	\$1,400	\$3,100	400 kg CO2e
			Facility site assessments through local distribution companies for ECM identification	\$ -	2016	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
Villa Valeau Seniors Building (DRLHC)	1910 Faylee Cres.	Pickering	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	6,800 kWh	-	\$900	\$1,950	250 kg CO2e
			Make-Up Air Unit Replacement	\$ 249,000	Underway/Planned	Anticipated energy and operational savings				
			Interior lighting retrofit	\$ 9,600	Underway/Planned	Anticipated energy and operational savings				
			Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Spruce Haven Seniors Building (DRLHC)	103 Cameron St. W	Brock	Interior lighting retrofit	\$ 8,600	2014 and onward	4,250 kWh	-	\$550	\$8,600	170 kg CO2e
			Exterior lighting retrofit	\$ 10,300	2014 and onward	2,700 kWh	-	\$350	\$5,200	110 kg CO2e
			Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	7,900 kWh	-	\$1,000	\$2,300	290 kg CO2e
			Roof Replacement - Front Entrance including additional insulation	\$ 15,939	2016 and onward	Anticipated energy and operational savings				
	385 Rosa St.	Scugog	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
			Replace lights, drop ceiling	\$ 9,825	2014 and onward	Anticipated energy and operational savings				
			Lighting retrofit	\$ 12,900	2014 and onward	6,900 kWh	-	\$900	\$1,600	280 kg CO2e
			Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	11,500 kWh	-	\$1,500	\$3,300	400 kg CO2e
Various	Various	Various	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
			Boiler Replacements for various locations including 20 Perry, 385 Beatrice and 655 Harwood	\$ 59,300	Underway/Planned	Anticipated electricity and/or natural gas and operational savings				

2014 to 2019 Measures Completed or Underway/Planned: Social Housing (DRLHC) (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Wayside Apartments Seniors Building (DRLHC)	342 Main St.	Brock	Appliance and lighting upgrades under the Home Assistance Program (HAP)	\$ -	2015 and onward	8,000 kWh	-	\$1,000	\$2,300	290 kg CO2e
			Exterior Doors	\$ 8,000	Underway/Planned	Anticipated energy and operational benefits with new efficient door				
			Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
			Interior lighting retrofit	\$ 11,000	Underway/Planned	Anticipated energy and operational savings				
Whitby, Centre St. S	409 Centre St. S	Whitby	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Windsor Place Seniors Building (DRLHC)	315 Colborne St W.	Whitby	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			Level 2 ASHRAE Energy Audit	\$ 7,500	2018	Detailed assessment for identification of CDM opportunities. Incentive/measure in amount of \$11,250				
			Emergency lighting	\$ 25,000	Underway/Planned	Anticipated energy and operational savings				

2014 to 2019 Measures Completed or Underway/Planned: Administration/Offices

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
289 Water St Building	289 Water St.	Whitby	LED lighting retrofit	\$ 3,500	2017 and onward	9,900 kWh	-	\$1,300	\$1,400	170 kg CO2e
Durham Health - Breastfeeding clinic	1615 Dundas St. E, Unit #84	Whitby	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Durham Health - Dental Clinic	1615 Dundas St. E, Unit #205	Whitby		TBD						
Family Services Brock	135 Albert St.	Brock		TBD						
Regional Headquarters Building	605 Rossland Rd. E	Whitby	Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (ICI)	\$ -	2017	Estimated avoided electricity costs of \$54,400				
				\$ -	2018	Estimated avoided electricity costs of \$161,000				
				\$ -	Underway/Planned	Estimated avoided electricity costs of \$31,400 (2019 YTD)				
			Installation of Electric Vehicle Charging Stations	\$ 50,000	Underway/Planned	Allow for public charging of electric vehicles (EV) and reduce fuel-related GHG emissions				
			Lighting Retrofit	\$ 100,000	Underway/Planned	Anticipated electricity savings and reduction of operational costs				
Social Services Ajax	138 Commercial Ave.	Ajax	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Traffic Operations/Environmental Health	101 Consumers Dr.	Whitby	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
Energy Management Staffing Resources	Miscellaneous Facilities	Various	Roving Energy Manager for Regional accounts within Veridian Connections service territory	-	Underway/planned	Agreement with Veridian for shared REM resource with other large end use customers to assist with project applications and measurement and verification (M&V)				
Regional Facilities (Various Locations)	Various locations	Various	Embedded Energy Manager Staffing Resource (mandated savings reflected in implemented initiatives)	Actual salary and expenses	Underway/Planned	Mandated savings target of 2 million kWh. EEM Program through IESO to cover 80% of salary costs and related expenses assuming targets met				

2014 to 2019 Measures Completed or Underway/Planned: Police Services

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Clarington Police Complex - East Division	2046 Maple Grove Rd.	Clarington	saveONenergy High Performance New Construction Program	\$ 24,400	2015	Savings for building design versus OBC baseline. Total measure/incentive amount of \$26,000				
Clarington Police Complex - Forensic Investigation Facility	2210 Bloor St.				2015	Savings for building design versus OBC baseline. Total measure/incentive amount of \$21,900				
Clarington Police Complex - East Division	2046 Maple Grove Rd.	Clarington	Construction of Facility to New Standard/Code	\$ 32,310,000	2015 and onward	Built to LEED Silver Standard - anticipated electricity and natural gas savings relative to OBC				
Clarington Police Complex - Forensic Investigation Facility	2210 Bloor St.									
DR Police Beaverton	412 Bay St. E	Brock	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
DR Police North Division	15765 Highway 12	Scugog	Lighting Retrofit	N/A	2019 and onward	Anticipated electricity and operational savings				
DR Police Property Bureau	19 Courtice Ct.	Clarington	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
DRPS Regional Reporting Centre	650 Rossland Rd. E	Whitby								
DRPS Central East Division	77 Centre St. N	Oshawa	Lighting Retrofit	n/a	2018 and onward	Anticipated electricity and operational savings				
Clarington Police Complex - East Division	2046 Maple Grove Rd.	Clarington	Enbridge RunitRight Program - Various Measures	\$ 12,200	2017 and onward	-	14,000 m3	\$4,200	\$9,000	26,600 kg CO2e
DRPS Central West Division	480 Taunton Rd, E, Whitby	Whitby	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
DRPS Clarington Police Complex	2046 Maple Grove Rd.	Clarington	Upgrade HVAC System	\$ 140,000	Underway/Planned	Anticipated electricity and natural gas savings. Project to be completed in 2019				
DRPS North Division	15765 Highway 12	Scugog	Replace Cooling Condenser and BAS	\$ 300,000	2018 and onward	Anticipated electricity and operational savings				
DRPS Central West Division	480 Taunton Rd, E, Whitby	Whitby	Lighting Retrofit	\$ 15,000	2019 and onward	Anticipated electricity and and operational savings. Incentive measure amount of \$3,400				
DRPS Regional Reporting Centre	650 Rossland Rd. E	Whitby	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
DRPS West Division	1710 Kingston Rd.	Pickering	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			Lighting Retrofit	n/a	Underway/Planned	Anticipated electricity and operational savings				
			HVAC upgrade - installation underway with completion expected mid-2019	\$ 346,000	Underway/Planned	Anticipated electricity and natural gas savings and operational savings. Anticipated incentive/measure amount of \$21,300				
DRPS Kid's Safety Village	1129 Athol St.	Whitby	Lighting Retrofit	n/a	2018 and onward	Anticipated electricity and operational savings				
DRPS Uxbridge Community Police Centre	307 Toronto St. S, Unit 11	Uxbridge	Lighting Retrofit	n/a	2019 and onward	Anticipated electricity and operational savings				

2014 to 2019 Measures Completed or Underway/Planned: Paramedic Services

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
RDPS Ajax Paramedic Station	175 Hunt St.	Ajax	LED lighting retrofit	\$ 3,300	2017 and onward	5,500 kWh	-	\$700	\$1,500	100 kg CO2e
				TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
RDPS Beaverton Paramedic Station	343 Bay St.	Brock	Lighting Retrofit under saveONenergy Small Business Lighting Program	\$ -	2014 and onward	300 kWh	-	\$40	\$560	10 kg CO2e
RDPS Courtyce Paramedic Station	2701 Courtyce Rd.	Clarington		TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
RDPS South Oshawa Paramedic Station	497 Bloor St E	Oshawa								
RDPS Paramedics Headquarters	4040 Anderson St.	Whitby	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			Lighting retrofit (exterior)	\$ 33,100	2016 and onward	29,900 kWh	-	\$3,800	\$2,600	500 kg CO2e
RDPS Pickering Paramedic Station	1103 Kingston Rd.	Pickering	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
RDPS Port Perry Paramedic Station	1775 Reach St.	Scugog								
RDPS Clarington Paramedic Station	-	Clarington	Construction of New Facility to Updated Standard/Codes	\$ 3,800,000	Underway/Planned	Anticipated electricity savings and reduction of operational costs				
RDPS Seaton Paramedic Station	-	Pickering		\$ 3,500,000						
RDPS North Oshawa Station	1260 Wilson Rd. N	Oshawa		3,900,000	2014 and onward	Built to ASHRAE 90.1 standard				
RDPS Sunderland Paramedic Station	1050 S. Regional Rd. 10	Brock	\$ 3,020,000	2018 and onward						
RDPS Uxbridge Paramedic Station	4A Campbell Dr. N.	Uxbridge	Lighting Retrofit under saveONenergy Small Business Lighting Program	\$ -	2014 and onward	1,360 kWh	-	\$200	\$1,100	55 kg CO2e
				TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				

2014 to 2019 Measures Completed or Underway/Planned: Sanitary Sewerage

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Anstead Sanitary Sewer Pumping Station	101 Lake Driveway	Ajax	Lighting Retrofit under saveONenergy SBL Program	\$ -	2014 and onward	50 kWh	-	\$10	\$400	2 kg CO2e
Bayly St Sanitary Sewer Pumping Station	655 Bayly St.	Pickering	LED lighting retrofit	\$ 3,000	2017 and onward	9,100 kWh	-	\$1,200	-	160 kg CO2e
			VFD Replacement	\$ 48,300	2015 and onward	287,000 kWh	-	\$37,300	\$24,150	11,400 kg CO2e
Beaton Farms Sanitary Sewer Pumping Station	1025 Colonel Sam Dr.	Oshawa		\$ -	2014 and onward	50 kWh	-	\$10	\$400	2 kg CO2e
Begley St. Sewage PS	911 Begley Street	Pickering	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Blue Maple Sewage PS	41 Mayor Crescent	Ajax								

2014 to 2019 Measures Completed or Underway/Planned: Sanitary Sewerage (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions		
Canterbury Commons Sewage PS	101 Waterbury Cres.	Scugog	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/Planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)						
Buckingham Gate Sanitary Sewer Pumping Station	2282 Canterbury Cres.	Pickering										
Cedar Beach Sewage PS	B129 Cedar Beach Rd.	Brock										
Clover Ridge Sewage PS	170 Clements Rd. E	Ajax										
Conlin Sewage PS	120 Conlin Rd W	Oshawa										
Corbett Creek Water Pollution Control Plant	2400 Forbes St.	Whitby	Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2015	-	289,000 m3	\$86,700	-	549,000 kg CO2e		
				\$ -	2016	-	2,000 m3	\$600	-	3,800 kg CO2e		
			Corbett Creek WPCP - Boiler Replacement	\$ 102,815	2016 and onward	-	14,000 m3	\$4,200	-	26,600 kg CO2e		
			Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (ICI)	\$ -	2017	Estimated avoided electricity costs of \$182,000						
				\$ -	2018	Estimated avoided electricity costs of \$424,000						
				\$ -	Underway/Planned	Estimated avoided electricity costs of \$111,500 (2019 YTD)						
			\$ -	2018	-	152,000 m3	\$45,600	-	288,700 kg CO2e			
Courtice Water Pollution Control Plant	100 Osborne Rd.	Clarington	Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2014	-	861,000 m3	\$0.3 million	-	1,635 tonnes CO2e		
				\$ -	2015	-	984,000 m3	\$0.3 million	-	1,870 tonnes CO2e		
				\$ -	2016	-	842,000 m3	\$0.3 million	-	1,600 tonnes CO2e		
				\$ -	2017	-	995,000 m3	\$0.3 million	-	1,890 tonnes CO2e		
							\$ -	2017	Estimated avoided electricity costs of \$214,000			
						\$ -	2018	Estimated avoided electricity costs of \$360,100				
			Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2018	-	861,000 m3	\$0.3 million	-	1,630 tonnes CO2e		
				\$ -	Underway/Planned	-	146,100 m3	\$43,800	-	280 tonnes CO2e		
			Class A account - Demand curtailment during system-wide peak events for Industrial Conservation Initiative			\$ -	Underway/Planned	Estimated avoided electricity costs of \$83,400 (2019 YTD)				
			Turbo Blower Upgrade			\$ 900,000	Underway/Planned	0.86 million kWh	-	\$139,000	-	-
			Courtice WPCP Integrated Resource Recovery (IRR) Phase 1 Study			\$ 200,000	2017	Outlines options which seek to maximize resource recovery from water, energy and heat from waste streams and nutrients (materials).				
			Courtice WPCP Integrated Resource Recovery (IRR) Phase 2 Study			\$ 300,000	Underway/Planned	Study nearing completion. Will assess pre-screened options including biogas produced at the plant. Funding of \$225,000 through Clean Water and Wastewater Funding (CWWF) Initiative				

2014 to 2019 Measures Completed or Underway/Planned: Sanitary Sewerage (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions			
Duffin Creek Water Pollution Control Plant	901 McKay Rd.	Pickering	Old dewatering building HVAC audit and ECM implementation	\$ -	2014 and onward	172,000 kWh	-	\$22,400	-	7,000 kg CO2e			
			Lighting decommissioning for old dewatering polymer mixing and unloading area high bay area	\$ -	2014 and onward	26,000 kWh	-	\$3,400	-	1,050 kg CO2e			
			Stage 3 aeration system diffuser cleaning	\$ 40,000	2014 and onward	105,000 kWh	-	\$13,700	-	4,300 kg CO2e			
			Old chlorine building exterior lighting decommissioning	\$ -	2014 and onward	26,000 kWh	-	\$3,400	-	1,050 kg CO2e			
			Old influent pump station high bay decommissioning	\$ -	2014 and onward	49,000 kWh	-	\$6,400	-	2,000 kg CO2e			
			Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2014	-	724,000 m3	\$0.2 million	-	1,375 tonnes CO2e			
			Lighting retrofit and controls include exterior LED upgrade	\$ 97,500	2015 and onward	87,000 kWh	-	\$11,300	\$21,200	3,200 kg CO2e			
			Lighting upgrades occupancy sensors	\$ 13,500	2015 and onward	75,000 kWh	-	\$9,600	\$3,700	2,700 kg CO2e			
			Plant Heating loop summer lay up/optimization	\$ -	2015 and onward	215,000 kWh	-	\$28,000	-	7,900 kg CO2e			
			Diffuser aeration tank optimization during 2014-16 retrofit	\$ -	2014 to 2016	3.5 million kWh	-	\$455,000	-	142 tonnes CO2e			
			Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2015	-	965,000 m3	\$0.3 million	-	1,830 tonnes CO2e			
			Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (ICI)	\$ -	2015	Estimated avoided electricity costs of \$607,000							
				\$ -	2016	Estimated avoided electricity costs of \$1.6 million							
			Stage 3 IPS Optimization Study and Implementation	\$ 107,000	2016 and onward	1.5 million kWh	-	\$195,000	\$50,000	54,800 kg CO2e			
			Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2016	-	1.1 million m3	\$0.3 million	-	2,090 kg CO2e			
			HVAC upgrade Administration building	\$ 14,300	2017 and onward	129,400 kWh	-	\$16,800	\$7,100	2,200 kg CO2e			
			Repurposing of old Dewatering Building as storage area so AHU air flow requirements adjusted	\$ -	2017 and onward	370,000 kWh	-	\$48,100	-	6,400 kg CO2e			
			Repurpose S Dewatering Building - Lighting upgrade, rescheduling and repurpose building	\$ -	2017 and onward	66,200 kWh	-	\$8,600	-	1,100 kg CO2e			
			HVAC optimization Digester 1 - HVAC system optimization.	\$ -	2017 and onward	228,000 kWh	-	\$29,600	-	3,900 kg CO2e			
			HVAC optimization Tunnels Stage 3 - HVAC System optimization	\$ -	2017 and onward	70,000 kWh	-	\$9,100	-	1,200 kg CO2e			
			Repurpose Detritor Buildings 1&2 (removed from service, reducing lighting and HVAC loads)	\$ -	2017 and onward	0.7 million kWh	-	\$91,000	-	12,100 kg CO2e			
			Repurpose Raw Lifting Station (building removed from service, reducing lighting and HVAC loads)	\$ -	2017 and onward	114,000 kWh	-	\$14,800	-	1,970 kg CO2e			
			Repurpose Chlorination Building (building removed from service reducing lighting and HVAC loads)	\$ -	2017 and onward	43,800 kWh	-	\$5,700	-	760 kg CO2e			
			Optimization level control influent pumping station 1 & 2	\$ -	2017 and onward	480,000 kWh	-	\$62,400	-	8,300 kg CO2e			
			Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2017	-	1.1 million m3	\$0.3 million	-	2,090 kg CO2e			
			Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (ICI)	\$ -	2017	Estimated avoided electricity costs of \$1.5 million							
				\$ -	2018	Estimated avoided electricity costs of \$2.5 million							
				\$ -	Underway/Planned	Estimated avoided electricity costs of \$646,500 (2019 YTD)							

2014 to 2019 Measures Completed or Underway/Planned: Sanitary Sewerage (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions			
Duffin Creek Water Pollution Control Plant	901 McKay Rd.	Pickering	Load reduction centrifuges - Fan operation optimization	\$ 9,500	2018 and onward	46,000 kWh	-	\$6,000	\$3,600	1,600 kg CO2e			
			HVAC System Optimization of the Administration building - minimize reheating loads during the summer	\$ -	2018 and onward	123,000 kWh	-	\$16,000	-	4,300 kg CO2e			
			Upgrade Raw Lifting Station with IPS Stage I&II	\$ -	2018 and onward	1.1 million kWh	-	\$143,000	-	38,500 kg CO2e			
			Distribution Flow Optimization - Distribution Flow Optimization	\$ -	2018 and onward	626,900 kWh	-	\$81,500	-	21,940 kg CO2e			
			Utilization of air from odour control system	\$ -	2018 and onward	18,000 kWh	-	\$2,300	-	630 kg CO2e			
			Elimination of FAB motor during normal operation	\$ -	2018 and onward	0.2 million kWh	-	\$26,000	-	7,000 kg CO2e			
			Ph1: Compressor upgrade Old and New Incineration building	\$ 90,000	2018 and onward	133,000 kWh	-	\$17,300	\$32,200	4,650 kg CO2e			
			Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2018 and onward	-	480,000 m3	\$140,000	-	910 kg CO2e			
				\$ -	Underway/Planned	-	253,500 m3	\$76,000	-	480 kg CO2e			
			Lighting and controls for maintenance, tunnels, galleries, and generator buildings and exterior posts.	\$ 204,100	Underway/Planned	310,000 kWh	-	\$37,200	\$19,200	10,800 kg CO2e			
			Lighting and controls for the new dewatering, digesters, administration and laboratory buildings.	\$ 307,800	Underway/Planned	452,000 kWh	-	\$54,200	\$29,100	15,800 kg CO2e			
			Ph2: Compressor upgrade Old and New Incineration building	\$ 90,000	Underway/planned	Anticipated electricity and operational savings. Anticipated incentive/measure amount of \$32,200							
			Ph3: Compressor upgrade Old and New Incineration building	\$ 90,000	Underway/planned	Anticipated electricity and operational savings. Anticipated incentive/measure amount of \$32,200							
			VFD on ID Fan Old Incineration Building	\$ 51,000	Underway/planned	Anticipated electricity and operational savings. Anticipated incentive/measure amount of \$17,700							
			Stage III Secondary Clarifiers Scum collectors - Timers to reduce operating hours	\$ 6,000	Underway/planned	Anticipated electricity and operational savings. Anticipated incentive/measure amount of \$3,000							
			Lighting and lighting controls upgrade for the old and Incineration and Stage 3 Headworks buildings	\$ 232,376	Underway/planned	Anticipated electricity and operational savings. Anticipated incentive/measure amount of \$24,000							
			Lighting and controls for headworks and IPS Stage 1 and 2 buildings	\$ 54,600	Underway/planned	Anticipated electricity and operational savings. Anticipated incentive/measure amount of \$11,800							
			Embedded Energy Manager Staffing Resource - Term 1 (savings reflected in implemented initiatives)	Actual salary and expenses	2014/15	Mandated savings target of 2 million kWh achieved as part of EEM program (savings captured through other initiatives). EEM Program through Veridian covered 80% of salary costs and related expenses							
			Embedded Energy Manager Staffing Resource - Term 2 (savings reflected in implemented initiatives)	Actual salary and expenses	2015								
			Embedded Energy Manager Staffing Resource - Term 1 (savings reflected in implemented initiatives)	Actual salary and expenses	2017								
Embedded Energy Manager Staffing Resource - Term 2 (savings reflected in implemented initiatives)	Actual salary and expenses	2018											
Embedded Energy Manager Staffing Resource - Term 3 (savings reflected in implemented initiatives)	Actual salary and expenses	Underway/planned											
Duffin Creek WPCP Integrated Resource Recovery (IRR) Study	\$ 500,000	Underway/planned	Will outline options which seek to maximize resource recovery from water, energy and heat from waste streams and nutrients (materials).										
Duffin Heights SPS	1820 Liatris Dr.	Pickering	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							
Harbour Sewage PS	51 Harbour Park Cres.	Brock		TBD									

2014 to 2019 Measures Completed or Underway/Planned: Sanitary Sewerage (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions			
Harmony Creek Water Pollution Control Plant	785 Colonel Sam Dr.	Oshawa	Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2014	-	54,000 m3	\$16,200	-	103 tonnes CO2e			
				\$ -	2015	-	9,000 m3	\$2,700	-	17 tonnes CO2e			
				\$ -	2016	-	8,000 m3	\$2,400	-	15,200 kg CO2e			
			Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (ICI)	\$ -	2017	Estimated avoided electricity costs of \$184,000							
				\$ -	2018	Estimated avoided electricity costs of \$243,000							
				\$ -	Underway/Planned	Estimated avoided electricity costs of \$75,700 (2019 YTD)							
Blower upgrade	\$ 400,000	Underway/Planned	0.54 million kWh	-	\$70,000	\$54,000	-						
Jodrel Sanitary Sewer Pumping Station	989 Jodrel Rd.	Pickering	Lighting Retrofit under saveONenergy SBL Program	\$ -	2014 and onward	150 kWh	0	\$20	\$1,100	6 kg CO2e			
				TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							
Lake Simcoe Water Pollution Control Plant	B885 Thorah Concession Rd. 5	Brock	LED lighting retrofit	\$ 5,000	2016 and onward	10,000 kWh	-	\$1,300	-	180 kg CO2e			
			Replace AHU and Repair Leak	\$ 180,000	Underway/planned	Anticipated energy and operational savings							
			Replace Boiler	\$ 180,000	Underway/planned								
			Lighting Retrofit	\$ 103,000	Underway/planned								
Finch Liverpool Sewage Pumping Station	1250 Finch Ave.	Pickering	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							
Lynde Creek Sewage PS (Cochrane PS)	506 Rossland Rd. W.	Whitby											
Madawaska Sanitary Sewer Pumping Station	Madawaska AVE	Oshawa											
Newcastle Water Pollution Control Plant	1000 Toronto St.	Clarington	Replace boiler	\$ 132,000	Underway/planned	Anticipated energy and operational savings							
Port Darlington Water Pollution Control Plant	130 Port Darlington Rd.	Clarington	Digester gas utilization in boilers offsetting conventional natural gas usage	\$ -	2017	-	4,000 m3	\$1,200	-	7,600 kg CO2e			
Reach St. Sewage PS	44 Sherrington Dr.	Scugog	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							
Rosebank Sewage PS	520 Rodd Ave.	Pickering											
Simcoe St. N Sewage PS	Oshawa, 1568-1574 Simcoe St. N.	Oshawa											
Southwood Sanitary Sewer Pumping Station	44 Lambard Cres.	Ajax				\$ -	2014 and onward	70 kWh	-	\$10	\$550	3 kg CO2e	
Sundial Sewage PS	90 Bayly St. W.	Ajax				TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)					
Toy Ave. Sanitary Sewer Pumping Station	1090 Toy Ave.	Pickering				\$ -	2014 and onward	50 kWh	-	\$10	\$400	2 kg CO2e	
Uxbridge Brook WPCP and Administration Building	127 Main St.	Uxbridge	Facility site assessments through local distribution companies for ECM identification	\$ -	2015	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200							
			Lighting Retrofit	\$ 30,000	Underway/Planned	Anticipated energy and operational savings							
Whitecliffe Sewage PS	13 Hathaway Dr.	Clarington	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)							

2014 to 2019 Measures Completed or Underway/Planned: Transit

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
DRT (Farewell) Transit Maintenance Facility	715 Farewell St.	Oshawa	Construction of Building to New Standard/Code	\$ 27,700,000	2017 and onward	Built to LEED Silver Standard - anticipated electricity and natural gas savings relative to OBC. Level 3 EV Charger and rainwater harvesting				
DRT (Raleigh) Transit Maintenance Facility	710 Raleigh Ave.	Oshawa	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			Upgrade Lighting	\$ 50,300	2018 and onward	Anticipated electricity and operational savings				
			Exterior Roadworks and Lighting Improvements	\$ 137,000	Underway/Planned	Anticipated electricity and operational savings				
			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
DRT (Westney) Transit Maintenance Facility	110 Westney Rd.	Ajax	LED lighting retrofit	\$ 11,500	2018 and onward	48,000 kWh	-	\$6,200	\$4,950	830 kg CO2e
				\$ 2,600	2018 and onward	12,100 kWh	-	\$1,570	\$1,150	200 kg CO2e
DRT (William St.) Office	44 William St. W Unit #3	Oshawa	Lighting Retrofit under saveONenergy SBL Program	\$ -	2014 to 2016	2,200 kWh	-	\$300	\$950	90 kg CO2e

2014 to 2019 Measures Completed or Underway/Planned: Works Maintenance Depots

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Ajax Works Maintenance Depot	2020 Salem/Taunton Rd	Ajax	Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
			Admin HVAC Upgrade	\$ 80,300	2016 and onward	Anticipated energy and operational savings				
			Lighting upgrade	\$ 4,800	Underway/Planned	Anticipated electricity and operational savings. Anticipated incentive/measure amount of \$1,650				
Orono Works Maintenance Depot	3480 Taunton Rd.	Clarington	Lighting Retrofit under saveONenergy SBL Program	\$ 1,140	2014 and onward	8,800 kWh	-	\$1,100	\$1,650	360 kg CO2e
			Expansion and Renovation	\$ 3,328,000	2017 and onward	Efficiency improvements made to existing areas. Improved building standard for expanded area				
Oshawa/Whitby Works Maintenance Depot	825 Conlin Rd.	Whitby	Facility site assessments through local distribution companies for ECM identification	\$ -	2015	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
			LED lighting retrofit	\$ 1,400	2016 and onward	37,400 kWh	-	\$4,900	-	680 kg CO2e
			LED lighting retrofit	\$ 4,900	2018 and onward	23,900 kWh	-	\$3,100	\$2,200	400 kg CO2e
			Replace Furnace in Fleet Garage	\$ 70,000	Underway/Planned	Anticipated energy and operational savings				
Scugog Works Maintenance Depot	10 Regional Rd. 21	Scugog	Lighting Retrofit under saveONenergy SBL Program	\$ 320	2014 and onward	2,900 kWh	-	\$400	\$1,800	120 kg CO2e
			LED lighting retrofit	\$ 4,800	2018 and onward	33,100 kWh	-	\$4,300	\$1,900	570 kg CO2e
Sunderland Works Maintenance Depot	S995 Regional Rd. 10	Brock	Lighting Retrofit under saveONenergy SBL Program	\$ 630	2014 and onward	900 kWh	-	\$100	\$1,700	40 kg CO2e
			Lighting Retrofit under saveONenergy SBL Program	\$ 260	2014 and onward	4,300 kWh	-	\$560	\$1,650	170 kg CO2e
			LED lighting retrofit	\$ 2,800	2018 and onward	10,400 kWh	-	\$1,350	\$950	180 kg CO2e
			Remove Existing Insulation and Replace with Spray Foam in Attic Above Administration Area	\$ 21,700	Underway/Planned	Anticipated energy and operational savings				
			Lighting Retrofit under saveONenergy SBL Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				

2014 to 2019 Measures Completed or Underway/Planned: Long-Term Care

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Fairview Lodge	632 Dundas St. W	Whitby	LED lighting retrofit	\$ 52,700	2018 and onward	183,500 kWh	-	\$23,900	\$9,200	3,200 kg CO2e
			saveONenergy High Performance New Construction Program	\$ 14,500	2015	Savings for building design versus OBC baseline. Total measure/incentive amount of \$48,000				
			Construction of Facility to New Standard/Code	\$ 46,700,000	2014 and onward	Built to LEED Gold Standard - anticipated electricity and natural gas savings relative to OBC. Built to accommodate future rooftop solar PV. Rainwater harvesting				
Hillsdale Estates	590 Oshawa Blvd. N.	Oshawa	LED lighting retrofit	\$ 23,896	2014 and onward	26,000 kWh	-	\$3,400	\$1,500	1,050 kg CO2e
			LED lighting retrofit	\$ 2,240	2018 and onward	3,800 kWh	-	\$500	\$1,100	70 kg CO2e
			LED lighting retrofit	\$ 5,800	2018 and onward	16,100 kWh	-	\$2,100	\$800	280 kg CO2e
			VFD on AHU #1	\$ 78,000	2016/17 and onward	230,000 kWh	136,900 m3	\$71,000	\$44,400	264,000 kg CO2e
			VFD on AHU #2							
			VFD on AHU #3							
			VFD on AHU #4	TBD	Underway/Planned	Anticipated electricity and natural gas savings and operational savings.				
			VFD on AHU #5	TBD						
			VFD on AHU #6	TBD						
			VFD on AHU #7	TBD						
			VFD on AHU #8	TBD						
			VFD on AHU #9	TBD						
			VFD on AHU #10	TBD						
			VFD on AHU #11	TBD						
			VFD on AHU #12	TBD						
			VFD on AHU #13	TBD						
Building Automation System Upgrades and Recommissioning	\$ 165,255	2014 and onward	4,500 kWh	0.2 million m3	\$60,600	\$21,200	380,000 kg CO2e			
Enbridge RunitRight Program - Various Measures	\$ 8,000	2016 and onward	-	54,300 m3	\$16,300	\$5,500	103,100 kg CO2e			
Lakeview Manor	133 Main St.	Brock	Attic Insulation Upgrades	\$ 296,000	2016 and onward	Increased attic insulation from R30 to R40. Improved operational efficiency and energy savings				

2014 to 2019 Measures Completed or Underway/Planned: Water Supply

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions							
Ajax Water Supply Plant	75 Lake Driveway	Ajax	Low lift pump #3 pump refurbishment	\$ 29,900	2014 and onward	1,800 kWh, 10.3 kW peak demand	-	\$1,100	\$9,300	70 kg CO2e							
			Low lift pump #2 pump refurbishment	\$ 34,200	2014 and onward	3.5kW Peak Demand	-	\$300	\$3,150	-							
			High lift pump #7 pump refurbishment	\$ 51,900	2014 and onward	30,000 kWh, 54.4 kW peak demand	-	\$8,000	\$25,900	1,200 kg CO2e							
			Lighting upgrade	\$ 4,100	Underway/Planned	Anticipated electricity and and operational savings (~12,000 kWh/yr, \$1,700/yr).											
			High lift pump #1 refurbishment	n/a	2015 and onward	Anticipated electricity and and operational savings.											
			Low lift pump #2 repair	n/a	2015 and onward	Anticipated electricity and and operational savings.											
			High lift pump #4 refurbishment	n/a	2016 and onward	Anticipated electricity and and operational savings.											
			High lift pump #6 refurbishment	n/a	2015 and onward	Anticipated electricity and and operational savings.											
			Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (ICI)	\$ -	2017	Estimated avoided electricity costs of \$92,000											
	\$ -	2018	Estimated avoided electricity costs of \$365,000														
	\$ -	Underway/Planned	Estimated avoided electricity costs of \$103,700 (2019 YTD)														
Arthur St. Reservoir	856 Arthur St.	Clarington	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)											
Blackstock Well # 7 & 8	132 Greensboro Dr.	Scugog															
Bowmanville Water Supply Plant	145 Port Darlington Rd.	Clarington	Facility site assessments through local distribution companies for ECM identification	\$ -	2014	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200											
			Low Lift Pump #3 refurbishment	n/a	2014 and onward	Anticipated electricity and operational savings. Estimated incentive/measure amount of \$1,100											
			LED lighting retrofit	\$ 4,200	2017 and onward	14,500 kWh	-	\$1,900	\$700	250 kg CO2e							
			LED lighting retrofit	\$ 17,900	2018 and onward	127,100 kWh	-	\$16,500	\$7,100	2,200 kg CO2e							
			Lighting Upgrade	\$ 56,000	Underway/Planned	Anticipated electricity and operational savings. Estimated incentive/measure amount of \$1,100											
Bowmanville Zone 2 Reservoir (Middle Road)	2548 Concession Rd 4	Clarington	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)											
Cannington Well 3	C21075 Sideroad 18A	Brock															
Cannington Wells No. 2 & 7	C1722 Regional Rd 12	Brock															
Cannington, Well No. 4	114 Davidson St	Brock															
Cannington, Well No. 8 & 6	179 Davidson St.	Brock															
Cherrywood Water PS	2105 Rosebank Rd.	Pickering															
Cherrywood Water Pumping Station	2228 Rosebank Rd.	Pickering									\$ -	2014 and onward	400 kWh	-	\$50	\$1,250	16 kg CO2e
Duffin Heights WPS	1610 Dersan St.	Pickering									TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Finch Ave Elevated Tank	384 Finch Ave.	Pickering															

2014 to 2019 Measures Completed or Underway/Planned: Water Supply (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Garrard Rd Water Pumping Station	4600 Garrard Rd. N	Whitby	Exhaust Fan Replacement	\$ 140,000	Underway/Planned	Anticipated energy and operational savings				
Grandview Water Pumping Station	1265 Grandview Rd. N.	Oshawa	Replacement of AC and dehumidifier units	\$ 415,000	Underway/Planned	Anticipated energy and operational savings				
Greenbank Water Pumping Station (Well 1&2)	9 Murray St.	Scugog	Lighting Retrofit under saveONenergy Small Business Lighting Program	\$ -	2014 and onward	1,600 kWh	-	\$200	\$1,200	65 kg CO2e
Harmony Rd. Reservoir	2271 Harmony Rd N	Oshawa		TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Hortop Water Pumping Station	930 Hortop Ct.	Oshawa	HL #5 refurbishment	TBD	2017 and onward	Anticipated electricity and and operational savings.				
			HL #1 refurbishment	n/a	2017 and onward	Anticipated electricity and and operational savings.				
Laidlaw Water Station	194 Laidlaw St. N	Brock	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Mill St. Water PS	15 North Mill Lane	Clarington								
Newcastle Water Supply Plant	5 Lakebreeze Dr.	Clarington	High lift pump #2 repair	n/a	2014 and onward	Anticipated electricity and and operational savings.				
			Low lift vertical turbine repair	n/a	2016 and onward	Anticipated electricity and and operational savings.				
			Low lift pump #3 repair	n/a	2017 and onward	Anticipated electricity and and operational savings.				
Newtonville Water PS	3742 Regional Hwy 2.	Clarington	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Orono Well No. 3 & 4	3370 Concession Rd. 5	Clarington								
Oshawa Water Supply Plant	1540 Ritson Rd. S	Oshawa	Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (ICI)	\$ -	2017	Estimated avoided electricity costs of \$201,000				
				\$ -	2018	Estimated avoided electricity costs of \$222,400				
				\$ -	Underway/Planned	Estimated avoided electricity costs of \$51,300 (2019 YTD)				
			Replace Boiler & Heating System	\$ 620,000	2018 and onward	Anticipated energy and operational savings				
Plants East	Various locations	Various	Pump / Motor / Mixer Repair / Replacement	\$ 50,000	Underway/Planned	Anticipated energy and operational savings				
Port Perry Water Tower	97 Silver St	Scugog	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Port Perry, Well 3 & 5	12375 Simcoe St.	Scugog								
Quakerhill Water PS	7245 Concession 6	Uxbridge		\$ -	2014 and onward	1,800 kWh	-	\$200	\$1,300	70 kg CO2e
Sunderland Water Tower	32 Jane St.	Brock		TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Sunderland Well 1 & 2	S1270 Brock Concession Rd. 6	Brock								
Taunton Rd Water Pumping Station	1265 Grandview Rd. N.	Oshawa	Pump #1 and #2	\$ 75,000	2015 and onward	22,100 kWh	-	\$2,900	\$14,800	800 kg CO2e

2014 to 2019 Measures Completed or Underway/Planned: Water Supply (cont'd)

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Taunton Reservoir	Oshawa, 1265 Grandview ST N	Oshawa	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Uxbridge Ind. Park Elev. Tank	69 Anderson Blvd	Uxbridge								
Uxbridge Well No. 6	6A Campbell Dr	Uxbridge								
Uxbridge Well No. 7	135 Reach St.	Uxbridge								
Uxville Ind. Park Water PS (Well 1 & 2)	15 Anderson Blvd	Uxbridge								
Waverly Water PS	Oshawa, 670 Buchan Ave.	Oshawa	HL #3 replacement	n/a	2017 and onward	Anticipated electricity and and operational savings.				
Waverly Water Pumping Station	670 Buchan Ave.	Oshawa	HL #1 replacement	n/a	2015 and onward	Anticipated electricity and and operational savings.				
Westney Road Reservoir	2900 Westney Rd	Ajax	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Whitby Water Supply Plant	289 Water St.	Whitby	LED lighting retrofit	\$ 4,700	2014 and onward	6,300 kWh	-	\$800	\$850	250 kg CO2e
			Raw water pump replacement	n/a	2016 and onward	Anticipated electricity and and operational savings.				
			Serviceid Industrial water pump 1 and 2	n/a	2017 and onward	Anticipated electricity and and operational savings.				
			Class A account - Demand curtailment during system-wide peak events as part of the Industrial Conservation Initiative (IC)	\$ -	2017	Estimated avoided electricity costs of \$198,000				
				\$ -	2018	Estimated avoided electricity costs of \$287,500				
				\$ -	Underway/Planned	Estimated avoided electricity costs of \$48,000 (2019 YTD)				

2014 to 2019 Measures Completed or Underway/Planned: Solid Waste Management

Facility Name	Address	Municipality	Project Description	Est. Cost (rounded)	Implementation year	Electricity Savings (kWh)	Natural Gas Savings (m3)	Operational Savings/Year	Incentive / Measure Value	Annual GHG Reductions
Brock Waste Management Facility	C22480 Brock Sideroad #17	Brock	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
Brock Waste Management Facility new building										
Durham Materials Recovery Facility	4590 Garrard Rd.	Whitby	HVAC Upgrades - replace 3 older units with 1 high efficiency unit	\$ 159,658	2017 and onward	Anticipated improved energy performance and operational cost savings				
Clarington MHSW Facility	1998 Regional Rd 57	Clarington	Lighting Retrofit under saveONenergy Small Business Lighting Program	TBD	Underway/planned	Anticipated electricity savings. Measures and savings subject to results of assessments (underway)				
			Renovations for New Facility	\$ 700,000	Underway/planned	Improvements planned to include re-roofing unit. Anticipated improved energy usage and operational cost savings.				
Garrard Rds Recycling and Water Pumping Station	4600 Garrard Rd. N	Whitby	Facility site assessments through local distribution companies for ECM identification	\$ -	2015	Facility site assessment through LDC to identify CDM measures. Approx. value of assessment at \$1,200				
Oshawa Waste Transfer and Recycling Station	1640 Ritson Rd. N, Oshawa	Oshawa	Lighting Retrofit under saveONenergy Small Business Lighting Program	\$ -	2014 and onward	4,100 kWh	-	\$500	\$1,100	170 kg CO2e
Scugog Waste Management Facility	1623 Reach Street	Scugog								
Transfer and Recycling Site	1460 Ritson RD N	Oshawa								
Transfer and Recycling Site	Ritson Rd N									

Total Energy Usage by Operational Area (2012 to 2018)

Electricity ('000 kWh)	2012	2013	2014	2015	2016	2017	2018
Transit	1,532.6	1,873.9	2,099.5	1,971.1	2,006.7	2,247.3	2,753.8
Child Care	309.5	286.4	258.4	243.2	243.9	222.8	232.6
Long-Term Care	13,763.9	13,215.0	12,670.5	10,586.3	13,667.4	13,102.5	13,154.3
Local Housing MURBs	8,200.2	8,766.6	8,844.7	8,207.5	7,953.8	7,738.9	8,131.5
Paramedic Services	877.5	939.7	1,018.9	935.3	922.1	914.8	923.5
Regional HQ	8,289.0	7,938.4	7,798.5	7,649.1	7,634.2	7,409.8	7,431.2
Other Offices	1,095.2	1,122.1	1,226.1	1,233.6	1,209.0	1,219.3	1,237.6
Police Services	5,157.4	5,256.2	6,075.6	5,961.8	7,587.1	7,241.7	7,261.6
Works Depots	1,257.7	1,219.6	1,216.5	1,146.3	1,133.3	1,182.1	1,146.4
Traffic Signals	1,576.7	1,713.8	1,499.9	1,269.3	1,310.7	1,329.4	1,301.9
Solid Waste Management	443.0	487.3	523.6	460.8	459.2	574.7	515.1
Other/Misc	36.0	50.4	34.3	18.9	62.1	72.0	83.2
Water Supply	39,584.4	39,153.7	39,877.4	39,534.1	40,807.4	38,666.3	41,213.4
Sanitary Sewer less Duffin Creek WPCP	31,081.7	30,647.8	31,065.4	29,294.9	30,317.2	31,268.6	32,316.1
Duffin Creek WPCP	65,631.6	65,221.5	70,016.0	67,066.8	63,432.7	62,319.7	66,312.6
Electricity Sub-Total	178,836.5	177,892.4	184,225.1	175,579.1	178,746.8	175,509.9	184,015.0
Sub-Total Energy ('000 GJ)	643.8	640.4	663.2	632.1	643.5	631.8	662.5
Natural Gas ('000 m3)	2012	2013	2014	2015	2016	2017	2018
Transit	391.2	504.0	600.9	558.6	578.2	698.3	802.3
Child Care	32.8	38.7	43.3	38.9	33.5	36.3	39.1
Long-Term Care	1,939.5	2,119.6	2,057.4	1,655.1	1,789.9	1,759.2	1,933.1
Local Housing MURBs and Family Units	1,144.4	1,395.0	1,409.0	1,392.5	1,246.9	1,281.8	1,311.9
Paramedic Services	127.8	145.6	180.3	143.8	150.2	152.8	179.0
Regional HQ	380.1	418.3	418.8	416.0	368.0	369.3	382.4
Other Offices	57.0	64.5	77.9	67.0	64.3	81.1	63.4
Police Services	421.1	604.7	653.1	582.1	665.4	772.5	811.0
Works Depots	171.3	205.5	306.9	323.9	255.2	273.8	280.5
Solid Waste Management	41.7	45.2	47.7	41.7	36.3	42.1	53.6
Other/Misc	7.3	9.4	8.5	8.6	5.0	4.4	8.6
Water Supply	427.5	373.3	355.4	409.8	370.1	284.9	318.6
Sanitary Sewer less Duffin Creek WPCP	772.6	1,034.6	1,009.5	993.0	1,076.3	1,058.7	1,239.0
Duffin Creek WPCP	4,624.6	3,403.7	3,171.6	1,901.8	2,119.1	2,226.8	3,730.8
Natural Gas Sub-Total	10,538.9	10,362.3	10,340.3	8,532.8	8,758.6	9,041.9	11,153.4
Sub-Total Energy ('000 GJ)	403.9	397.1	396.2	327.0	335.6	346.5	427.4
Diesel ('000 L)	2012	2013	2014	2015	2016	2017	2018
Transit	-	-	-	-	-	0.5	0.5
Long-Term Care	10.2	7.9	10.7	6.3	12.1	7.4	14.5
Paramedic Services	1.2	3.3	2.9	2.1	2.0	2.7	2.2
Regional HQ	12.4	14.6	4.2	-	13.3	3.9	6.1
Other Offices	-	2.5	0.1	0.7	0.3	0.7	0.3
Police Services	0.6	1.7	2.7	-	2.7	-	7.8
Works Depots	-	-	-	-	-	-	0.4
Water Supply	71.7	76.6	96.6	80.4	70.9	68.1	65.7
Sanitary Sewer less Duffin Creek WPCP	40.5	63.9	31.4	36.6	42.7	40.7	41.3
Duffin Creek WPCP	36.1	26.4	227.5	27.0	16.4	72.3	85.9
Diesel Sub-Total	172.9	196.9	376.1	153.1	160.4	196.3	224.7
Sub-Total Energy ('000 GJ)	6.6	7.5	14.4	5.9	6.1	7.5	8.6
Furnace Oil ('000 L)	2012	2013	2014	2015	2016	2017	2018
Other/Misc	7.2	13.3	11.5	11.2	9.7	6.2	9.3
Duffin Creek WPCP	1,262.5	687.4	924.4	624.3	491.3	694.7	751.2
Furnace Oil Sub-Total	1,269.7	700.7	935.9	635.5	501.0	700.9	760.5
Sub-Total Energy ('000 GJ)	49.3	27.2	36.3	24.7	19.4	27.2	29.5
Propane ('000 L)	2012	2013	2014	2015	2016	2017	2018
Solid Waste Management	1.4	-	6.2	3.6	4.2	3.7	4.1
Police Services	15.8	14.4	0.2	-	-	-	-
Other/Misc	0.8	8.8	5.0	3.4	0.8	0.7	-
Propane Sub-Total	18.0	23.2	11.5	7.0	5.0	4.4	4.1
Sub-Total Energy ('000 GJ)	0.5	0.6	0.3	0.2	0.1	0.1	0.1
Total Energy ('000 GJ)	1,104.0	1,072.8	1,110.5	989.8	1,004.8	1,013.1	1,128.1

Total Energy Cost by Operational Area (2012 to 2018)

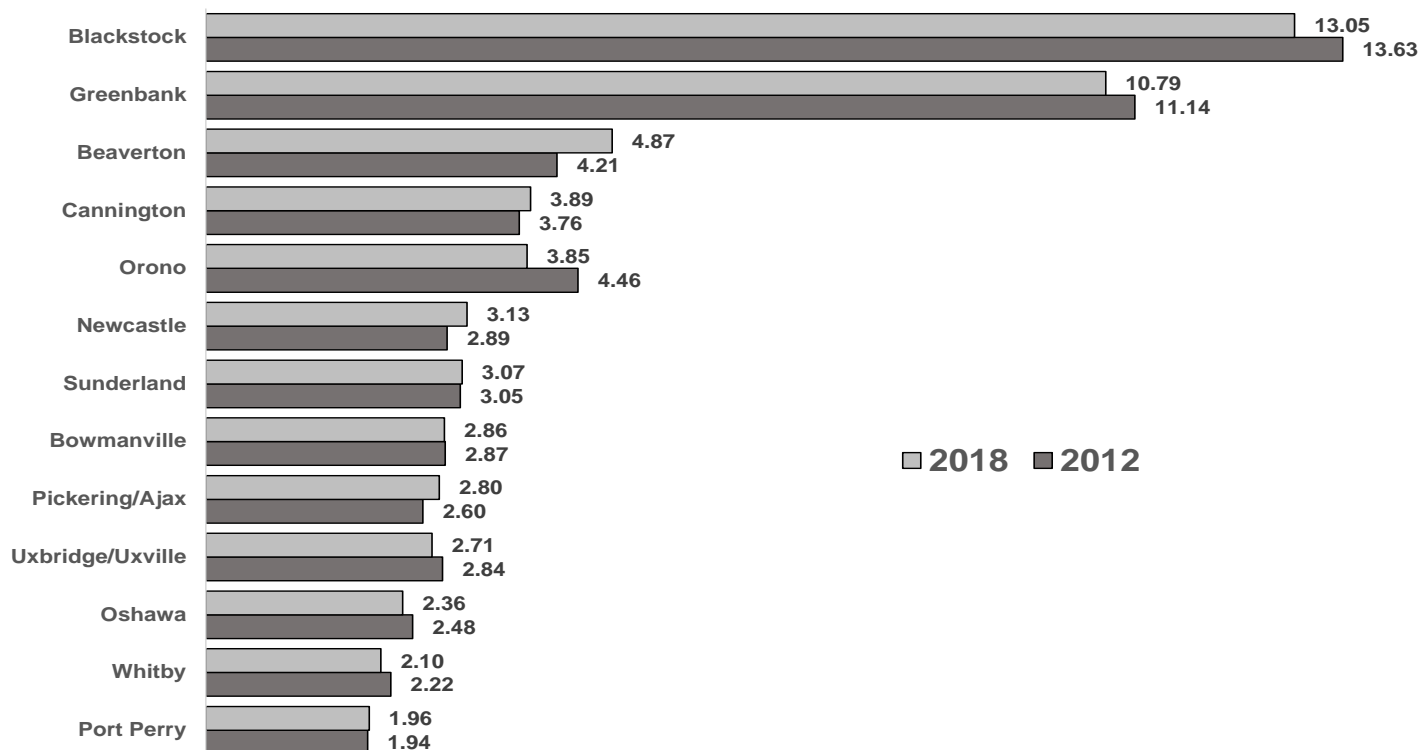
Electricity (\$000s)	2012	2013	2014	2015	2016	2017	2018
Transit	\$ 179.8	\$ 244.9	\$ 273.0	\$ 296.6	\$ 339.3	\$ 389.1	\$ 454.3
Child Care	\$ 37.8	\$ 39.9	\$ 36.4	\$ 39.6	\$ 48.2	\$ 37.1	\$ 33.3
Long-Term Care	\$ 1,592.9	\$ 1,716.3	\$ 1,668.4	\$ 1,643.3	\$ 2,371.5	\$ 1,982.6	\$ 1,443.7
Local Housing MURBs	\$ 876.9	\$ 1,004.7	\$ 1,091.0	\$ 1,120.1	\$ 1,243.0	\$ 1,002.1	\$ 905.8
Paramedic Services	\$ 109.1	\$ 128.6	\$ 145.4	\$ 152.6	\$ 171.1	\$ 152.6	\$ 150.8
Regional HQ	\$ 963.1	\$ 1,019.8	\$ 1,008.7	\$ 1,185.5	\$ 1,327.9	\$ 1,191.9	\$ 1,053.6
Other Offices	\$ 135.6	\$ 153.9	\$ 175.1	\$ 204.9	\$ 228.7	\$ 213.7	\$ 197.9
Police Services	\$ 618.8	\$ 714.5	\$ 850.4	\$ 982.0	\$ 1,409.4	\$ 1,329.8	\$ 1,270.6
Works Depots	\$ 160.6	\$ 173.6	\$ 184.3	\$ 198.5	\$ 221.9	\$ 215.5	\$ 202.6
Traffic Signals	\$ 213.1	\$ 262.6	\$ 251.2	\$ 234.7	\$ 287.2	\$ 251.6	\$ 225.6
Solid Waste Management	\$ 57.1	\$ 71.0	\$ 80.3	\$ 79.5	\$ 93.4	\$ 103.6	\$ 86.2
Other/Misc	\$ 6.4	\$ 9.5	\$ 6.8	\$ 4.7	\$ 13.3	\$ 12.2	\$ 12.5
Water Supply	\$ 4,792.9	\$ 5,284.1	\$ 5,481.2	\$ 6,258.2	\$ 7,272.9	\$ 6,126.0	\$ 5,843.2
Sanitary Sewer less Duffin Creek WPCP	\$ 3,551.5	\$ 3,886.9	\$ 4,010.6	\$ 4,491.1	\$ 5,209.1	\$ 4,563.8	\$ 4,093.0
Duffin Creek WPCP	\$ 6,994.4	\$ 8,434.9	\$ 9,249.2	\$ 9,419.4	\$ 8,755.4	\$ 8,554.7	\$ 7,581.4
Electricity Sub-Total	\$ 20,290.0	\$ 23,145.0	\$ 24,512.2	\$ 26,310.8	\$ 28,992.3	\$ 26,126.4	\$ 23,554.6
Natural Gas (\$000s)	2012	2013	2014	2015	2016	2017	2018
Transit	\$ 101.6	\$ 114.7	\$ 148.9	\$ 186.3	\$ 188.3	\$ 219.5	\$ 250.0
Child Care	\$ 15.8	\$ 15.3	\$ 17.3	\$ 19.1	\$ 17.7	\$ 18.5	\$ 18.4
Long-Term Care	\$ 529.3	\$ 461.9	\$ 516.3	\$ 581.5	\$ 617.0	\$ 599.3	\$ 585.9
Local Housing MURBs and Family Units	\$ 539.1	\$ 674.7	\$ 701.3	\$ 707.4	\$ 520.2	\$ 557.6	\$ 533.7
Paramedic Services	\$ 46.6	\$ 45.0	\$ 58.4	\$ 62.8	\$ 65.1	\$ 64.5	\$ 73.1
Regional HQ	\$ 96.1	\$ 94.7	\$ 109.3	\$ 140.5	\$ 120.0	\$ 123.9	\$ 113.7
Other Offices	\$ 19.9	\$ 19.3	\$ 23.7	\$ 26.6	\$ 25.7	\$ 30.3	\$ 26.3
Police Services	\$ 126.7	\$ 139.0	\$ 168.8	\$ 205.3	\$ 239.7	\$ 279.8	\$ 266.4
Works Depots	\$ 56.2	\$ 51.6	\$ 79.6	\$ 115.6	\$ 97.3	\$ 99.9	\$ 99.7
Traffic Signals	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Other/Misc	\$ 3.2	\$ 2.6	\$ 3.3	\$ 4.1	\$ 2.8	\$ 2.6	\$ 3.8
Water Supply	\$ 121.8	\$ 89.4	\$ 97.4	\$ 142.6	\$ 132.0	\$ 106.2	\$ 109.4
Sanitary Sewer less Duffin Creek WPCP	\$ 238.0	\$ 235.1	\$ 269.3	\$ 355.3	\$ 375.2	\$ 368.7	\$ 389.5
Duffin Creek WPCP	\$ 1,261.1	\$ 701.0	\$ 764.4	\$ 672.5	\$ 728.8	\$ 763.2	\$ 1,094.0
Natural Gas Sub-Total	\$ 3,168.9	\$ 2,655.1	\$ 2,970.6	\$ 3,234.8	\$ 3,143.9	\$ 3,249.3	\$ 3,583.3
Diesel (\$000s)	2012	2013	2014	2015	2016	2017	2018
Transit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.5	\$ 0.5
Long-Term Care	\$ 10.6	\$ 8.6	\$ 11.2	\$ 5.5	\$ 8.5	\$ 6.8	\$ 15.0
Paramedic Services	\$ 1.3	\$ 2.8	\$ 3.0	\$ 1.7	\$ 1.4	\$ 2.3	\$ 2.1
Regional HQ	\$ 12.6	\$ 12.6	\$ 4.0	\$ -	\$ 8.7	\$ 3.5	\$ 5.9
Other Offices	\$ -	\$ 2.2	\$ 0.1	\$ 0.6	\$ 0.2	\$ 0.6	\$ 0.3
Police Services	\$ 0.6	\$ 1.8	\$ 2.6	\$ -	\$ 2.2	\$ -	\$ 7.7
Works Depots	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.4
Water Supply	\$ 71.2	\$ 70.9	\$ 104.9	\$ 67.1	\$ 49.4	\$ 58.8	\$ 65.3
Sanitary Sewer less Duffin Creek WPCP	\$ 36.7	\$ 60.4	\$ 33.5	\$ 30.3	\$ 29.9	\$ 32.3	\$ 41.7
Duffin Creek WPCP	\$ 32.1	\$ 24.5	\$ 232.5	\$ 21.4	\$ 11.6	\$ 62.5	\$ 82.5
Diesel Sub-Total	\$ 165.1	\$ 184.0	\$ 391.9	\$ 126.6	\$ 111.9	\$ 167.2	\$ 221.4
Furnace Oil (\$000s)	2012	2013	2014	2015	2016	2017	2018
Other/Misc	\$ 7.3	\$ 13.6	\$ 12.1	\$ 8.8	\$ 6.1	\$ 4.9	\$ 8.7
Duffin Creek WPCP	\$ 1,253.3	\$ 688.3	\$ 940.6	\$ 471.0	\$ 322.6	\$ 554.1	\$ 700.8
Furnace Oil Sub-Total	\$ 1,260.6	\$ 701.9	\$ 952.7	\$ 479.8	\$ 328.7	\$ 559.0	\$ 709.5
Propane (\$000s)	2012	2013	2014	2015	2016	2017	2018
Solid Waste Management	\$ 0.9	\$ -	\$ 4.0	\$ 2.3	\$ 2.2	\$ 2.1	\$ 3.9
Police Services	\$ 10.8	\$ 9.9	\$ 0.2	\$ -	\$ -	\$ -	\$ -
Other/Misc	\$ 0.5	\$ 4.3	\$ 3.2	\$ 2.2	\$ 0.5	\$ 0.4	\$ -
Propane Sub-Total	\$ 12.3	\$ 14.2	\$ 7.4	\$ 4.5	\$ 2.7	\$ 2.5	\$ 3.9
Total Cost (\$000s)	\$ 24,897.0	\$ 26,700.3	\$ 28,834.9	\$ 30,156.5	\$ 32,579.5	\$ 30,104.3	\$ 28,072.7

Total Energy-Related Emissions by Operational Area (2012 to 2018)¹

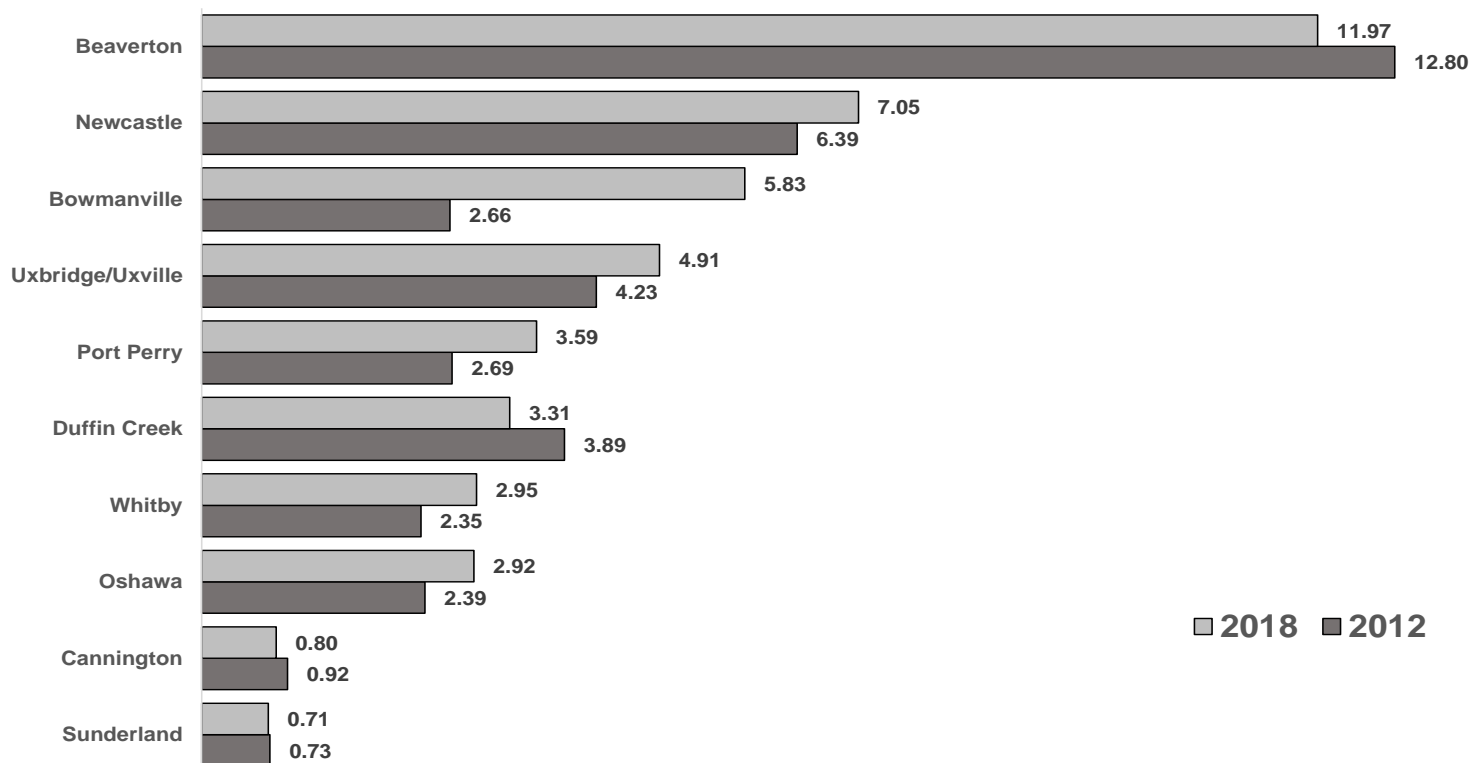
Electricity (tonnes CO2e)	2012	2013	2014	2015	2016	2017	2018
Transit	147.3	123.4	83.0	79.9	73.3	38.9	47.6
Child Care	29.7	18.9	10.2	9.9	8.9	3.9	4.0
Long-Term Care	1,322.7	870.2	501.1	429.3	499.5	226.6	227.5
Local Housing MURBs	788.0	577.2	349.8	332.8	290.7	133.9	140.7
Paramedic Services	84.3	61.9	40.3	37.9	33.7	15.8	16.0
Regional HQ	796.5	522.7	308.4	310.2	279.0	128.2	128.5
Other Offices	105.2	73.9	48.5	50.0	44.2	21.1	21.4
Police Services	495.6	346.1	240.3	241.7	277.3	125.3	125.6
Works Depots	120.9	80.3	48.1	46.5	41.4	20.4	19.8
Traffic Signals	151.5	112.9	59.3	51.5	47.9	23.0	22.5
Solid Waste Management	42.6	32.1	20.7	18.7	16.8	9.9	8.9
Other/Misc	3.5	3.3	1.4	0.8	2.3	1.2	1.4
Water Supply	3,803.9	2,578.1	1,577.1	1,603.0	1,491.4	668.8	712.9
Sanitary Sewer less Duffin Creek WPCP	2,986.8	2,018.0	1,228.6	1,187.9	1,108.0	540.9	559.0
Duffin Creek WPCP	6,306.9	4,294.6	2,769.0	2,719.4	2,318.3	1,078.0	1,147.1
Electricity Sub-Total	17,185.5	11,713.5	7,285.7	7,119.4	6,532.8	3,036.0	3,183.1
Natural Gas (tonnes CO2e)	2012	2013	2014	2015	2016	2017	2018
Transit	743.1	957.3	1,141.3	1,061.0	1,098.3	1,326.2	1,523.9
Child Care	62.4	73.5	82.2	73.9	63.7	68.9	74.3
Long-Term Care	3,683.9	4,025.9	3,907.7	3,143.6	3,399.7	3,341.4	3,671.7
Local Housing MURBs and Family Units	2,173.6	2,649.7	2,676.2	2,644.9	2,368.2	2,434.5	2,491.8
Paramedic Services	242.8	276.6	342.5	273.1	285.3	290.3	339.9
Regional HQ	721.9	794.4	795.4	790.2	699.0	701.5	726.4
Other Offices	108.2	122.5	147.9	127.2	122.2	154.1	120.5
Police Services	799.8	1,148.5	1,240.4	1,105.6	1,263.9	1,467.2	1,540.4
Works Depots	325.3	390.3	583.0	615.1	484.8	520.0	532.8
Traffic Signals	-	-	-	-	-	-	-
Other/Misc	13.8	17.9	16.1	16.2	9.4	8.3	16.3
Water Supply	812.1	709.1	675.1	778.3	703.0	541.1	605.1
Sanitary Sewer less Duffin Creek WPCP	1,467.4	1,965.1	1,917.5	1,886.1	2,044.3	2,010.9	2,353.3
Duffin Creek WPCP	8,783.7	6,464.9	6,024.0	3,612.2	4,024.9	4,229.4	7,086.1
Natural Gas Sub-Total	20,017.2	19,681.6	19,639.8	16,206.8	16,635.7	17,173.7	21,184.2
Diesel (tonnes CO2e)	2012	2013	2014	2015	2016	2017	2018
Transit	-	-	-	-	-	1.4	1.5
Long-Term Care	28.7	22.2	29.9	17.6	33.9	20.6	40.8
Paramedic Services	3.5	9.1	8.2	5.9	5.6	7.5	6.0
Regional HQ	34.9	41.0	11.7	-	37.2	10.9	17.0
Other Offices	-	7.0	0.3	2.0	0.9	1.9	0.9
Police Services	1.8	4.8	7.6	-	7.7	-	21.9
Works Depots	-	-	-	-	-	-	1.1
Water Supply	201.1	214.8	270.9	225.4	198.8	190.9	184.1
Sanitary Sewer less Duffin Creek WPCP	113.4	179.3	88.0	102.7	119.7	114.2	115.9
Duffin Creek WPCP	101.2	73.9	637.9	75.7	45.8	202.8	240.7
Diesel Sub-Total	484.6	552.0	1,054.4	429.1	449.6	550.2	629.8
Furnace Oil (tonnes CO2e)	2012	2013	2014	2015	2016	2017	2018
Other/Misc	19.9	36.7	31.8	30.8	26.8	17.1	25.6
Duffin Creek WPCP	3,487.4	1,898.8	2,553.6	1,724.6	1,357.1	1,918.9	2,075.1
Furnace Oil Sub-Total	3,507.4	1,935.5	2,585.4	1,755.4	1,383.9	1,936.1	2,100.7
Propane (tonnes CO2e)	2012	2013	2014	2015	2016	2017	2018
Solid Waste Management	2.1	-	9.7	5.5	6.5	5.7	6.3
Police Services	24.5	22.3	0.4	-	-	-	-
Other/Misc	1.2	13.7	7.8	5.3	1.3	1.1	-
Propane Sub-Total	27.9	36.0	17.9	10.8	7.8	6.8	6.3
Total Emissions (tonnes CO2e)	41,222.4	33,918.6	30,583.3	25,521.5	25,009.8	22,702.7	27,104.2

¹ Emission intensity coefficients based on most updated Environment Canada National Inventory Report (NIR), 1990-2017. Electricity coefficients based on generation intensity factors and reflect changes in emission intensity of Ontario generation composition. Global Warming Potential (GWP) factors based on IPCC 4th Assessment Report (SAR) method, as verified by use by Ministry of Energy, Northern Development and Mines and in alignment with federal GHG emission reporting methodology (subject to change).

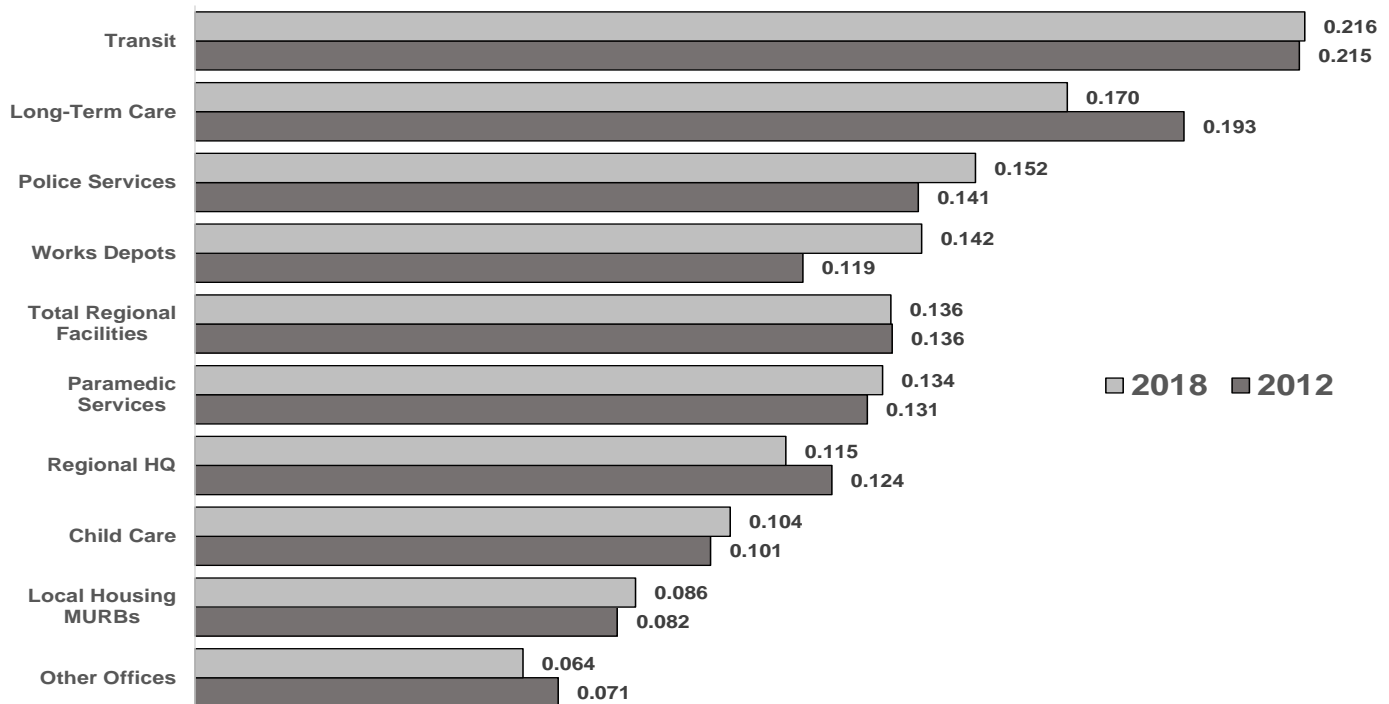
Energy Use Intensity (EUI) – Water Supply, by System, 2018 vs. 2012 Baseline (GJ/ML Flow)



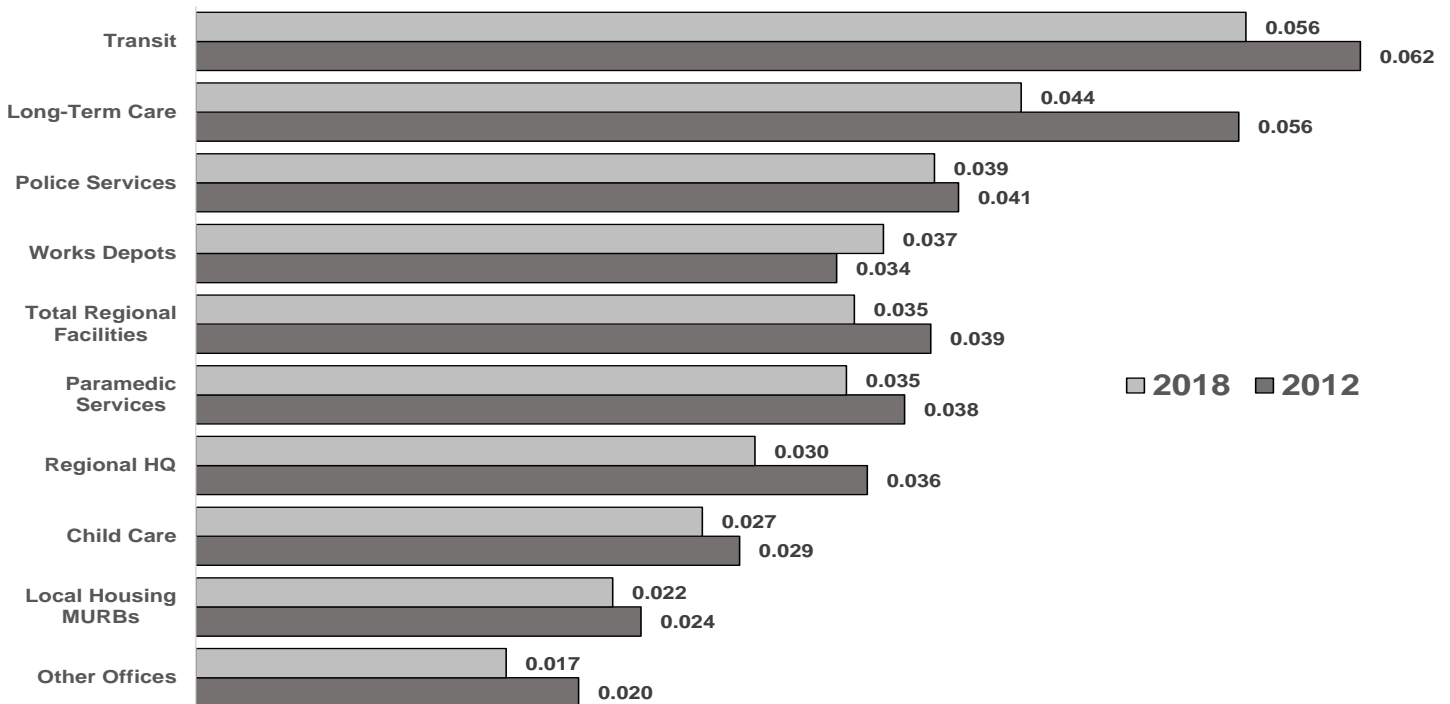
Energy Use Intensity (EUI) – Sanitary Sewerage, by System, 2018 vs. 2012 Baseline (GJ/ML Flow)



Nominal Energy Use Intensity (EUI) – Facilities, 2018 vs. 2012 Baseline (GJ/ft²)



Normalized Energy Use Intensity (EUI) – Facilities, 2018 vs. 2012 Baseline (GJ/DD/Thousand ft²)¹



¹ Adjustments made using total heating degree days (HDD) and cooling degree days (CDD) for Toronto City weather station. Energy usage for smaller, miscellaneous facilities, solid waste management and energy related to non-facility usage (i.e. NextGen towers) are not included in EUI measures. Accounts with partial year data (i.e. in-service or closed mid-year) are excluded.