

TO:	CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON AUGUST 29, 2017
FROM:	JAY STANFORD, M.A., M.P.A. DIRECTOR, ENVIRONMENT, FLEET & SOLID WASTE
SUBJECT:	2016 COMMUNITY ENERGY AND GREENHOUSE GAS INVENTORY

RECOMMENDATION

That on the recommendation of the Director, Environment, Fleet & Solid Waste the 2016 Community Energy & Greenhouse Gas Inventory report **BE RECEIVED** for information.

PREVIOUS REPORTS PERTINENT TO THIS MATTER

Relevant reports that can be found at www.london.ca under City Hall (Meetings) include:

- Report to the August 22, 2016 Civic Works Committee (CWC) Meeting, Ontario's Climate Change Action Plan – Initial Impact and Alignment with London's Current Plans, Programs and Projects (Agenda Item #14)
- Report to the June 8, 2016 Civic Works Committee (CWC) Meeting, 2015 Community Energy and Greenhouse Gas Inventory (Agenda Item #10)
- Report to the June 8, 2016 Civic Works Committee (CWC) Meeting, Community Energy Action Plan – Update and Status (Agenda Item #11)

STRATEGIC PLAN 2015-2019

Municipal Council has recognized the importance of climate change and other related environmental issues in its 2015-2019 - Strategic Plan for the City of London ([2015 – 2019 Strategic Plan](#)). Providing community energy use and greenhouse gas data in a timely fashion supports three of the four Areas of Focus at one level or another as follows:

Building a Sustainable City

- Strong and healthy environment

Leading in Public Service

- Collaborative, engaged leadership

Growing our Economy

- Strategic, collaborative partnerships

BACKGROUND

PURPOSE

The purpose of this report is to provide the Civic Works Committee (CWC) and Council with an overview of the 2016 Community Energy and Greenhouse Gas Inventory, and how this information illustrates the challenges and opportunities associated with reducing community energy use and greenhouse gas emissions.

This CWC report and the *2016 Community Energy and Greenhouse Gas Inventory report* (found on the City of London website www.london.ca) are key deliverables of the Community Energy Action Plan.

CONTEXT:

The City of London does not have direct control over how much energy is used in London, but it does have influence. The control over energy use in London rests primarily with our citizens, visitors, employers and employees. Individual and collective action with respect to sustainable energy use, energy management, and energy conservation is critical for our future.

London's Community Energy Action Plan (CEAP) was approved by Council in July 2014. Within the CEAP, listed under the subsection titled Reporting and Education about the Economic and Environmental Considerations of Energy Use, the highest priority actions for the City of London were to:

1. Provide Londoners with annual information on community energy use and greenhouse gas (GHG) emissions.
2. Develop and report new energy-related performance indicators that highlight the total cost of energy and total money saved/generated from community energy actions.
3. Develop new tools to raise awareness on progress being made in London.

DISCUSSION:

Background

The CEAP focusses on actions to be taken over this Council term (2014-2018). The overall goals of the CEAP are to:

1. Increase the local economic benefit of sustainable energy use through:
 - a. Cost savings from energy conservation and energy efficiency,
 - b. Revenue from local production of clean and green energy products, and
 - c. Job creation associated with product and service providers engaged in these activities.
2. Reduce the environmental impact associated with energy use, through the use of greenhouse gas emission (GHG) reduction targets consistent with the Province of Ontario's goals, namely:
 - a. 6 percent reduction from 1990 levels by 2014,
 - b. 15 percent reduction from 1990 levels by 2020,
 - c. 37 percent reduction from 1990 levels by 2030, and
 - d. 80 percent reduction from 1990 levels by 2050.

The three most common benchmark dates being used for reporting on overall progress are:

- 1990 – the baseline year used for the Province of Ontario's GHG reduction targets
- 2007 – the year that energy use and greenhouse gas emissions reached their peak
- 2010 – the first year for which total energy cost data was determined

The *2016 Community Energy and Greenhouse Gas Inventory* provides an overview of the energy used in the London community as a whole. This report covers all significant energy sources used in London: natural gas, gasoline, electricity, diesel, fuel oil, and propane. Energy-using sectors covered by the inventory include transportation, residential, industrial, commercial, and institutional. It also includes an estimate of the total cost associated with these energy needs and the greenhouse gas emissions associated with these energy sources. In addition, this report also includes the

greenhouse gas emissions associated with the City of London's W12A Landfill and closed landfill sites as well as sewage sludge incineration at the Greenway Wastewater Treatment Plant.

Why is this Important and How Will Londoners and London Businesses Benefit?

Providing community energy use and greenhouse gas inventory data in a timely fashion helps to inform City staff on what progress is being made to reduce energy use and greenhouse gas emissions for the major energy-using sectors in London. This helps City staff to reassess priority projects, determine which energy-using sectors to work with and which energy commodities to focus on.

Providing these inventory data in a timely fashion also provides Londoners and London businesses and institutions with both information and feedback on the impact that their collective actions have made to date. These inventory data are also the foundation for many of the community engagement tools developed to date, such as the Trouble with Bubbles greenhouse gas visualization video as well as energy infographics.

What is the Connection with Other City of London Programs?

The community energy use and greenhouse gas inventory data is connected to many City of London programs and initiatives, such as:

- London's Community Energy Action Plan (CEAP)
- Corporate Energy Conservation & Demand Management (CDM) Plan
- Active & Green Communities and other CityGreen community engagement activities
- Active Transportation and Transportation Demand Management activities
- The London Plan
- Shift Bus Rapid Transit
- London On Bikes Cycling Master Plan
- NeighbourGood London: London Strengthening Neighbourhoods Strategy
- Waste reduction and diversion
- Water conservation and efficiency programs
- Climate change adaptation (i.e., stormwater management)
- Urban Forest Strategy

How is the Data Acquired and Funded?

The community energy use and greenhouse gas inventory data is maintained in-house by City staff, with utility data being provided by London Hydro and Union Gas (without charge), retail sales of fuel data provided by Kent Marketing (purchased), and other data provided by Statistics Canada. Data analyses and interpretation is completed in-house by City staff. The methodology used to develop the community energy use and greenhouse gas inventory has been reviewed by ICLEI Canada as part of the Partners for Climate Protection Program, as well as HDR Incorporated as part of the CDP Cities program.

Overview of the 2016 Community Energy and Greenhouse Gas Inventory

The *2016 Community Energy and Greenhouse Gas Inventory* report can be found on the City of London website (www.london.ca).

Energy use accounted for 95 percent of community greenhouse gas emissions; and landfill gas accounted for the most of the remaining five percent. The new source that had to be added to this year's inventory report for the Compact of Mayors – nitrous oxides from sewage sludge incineration – accounted for just 0.1 percent of London's greenhouse gas emissions.

Energy use by sector in London is as follows:

- 39 percent from industrial, commercial, and institutional buildings and facilities;
- 39 percent from transportation, primarily cars and trucks on London's roads; and
- 23 percent from single-family residential homes.

Natural gas was the largest source of energy used in London, accounting for 39 percent of all energy used. Gasoline accounted for 27 percent of London's energy use, and electricity accounted for 21 percent of all of the energy used in London.

London as a whole spent over \$1.4 billion on energy, a decrease of three percent from last year. Most of this was driven by the drop in petroleum fuel prices combined with lower natural gas use due to warmer weather. Gasoline is still very significant, accounting for 34 percent of local energy costs. Natural gas only accounts for about 15 of our energy costs even though it is the biggest source of energy we use. Electricity costs continued to increase and now accounts for 41 percent of local energy costs.

Overall, the results as demonstrated in the 2016 Inventory Report continue to tell a positive story for the community. In 2016, London managed to reduce its total greenhouse gas emissions to levels that are 15 percent below 1990 levels. It is too early to say whether the 2020 greenhouse gas reduction goal has been met early, since weather does have an impact on how much energy we use for heating. What are more important are the longer-term trends in energy use, not year by year fluctuations.

Ontario's actions to replace coal-fired power plants with cleaner forms of power generation have played a significant role in this reduction. Greenhouse gas emissions from Ontario's electricity grid were 90 percent lower than they were ten years ago. However, Londoners have also taken action by reducing the amount of energy they use at home and at work.

Transportation fuel use is the one area where recent trends are not positive, as retail sales of gasoline in London continue to grow at a pace greater than population growth, reversing the reductions observed between 2008 and 2011. There are a number of factors that could be contributing to rising fuel use:

- London's competitive retail fuel market may be encouraging out-of-town commuters and shoppers to fuel up while in London, as noted in discussions with Kent Marketing.
- London's economic recovery may have more people commuting to work by car. Lower fuel prices may also be encouraging people to drive more often.
- Vehicle ownership in London has also grown by 25 percent since 2011, or about four percent per year on average. As of July 2016, there were over 264,000 light-duty vehicles registered in London – an increase of almost 54,000 since 2011.

Specific highlights of recent progress, as observed by longer-term trends, include:

- **Londoners are using energy more efficiently** – on a per person basis, Londoners and London businesses used 10 percent less energy overall in 2016 than used in 2007.
- **London is producing more good and services for every unit of energy used** – on a dollar gross domestic product (GDP adjusted for inflation) per unit energy basis, London's industrial, commercial, and institutional sector improved the value of goods and services produced per unit of energy used by 57 percent between 1990 and 2016, from \$474/gigajoule in 1990 to \$746/gigajoule in 2016.
- **London is spending less money on energy** – improvements in energy efficiency compared to 2010 levels of energy efficiency (on a per person basis and applied to activity in 2016) resulted in over \$100 million in avoided energy costs.
- **Londoners' share of greenhouse emissions are significantly lower** – on a per person basis, Londoners and London businesses released 32 percent fewer greenhouse gas emissions in 2016 than they did in 1990, along with reductions in air pollution emissions (e.g., nitrogen oxides, volatile organic compounds) from fossil fuel use.

Since 1990:

- The total amount of energy used in London in 2016 was 57,600 terajoules, 12 percent above 1990 levels;
- Energy use per person for transportation decreased by 2 percent;
- Energy use per person for single-family residential homes decreased by 20 percent;
- Energy use per person for industrial, commercial, and institutional buildings decreased by 12 percent; and
- London's total annual greenhouse gas emissions, estimated to be over 2.9 million tonnes, have decreased by 15 percent.

Since 2007:

- The total amount of energy used in London decreased by three percent; and
- London's total annual greenhouse gas emissions have decreased by 24 percent.

Figure 1 illustrates the trend on energy use for major energy-using sectors on a per person basis since 1990. Figure 2 illustrates the trend for energy costs by commodity since 2010. Figure 3 illustrates the trend in total annual greenhouse gas emissions since 1990 and compares these emissions to the greenhouse gas emission reduction targets established by the federal and provincial government.

Figure 1 – Change in Energy Use in London, Per Person by Sector Since 1990

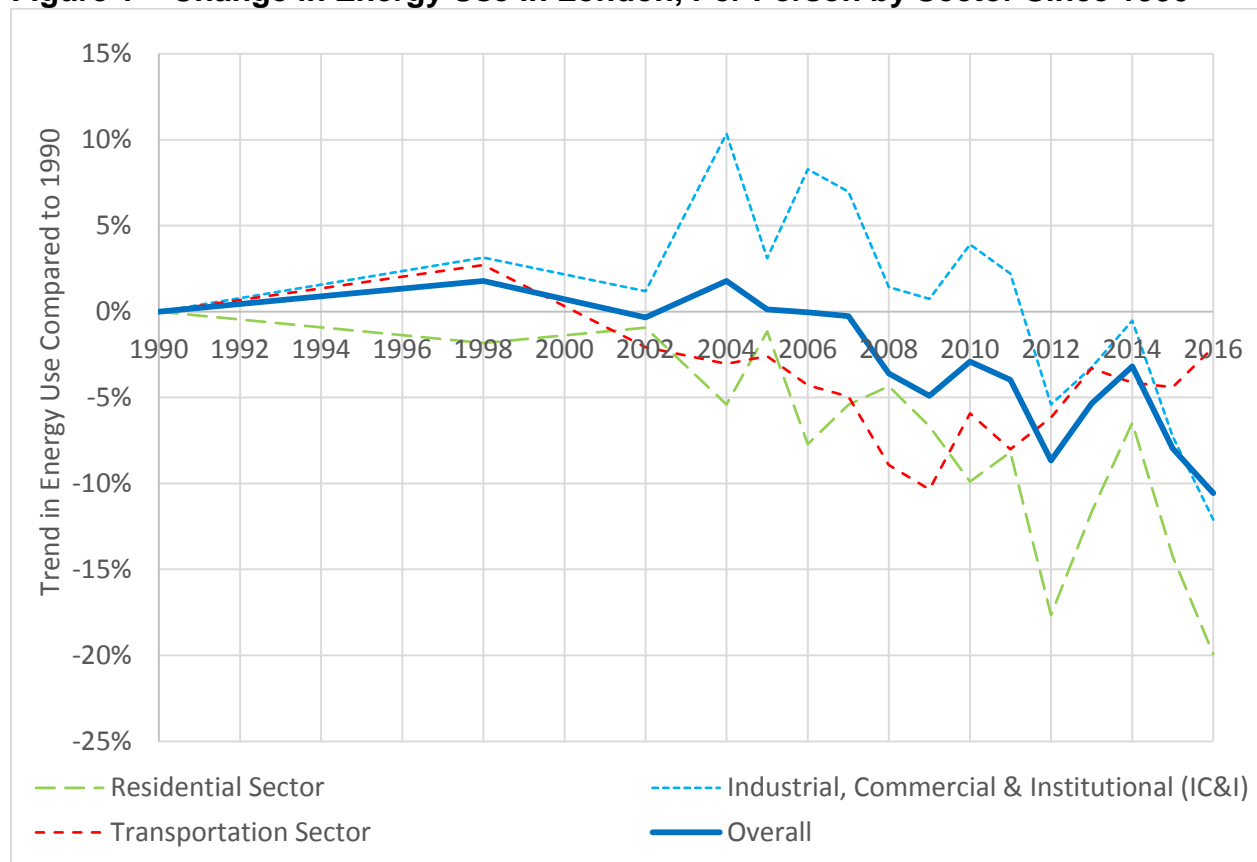


Figure 2 – Trends in Energy Costs (\$ Millions) by Energy Commodity

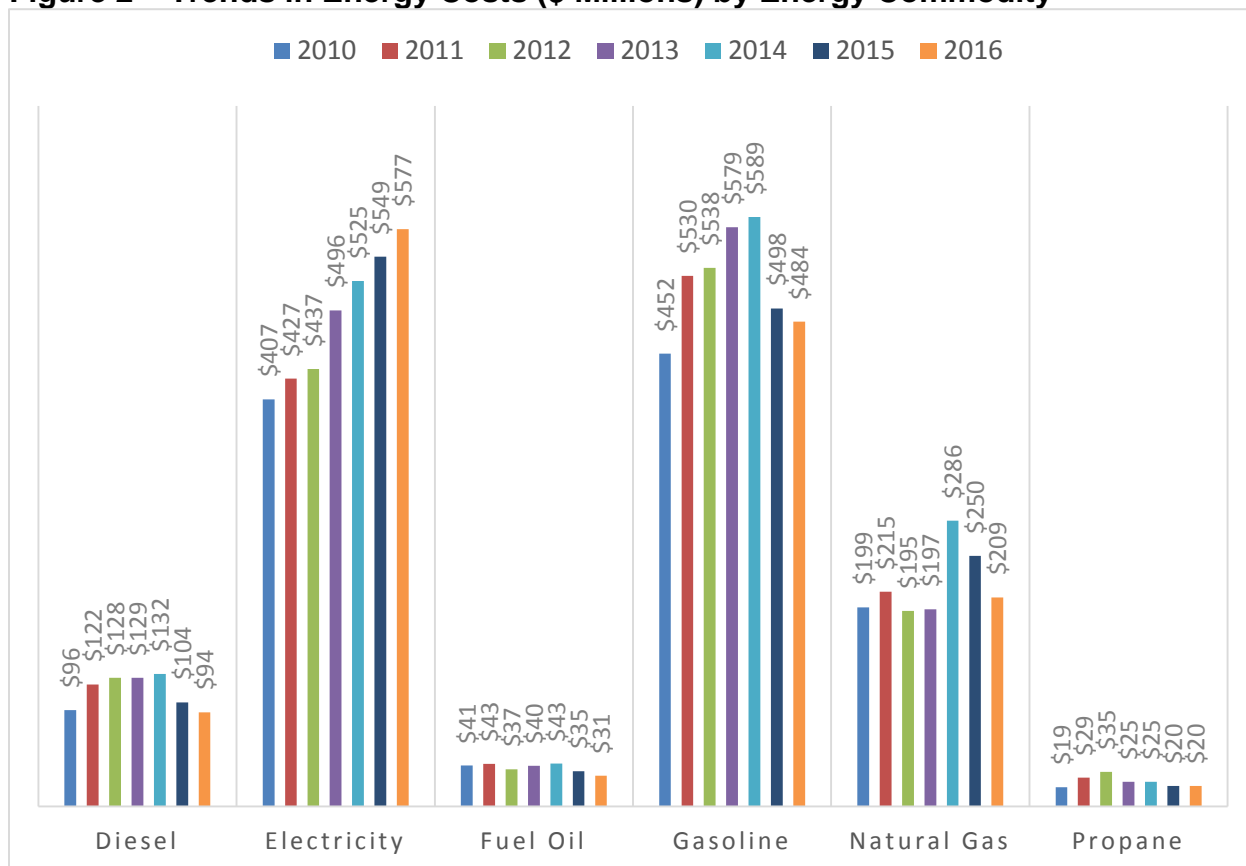
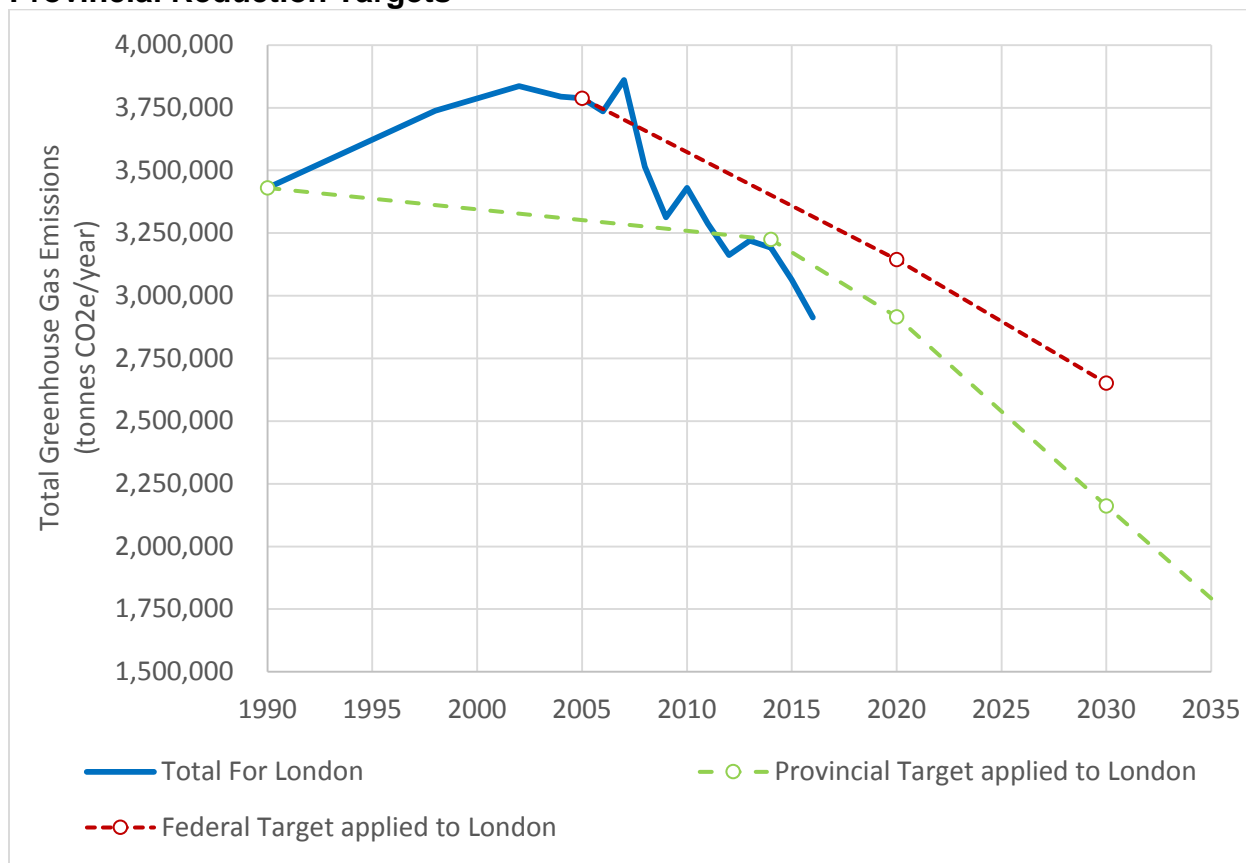


Figure 3 – London’s Greenhouse Gas Emission Trend versus Federal and Provincial Reduction Targets



Challenges and Opportunities

As previously noted, Londoners, London businesses, and institutions spent over \$1.4 billion on energy in 2016, and almost 90 percent of this money leaves London. London would be better off keeping more of this money in the local economy. Every percentage that Londoners and London businesses reduce energy use keeps about \$12 million from leaving our economy. Money saved through energy efficiency and conservation can be used for other purposes, whether that’s paying down debts faster or purchasing other local goods and services.

Investing in energy-saving retrofits, sustainable energy projects, and local energy production creates local jobs. Examples of the above include:

- Energy retrofits of existing buildings, as well as the design and construction of high-performance new buildings, are primarily carried out by London area builders, contractors, and service providers and can also generate demand for London area suppliers of energy-saving products.
- Replacing older appliances with new, energy efficient (Energy Star) appliances also helps to reduce energy use and supports the local and regional economy.
- Increasing local electricity generation and bioenergy production keeps energy-related expenditures in London, as well as builds local capacity to develop these projects.

Given the recent trend towards increasing gasoline sales in London, the investments that the City of London is planning to make on its transportation system, particularly through Shift (rapid transit) and London ON Bikes (cycling infrastructure), will play a key role in reducing London's use of transportation fuels. Developing the means to measure the contribution that these investments make towards reducing fuel use will be challenging, yet important.

With 90 percent of Ontario's electricity now coming from emissions-free sources (e.g., nuclear, hydro, wind and other renewable), the role of electricity in London's climate change actions is shifting towards encouraging the use of electricity to replace fossil fuels. Examples could include purchasing electric vehicles to reduce gasoline use, and installing heat pumps to reduce natural gas use for space heating. Both of these measures have been highlighted in Ontario's Climate Change Action Plan, given that they both have the potential to provide significant reductions in greenhouse gas emissions.

Electric vehicles have been receiving support through both provincial funding for a province-wide electric vehicle charging network and increased provincial incentives for purchasing electric vehicles. Electric vehicles have significantly lower operating costs since electric motors are three-to-five times more efficient than gasoline engines, as well as significantly lower maintenance costs since electric motors have fewer parts than a gasoline engine. The provincial electricity grid will also benefit from the increased load that electric vehicles will draw during off-peak hours, which will take advantage of the surplus power available during these hours. The increased use of electricity for transportation will provide some technical challenges for future energy and greenhouse gas inventories, since it could be difficult to determine how much electricity was used for transportation (recharging electric vehicles) versus powering appliances and other power loads within the home or building. However, electric vehicle use will result in reduced retail sales of fuels at local gas stations.

Replacing natural gas with electricity for space heating and water heating will be more challenging financially, given the price difference between natural gas and electricity, even when Ontario's carbon pricing for natural gas use is taken into account. To overcome this financial barrier, the provincial government is planning to use revenue from the Cap & Trade program to fund incentives for heat pumps, which can be used for both space heating and air conditioning. There are no details available at this time.

Even though the province is looking to switch fossil fuel use towards electricity, conserving electricity will still remain important for reducing energy costs as well as emissions during peak demand periods when natural gas is used to provide peak power.

SUMMARY:

The results as demonstrated in the 2016 Inventory Report continue to tell a positive story for London. Ontario's actions to replace coal-fired power plants with cleaner power generation have played a significant role in this reduction. However, Londoners have also taken action by reducing the amount of energy they use at home and at work.

Transportation fuel use is the one area where progress is lacking, as retail sales of gasoline in London continue to grow at a pace greater than population growth. This highlights the importance of City-led measures outlined in the 2030 Transportation Master Plan and the London Plan to shift Londoners towards sustainable transportation choices.

ACKNOWLEDGEMENTS:

This report was prepared with assistance from Allison Miller, Transportation Demand Management Coordinator and Pat Donnelly, Urban Watershed Program Manager.

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Documents found on the City of London website (www.london.ca) are:

2016 Community Energy and Greenhouse Gas Inventory