



CITY OF LONDON

Corporate Energy Conservation and Demand Management (CDM) Plan

July 2014



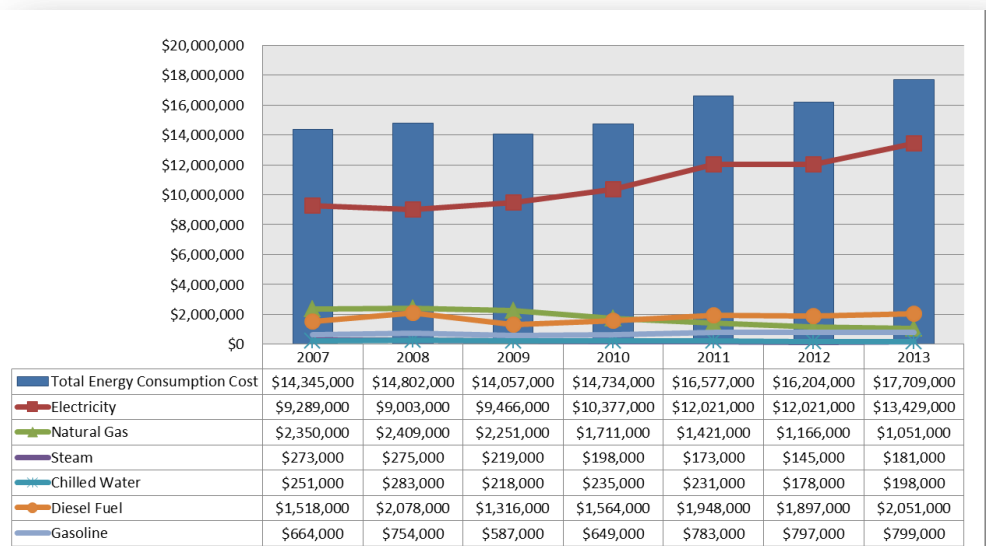
TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
1 INTRODUCTION AND OVERVIEW	9
2 BACKGROUND AND CONTEXT	10
2.1 BACKGROUND	10
2.2 ONTARIO REGULATION 397/11	10
2.3 BOARDS AND COMMISSIONS	12
2.4 ENERGY PRICE FORECASTS	12
2.5 CITY OF LONDON INITIATIVES.....	13
2.5.1 CITY OF LONDON STRATEGIC PLAN	14
2.5.2 CITY OF LONDON OFFICIAL PLAN.....	14
2.5.3 CITY OF LONDON COMMUNITY ENERGY ACTION PLAN.....	15
2.5.4 CITY OF LONDON RENEWABLE ENERGY PROJECTS.....	16
2.5.4.1 SOLAR GENERATION.....	16
2.5.4.2 GEOTHERMAL HEATING & COOLING.....	17
2.5.5 RENEWABLE ENERGY.....	18
2.5.5.1 CURRENT RENEWABLE ENERGY PROJECTS UNDER REVIEW OR UNDERWAY	18
LANDFILL GAS RENEWABLE ENERGY PROJECT.....	18
BIOENERGY	19
SOLAR ENERGY	20
WIND POWER.....	22
GEOTHERMAL HEATING & COOLING (GROUND SOURCE ENERGY).....	22
3 STRATEGY FOR ENERGY REDUCTION TARGETS AND CDM PLANS	23
3.1 ENERGY CONSUMPTION – ESTABLISH A BASELINE.....	23
3.1.1 ESTABLISHING A BASELINE.....	23
3.1.1.1 TRACKING & MONITORING ENERGY CONSUMPTION	23
3.1.1.2 TECHNICAL MEASURES	24
3.1.1.3 ORGANIZATIONAL MEASURES.....	25
3.1.1.4 BEHAVIOURAL MEASURES.....	26
3.1.1.5 FLEET SERVICES MEASURES	27
3.1.2 WHERE WE ARE TODAY – RECENT TRENDS	27
3.2 SETTING GOALS AND ACTIONS FOR CONSERVING ENERGY.....	31

3.2.1	CITY OF LONDON'S CDM FIVE YEAR PLAN	31
3.2.2	KEY PRINCIPLES TO MEET THE CITY OF LONDON TARGET TO 2020	33
3.2.2.1	BUDGET – THE COSTS ASSOCIATED TO THE SAVINGS.....	34
3.2.2.2	INCENTIVE OPPORTUNITIES	34
3.2.2.3	ECONOMIC DEVELOPMENT OPPORTUNITIES	35
3.2.2.4	LEVEL OF COMMITMENT	35
3.2.2.5	FLEET SERVICES “GREEN FLEET STRATEGY”	36
3.3	IDENTIFY CONSERVATION POTENTIAL	36
3.3.1	IDENTIFYING THE ENERGY POTENTIALS	36
3.3.1.1	ENERGY AUDITS	36
3.3.1.2	CDM STRATEGIC PLANNING	37
3.3.1.3	IT'S WITHIN REACH PROGRAM.....	37
3.3.2	FROM PLAN TO IMPLEMENTATION - PROPOSED ENERGY REDUCTION STRATEGY	38
3.3.2.1	TRACKING AND MONITORING STRATEGY	38
3.3.2.2	TECHNICAL MEASURES STRATEGY.....	39
3.3.2.3	ORGANIZATIONAL MEASURES AND STRATEGY	41
3.3.2.4	BEHAVIORAL MEASURES AND STRATEGY	42
3.4	IMPLEMENT MEASURES	43
3.5	EVALUATE AND MEASURE RESULTS.....	43
4	ADMINISTRATION OF THE CDM PLAN.....	44
	APPENDIX A – AMERESCO PHASE III – CGAC PROJECT.....	45
	APPENDIX B – PROPOSED ENERGY AND CAPITAL RENEWAL MEASURES	46
	APPENDIX C – CITY OF LONDON CDM PLANNING MEASURES	49

EXECUTIVE SUMMARY

The Corporation of the City of London (City of London) is challenged with significant budgetary pressures with increased energy costs and reduced levels of funding, which impact our city and local economy. The City of London spent approximately \$17.7 million in 2013 on its



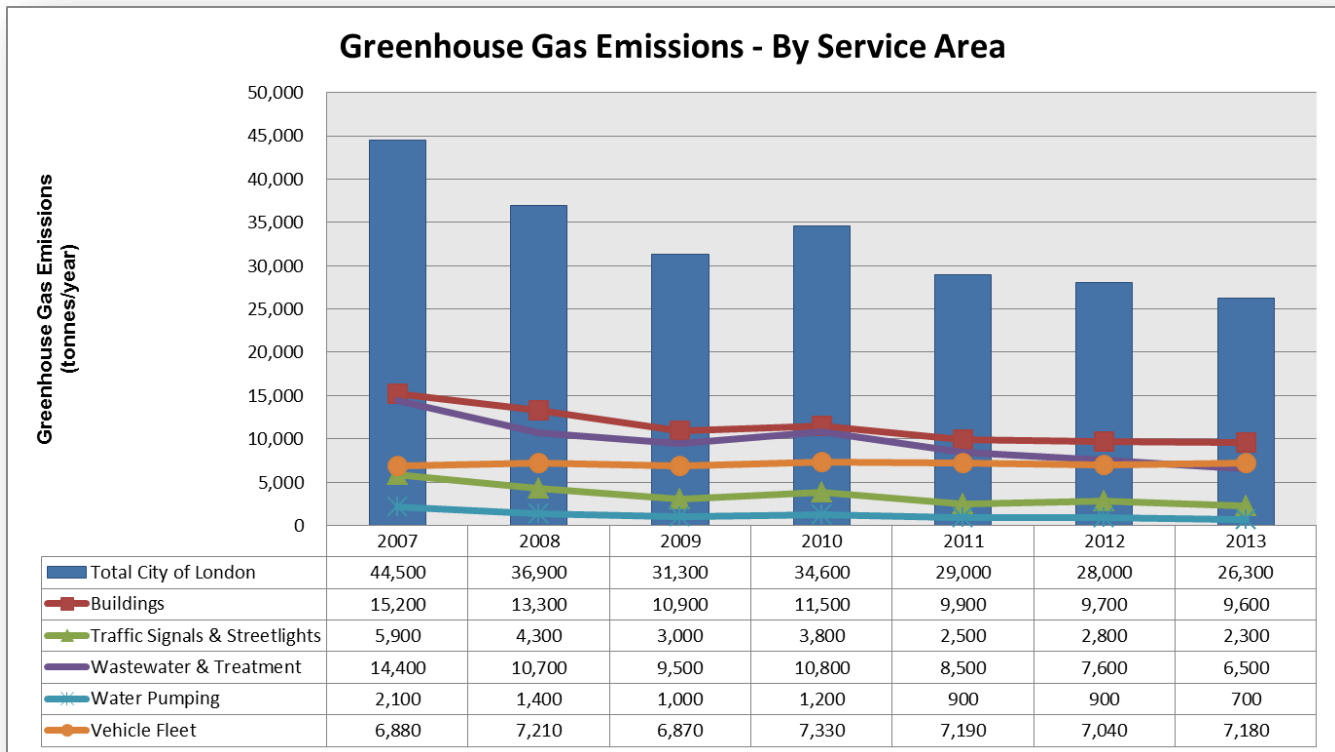
corporate energy needs, with a forecast expectation that these costs will continue to increase. To help address these challenges, the Ministry of Energy introduced *Ontario Regulation 397/11* under the *Green Energy Act, 2009*. The act requires the City of London to establish a Corporate Energy Conservation and Demand Management (CDM) Plan.

Fortunately, the City of London has invested in a Corporate Energy Management Program which dates back to 2007 with some of its foundation traced back to the early 1990s. This program has six key focus areas already underway that meets a significant portion of the Ministry's requirements. These organizational measures in energy conservation can be identified as policies, procurement strategies and design standards that assist with energy savings for the City of London. The six key focus areas are:

1. Tracking & monitoring energy consumption;
2. Renewable energy and feasibility projects;
3. Leadership in Energy and Environmental Design (LEED) Buildings;
4. Energy conservation and demand management projects;
5. Energy procurement; and
6. Creating a corporate "culture of conservation".

With the implementation of this program, the Corporation has:

- Reduced its overall energy use by 5 percent from 2007 levels.
- Reduced its Greenhouse Gas emissions from energy use by 41 percent (18,200 tonnes) compared to 2007 due to increased conservation efforts and cleaner sources of energy used to generate electricity in Ontario.

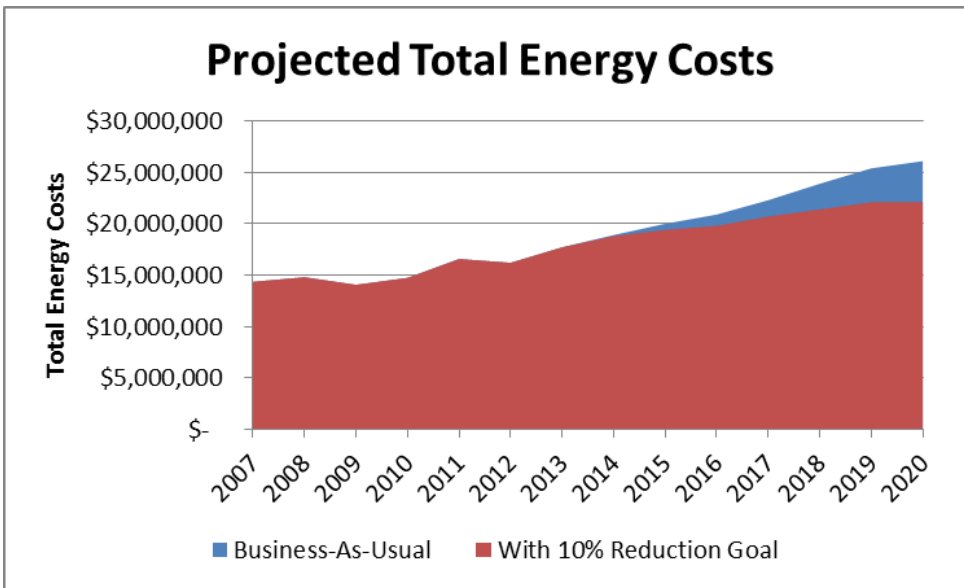


The existing Corporate Energy Management Program has been successful for the City of London, but has room for improvement and areas that require more attention. The introduction of the Ministry CDM Plan requirements provides the City of London with the opportunity to review our program initiatives and proposed energy targets. City staff prepared the CDM Plan to include the following minimum required elements as stated by the Ministry of Energy documentation:

- ✓ Information on the public agency's annual energy consumption during the last year for which complete information is available for a full year;
- ✓ The public agency's goals and actions for conserving and otherwise reducing energy consumption and managing its demand for energy;
- ✓ The public agency's proposed measures under its CDM Plan, the cost and saving estimates for these proposed measures, and the estimated length of time these measures will be in place.
- ✓ A description of any renewable energy generation facility operated by the public agency and the amount of energy produced on an annual basis by the facility.
- ✓ Confirmation that the public agency's senior management has approved the CDM Plan.

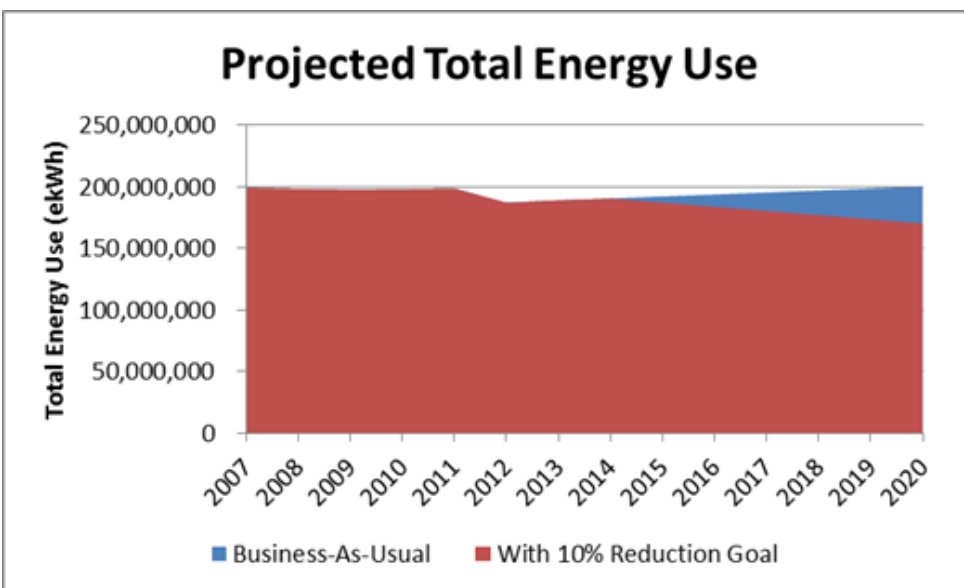
The City of London's proposed goal is to achieve an additional 10 percent reduction in total annual energy use from 2014 levels by 2020.

The significance of a 10 percent reduction in overall energy consumption compared to business-as-usual can be seen in the following results:



A projected energy cost avoidance of about \$4 million per year by 2020.

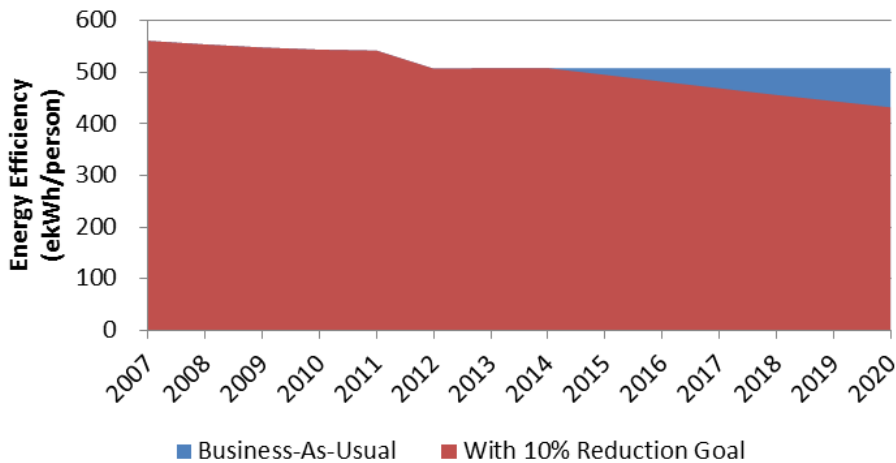
	Business-As-Usual = \$26,700,000
	10% Reduction in 2020 = \$22,700,000
	Cost Avoidance = \$4,000,000 per year



A projected total energy use reduction of 30 million ekWh per year by 2020.

	Business-As-Usual = 200,100,000 ekWh
	10% Reduction in 2020 = 170,074,000 ekWh
	Avoidance = 30,026,000 ekWh annually

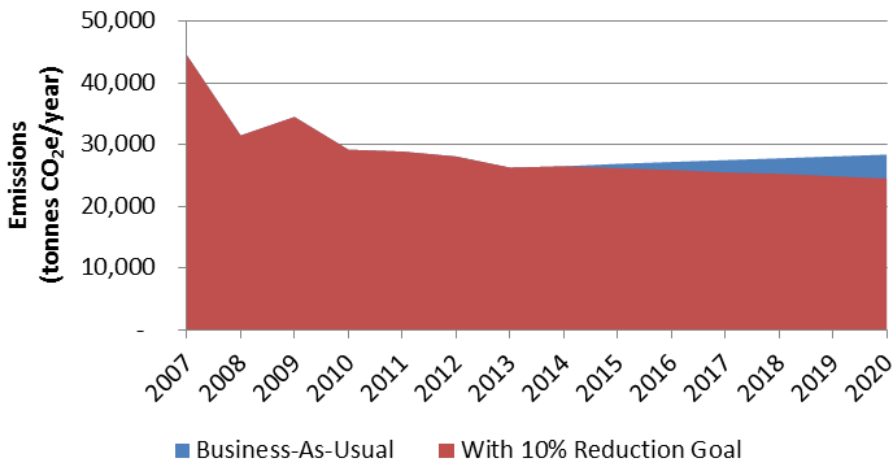
Projected Energy Efficiency



A projected 15 percent improvement (76 ekWh/person) in energy efficiency annually based on the projected population in 2020.

	Business-As-Usual = 508 ekWh/person
	10% Reduction in 2020 = 432 ekWh/person
	Avoidance = 76 ekWh/person annually

Projected GHG Emissions



A projected total GHG emission reduction of 3,900 tonnes annually by 2020.

	Business-As-Usual = 28,400 tonnes
	10% Reduction in 2020 = 24,500 tonnes
	Avoidance = 3,900 tonnes per year

The proposed CDM Plan outlines the City of London's commitment to corporate energy reductions. This plan details the City's proposed strategies to reduce energy and GHG emissions across corporate operations which includes buildings, street lighting, wastewater facilities, wastewater treatment facilities, vehicles and equipment, and other municipal operations.

The following CDM Plan identifies achievable measures and commitments towards:

- Reduced energy costs,
- Greater budget control towards energy consumption,
- Reduced greenhouse gas emissions (GHGs).
- Achievable measures to reach these targets,
- Operational retrofits and contributions,
- Energy policy development relating to capital investment, and
- Monitoring energy consumption and utility usage.

Council and staff endorsement and support brings the Corporate Energy CDM Plan to the forefront in the City's decision making process with all City operations. The City of London CDM Plan proposes 35 actions that will be used towards the 10 percent reduction by 2020. Thirteen actions have been selected to begin the process in 2014/2015 and the results to these actions will be reported in 2015. Future actions will be confirmed based on the results and level of participation and adoption by the Corporation as there are some inherent challenges with the CDM Plan that may limit the results such as:

- The level and timing of investment in renewable energy projects and energy efficiency projects.
- Uncontrollable factors, such as global, national, and regional energy prices that have resulted in significant operating budget costs;
- Senior government legislative and regulatory changes, such as financial incentives for energy projects which impact saving opportunities; and
- Adoption rate of the program and City staff participation.

The Corporation of the City of London leads by example when it comes to sustainable energy investments and initiatives. London's future sustainability depends on the implementation of best practices and strategies today, for a sustainable tomorrow.

1 INTRODUCTION AND OVERVIEW

The City of London Corporate Energy Conservation and Demand Management (CDM) Plan is intended to meet the requirements for Ontario Regulation 397/11 under the *Green Energy Act, 2009* that requires public agencies to develop five year CDM Plans starting in 2014 that include:

- Reporting of annual energy consumption;
- Goals and actions for conserving energy by reducing its energy consumption and managing its demand for energy, build on the City of London's commitment to energy conservation;
- Proposed energy saving and demand management measures, the cost and saving estimates associated with these measures and the estimated length of time that these measures will be in place, taking advantage of all available incentives for energy efficiency;
- Descriptions of any renewable energy generation facilities owned by the agency and the amount of renewable energy produced on an annual basis;
- Evidence of senior management approval of the CDM Plan; and
- Increasing community awareness and demonstrating City of London leadership in energy and GHG emissions reduction

This CDM Plan details the City's plan to reduce energy and GHG emissions across corporate operations, including;

- Facilities and buildings owned and operated by the City of London
- Wastewater treatment and pumping facilities and operations
- Water distribution and storage facilities and operations
- Street lighting
- Fleet vehicles and equipment

The City of London is committed to following the direction of this plan, and will take the necessary steps to ensure its implementation and success. The CDM Plan will be a "living document", in the actions taken by the City of London which are expected to grow and change as the CDM Plan is developed and implemented. For the City of London, this involves taking the actions outlined in this CDM Plan and developing this in to a Corporate Energy Management Program that will be updated on an annual basis. The proposed actions for the Corporate Energy Actions are highlighted as part of this CDM for 2014/15 actions and for the duration of the CDM Plan.

2 BACKGROUND AND CONTEXT

2.1 BACKGROUND

Corporate energy management can have a significant impact on how much energy we use. The City has already taken action for managing its energy commodity costs in the past, but the best way to mitigate rising energy prices is to use less energy.

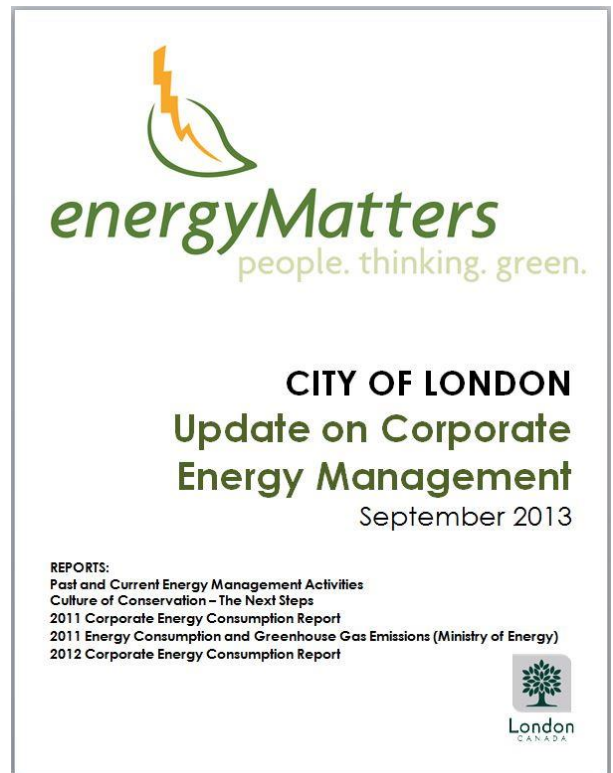
The Corporation of the City of London is one of London's largest employers, operating over 200 facilities and over 300 vehicles involved in delivering a wide range of services to London. When addressing the requirement for municipalities to set reduction targets as part of the CDM Plan for 2014, consideration needs to be given to the fact that the City of London has already been engaged in corporate energy management activities since the early 1990s.

In order to understand where the City actually stands today, in September 2013, the City of London published a series of documents to capture the past achievements and current management activities for all of the Corporation's energy needs, including those that the City is not required to report to the Province (e.g., street lighting, parks, vehicle fleet). The series of background interrelated reports and documents build on previous submissions in the last ten years to Committee, Council and the public on the work undertaken that support and assist in the development of the Corporate Energy CDM Plan and targets. The submission in September 2013 included the following five published documents:

- Past and Current Energy Management Activities
- Culture of Conservation – The Next Steps
- 2011 Corporate Energy Consumption Report
- 2011 Energy Consumption and Greenhouse Gas Emissions (Ministry of Energy)
- 2012 Corporate Energy Consumption Report

2.2 ONTARIO REGULATION 397/11

In August 2011, the provincial government introduced *Ontario Regulation 397/11* under the *Green Energy Act, 2009*. This regulation requires certain public agencies – Municipalities, Municipal Service Boards, Schools Boards, Universities, Colleges and Hospitals – to report on their energy consumption and greenhouse gas emissions annually beginning in 2013. The affected public agencies are also required to develop and implement five-year energy conservation and demand management (CDM) Plans starting in 2014. The intent of the



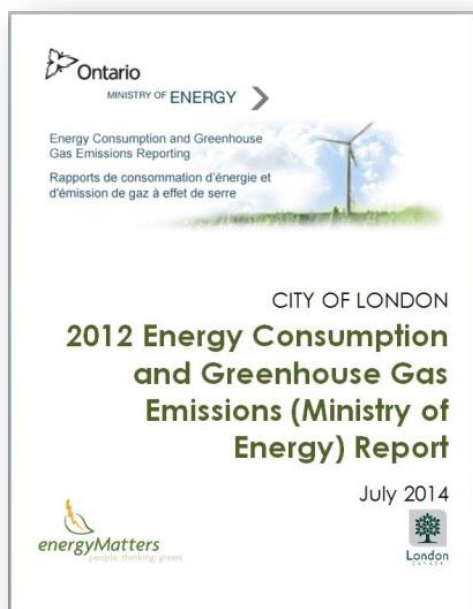
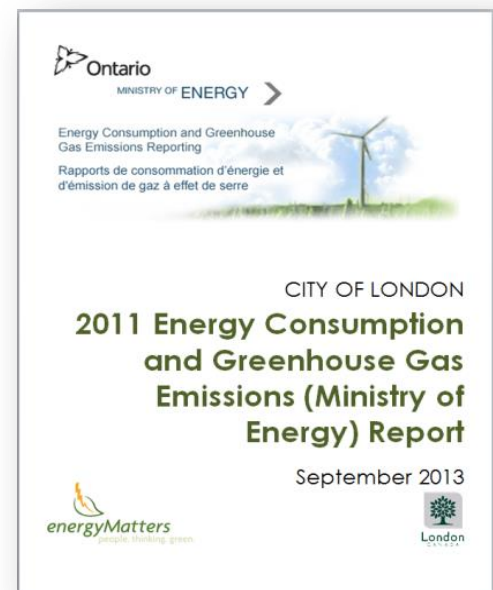
regulation is to help the broader public sector organizations better understand their energy consumption, to help them benchmark energy use and to encourage energy conservation and demand management activities within them.

In order to comply with the minimum requirements of the Green Energy Act and the Ontario Regulation 397/11, the City of London must submit annual energy consumption and greenhouse gas emissions for each calendar year in buildings or facilities the public agency owns or leases that,

- a) Are heated or cooled and in respect of which the public agency is issued the invoices and is responsible for making the payments for the energy consumptions; or
- b) Are related to the treatment or pumping of water or sewage and in respect of which the public agency is issued the invoices and is responsible for making the payments for the energy consumptions.

On July 1, 2013, the City of London prepared and submitted the **2011 Energy Consumption and Greenhouse Gas Emissions (Ministry of Energy)** report to the Ministry of Energy to support the province's reporting requirements. Beginning in July of 2013, it became mandatory for municipalities to submit this report annually and make this report available to the public. A copy of the City of London's submission is publicly available and is accessible by the following link: [2011 - Green Energy Act, 2009 O.Reg. 397/11](#)

[Submission](#)



On July 1, 2014, the City of London will

submit the **2012 Energy Consumption and Greenhouse Gas Emissions (Ministry of Energy)** report to the Ministry of Energy to support the province's reporting requirements. The 2012 energy data in comparison to the 2011 benchmark energy use will encourage energy conservation and demand management opportunities to help support the Corporate Energy CDM Plan and five-year energy targets. A copy of the City of London's submission is publicly available and is accessible at the following link: [2012 - Green Energy Act, 2009 O.Reg. 397/11 Submission](#)

In July, 2014, the City will also submit a Council approved and endorsed CDM Plan to comply with *Regulation 397/11* under the *Green Energy Act, 2009*. The plan will provide highlights to include:

- ✓ Reporting on annual energy consumption
- ✓ The public agency's goals and objectives for conserving and otherwise reducing energy consumption and managing its demand for energy
- ✓ Proposed measures under its CDM Plan and the cost and saving estimates for these proposed measures
- ✓ A description of any renewable energy generation facilities and amount of energy produced on an annual basis.

2.3 BOARDS AND COMMISSIONS

All City Boards and Commissions have been requested to report to City of London Council on their conservation and demand management activities. Boards and Commissions are not required to report their energy conservation and demand management practices, however, the City encourages that all Boards and Commissions adopt or take steps towards achieving energy consumption reductions and cost saving initiatives introduced in the City of London Corporate Energy CDM Plan.

2.4 ENERGY PRICE FORECASTS

In the past, the City of London has strived to maintain a zero increase when it comes to energy consumption as well as costs. In 2013, the City of London spent approximately \$18 million on corporate energy. This cost is significantly higher than 2012, when the City spent approximately \$16 million. Most of this cost increase is due to increasing electricity prices, since our overall energy use only went up one percent in the same period. These price increases can quickly impact set budgets and the bottom line on energy costs for the city.

In future years, Ontario's electricity prices are predicted to increase a total of 45 percent over the next ten years. In addition, the Ontario Energy Board approved a 28 per cent increase for natural gas prices for Union Gas customers in Spring 2014 as a result of this winter's below-average temperatures. These costs will definitely impact the City of London's 2014 operational costs associated to energy use, making conservation and demand management even more important to help mitigate costs.

In order to better secure our position within the energy markets, the City of London works with an energy management consulting service, WattsWorth Analysis Inc., to assist the City of London in energy projections in commodity price forecasts for electricity and natural gas. This assists the City of London to project long term budgetary considerations in preparation for budget projections.

Currently, projections indicate rate change increases for the next five years for electricity and natural gas. These market forecasts also give the City of London the opportunity to prepare for increased operating costs and to develop additional measures to mitigate some of these financial impacts.

Predicted Rate Changes Year Over Year

Year	Electricity	Natural Gas
2014	7.9%	21.1%
2015	6.5%	-5.3%
2016	3.9%	7.0%
2017	6.3%	8.4%
2018	6.9%	7.8%
2019	5.7%	7.9%

It is important to note, that the intention of the projections are to provide general direction rather than absolute values for reporting purposes. The electricity projections reflect the effective price which incorporates both the Hourly Ontario Electricity Price and Global Adjustment charges. The slight decrease in electricity in 2016 is based on a continued slow economic growth in combination with nuclear reactor refurbishments. The natural gas projections illustrated in 2014 are a direct result to the extremely cold winter of 2013/14 and the temporary high prices during this time due to storage levels being depleted. The 2014 projection will be significantly dependant on the storage levels being replenished during the injection season.

2.5 CITY OF LONDON INITIATIVES

The introduction of the Ontario Regulation 397/11 under the Green Energy Act, 2009 introduces the opportunity for the City of London to develop a more secure CDM Plan moving forward that will help us to better understand our consumption, but to also encourage energy conservation and demand management activities. Identifying targets for the future will help bring corporate energy use to the forefront, and help us to maintain, but also potentially reduce our usage, costs and GHG.

The City of London has several initiatives that that directly relate and complement the energy and GHG emissions goals towards the City of London Conservation and Demand Management Plan.

2.5.1 CITY OF LONDON STRATEGIC PLAN

The City of London developed the vision “London as the City of Opportunity”. The [Strategic Plan](#) outlines the mission, values and the five key results that are important to the community.



The five key results to the strategic plan have significant ties to the CDM Plan for corporate energy.

2.5.2 CITY OF LONDON OFFICIAL PLAN

The City of London Official Plan contains the objectives and policies for development in the City. The plan contains 5 sections that include:

- Planning Framework Policies
- Land Use Policies
- Amenity, Urban Design and Environmental Policies
- Servicing Policies; and
- Implementation Policies.

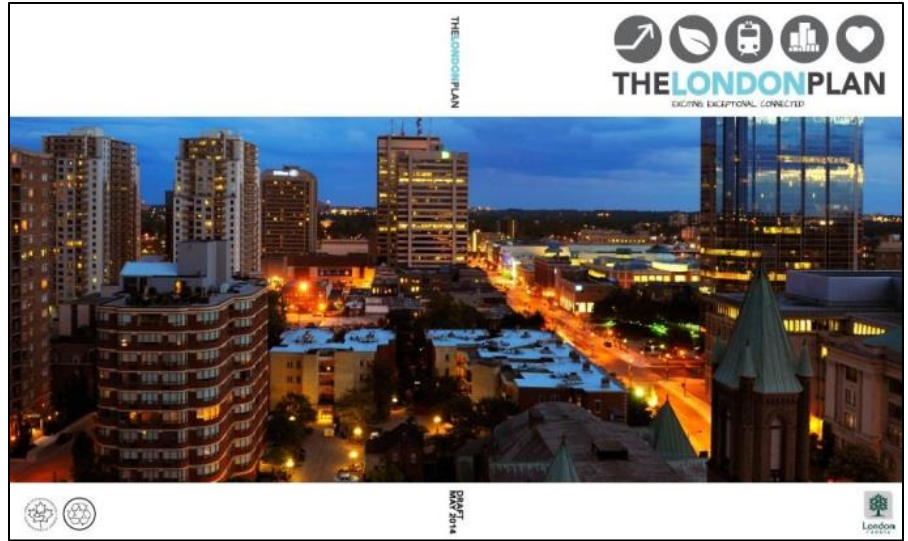
These objectives and policies comprise the “official” part of the Plan to which the provision of public works and adoption of the by-laws by City Council must conform. The Plan seeks to balance the multiple goals of economic prosperity, community vitality, environmental responsibility, enriched cultural identity and infrastructure sustainability. It provides direction for the allocation of land use, provision of municipal services and facilities, and preparation of regulatory by-laws to control the development and use of land.

Council revises its Official Plan every five years to ensure that it conforms to provincial plans; takes into account matters of provincial interest; and is consistent with provincial policy statements.

Recently, after more than two years of community consultation and engagement that involved thousands of Londoners, the City of London's Planning Division has released its new draft Official Plan. ["The London Plan"](#) has been created as a guide towards the city's growth during the next 20 years. The last official plan was set by Municipal Council in 1989.

The London Plan contains the following objectives and policies for development in the City that directly relate to the CDM Plan. The plan contains six sections that include:

- City Structure Plan
- City Building Policies
- Urban London Place Types
- Rural London Place Types
- Our Tools; and
- Our Actions.



Similar to the current plan, these objectives and policies comprise the “official” part of the draft Plan to which the provision of public works and adoption of the by-laws by City Council must conform. The Plan seeks to balance goals and provide direction for the allocation of land use, provision of municipal services and facilities, and preparation of regulatory by-laws to control the development and use of land.

Within City Building Policies, the chapter on Civic Infrastructure in The London Plan reflects the importance of the effective, coordinated and efficient provisions of civic infrastructure.

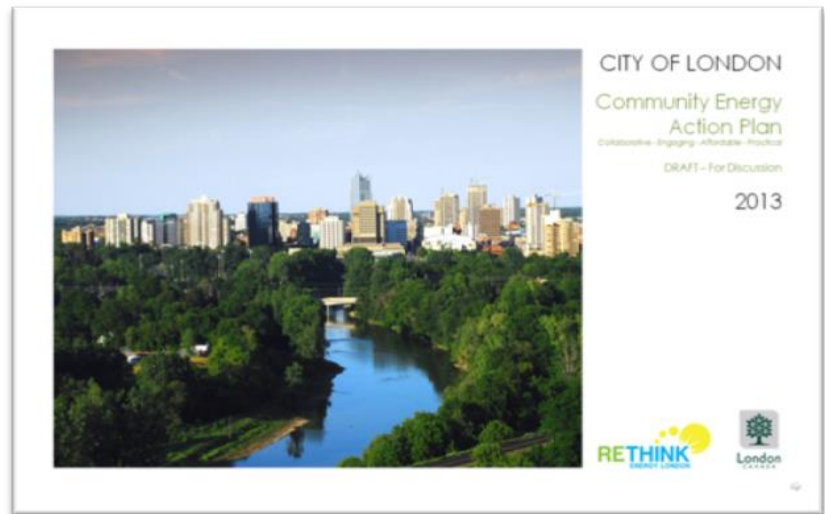
The chapter on Infrastructure states that “Green technologies and construction methods will be used whenever possible to develop new and replace old civic infrastructure. Develop civic infrastructure that is environmentally sustainable, assists with climate change adaptation and lessens environmental impacts.” and “Where possible, civic infrastructure projects should design to and achieve a LEED accreditation.”

This infrastructure identified in The London Plan interrelates to the objectives identified as priorities in the CDM Plan as they both relate to the delivery of services that make our city work and is critical to our prosperity, allowing us to grow and develop as a City to create economic opportunities and jobs.

2.5.3 CITY OF LONDON COMMUNITY ENERGY ACTION PLAN

The City of London does not have a lot of direct control over how much energy is used in London as a whole, but it does have a lot of influence. London’s Community Energy Action Plan builds upon what City staff learned through Rethink Energy London and supporting activities, and sets out an action plan with the following key principles:

1. This needs to be the community's plan for London, not the City of London's plan for the community.
2. We can't control the price of energy, but we can control the cost of energy.
3. Start first with conservation.
4. Get the size right.
5. Invest in energy efficiency and good design.
6. Make use of free heat and free light.
7. Reduce waste.
8. Make it local.
9. Build on local strengths.
10. Use renewable energy.
11. Measure your progress.
12. Share your stories.



The CDM Plan will play a key role within this broader Community Energy Action Plan, as the City of London can play a leadership role when it comes to management of energy that it does have direct control over, namely the energy we use in municipal buildings, facilities and vehicle fleet.

2.5.4 CITY OF LONDON RENEWABLE ENERGY PROJECTS

The following are some examples of the renewable energy generation facilities operated by the City of London that result in energy produced on an annual basis.

2.5.4.1 SOLAR GENERATION

Solar Tree Located at Tourism London

In 2010, the City of London installed a new 8.6 kilowatt (kW) solar photovoltaic system (PV) array system. This installation promotes the City of London's dedication to renewable energy and supports the visions of providing "Sustainable infrastructure", and a "Green and Growing City" in the City of London Strategic Plan.



This system includes a 7 meter (23 feet) tall "solar tree" which includes PV panels on all 27 leaves, and three pole-mounted systems. The system was designed to

generate around 10,000 kilowatt-hour per year, about one-third of the annual electricity needs for the Tourism London building at 696 Wellington Road. Taking advantage of the Ontario Power Authority's (OPA) microFIT program, the project will pay for itself within 20 years.

Year	Building Consumption		Solar Tree Production	
	Use (kWh)	Cost	Production (kWh)	microFIT Revenue
2011	36260	\$4,420	9660	\$8,680
2012	34200	\$4,200	10680	\$9,640
2013	23184	\$3,340	8448	\$7,650

In the first three years of full operation, the solar PV system has generated over 28,750 kilowatt-hours with microFIT revenue of over \$25,000.

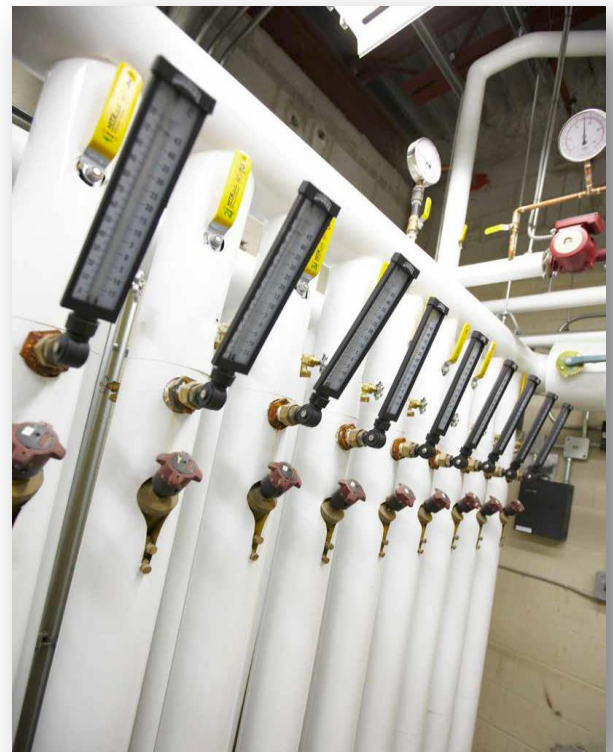
It is anticipated that 10,000 kilowatt-hour per year of energy will be generated annually through this eco-friendly Visitors Centre. Revenue from the solar PV system will be approximately \$8,000 annually, with projected total revenues of \$165,000 over the 20 year contract.

2.5.4.2 GEOTHERMAL HEATING & COOLING

Exeter Road Operations Centre (EROC)

The City of London performed extensive renovations to the Exeter Road Operations Centre in 2010. The building retrofits incorporated many energy-efficient and renewable energy technologies. A geothermal heating and cooling system was incorporated into the retrofit project to take advantage of moderate ground temperatures to boost efficiency and reduce the operational costs of heating and cooling.

The ground source energy harnessed by the ground source heat pump (GSHP) is estimated to have generated 290,600 kWh annually. The GSHP at Exeter Road Operations Centre is not metered as per original design specifications, therefore best available energy reduction estimates are used. It is anticipated that the net reduction in greenhouse gasses as a result of this install will be between 85 and 90 tonnes annually. This is equivalent to taking approximately 530 cars off the road annually.



2.5.5 RENEWABLE ENERGY

Ontario Regulation 397/11 requires the City of London to include a description of any renewable energy generation facility operated by the City of London and the amount of energy produced on an annual basis by the facility. In terms of the City of London's overall approach for supporting renewable energy, City staff recommends making direct investments in renewable energy projects at municipal facilities rather than the procurement of "green energy" from energy retailers (e.g., purchase offset credits).

2.5.5.1 CURRENT RENEWABLE ENERGY PROJECTS UNDER REVIEW OR UNDERWAY

The following are some examples of some of the renewable energy generation projects currently under consideration by the City of London that would result in energy produced on an annual basis.

LANDFILL GAS RENEWABLE ENERGY PROJECT

W12A Landfill

Since 2010, the City of London has proposed to develop a 2.4 megawatt landfill gas power plant at the W12A landfill site. Regional electricity transmission constraints prevented the City of London from obtaining a FIT contract during the first round of FIT contracts. However, recent information from the OPA suggests that transmission capacity may become available for the W12A Landfill site.



The OPA had delayed the implementation of their proposed "Large FIT" application process (for projects larger than 500 kilowatts) a number of times over the last two years. On February 28th, 2014, the Ontario Power Authority (OPA) submitted a report to the Minister of Energy that included the OPA's final recommendations on the development of a new process to procure large renewable energy projects. The new Large Renewable Procurement (LRP) Interim recommendations from the Ontario Power Authority suggest that in each of 2014 and 2015 there will be the 50 MW of bioenergy and 50 MW (45MW in 2015) of hydro-electric capacity. These renewable



energy targets would have to be obtained by utilizing existing transmission systems. The OPA plans to post an LRP-specific transmission availability table to identify specific circuits and transmission stations in the province where capacity for potential LRP projects may be available which will advise whether or not there is capacity for the W12A project to proceed.

BIOENERGY

Environmental & Engineering Services continue to review numerous bioenergy project concepts to provide renewable energy sources for the City of London. Bioenergy can either be used directly or indirectly by being converted to energy in three ways: thermal, chemical and biochemical conversion.

Anaerobic Digestion of Sewage Sludge BioSolids

There has been private sector interest expressed in the potential use of biosolids and other organic feedstocks for biogas production in an anaerobic digester at the W12A landfill site. The proposed biosolid-based power generation project would likely need to pursue its own application separate from the landfill gas project, if the former OPA Feed-In Tariff (FIT) program rules apply in their new competitive procurement process. There is currently limited transmission capacity for additional power generation projects at the landfill site. City staff continue to monitor the progress with OPA and London Hydro.

Waste Heat Recovery from Sludge Incineration

In 2012, the Greenway Pollution Control Plant operations studied the feasibility of using an Organic Rankine-Cycle engine to generate electricity from the sludge incinerator's waste heat. Preliminary results estimate the potential to produce 800 kilowatts of electricity generation from this waste heat.

Wastewater Operations have submitted an Electricity Retrofit Incentive Program (ERIP) application to the OPA for funding a follow-up feasibility study. The heat recovery generator for Greenway application is currently on hold pending clarification of Technical Standards and Safety Authority (TSSA) requirements for full-time licensed operators, which have traditionally applied to steam boilers. In June 2013, representatives from London Hydro and City staff met with the TSSA and learned that any updates to the regulations will not likely be completed within the next two years. To make the ORC engine cost effective, there will need to be a favourable interpretation of, or changes to, operator licensing requirements to reflect those requirements used in other provinces of Canada and countries where ORC engines are currently used. City staff continue to pursue the ORC engine project, notwithstanding these preliminary discussions, to accelerate the project. London Hydro is very supportive of the project and they are willing to assist in overcoming any challenges to it.

SOLAR ENERGY

The City of London continues to review opportunities surrounding solar energy technology as a renewable energy source.

Rooftop Solar Study

In 2012, The City of London with assistance of its energy partner, developed and proposed a strategy with respect to maximizing the opportunities for solar PV projects on City of London properties. The strategy included the recommendation to focus on larger rooftop projects eligible for the OPA Small Feed-In Tariff (FIT) for projects up to 500 kilowatts – under the revised, Fit 2.1 rules.

An engineering review of over 25 sites with the rooftop capability to install the PV systems was completed. Eleven out of 25 proposed sites were deemed suitable for rooftop solar.

The FIT 2.1 rules included a priority points grading system which ranked proposals in this highly competitive market segment. In order for applications to qualify for the maximum possible points, it was practical for the City to adopt the role of system host (landlord) rather than project owner. In early 2013, the City of London entered into roof lease agreements for municipal facilities with a joint venture between London Hydro and the London District Renewable Energy Cooperative (LDREC). The joint venture submitted in January 2013 to the OPA for approval.

In May 2013, it was learned that the proposed generating capacity associated with the very large number of OPA Small FIT submissions far exceeded the generating capacity on the grid that was set aside for this particular Small FIT window. In the process of determining the most eligible applications, the OPA rejected all 11 applications submitted by the joint venture based on the perceived risk associated with the property access rights noted in the roof lease agreements with the City of London - which included exit clauses - versus other submissions that contained no protection in this regard.



The FIT program has undergone significant changes that include the issuance of a new set of rules (FIT 3.0) and directional changes issued by the Ministry of Energy. In June, 2013 the Ministry of Energy issued a directive to the OPA to open a new FIT contract

application window in the fall of 2013 and also indicated that it was to open further contract application windows up until 2018. This procurement plan was further clarified in the Achieving Balance long term energy plan outline 150 megawatts (MW) of grid capacity will be allotted to the FIT program in each of the next four years. The rooftops of the municipal facilities named in the Solar Facility Lease continue to be available to LREI for the forthcoming contract application windows in 2014 and beyond.

Changes to the program rules have introduced some new opportunities for the City of London to explore. The current FIT 3.0 rules noted two significant changes:

- The granting of priority points for municipally owned projects in addition to municipally hosted projects, and
- The introduction of the Unconstructed Rooftop Solar Pilot (URSP) which makes it possible to apply for a rooftop PV System contract on a planned future building.

These changes offer a new opportunity for the City to explore and to make additional suitable rooftops available when constructing new buildings and additions to buildings for participation in the FIT program.

Ground Mount Solar

City staff continues to review future opportunities towards solar technology. The installation of ground mount solar in a large-scale applications require significant review to ensure that there is little or no potential for impacts on adjacent properties. Preliminary reviews of City owned sites continue to be considered for future application windows up to 2018.



Solar Trackers

A number of ground mounted, automatic two-axis, solar tracking arrays have been installed through a partnership with London Hydro. The solar trackers are intended to promote the City of London and London Hydro's continued support of renewable energy technology. The Occupancy Agreements permitted London Hydro to install the solar tracking systems on municipal property with no financial cost for the City of London.

Currently, the partnership consists of four sites where solar (ground mounted) tracking arrays (10kW) are currently operational. These sites include:

- NW Corner of Hwy 401 & Wellington
- 1570 Oxford St West - Pollution Control Plant
- 1159 Adelaide St North Pollution Control Plant
- 5200 Highbury Ave S - SE Reservoir Pump Station



WIND POWER

Wind Power at the Materials Recovery Facility (Recycling Centre)

Due to its in-land location, London in general has limited ability to employ wind power generation. However, the City continues to explore the feasibility of wind power options at select locations. The City engaged Ameresco to carry out a pre-feasibility study on the use of micro-wind (under 10 kilowatt) turbines and small wind (10 kilowatt – 500 kilowatts) turbines at three City locations. The study indicated that micro-wind turbines are not financially feasible. However, the study did indicate that a “medium-scale” (300-800 kilowatt) wind turbine in a behind-the-meter, net metering application (i.e., without using the FIT program incentive) at the Materials Recovery Facility might be financially feasible. Current net metering rules limit the size to 500 kilowatt. Further studies, such as geotechnical, communication, and environmental impacts, are required in order to confirm feasibility. City staff will explore this option in 2014 or 2015.

GEOTHERMAL HEATING & COOLING (GROUND SOURCE ENERGY)

Thames Valley Golf Courses

Based on the successful implementation of geothermal heating and cooling at EROC, the City is studying the installation of ground source heat pumps at the city owned Thames Valley Golf Course facility.

Early engineering estimates indicate the potential to reduce electricity demand by approximately 19 percent at Thames Golf Course. The City intends to hire a consultant to design the project in 2014.

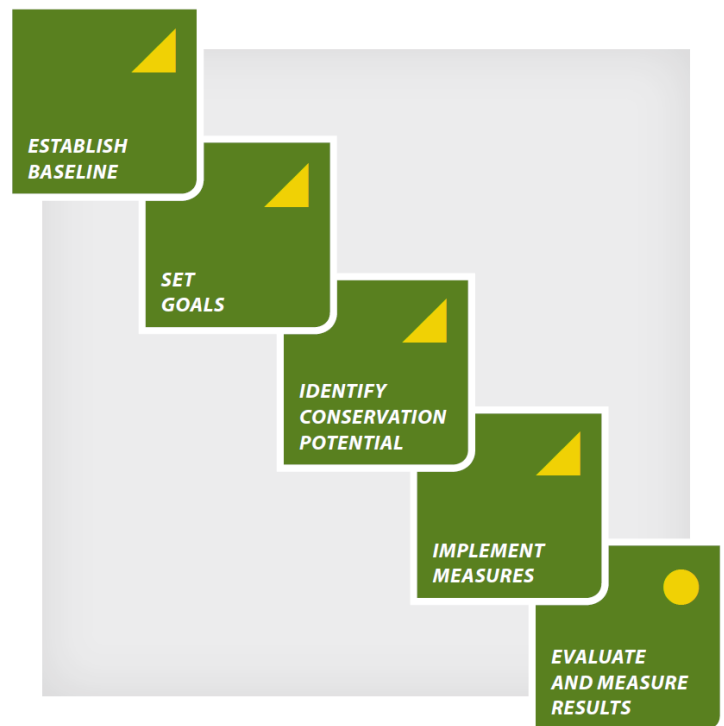


3 STRATEGY FOR ENERGY REDUCTION TARGETS AND CDM PLANS

The Ministry of Energy has provided a guide to preparing a CDM Plan outlining a series of steps that the City can utilize in the development of the Corporation's CDM Plan.

The Ministry's guide was prepared and developed in consultation with public agencies and organizations.

The following strategy outlines and identifies the actions, challenges and opportunities to reduce energy consumption for the Corporation of the City of London.



Source: A Guide to Preparing Conservation and Demand

3.1 ENERGY CONSUMPTION – ESTABLISH A BASELINE



Prior to the development and establishment of the Ministry requirements, the City of London has actively tracked energy consumption through the Corporate Energy Management Program since 2007. This provides the City of London with the additional support and ability to track annual energy consumptions to provide a total of all significant energy costs associated with City of London operations.

3.1.1 ESTABLISHING A BASELINE

Measures identified in the past years have been collectively captured in the document [Past and Current Energy Management Activities](#). Corporate Energy Management supports and captures the City of London's energy management activities. To establish the baseline, the CDM Plan has identified the past technical and non-technical measures taken to support energy conservation initiatives taken from our Corporate Energy Program.

3.1.1.1 TRACKING & MONITORING ENERGY CONSUMPTION

In 2005 the Corporate Energy Management Program was established and EnergyCAP software was procured to provide the City of London with the ability to track, record and analyze the volumes of energy consumption data from hundreds of utility bills received every month. Using EnergyCAP, we currently maintains a database with electricity, natural gas,

steam, chilled water and potable water consumption and associated costs, dating back to 2005.

EnergyCAP is used to identify opportunities to reduce costs, for example:

- Targeting inefficient facilities based on energy use per square foot.
- Generating energy analysis graphs and reports to be made available to managers of facilities.
- Identifying billing and metering errors.
- Optimizing utility bill payment processes.
- Assisting with energy budgeting and accruals by forecasting energy consumption and costs.

3.1.1.2 TECHNICAL MEASURES

Identified in the previous [City of London Corporate Energy Management Reports](#), the City of London has undertaken energy conservation projects since the early 1990s which includes numerous energy audits and feasibility studies.

Ameresco Canada was approved as the City of London's energy service partner in 2006 at which time a multi-year \$21.7 million Facility Renewal/Energy Project program was recommended. Ameresco has subsequently undertaken \$7.5 million of approved Facility Renewal and Energy Retrofit Programs (Phases I, II and III) that include over 50 energy audits that have resulted in approximately \$350,000.00 in cumulative savings to the end of 2013.

Phase III in the Energy Retrofit Program In 2013, the City of London engaged a consultant to evaluate the existing condition of the Canada Games Aquatic Centre. A comprehensive Life Cycle renewal review was conducted along with a Facility Renewal and Energy Retrofit Program audit. The study recommended many energy saving opportunities and incentive dollars available from both the OPA and Union Gas to assist with the implementation of the energy conservation measures identified. *Appendix A – CGAC Project* illustrates the energy measures expected for the Canada Games Aquatic Centre and will contribute to:

- over 40% reduction in overall energy usage;
- over 42% reduction in facility greenhouse gas emissions; and



- an estimated decrease in utility costs of between \$85,000 and \$90,000 in the first year

In April 2014, the Canada Games Aquatic Centre closed for several months in order to complete the following:

1. New heating, ventilation and air conditioning (HVAC) systems and modifications to the building controls and security systems
2. Updated pool mechanical and filtration systems
3. New lighting

The project will also be reviewed with other levels of government and utility providers such as Union Gas, Ontario Power Authority. This project will also be well positioned to qualify for funding assistance through the Green Municipal Fund (GMF) program for which the Federation of Canadian Municipalities (FCM) is a trustee.

3.1.1.3 ORGANIZATIONAL MEASURES

Organizational measures in energy conservation can be identified as policies, procurement strategies and design standards that assist with potential energy savings for the City of London. Since 2007, the City's Corporate Energy Management Program has had six key focus areas;

- Tracking & monitoring energy consumption
- Renewable energy and feasibility projects
- Leadership in Energy and Environmental Design (LEED) Buildings
- Energy Conservation and Demand Management Projects
- Energy Procurement
- Creating a Corporate "Culture of Conservation"

The existing Corporate Energy Management Program has resulted in significant savings for the City of London. As an example, since 2005 the City of London has actively pursued energy procurement strategies in an effort to mitigate the cost of energy. As of 2012, the City of London has avoided over \$6 million in accumulated electricity costs versus the use of the Provincial Government's Regulated Price Plan (RPP).

In 2012, the City of London revisited the management model for corporate energy management. This created a coordinating group now known as the Energy Management and Conservation Team (EMCT) which involves management staff from Environmental & Engineering Services, Facilities, and Finance.

Primary Energy Use Area	Corporate Service Area	Responsibility
City Buildings	Finance & Corporate Services	Facilities
Operational “Utility” Facilities (W12A Landfill, water distribution, wastewater treatment, pumping stations)	Environmental & Engineering Services (EES)	Environmental Programs on behalf of the Operational “utility”
Fleet & Equipment	EES(Environment, Fleet & Solid Waste)	Fleet & Operational Services
Street lights & Traffic Lights	EES (Roads and Transportation)	Roadway Lighting & Traffic Control
Agencies, Boards and Commissions (ABCs)	Some work done by Finance & Corporate Services	Individual ABCs. Some work done by Facilities. Future assistance from Environmental Programs

The EMCT has lead responsibility and accountability for achieving energy reduction targets for the City of London. Corporate Energy Management staff provide commitment to work with each service area, and review potential projects to assist in incentive opportunities, and best practices in the commitment to reduce our energy impacts.

3.1.1.4 BEHAVIOURAL MEASURES

Behavioural measures can significantly contribute to energy conservation initiatives to save energy and reduce costs for the corporation. In the past, there have been many programs that the City of London has participated in to focus on energy conservation.

The City of London developed a corporate energy program to embrace a culture of conservation called *energyMatters*. The *energyMatters* program was developed to engage staff on their participation and impacts towards corporate energy.



Updates to the *energyMatters* program and further details were featured in the City of London Culture of Conservation - The Next Steps document in September 2013. The revised program focusses on City of London staff to promote the key principles of “A Green and Growing City” and “A Sustainable Infrastructure” identified in the City of London's Strategic Plan. The plan challenges staff to

participate and commit to their role of energy conservation. Engaging City of London staff in energy conservation initiatives, combined with improvements to facilities, can reduce costs of City services/operations and assist in achieving conservation targets.

3.1.1.5 FLEET SERVICES MEASURES

Green Fleet Initiatives

The City of London's Fleet Service Division is responsible for over \$45 million in municipal fleet and equipment assets. The fleet consists of over 1,250 units ranging from hand held equipment like string trimmers, to light passenger vehicles, to heavy off road equipment like graders and backhoes. As a large consumer of energy, Fleet Services continues to research technology that reduces both energy consumption and its environmental impacts.

Fleet Services have tracked fuel energy use since 2004 to better understand and implement fuel saving opportunities and how to reduce environmental impacts. This included the introduction and procurement of Hybrid vehicles and smart cars, which has saved over 5,500 litres of fuel per year and reduced greenhouse gas emissions by 12 tonnes per year.



In 2011 Fleet Services started using biodiesel. In 2011 and 2012 combined, London's fleet used 1,363,000 of biodiesel, which calculated to approximately 190 tonnes of GHG emissions.

3.1.2 WHERE WE ARE TODAY – RECENT TRENDS

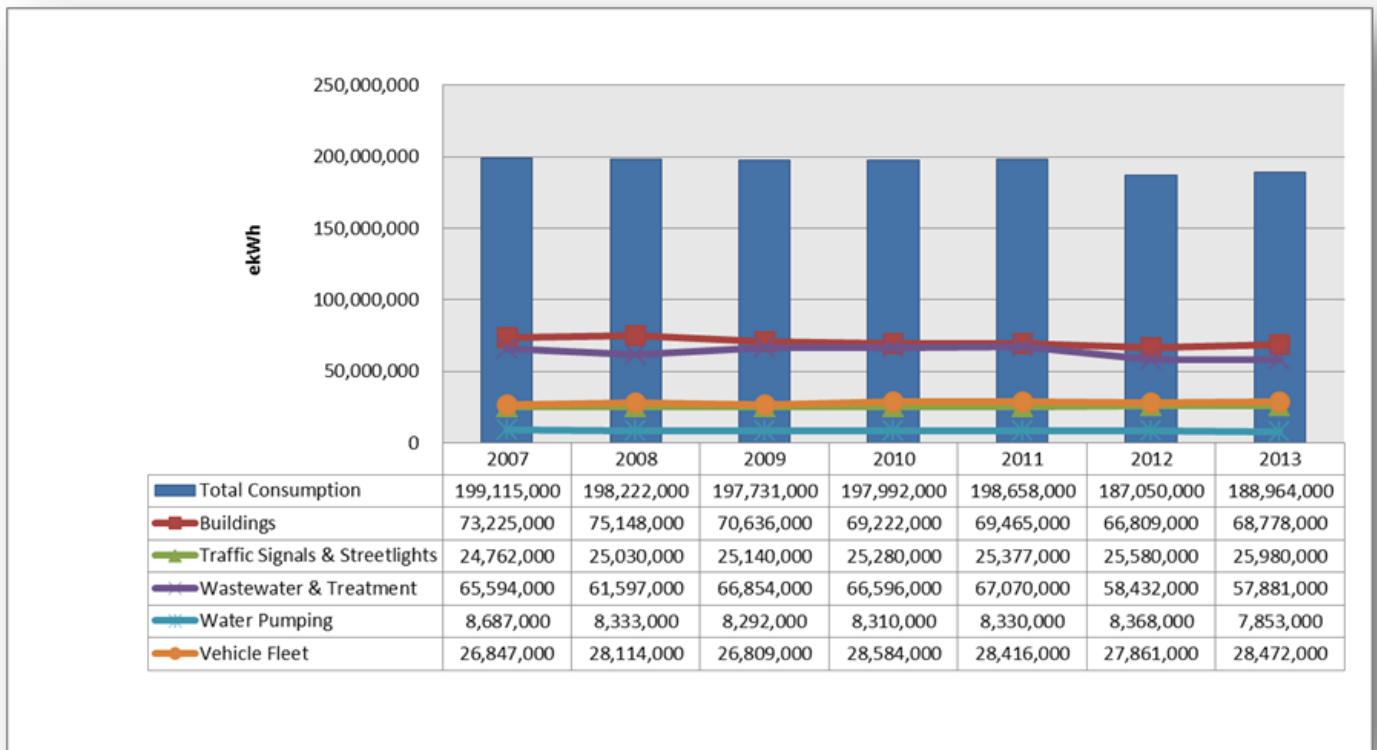
The City of London is challenged with significant budgetary pressures with increased energy costs and reduced levels of funding. In terms of energy, the City of London is faced with recent trends in corporate energy use that show energy costs continue to increase and impact our city and local economy. Shown in Figure 1 – Energy Costs, the City of London spent approximately \$17.7 million in 2013 on its corporate energy needs. Energy costs have increased by 9 percent between 2012 and 2013, and 23 percent overall from our baseline records in 2007. The five energy costs measured include electricity, natural gas, gasoline and diesel fuel, and steam & chilled water with a forecast expectation that these costs will continue to increase.

Figure 1 – Energy Costs



Although the City of London continues to see increases in energy costs, as shown in Figure 2 – Energy Use, the Corporation has reduced its overall energy use by 5 percent from 2007 levels. This reduction can be attributed to recent energy conservation measures and facility upgrades.

Figure 2 – Energy Use



The City of London's corporate energy consumption contributes to serving the public, businesses and visitors to London. London continues to grow in population, and increased services are required to support that growth. It is important to capture energy usage per capita to demonstrate the City of London's achievements in energy reductions while continued growth occurs in London.

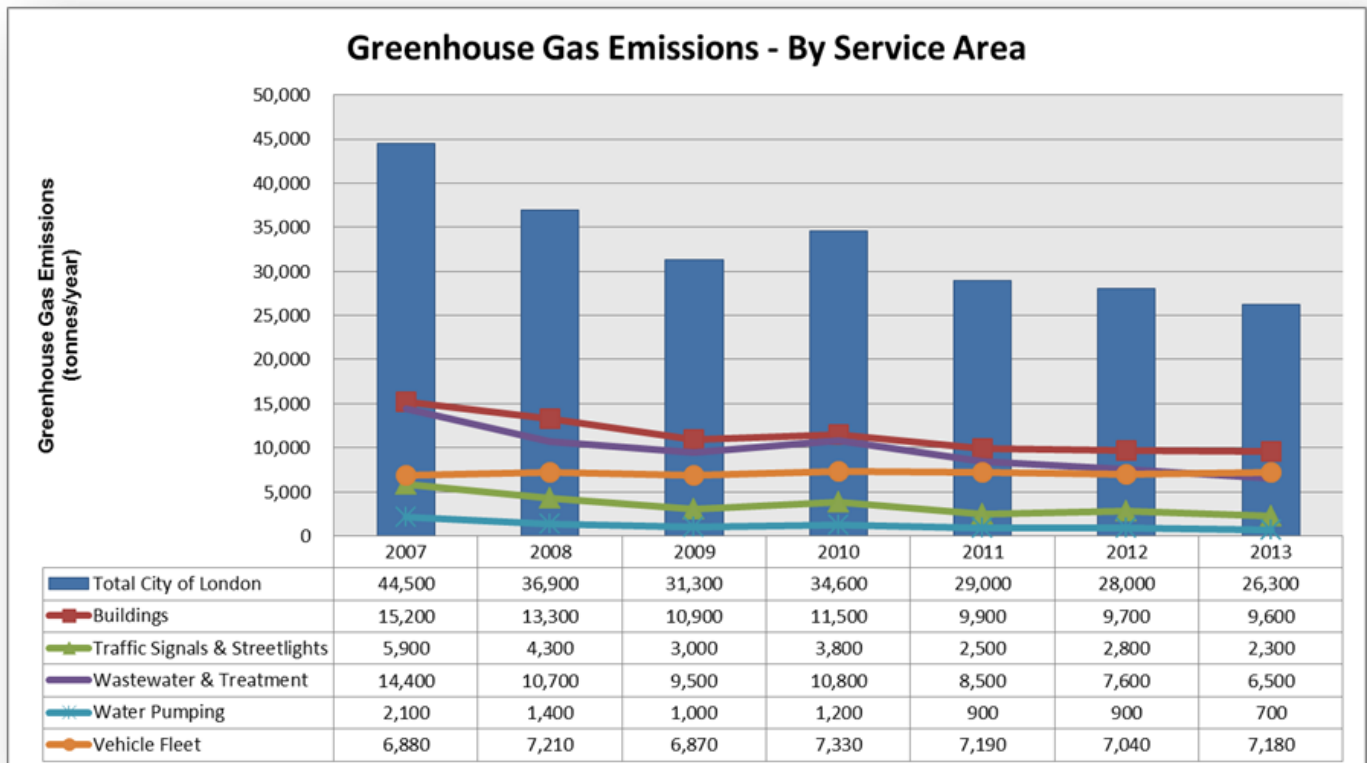
In terms of service delivery to Londoners, several years of data shows continued improvement of corporate energy use per capita with a 9.4 percent reduction compared to 2007. In 2013, The City of London's population has grown by almost 5 percent (17,000 people) compared to 2007 baseline records. In Figure 3 – Service Delivery to Londoners, the average energy consumption per person in 2013 based on London's population was 508 ekWh's.

Figure 3 – Energy Used in Service Delivery to Londoners

Energy Consumption (ekWh) by Service Area			Change since 2007	
	2007	2013	Variance	% Change
Buildings	73,225,000	68,778,000	(4,447,000)	-6.1%
Traffic Signals & Streetlights	24,762,000	25,980,000	1,218,000	4.9%
Wastewater & Treatment	65,594,000	57,881,000	(7,713,000)	-11.8%
Water Pumping	8,687,000	7,853,000	(834,000)	-9.6%
Vehicle Fleet	26,847,000	28,472,000	1,625,000	6.1%
Total City Of London	199,115,000	188,964,000	(10,151,000)	-5.1%
London's Population	355,000	372,000	17,000	4.8%
Energy Use (ekWh) per person	561	508	(53)	-9.4%

In Figure 4 – Greenhouse Gas Emissions, the GHG emissions from facility and infrastructure energy use are 6 percent lower (1,700 tonnes) between 2012 and 2013 and 41 percent lower (18,200 tonnes) in 2013 compared to 2007 due to increased conservation efforts and cleaner sources of energy used to generate electricity in Ontario.

Figure 4 – Greenhouse Gas Emissions

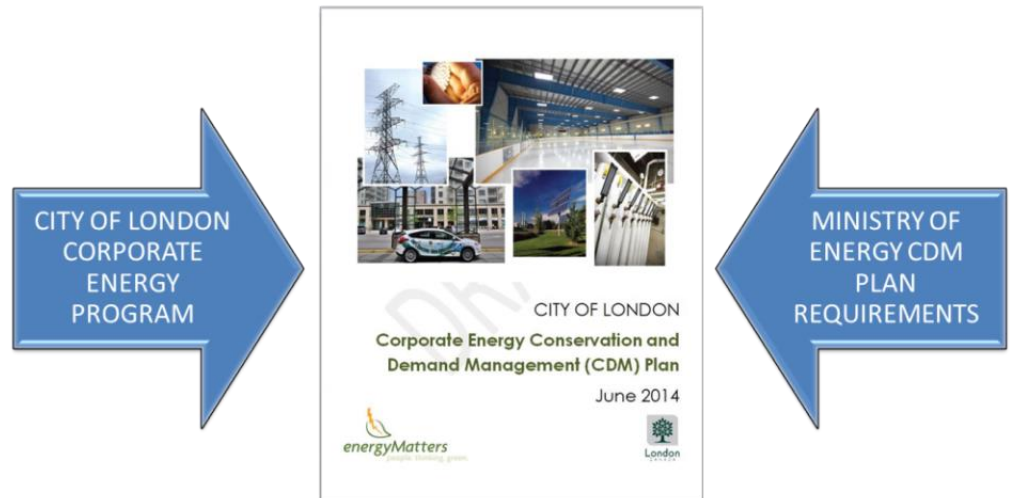


3.2 SETTING GOALS AND ACTIONS FOR CONSERVING ENERGY



In order for the City of London to establish goals and actions towards an effective conservation and demand management action plan, it must set a goal that is ambitious and something to strive for, but be realistic enough that the goal is attainable. The Energy and GHG reduction goals identified in this plan will act as a guide and provide focus and direction for the Corporation to achieve. Should the City of London wish to set more aggressive targets, additional funding, resources and investment would be required.

The existing City of London Corporate Energy Management Program expanded upon in 2007 and the six key focus areas already underway contribute to a significant portion towards the required elements of the Ministry of Energy's CDM Plan. Through the City of London Corporate



Energy Program, City staff captured a significant amount of information attributed to the required elements identified in the Green Energy Act and the Ontario Regulation 397/11 through a series of documents and reports focused on energy management activities. The introduction of the Ministry requirements provides the City of London with the opportunity to review our program initiatives, propose targets and actions for the next five years by preparing the Corporate Energy Management Conservation and Demand (CDM) Plan.

The City of London's approach for this conservation and demand management plan is to set targets achievable by continuing to implement short term initiatives, adopt energy conservation resources into current capital investments already assigned, explore incentive opportunities toward energy project initiatives and review long term initiatives that have significant impacts on energy consumption and GHG emissions.

3.2.1 CITY OF LONDON'S CDM FIVE YEAR PLAN

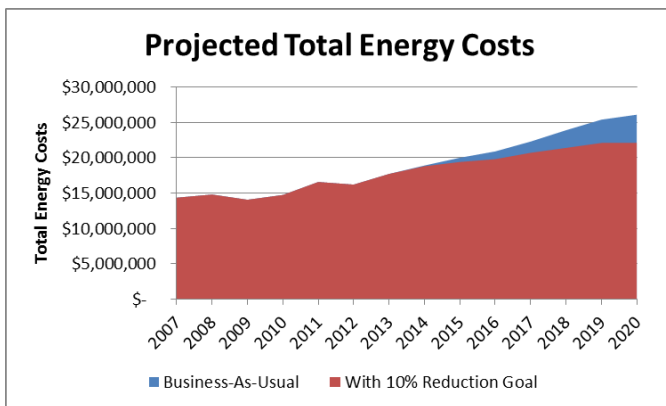
City staff have prepared the CDM Plan to include the following minimum required elements:




- ✓ Information on the public agency's annual energy consumption during the last year for which complete information is available for a full year.

- ✓ The public agency's goals and actions for conserving and otherwise reducing energy consumption and managing its demand for energy.
- ✓ The public agency's proposed measures under its CDM Plan, the cost and saving estimates for these proposed measures and the estimated length of time these measures will be in place.
- ✓ A description of any renewable energy generation facility operated by the public agency and the amount of energy produced on an annual basis by the facility.
- ✓ Confirmation that the public agency's senior management has approved the CDM Plan.

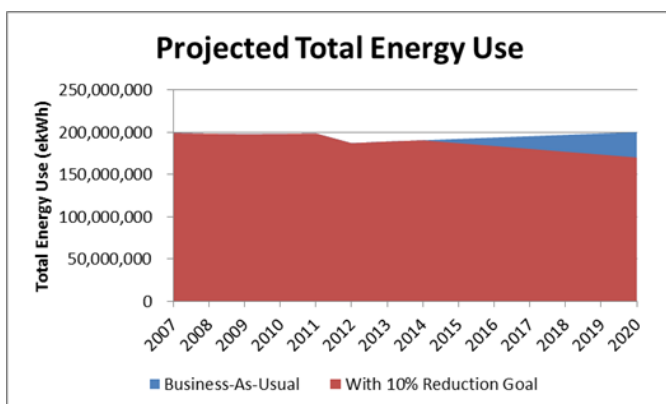
The City of London's proposed CDM goal is to achieve an additional 10 percent reduction in overall annual energy use over the duration of the CDM Plan to the end of calendar year in 2020. The baseline year will be 2014.




The significance of a 10 percent reduction in overall energy consumption compared to a business-as-usual approach projects the following results:



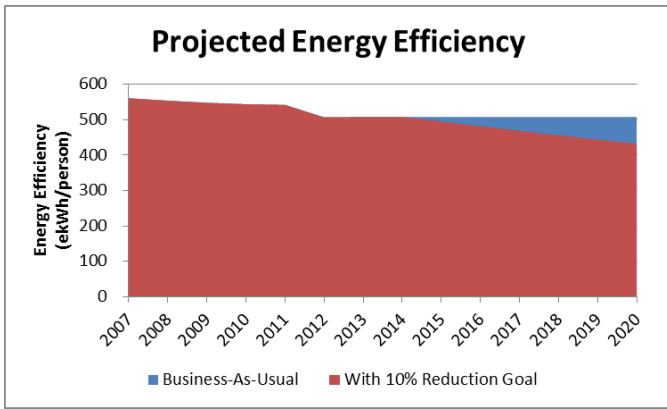
	Business-As-Usual = \$26,700,000
	10% Reduction in 2020 = \$22,700,000
	Cost Avoidance = \$4,000,000 per year

A projected energy cost avoidance of about \$4 million per year by 2020.



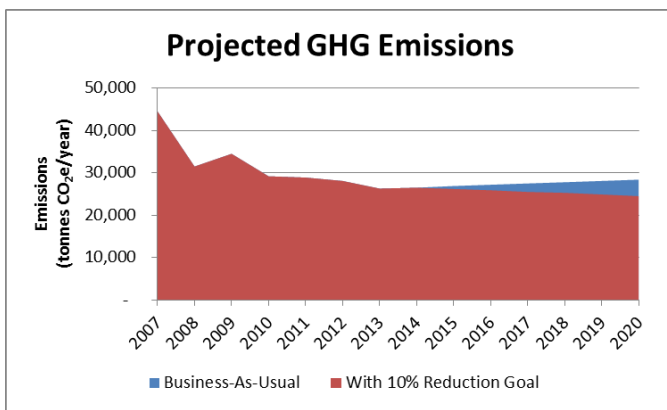
	Business-As-Usual = 200,100,000 ekWh
	10% Reduction in 2020 = 170,074,000 ekWh
	Avoidance = 30,026,000 ekWh annually

A projected total energy use reduction of 30 million ekWh per year by 2020.



Business-As-Usual = 508 ekWh/person
10% Reduction in 2020 = 432 ekWh/person
Avoidance = 76 ekWh/person annually

A projected total energy efficiency of 76 ekWh/person annually based on the projected population in 2020.



Business-As-Usual = 28,400 tonnes
10% Reduction in 2020 = 24,500 tonnes
Avoidance = 3,900 tonnes per year

A projected total GHG emission reduction of 3,900 tonnes annually by 2020.

This is comparable to energy reduction goals being prepared in other municipalities, where we have seen a typical energy reduction goals of approximately 10 percent over the duration of the plan. The City of London's approach is comparable to other municipalities in striving to achieve a 10 percent reduction target.

3.2.2 KEY PRINCIPLES TO MEET THE CITY OF LONDON TARGET TO 2020

The strategy identified as part of the CDM Plan of a 10 percent reduction can be obtained by a series of broad initiatives:

- Identify saving potentials within all service areas by including and conducting energy audits for their capital infrastructure project proposals.
- Verify and validate all utility bills with respect to energy rates, demand and energy consumption charges.
- Incorporate energy conservation measures into capital investments to save energy in the investments already being pursued.
- Continue to explore utility conservation incentive opportunities and to take and use the incentive grants towards future energy projects.

- Work with other service areas to incorporate and pursue common goals and actions with respect to energy conservation and environmental goals.
- Review energy management plans in other jurisdictions and organizations to identify additional energy saving initiatives being implemented elsewhere that may assist the City of London in achieving its energy reduction goals.

The following key principles were part of the foundation in the development of the CDM Plan.

3.2.2.1 BUDGET – THE COSTS ASSOCIATED TO THE SAVINGS

Since the expansion of the Corporate Energy Management Program in 2007, the City of London has assigned an annual budget of between \$300,000 to \$600,000 towards the program and the associated costs for energy management staff, feasibility studies, and other consulting costs. The City has also invested between \$250,000 and \$1 million per year in capital expenditures related to energy-efficiency projects. The previous operating and capital budgets form the foundation of expenditures required for the CDM plan over the next five years.

The City of London's approach to energy efficiency improvements is to maximize existing budgets identified within asset renewal projects scope of work. The incremental costs are integrated within asset renewal projects scope of work, such as the work currently underway with Canada Games Aquatic Centre and process upgrade projects such as sludge dewaterers at Greenway WWTP.

The CDM Plan has been designed to achieve its targets based on the current Corporate Energy Management Program and budget allocation, as the CDM Plan was developed using current measures and budgets from recent experience. Our position is that we have already committed to many of the measures towards energy management in the past that have positioned us well today, and moving forward.

3.2.2.2 INCENTIVE OPPORTUNITIES

Improvements in energy efficiency help to offset the pressures of energy prices placed on operating budgets. The City of London has been very active in pursuing grants and incentives that are made available by provincial & federal governments, London Hydro, Union Gas and the Federation of Canadian Municipalities (FCM). The incentive programs offer incentive funding for controlling and reducing electricity and gas demand by replacing energy-wasting equipment or to pursue new construction that exceed provincial building codes and standards which in turn assist the City of London in targets to reduce annual electricity and gas costs and GHG production. The City of London has applied for and received over \$1 million in incentive funding since 2006 and this number continues to grow.

3.2.2.3 ECONOMIC DEVELOPMENT OPPORTUNITIES

In addition to the corporate energy cost savings associated with corporate energy management activities, energy projects also generate economic development and business activity in London. Examples of this include:

- Energy retrofits of municipal buildings are primarily carried out by London area service providers, and can also generate demand for London area suppliers of energy-saving products. These product and service providers can then use the experience gained from municipal projects to the benefit of London area businesses and institutions.
- Green municipal building projects, such as the Stoney Creek Community Centre, provide opportunities for London area product and service providers to increase their capacity to deliver these products and services to other London area businesses and institutions.
- Technology demonstration projects, such as LED lighting trials on London roadways and parking lots, allows this technology to be tested in local conditions against existing standards often based on older technologies. This helps to bring new technology to the London area, either by providing London area product and service providers with experience in utilizing this new technology or by bringing new product and service providers to London to serve our market.
- Municipal renewable energy projects provide London area product and service providers with experience in undertaking projects that help to expose unexpected challenges, such as transmission grid constraints and technology standards developed for older technologies that can then be addressed and/or taken into account for future projects. This activity will represent a number of different business opportunities and/or community opportunities.

3.2.2.4 LEVEL OF COMMITMENT

The level of commitment towards the CDM Plan depends on the level of commitment by Council, senior management and staff at the City of London. In recent years, commitments towards energy conservation have proven to be a challenge based on budget discussions and the continued reduction in energy conservation budget funding.

As noted above, energy efficiency measures are incorporated in to major projects in asset renewal, new construction, and process improvement projects to maximize existing budgets. Obtaining the current level of financial and resources commitment over the next five years is required to achieve a 10 percent reduction in total annual energy use by 2020. With the nature of our business, this target may be subject to change if endorsement changes.

If current investments and city staff remain committed to conservation and demand management, the City of London can deliver what has been outlined by the plan. The

purpose of the CDM Plan initiative from Ministry of Energy is to show the City of London's commitment towards conservation and demand management, the only penalties would be "self-inflicted" by potential higher energy consumption and increased future operational cost.

3.2.2.5 FLEET SERVICES "GREEN FLEET STRATEGY"

In the commitment to the reduction of emissions, Fleet Services are updating an Action Plan which focuses on future reduction strategies for fuel consumption, the use of alternate fuels and the review of reduction technology such as low emission vehicles and equipment which will contribute significantly to the City of London's overall energy consumption targets.

3.3 IDENTIFY CONSERVATION POTENTIAL



In order for the City of London to meet the established goals and actions towards an effective CDM Plan, we must review the technical or non-technical conservation potential of proposed measures, the cost estimates towards the proposed measures, and the estimated length of time these measures will be in place. In CDM Plans as defined by the Ministry of Energy, energy saving measures are considered to be technical in nature, however, there are also organizational, behavioral and tracking measures that can also

produce energy savings.

3.3.1 IDENTIFYING THE ENERGY POTENTIALS

In order to support the technical and non-technical conservation potential of proposed measures, it was important for the City of London to capture goals and actions that our service areas could relate to, but also be part of in the implementation process over the next five years. A three stage approach was used in identifying the energy proposals.

3.3.1.1 ENERGY AUDITS

The City of London retained Ameresco to perform energy audits on 17 facility sites in 2013 which included the costs, savings and lifespans of the measures identified. The audit revealed numerous energy saving opportunities and gave the City of London the opportunity to prioritize and initiate capital investments in a best payback scenario. The 17 energy audits highlighted \$3.5 million worth of asset renewal and energy measures which result in savings from common, straightforward energy conservation initiatives with simple payback project scenarios ranging from 4 to 20 years. *Appendix B – Proposed Energy and Capital Renewal Measures* illustrates the complete list of proposed energy and capital renewal measures as a result of the energy audit performed along with the internal rate of return for each measure evaluated in the energy audit.

3.3.1.2 CDM STRATEGIC PLANNING

The CDM strategic planning process was used to obtain information from service areas within the corporation in relationship to Energy Conservation. *Appendix C – City of London CDM Planning Measures* illustrates the current and future measures that have energy conservation impacts that were captured as part of this process that were provided by multiple service areas within the City of London. The focus of the process was to identify items in four categories as highlighted by the Ministry of Energy:

SERVICE AREA	Service Area or division within the Corporation where the technical energy measures identified can be found.
LONG TERM GOALS	The preferred state is where the public agency wants to be with respect to energy and energy conservation. The preferred state will set the long-term direction and vision for energy management for the public agency. As part of the strategic planning process, the defined preferred state will be used to identify the goals and actions of the CDM Plan.
CURRENT	The present state is the current energy use within the public agency. It provides the public agencies with an indication of how far away their present state of energy management is from where they want to be - the preferred state.
PROPOSED ACTIONS	At this stage, the specific measures identified to move from the present to the preferred state of energy management. Priorities should also be assigned to aid with effective implementation of the plan.

As a result, multiple measures were identified for implementation of the CDM Plan. These technical and non-technical measures identified by our service areas contribute and support the CDM Plan and priority actions proposed to save energy and help achieve the initial goals and actions of the plan.

3.3.1.3 It's WITHIN REACH PROGRAM

"Harry" the leopard frog (a native frog species found in the Thames River) is the energy conservation captain, looking for staff to help tackle the rising cost of energy, by using less energy and using energy more wisely by giving energy saving tips to all service areas that include:



- Turning of unneeded lights in rooms that are not in use
- Reporting repairs (e.g. damaged weather stripping that results in up to 40% of heat loss)
- Turning of unneeded electronics when not in use
- Using preventative maintenance programs to keep vehicles and equipment in good repair
- In winter, to open blinds to let the heat and sun in, and to do the opposite in the summer
- Set back heating/cooling temperatures at night in buildings with no Building automation controls, and
- When driving, accelerate gently and maintain steady speeds for better fuel efficiency

The ‘It’s Within Reach” program focuses on behavioral measures and has presented the opportunity to inform staff of savings associated with energy conservation initiatives that they can do to help save energy within the organization.

3.3.2 FROM PLAN TO IMPLEMENTATION - PROPOSED ENERGY REDUCTION STRATEGY

After the identification process, the City of London reviewed the results of the conservation potential results along with baseline information to develop energy reduction targets for technical and non-technical goals.

In order for the City of London to achieve a quantitative goal of a 10 percent reduction in overall energy consumption towards the CDM Plan to 2020, the 35 technical and non-technical actions have been prioritized to contribute to overall savings. The actions have been separated to show our proposed actions for 2014/15 and future actions to 2020.

3.3.2.1 TRACKING AND MONITORING STRATEGY

The City of London will focus on the following actions to support the City of London CDM Plan.

Highest Priority Actions for Tracking and Monitoring in 2014/15

In the CDM Plan in 2014/15 the City of London will focus on the following highest priority actions. The plan will continue to utilize the EnergyCAP software procured to provide the ability to track, record and analyze energy consumptions. This plan will assist the City to:

1. Continue to provide the required data to support the requirements outlined in Ontario Regulation 397/11 under the Green Energy Act, 2009
2. Monitor our energy consumption and accounts to ensure accuracy and consistency of usage by identifying metering or consumption errors

3. Identify opportunities to forecast energy consumption and costs, with the data utilized during the budget process in future capital and maintenance projects to be completed in 2014/15.

Key Strategies for Tracking and Monitoring to 2020

In the CDM Plan for the City of London will review the following key strategies towards tracking and monitoring to update the CDM Plan requirements in 2019 to include:

14. Continue to meet the annual reporting requirements identified in Ontario Regulation 397/11 to support the required update to the CDM Plan in 2019
15. Continue to identify opportunities in energy efficiencies within Corporate Facilities, operations and infrastructure
16. Monitor and verify actual energy consumption, cost reductions and projected savings from energy conservation projects
17. Assist with energy budgeting and accruals to report on and forecast energy consumption and costs for budget process.
18. A review of real-time tracking and monitoring options available to incorporate real-time monitoring of all utilities to better support energy used by the City of London. In order to accurately measure the success of energy efficiencies implemented to corporate facilities, the addition of real-time metering would support the targeted measures to be monitored to see the positive effects.
19. A strategy or policy to better capture energy usage and data for measurement should be included in all City of London building retrofits for better measurement. Moving towards interval meters on all electrical services and pulse outputs on gas and water meters would support this initiative to better track energy use at City of London facilities.

3.3.2.2 TECHNICAL MEASURES STRATEGY

Technical measures can be achieved to support the City of London's goal quantitative goal of a 10 percent reduction in overall energy consumption towards the CDM Plan to 2020 and beyond. From the energy audits retained from Ameresco on 17 facilities sites, *Appendix B – Proposed Energy and Capital Renewal Measures* illustrate the complete list of proposed energy and capital renewal with internal rates of return for each measure evaluated. The City of London will focus on the following actions to support the City of London CDM Plan.

Highest Priority Actions for Technical Measures in 2014/15

In the CDM Plan in 2014/15 the City of London will focus on the following highest priority actions to support the City of London CDM Plan. The plan will:

4. Focus on city facilities and buildings that will provide the greatest opportunities in energy saving measures by utilizing the Ameresco report to complete projects identified in the replacement date of 2014/15.
5. Utilization of incentive opportunities from governmental, and local distribution companies towards energy audits on capital projects.
6. Consultation with city staff and managers who operate the buildings, systems and equipment to review and suggest energy saving opportunities.
7. Investment in future energy audits towards identifying new energy saving measures and opportunities on City of London infrastructure

Key Strategies for Technical Measures to 2020

In the CDM Plan for the City of London will review the following key strategies towards technical measures to reduce energy consumptions and update the CDM Plan requirements in 2020 to include:

20. Focus on city facilities and buildings that will provide the greatest opportunities in energy saving measures by utilizing the Ameresco report to complete projects identified in the replacement date to 2020.
21. Continue to identify opportunities in energy efficiencies within Corporate Facilities, operations and infrastructure and utilize incentive opportunities from government and local distribution companies
22. Develop and implement a master specification for direct digital controls to be used as the basis of design for building automation system projects.
23. Ongoing review and evaluation of various mechanical equipment for potential cost recovery.
24. Develop a policy that all major renovations and new construction of city owned facilities include provisions to include central BAS control technology
25. Continue to develop and review opportunities towards the development of renewable energy generation projects.

3.3.2.3 ORGANIZATIONAL MEASURES AND STRATEGY

The EMCT has lead responsibility and accountability for achieving energy reduction targets for the City of London. Corporate Energy Management staff provide commitment to work with each service area, and review potential projects to assist in incentive opportunities, and best practices in the commitment to reduce our energy impacts.

Estimating the costs, savings and lifespan of organizational measures is challenging. The proposed potential policies, procurement practices and design standards in *Appendix C – City of London CDM planning Measures* would serve as a guideline in order to assist in measures to achieve for overall energy saving opportunities and the 10 percent reduction in energy consumption for the proposed CDM Plan.

Highest Priority Actions for Organizational Measures in 2014/15

In the CDM Plan in 2014/15 the City of London will focus on the following highest priority actions to support the City of London CDM Plan. The plan will:

8. Continue to work with energy market advisors to obtain procurement advice to evaluate utility rates on behalf of the City's commodity supply arrangements to optimize rates favourable to the City of London.
9. Develop a policy that all retrofits to infrastructure consisting of energy measures be reviewed for energy conservation practices.
10. Develop a policy to adapt a minimum standard of equipment for energy appliances, and high efficiency motors.
11. Investment in future energy audits towards identifying new energy saving measures and opportunities on City of London infrastructure.

Key Strategies for Organizational Measures to 2020

In the CDM Plan for the City of London will review the following key strategies towards organizational measures to reduce energy consumptions and update the CDM Plan requirements in 2020 to include:

26. Piloting the use of tools such as Natural Resource Canada's Portfolio Manager and the Building Owners and Managers Association Canada's Building Environmental Standards (BOMA Best) performance labelling system at City Hall.
27. A continual focus on energy procurement by working with energy market advisors to obtain procurement advice for electricity and natural gas commodities.

28. Development of a policy that all new City of London owned buildings be designed to meet or exceed LEED Silver standards.
29. Continual evaluation of utility rates on behalf of the City's commodity supply arrangements to optimize rates favorable to the City

3.3.2.4 BEHAVIORAL MEASURES AND STRATEGY

In 2013 the City of London re-launched the *energyMatters* program, with a key message, "It's within Reach", to encourage city services and operations to embrace a culture of conservation. Energy savings can be successful through behavioral measures which can result in a 5-10 percent reduction in overall energy use. The program focus is to encourage an employee commitment to reduce their personal energy consumption at work and to inform staff that employees have a direct impact and personal responsibility in supporting the Corporation's efforts to reduce energy consumption. The "It's Within Reach" program continues to build momentum with City of London staff to encourage employee engagement towards energy conservation in the workplace.

Highest Priority Actions for Behavioral Measures in 2014/15

In the CDM Plan in 2014/15 the City of London will focus on the following highest priority actions to support the City of London CDM Plan. The plan will:

12. Continue to build upon the "It's Within Reach" Program to encourage employee engagement towards energy conservation in the workplace
13. Continue to develop and improve upon the employee engagement program to solicit energy saving ideas from City of London Staff

Key Strategies for Behavioral Measures to 2020

In the CDM Plan for the City of London will review the following key strategies towards Organizational measures to reduce energy consumptions and update the CDM Plan requirements in 2019 to include:

30. Reporting structure for staff to report repairs that influence energy savings.
31. Continue to identify opportunities in energy efficiencies within Corporate Facilities, operations and infrastructure and utilize incentive opportunities from government and local distribution companies.
32. Develop and implement a master specification for direct digital controls to be used as the basis of design for building automation system projects.

33. Ongoing review and evaluation of various mechanical equipment for potential cost recovery.
34. Develop a policy that all major renovations and new construction of city owned facilities include provisions to include central BAS control technology.
35. Continue to develop and review opportunities towards the development of renewable energy generation projects.

3.4 IMPLEMENT MEASURES



The intent of this CDM Plan is to outline what the City of London is doing to better manage their energy use and to reduce energy consumption and demonstrate leadership in our community. The City of London has identified numerous energy reduction strategies, measures and proposed actions to support the CDM planning process. To implement the plan, the City has assigned responsibility for measures, linked the CDM Plan to other corporate activities with partnering service areas and has set prioritization and timelines towards the actionable measures identified. *APPENDIX B – Proposed Energy and Capital Renewal Measures* also identifies a full list of proposed energy and capital renewal measures with actionable timelines up until 2038 and incremental payback scenarios zero to 25 years on proposed energy and capital renewal measures.

3.5 EVALUATE AND MEASURE RESULTS



The City of London's quantitative goal is to achieve a 10 percent reduction in overall energy use over the duration of the CDM Plan to 2020. This goal equates to an approximate 2 percent annual reduction in energy from City owned facilities and operations yearly starting in 2015. In order to achieve this target, it is important for the City to maintain commitment in monitoring and evaluation of its energy consumption and greenhouse gas emissions in order to achieve this aggressive goal.

The City will submit to the Ministry of Energy an updated CDM Plan in July 2019 to illustrate the reduction results presented in the 2014 CDM Plan report. The report will illustrate results from the 2017 energy consumption and greenhouse gas emissions reporting and provide:

- Results and summary of the annual “Energy Consumption and Greenhouse Gas Emission” templates submitted

- A summary of the proposed measures for conserving and otherwise reducing energy consumption and managing its demand for energy from the 2014 CDM Plan report
- A revised forecast of the expected results of current and proposed measures identified in the 2014 CDM Plan
- A report on the actual results achieved based on the proposed actions of the 2014 CDM Plan
- Identification of future proposed measures for conserving and reducing energy consumption and new targets towards energy management activities
- A description of any changes to the existing CDM Plan to further assist the City of London in reaching future targets.

The required elements and results for the first CDM update will be required for July 1, 2019. In order to assist the City of London with this report, Ontario Regulation 397/11 has included a checklist to follow for the 2019 report update to insure that the required elements are included in the results of the CDM Plan.

4 ADMINISTRATION OF THE CDM PLAN

Although the CDM Plan is not required to be submitted to the Ministry of Energy for approval, the plan does have minimum requirements that must be met.

The Broader Public Sector (BPS) reporting site set up by the Ministry of Energy to house the annual energy consumption and greenhouse gas emission required documents and data will also include a check box where organizations can indicate completion of their CDM Plan. The CDM Plan must be approved and provide confirmation that it has been approved by senior management. This document will also be presented to the Civic Works Committee, and will seek approval for City of London Council. A signed council resolution document will be attached, confirming approval of this CDM Plan and the commitment to implementing the plan for the next five years.

The costs associated to the savings in the recommended CDM Plan towards energy efficiency improvements is to maximize the existing budgets currently in place with the current Corporate Energy Management Program. It is important to note that CDM Plan prepared, is a 5 plan on conservation and demand management targets. The plan provides subjective results moving forward and may be subject to change based on uncontrollable factors (economic, market conditions, legislative changes, etc.)

APPENDIX A – AMERESCO PHASE III – CGAC PROJECT

Measure Description	Estimated Cost ¹ (\$)	Incentives Available (\$)	Net Construction Cost (\$)	Energy Reduction (%)	GHG Reduction (%)	Savings	
						Year 1	Year 20
Replace existing boilers with high efficiency condensing style boilers	\$265,000	\$9,000	\$256,000	11.0%	12.0%	\$13,145	\$25,950
Replace Pool air-handling equipment with new Dectron units and a dedicated outdoor air energy recovery unit	\$1,455,000	\$4,150	\$1,450,850	9.5%	10.3%	\$11,315	\$22,340
Replace existing Change Room MUA with new unit complete with integral energy recovery	\$197,500	\$2,975	\$194,525	2.5%	2.7%	\$4,155	\$8,375
Replace existing roof mounted AHU's serving Spectator Area with new high efficiency units complete with integral energy recovery	\$397,000	\$9,600	\$387,410	3.0%	3.0%	\$6,290	\$12,830
Replace existing Packaged RTU's serving Admin Offices and Community Room	\$89,500	\$2,640	\$86,860	0.2%	0.3%	\$1,350	\$2,815
Replace existing DHW heater with new high efficiency condensing style DHW heater	\$23,600	\$800	\$22,800	2.0%	2.1%	\$2,275	\$4,490
Pool drain heat recovery system	\$25,600	\$800	\$24,800	2.0%	2.0%	\$2,250	\$4,440
Building Automation System Upgrade	\$76,000	\$2,030	\$73,970	1.0%	1.0%	\$2,525	\$5,195
Replace lighting in the Pool and Spectator Area	\$323,000	\$17,550	\$305,450	8.0%	7.0%	\$36,500	\$76,170
Replace existing pool pumps with new high efficiency pumps complete with variable speed drives (VFD's)	\$79,000	\$6,570	\$72,430	1.5%	1.3%	\$6,830	\$14,260
LED Parking lot lighting	\$64,000	\$800	\$63,200	0.3%	0.3%	\$1,665	\$3,470
Total	\$2,995,200	\$56,915	\$2,938,295	41.0%	42.0%	\$87,300	\$180,335

Notes:

¹ All Costs presented are per the Energy Partner Agreement currently in place between the City of London and Ameresco Canada

APPENDIX B – PROPOSED ENERGY AND CAPITAL RENEWAL MEASURES

Asset	Measure	Measure Cost Estimate (a)	Incentives as per Existing Approved Programs	Net Cost	Annual Savings	Simple Payback (b)	Replace Date	Payback (c)
Kiwanis Senior Centre	Boiler Replacement	\$132,000	\$3,000	\$129,000	\$350	20+	2022	8.6
	Rooftop HVAC Replacement Program	\$277,200	\$16,000	\$261,200	\$1,360	20+	2014	6.6
	General Lighting Upgrades	\$14,000	\$1,200	\$12,800	\$990	12.9	2022	12.9
	Exterior Lighting Upgrades	\$33,400	\$1,600	\$31,800	\$3,780	8.4	2017	3.7
CHOCC	Boiler Replacement	\$81,000	\$3,000	\$78,000	\$6,060	12.9	2018	3.0
	Rooftop HVAC Replacement Program	\$248,000	\$20,000	\$228,000	\$2,530	20+	2008	5.5
	General Lighting Upgrades	\$25,600	\$1,900	\$23,700	\$2,800	8.5	2015	8.5
	Building Automation System Expansion & Upgrade	\$46,800	\$2,500	\$44,300	\$3,780	11.7	2008	11.7
	Parking Lot Lighting Upgrades	\$19,900	\$1,280	\$18,620	\$1,460	12.8	2015	6.9
Glen Cairn Arena	Boiler Replacement	\$172,000	\$3,000	\$169,000	\$950	20+	2008	4.7
	Lobby Heating Upgrade	\$15,100	\$1,600	\$13,500	\$700	19.3	2011	19.3
	DHW Heater Replacement	\$23,900	\$7,200	\$16,700	\$3,050	5.5	2025	2.4
	General Lighting Upgrades	\$6,400	\$380	\$6,020	\$360	16.7	2010	16.7
	Exterior Lighting Upgrades	\$8,000	\$440	\$7,560	\$1,050	7.2	2012	7.2
	Building Automation System Expansion & Upgrade	\$28,000	\$1,000	\$27,000	\$1,750	15.4	2010	15.4
Table continued								

Asset	Measure	Measure Cost Estimate (a)	Incentives as per Existing Approved Programs	Net Cost	Annual Savings	Simple Payback (b)	Replace Date	Payback (c)
Fanshawe GC Club House	Ground Source Heat Pump HVAC System	\$189,000	\$8,800	\$180,200	\$5,600	32.2	2019	15.5
	General Lighting Upgrades	\$8,000	\$1,160	\$6,840	\$740	9.2	2008	9.2
Thames GC Club House	Ground Source Heat Pump HVAC System	\$220,000	\$11,200	\$208,800	\$8,610	24.3	2014	15.0
	General Lighting Upgrades	\$16,200	\$2,240	\$13,960	\$3,120	4.5	2008	4.5
AJ Tyler	Boiler Replacement	\$377,000	\$9,000	\$368,000	\$5,160	20+	2014	24.3
	Rooftop HVAC Replacement Program	\$203,200	\$10,720	\$192,480	\$1,680	20+	2013	-15.8
	Garage Lighting Upgrades	\$23,000	\$3,800	\$19,200	\$3,580	5.4	2006	0.9
	General Lighting Upgrades	\$33,000	\$6,170	\$26,830	\$2,840	9.4	2015	9.4
	Exterior Lighting Upgrades	\$11,600	\$780	\$10,820	\$1,740	6.2	2013	6.2
Firehall #1	Rooftop HVAC Replacement Program	\$55,400	\$2,320	\$53,080	\$730	20+	2017	7.1
	Exterior Lighting Upgrades	\$10,800	\$540	\$10,260	\$1,280	8.0	2013	8.0
Firehall #12	Rooftop HVAC Replacement Program	\$138,300	\$5,440	\$132,860	\$1,010	20+	2012	5.5
	Exterior Lighting Upgrades	\$7,700	\$220	\$7,480	\$990	7.6	2015	1.0
Earl Nichols Arena	Rooftop HVAC Replacement Program	\$207,900	\$14,800	\$193,100	\$2,070	20+	2014	4.9
141	Dessicant Dehumidification System	\$141,750	\$23,520	\$118,230	\$10,110	11.7	2012	12.3
	Exterior Lighting Upgrades	\$32,000	\$780	\$31,220	\$3,900	8.0	2010	4.3
Oakridge Arena	Desiccant Dehumidification System	\$52,920	\$8,000	\$44,920	\$2,600	17.3	2014	17.3
	DHW Heater Replacement	\$44,100	\$7,200	\$36,900	\$6,300	5.9	2020	2.7

Table continued

Asset	Measure	Measure Cost Estimate (a)	Incentives as per Existing Approved Programs	Net Cost	Annual Savings	Simple Payback (b)	Replace Date	Payback (c)
	General Lighting Upgrades	\$14,510	\$920	\$13,590	\$1,360	10.0	2011	4.1
	Pool Heating Boiler Upgrade	\$100,800	\$3,000	\$97,800	\$1,250	20+	2015	7.7
Silverwoods Arena	DHW Heater Replacement	\$23,940	\$0	\$23,940	\$3,740	6.4	2013	3.1
	General Lighting Upgrades	\$6,400	\$400	\$6,000	\$380	15.8	2011	16.6
	Exterior Lighting Upgrades	\$5,100	\$190	\$4,910	\$990	5.0	2011	5.3
Farquarson Arena	Desiccant Dehumidification System	\$105,840	\$15,680	\$90,160	\$4,030	22.4	2009	19.6
	Exterior Lighting Upgrades	\$7,550	\$260	\$7,290	\$1,260	5.8	2009	1.8
Stronach Arena	Gym Lighting Upgrade	\$9,100	\$1,890	\$7,210	\$2,280	3.2	2038	-6.0
	Lobby Lighting Upgrade	\$8,200	\$1,680	\$6,520	\$1,660	3.9	2038	4.5
	Update Refrigeration Plant DDC System	\$75,600	\$6,610	\$68,990	\$7,550	9.1	N/A	10.8
	Desiccant Dehumidification System	\$94,500	\$15,680	\$78,820	\$5,170	15.2	N/A	15.2
EROC	Exterior Lighting Upgrades	\$20,800	\$1,260	\$19,540	\$2,840	6.9	N/A	6.9
Lambeth Arena	Exterior Lighting Upgrades	\$21,600	\$1,180	\$20,420	\$2,570	7.9	2010	2.1
	Gym Lighting Upgrade	\$23,500	\$1,440	\$22,060	\$1,490	14.8	2010	14.8
Victoria Park Bandshell	Park Pathway Lighting Upgrades	\$36,500	\$640	\$35,860	\$1,780	20.1	2011	14.0
	Total	\$3,457,110	\$231,620	\$3,225,490	\$131,380	24.6		8.9

Notes:

- (a) All costs presented are per the Energy Partner Agreement currently in place between the City of London and Ameresco Canada.
- (b) Simple payback: time required to pay back the net cost of the high efficiency equipment using annual savings.
- (c) (Incremental) Payback: time required to pay back the net cost difference between high efficiency equipment and nominal efficiency equipment that would otherwise be purchased when the existing equipment reaches the end of its service life.

APPENDIX C – CITY OF LONDON CDM PLANNING MEASURES

SERVICE AREA/DIVISION	LONG TERM GOALS	CURRENT	PROPOSED ACTIONS
Publically Accessible Buildings	All new buildings designed to meet LEED Silver criteria or a comparable program	All new buildings are designed to meet Ontario Building Code requirements. Buildings with a certain size have been built to various LEED criteria and standards	Develop a policy that all new buildings be designed to meet or exceed LEED Silver standards or a comparable program, although decision to certify will be considered on a case by case basis
All Service Areas - Corporate Buildings and Facilities	All renovations to existing buildings and assets to include an energy efficiency review to ensure targets and efficiencies are being considered	All building and asset retrofits are built and designed to meet minimum regulatory requirements.	Develop a policy that all retrofits to infrastructure consisting of energy measures be reviewed by Energy Management Conservation Committee (EMCT) for comment.
All Service Areas	Employee engagement, an informational tool providing employee awareness in energy conservation for the Corporation	Staff are informed about energy conservation through a recently launched campaign targeting energy conservation	Continue to develop and improve the employee engagement program to solicit energy saving ideas from City of London Staff
Roadway Lighting and Traffic Control Environmental and Engineering Services	Street light conversion program	Currently select Pilot Projects have been assigned to test LED technology and to report back on future use	Currently examining and developing potential policies and strategies to convert all existing HPS fixtures and design of new streetlight applications to more energy efficient street light alternatives.
All Service Areas	Better utilization of government and utility incentive programs to encourage greater levels of energy efficiencies within all Service areas of the Corporation.	Currently, not all service areas are fully aware of the government and utility funding incentive programs that may be available towards their projects.	The EMCT to continue to educate all service areas throughout the Corporation to review funding opportunities available to encourage greater efficiency levels for the next 3 to 5 years.
All Service Areas - Corporate Buildings and Facilities	All capital investments including major renovations and new construction buildings designed to incorporate building automated systems (BAS) to be centrally controlled, monitored and operated.	BAS systems currently are implemented in some service areas sites, but there is no standard in place to accommodate these monitoring systems. There are many existing facilities within the Corporation where the buildings are controlled and maintained by location, with no controls in place.	Develop a policy that all major renovations and new construction of city owned facilities include provisions to include Central BAS Control technology to ensure efficient temperature control is maintained reliably and monitored for a single location.
Purchasing and Supply	Source and identify energy efficient products during the procurement of equipment.	All upgrades to equipment and products during procurement are decided upon by the service area and the use of the area.	Develop a City purchasing policy to reflect and adapt a minimum standard of equipment for energy appliances, and high efficiency motors.

SERVICE AREA/DIVISION	LONG TERM GOALS	CURRENT	PROPOSED ACTIONS
Purchasing and Supply	Energy Procurement strategy for the City of London	Currently the City of London evaluates energy procurement options on an ongoing basis taking into account energy market regulations and conditions.	Continue to evaluate utility rates on behalf of the City's commodity supply arrangements to optimize rates favourable to the City.
All Service Areas	Invest further in renewable energy generation	Currently the City of London is working on strategies to include the development of future renewable energy generation projects.	Continue to develop and review opportunities toward the development of renewable energy generation projects.
Energy Management	Develop an energy project funding program for future energy reduction projects using the utility cost savings and grant funding from current conservation initiatives	Currently all utility cost savings and grant funding go back to the service area of the project	Creation of an energy project funding program that takes the savings and grants, and applies the savings earned to future energy savings projects for that service area.
Corporate Services - Facilities	Modern direct digital control systems in all occupied buildings with standardized graphical user interface, real-time energy dashboards and sub-metering	Buildings have a mix of control types and systems throughout ranging from manual control to direct digital automated feedback control.	Develop and implement a master specification for direct digital controls to be used as the basis of design for building automation system projects.
Corporate Services - Facilities	The use of automated lighting controls which interface with the building automation systems	There are various lit spaces with localized automatic control via occupancy sensors.	Complete a pilot lighting control project in conjunction with the lighting retrofit project at AJT and adapt the 'lessons learned' to future, suitable lighting projects
Corporate Services - Facilities	Elimination of inefficient T12 fluorescent lighting from all City of London facilities	There are currently T12 light fixtures scattered throughout the City's building portfolio. They are primarily located in lightly to unoccupied spaces like storage rooms and mechanical rooms	Replace/retrofit the fixtures as they are encountered with new, suitable high efficiency fixtures/components
Corporate Services - Facilities	A primarily predictive and preventative maintenance program that incorporates energy efficiency in maintenance decisions: correct lubrication, laser alignment, vibration analysis and photo thermography	Maintenance efforts are a combination of reactive and preventative	Continuation of the recently launched Facilities maintenance service delivery model with maintenance works flowing through the new work order system
Fleet and Operational Services - Environmental and Engineering Services	Fleet Vehicle Tracking and Monitoring Systems	City of London has installed three Geo Tab tracking devices as a pilot project on highway tractors serving the Pollution Control Plants.	Additional Geo Tab tracing devices be implemented. Fleet to facilitate educational workshops to demonstrate the results to improve driver habits.

SERVICE AREA/DIVISION	LONG TERM GOALS	CURRENT	PROPOSED ACTIONS
Fleet and Operational Services - Environmental and Engineering Services	Update a vehicle and equipment emission reduction strategy to be implemented	Green Fleet initiatives were approved by Council.	The Green Fleet Strategy is being updated to include: fuel management systems, preventative maintenance programs, procurement of fuel efficient vehicles and equipment, vehicle and driver performance monitoring programs.
Corporate Services - Facilities	Asset database populated with increasingly detailed facility data gleaned from audits completed at regular intervals	Asset database has a mixture of high level and detailed facility information	Continue to complete detailed-level energy/lifecycle renewal audits of City of London facilities.
Wastewater Treatment Operations - Environmental and Engineering Services	Reduce energy consumed by HVAC systems.	Existing systems have not been evaluated for heat recovery or optimization of heating equipment or building air exchanges.	Ongoing upgrades of HVAC systems and controls based on cost recovery.
Wastewater Treatment Operations - Environmental and Engineering Services	Minimize hydro consumed in the operation of pumps and blowers	Most installations have not been optimized with new technologies and efficient sizing of pumps.	Ongoing evaluation of various pumping and aerations systems. Upgrade based on potential cost recovery.
Water Engineering - Environmental and Engineering Services	Achieve energy savings at the 7 City owned pumping stations.	Several pumping stations utilize variable speed motors. Largest pumping station pumps in off peak periods to reduce energy costs. Undertake pump modifications to make each unit more efficient where practical.	Investigate major pump overhauls, including replacement which will eliminate or significantly reduce energy loss within pumping stations.
Water Engineering - Environmental and Engineering Services	Achieve energy savings through optimization of Regional Water and City Distribution system pumping schemes.	Regional Water and the City of London are working together to investigate the best use of reservoir storage to reduce energy costs from the source waters through to the customers. Off peak pumping is currently practised by both the Regional Water system and the City.	Modify operational procedures to allow greater cycling of water storage reservoirs to reduce energy costs by reducing pumping during peak power costs where practical.
Transportation Demand Management - Environmental and Engineering Services	Bikes and eBikes in the Fleet, Community CarShare corporate membership, full corporate participation in Commuter Options Month, full bicycle facilities at all City facilities, carpool parking spaces at all City facilities.	Moderate participation in Commuter Options month, bike facilities at City Hall and the Planning Office, carpool parking spots at some City Facilities.	Conduct survey to review the demand for bikes and ebikes in City Fleet. Conduct survey to asses City staff commute modal split. Add bicycle facilities to all City facilities. Add carpool parking spots to all City facilities. Explore feasibility of joining Community CarShare as corporate member.

SERVICE AREA/DIVISION	LONG TERM GOALS	CURRENT	PROPOSED ACTIONS
Corporate Services - Facilities	Create a standard of performance policy for indoor temperature settings	Currently no set standard.	Develop a policy and standards around indoor temperature settings for City of London Facilities. This could include temperature setbacks during electrical supply constrained days.
Planning - Environmental and Parks Planning	Reduce energy consumption in City of London Parks	Lighting park amenities is based on set times using traditional sources.	Reviewing lighting standards for parks to assess the needs and to adjust lighting requirements to suit time of use. Expand the use of solar-powered lighting and LED technology.



CITY OF LONDON

Corporate Energy Conservation and Demand Management (CDM) Plan

July 2014

