TO:	**CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON OCTOBER 22, 2019**
FROM:	**KELLY SCHERR, P.ENG., MBA, FEC MANAGING DIRECTOR - ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER**
SUBJECT:	**2018 COMMUNITY ENERGY USE AND GREENHOUSE GAS EMISSIONS INVENTORY AND UPDATE ON THE DEVELOPMENT OF THE 2019-2023 COMMUNITY ENERGY ACTION PLAN**

RECOMMENDATION

That, on the recommendation of the Managing Director, Environmental & Engineering Services and City Engineer, the following actions **BE TAKEN:**

a) this report on the 2018 Community Energy Use and Greenhouse Gas Emissions Inventory **BE RECEIVED** for information;

b) this report **BE INCLUDED** as one of many informational and technical sources to assist in further reducing fossil fuel energy use and increasing climate change actions, as per the City's Climate Emergency Declaration, and become a central document as part of the community engagement process for the development of the 2019-2023 Community Energy Action Plan starting in November 2019; it being noted that City staff are preparing additional details with respect to the City's Climate Emergency Declaration; and,

c) this report **BE CIRCULATED** to the Advisory Committee on the Environment (ACE), Transportation Advisory Committee (TAC), Cycling Advisory Committee (CAC), Trees and Forestry Advisory Committee (TFAC), Agricultural Advisory Committee (AAG) and Environmental & Ecological Planning Advisory Committee (EEPAC) for their 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 April 2, 2019 Civic Works Committee (CWC) Meeting, Development of the Next 2019-20123 Community Energy Engagement Plan (Agenda Item #2.7)
- Report to the April 2, 2019 CWC Meeting, 2014-2018 Community Energy Action Plan Final Update (Agenda Item #2.7)
- Report to the August 13, 2018 Civic Works Committee (CWC) Meeting, 2017 Community Energy and Greenhouse Gas Inventory (Agenda Item #2.7)

STRATEGIC PLAN 2019-2023

Municipal Council continues to recognize the importance of climate change mitigation, climate change adaptation, sustainable energy use, related environmental issues and the need for a more sustainable and resilient city in the development of its 2019-2023 - Strategic Plan for the City of London. Specifically, London's efforts in both climate change mitigation and adaptation can address four of the five Areas of Focus, at one level or another:

- Strengthening Our Community
- Building a Sustainable City
- Growing our Economy
- Leading in Public Service

BACKGROUND

PURPOSE

The purpose of this report is to provide the CWC and Council with:

- an overview of the 2018 Community Energy Use and Greenhouse Gas Emissions Inventory;

- how this information illustrates the challenges and opportunities associated with reducing community energy use and greenhouse gas (GHG) emissions; and

- how Londoners, employers and employees can get involved in the upcoming community engagement process as part of the development of the 2019 - 2023 Community Energy Action Plan starting in November 2019.

This CWC report and the comprehensive 2018 Community Energy Use and Greenhouse Gas Emissions Inventory report (found on the City of London website www.london.ca) are key deliverables of the Community Energy Action Plan (CEAP), with the overarching goal of reducing GHG emissions caused by consuming fossil fuels.

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 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 2014-2018 Community Energy Action Plan (CEAP) was approved by Council in July 2014. Within the 2014-2018 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 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; and
3. Develop new tools to raise awareness on progress being made in London.

Goals of 2014-2018 CEAP – GHG Reduction Targets

The overall goals of the 2014-2018 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 (GHG) emissions reduction targets, namely:
   a. 15 percent reduction from 1990 levels by 2020,
   b. 37 percent reduction from 1990 levels by 2030, and
   c. 80 percent reduction from 1990 levels by 2050.

The three most common benchmark dates used by City staff to report on overall progress are:

- 1990 – the baseline year previously 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 2018 Community Energy Use and Greenhouse Gas Emissions 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.

The City of London also reports this information on an annual basis to CDP Cities (formerly the Climate Disclosure Project) and the Global Covenant of Mayors for Climate & Energy.

Addressing the Need for Action on Climate Change
On April 23, 2019, the following was approved by Municipal Council with respect to climate change:

> *Therefore, a climate emergency be declared by the City of London for the purposes of naming, framing, and deepening our commitment to protecting our economy, our eco systems, and our community from climate change.*

The 2018 Community Energy Use and Greenhouse Gas Emissions Inventory report is the measurement tool to highlight London's progress towards meeting its community energy reduction and GHG reduction targets along with other targets and directions.

DISCUSSION

This section is divided into two parts:

Part A: Overview of the 2018 Community Energy Use and Greenhouse Gas Emission Inventory

Part B: Launching the Development of the 2019-2023 Community Energy Action Plan

PART A: Overview of the 2018 Community Energy Use and Greenhouse Gas Emissions Inventory

The 2018 Community Energy Use and Greenhouse Gas Emissions Inventory report can be found on the City of London website (www.london.ca). Highlights from the 2018 report are below in two categories:

1. Community energy use by product and sector including cost spent on energy
2. GHG generation, historical trends, reductions and progress towards current targets

Energy use accounted for 94 percent of community GHG emissions. The remaining six percent of GHG emissions are methane emissions from landfills and nitrous oxide emissions from sewage sludge incineration.

1. Community Energy Use

Energy use by sector in London is as follows:

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

There are four major energy commodities used in London – natural gas, gasoline, electricity, and diesel. The following table summarizes the impact of these energy commodities in terms of total energy use, total cost, and GHG emissions.

Energy Commodity	Share of Total Energy Used (in terajoules)*	Share of Total Energy Costs	Share of Energy-related GHG Emissions
natural gas	45%	18%	48%
gasoline	25%	37%	33%
electricity	19%	33%	3%
diesel	7%	8%	10%
other	5%	3%	6%

Note: * a terajoule (or, one trillion joules) is a metric unit for measuring energy, and is approximately equivalent to the energy provided by burning 26,000 litres of gasoline (roughly the amount of gasoline in 500 cars)

Specific highlights of recent community energy use progress and longer-term trends, include:

- **The total amount of energy used in London in 2018 was 61,800 terajoules.** This is a 7% increase over 2017. The combination of a colder winter and a hotter summer in 2018 (compared to 2017) increased the demand for natural gas and electricity.

- **Londoners are using energy more efficiently** – on a per person basis, Londoners and London businesses used eight percent less energy overall in 2018 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 35 percent between 1990 and 2018.
- **On a per person basis, Londoners and London businesses used eight percent less energy overall in 2018 than used in 2007**. 2007 is the year that energy use reached its peak in London.

- **Almost $1.6 billion was spent by Londoners and London businesses on energy in 2018**. This is an 11% increase over 2017. Almost 90 percent of this money leaves London. Every one percent reduction in energy use that Londoners and London businesses achieve keeps about $13 million from leaving the local economy. Gasoline costs increased by nine percent, due primarily to an increase in crude oil prices in 2018. Electricity costs increased by two percent, due to higher electricity consumption. Natural gas costs increased by seven percent overall, where decreases in natural gas prices were offset by increases in natural gas consumption.

- **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 2018) avoided $160 million in energy costs had there been no improvements (i.e., Londoners and businesses would have spent $160 million more in 2018 on energy).

In addition, since 1990:

- The total amount of energy used in London in 2018 was 61,800 terajoules, 20 percent above 1990 levels. This increase is due to London's growing population along with our growing economy, partially offset by the improved energy efficiencies noted below.

- On an energy used per person basis:
  - Transportation fuel use has decreased by 10 percent;
  - Energy use to heat and power single-family residential homes has decreased by 13 percent; and
  - Energy use to heat and power industrial, commercial, and institutional buildings decreased by 3 percent.

The one sector that had been lagging behind a couple of years ago was transportation. The volume of fuel sold in London had been increasing year-over-year between 2011 and 2016, but this trend stopped in 2017 and continued on in to 2018. Transportation fuel use per person decreased by four percent between 2017 and 2018, with transportation energy use per person in 2018 now 10 percent lower than 1990.

Vehicle ownership in London has grown by 36 percent since 2011, or almost five percent per year on average. As of December 2018, there were over 286,000 light-duty vehicles registered in London – an increase of about 75,000 since 2011. When compared to Census data on Londoners between the age of 20 and 84, vehicle registration increased from 0.77 per person in 2011 to 0.94 per person in 2018. However, on a positive note, the average annual fuel use per registered vehicle in London was 19 percent lower in 2018 compared to 2011.

Figure 1 illustrates the trend on energy use for major energy-using sectors on a per person basis since 1990. Figure 2 (next page) illustrates the trend for energy costs by commodity since 2010.

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

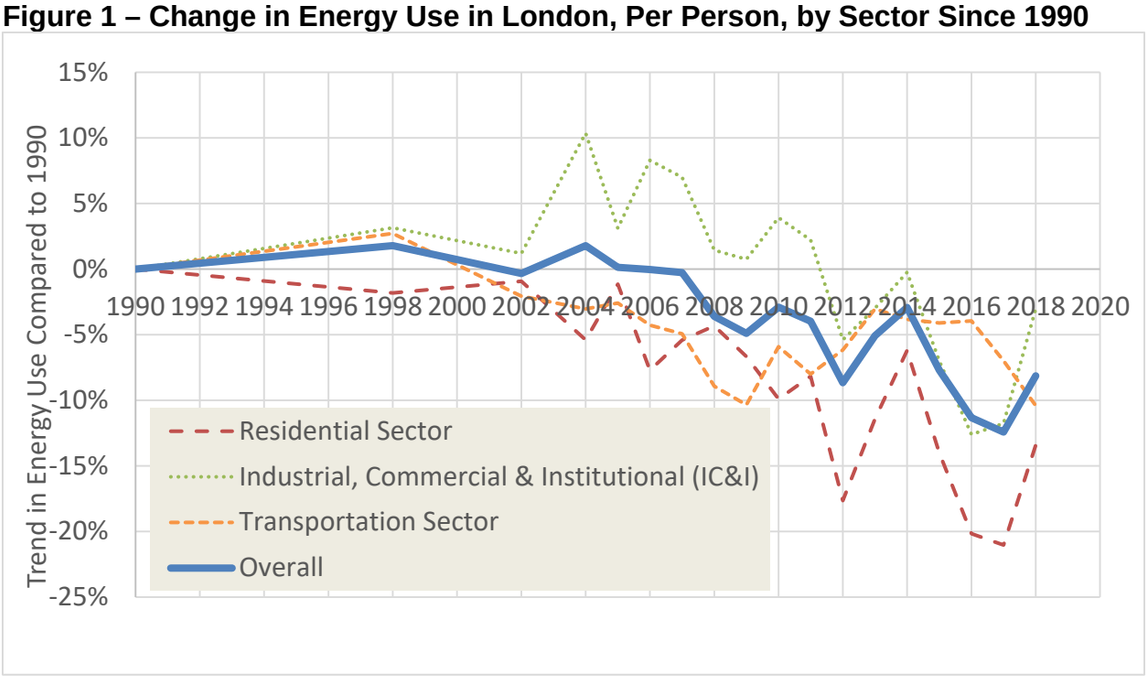
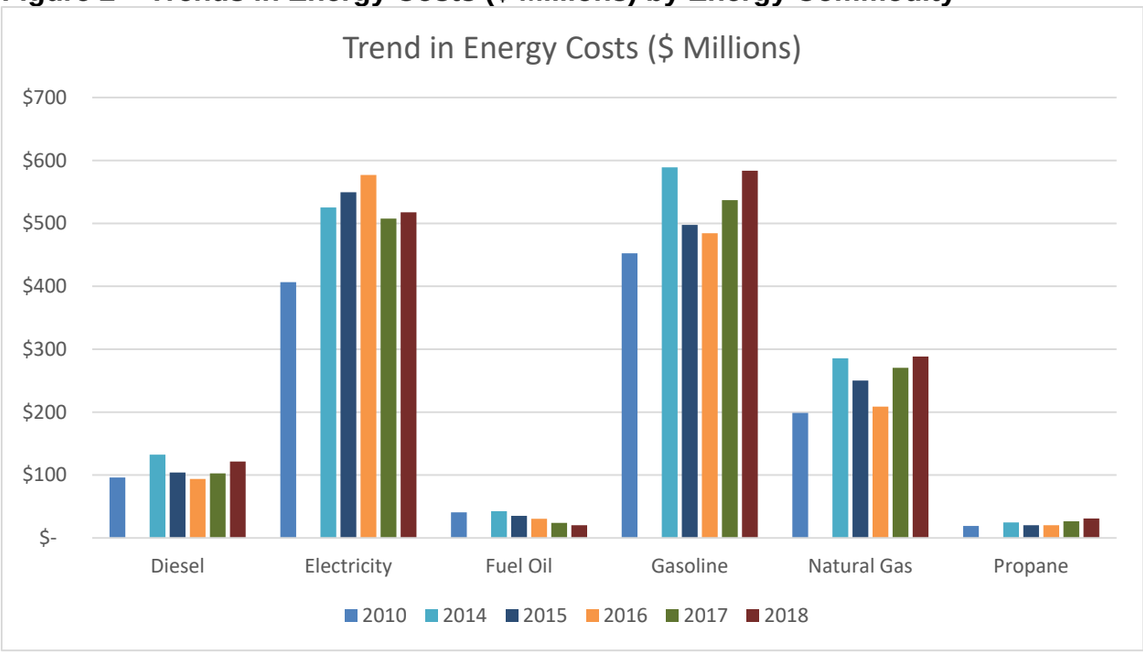


Figure 2 – Trends in Energy Costs ($ Millions) by Energy Commodity



2. <u>GHG Emissions, Trends, Reductions and Progress Towards Targets</u>

Total greenhouse gas emissions in 2018 were over 3.1 million tonnes of equivalent carbon dioxide, or nine percent lower than the 1990 level, which is above the trend line for the first time for meeting the 2020 goal. There were three primary reasons for the increase in emissions in 2018 of which the first two applied to many cities in eastern North America:

- Colder weather in the winter and spring seasons of 2018, compared to 2017, resulted in an increased demand for natural gas for space heating;

- Hotter summer temperatures in 2018, compared to 2017, increased demand for electricity for air conditioning. This increased demand was met by Ontario's natural gas fuelled power plants, which resulted in higher emissions associated with electricity use; and

- Landfill gas emissions from the City of London's W12A Landfill were also higher in 2018 due to operational challenges with the W12A Landfill's gas flare system.

Using a three-year rolling average smooths out the impact of annual variations in weather in order to determine trend directions. One year spikes in GHG emissions have occurred in previous years in London. Although total GHG emissions for 2018 were above the trend line for meeting the 2020 target, the three-year rolling average total GHG emissions for the 2016-2018 period (13 percent below 1990 levels) was still below the trend line for meeting the 2020 target.

In summary:

- **Total GHG emissions in 2018 were over 3.1 million tonnes of equivalent carbon dioxide** – the top three sources in 2018 were personal vehicles (30%), single-family homes (19%), and local industry (14%).

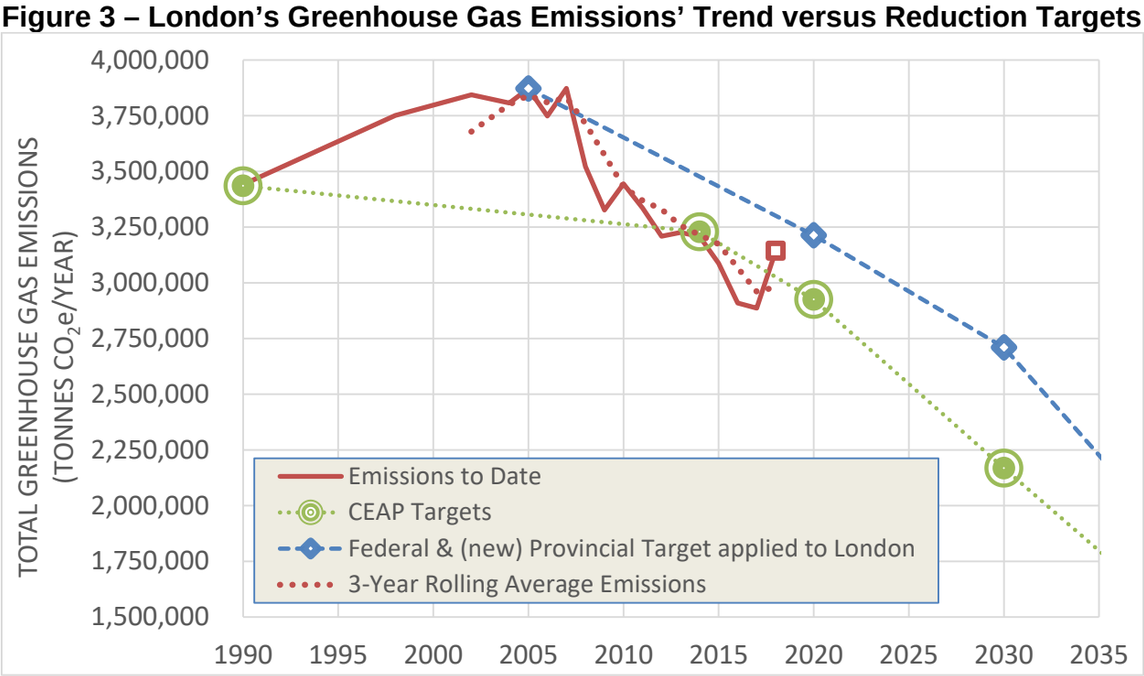
- **London's total GHG emissions in 2018 were 9% below 1990 levels** – the colder winter and a hotter summer increased the use of natural gas for heating and electricity generation, which resulted in higher GHG emissions. In comparison, GHG emissions in 2017 were the lowest to date at 17% below 1990 levels.

- **London's 3-year rolling average for total GHG emissions in 2018 were 13% below 1990 levels** – the rolling average is determined by averaging the last three years (2016, 2017 and 2018). London's CEAP goal is to reach 15% reduction from 1990 levels by 2020.

- **Londoners' per-person GHG emissions are significantly lower** – on a per person basis, Londoners and London businesses released 30 percent fewer greenhouse gas emissions in 2018 than they did in 1990.

Figure 3 illustrates the trends to date for GHG emissions compared to London's CEAP targets as well as targets set by senior levels of government.

Figure 3 – London's Greenhouse Gas Emissions' Trend versus Reduction Targets



Whether emissions continue to decrease depends upon the impact of energy and fuel conservation efforts, provincial and federal climate change policies, climate trends, economic growth, and consumer choices. It is also important to note that these actions also contribute to reductions in air pollution emissions (e.g., nitrogen oxides, volatile organic compounds) from fossil fuel use.

Household-Level Energy Use and Greenhouse Gas Emissions

The average household in London, living in a single-family home, spent over $450 every month on energy. Over half of this, about $260, was spent on gasoline. Electricity accounted for about $100 per month, while natural gas was under $80 per month.

In terms of household GHG emissions, the average household emitted 10.8 tonnes per year. As with cost, about half (49%) of this came from burning gasoline. Natural gas used for space heating and water heating accounted for 40 percent of emissions. Organic waste in the landfill accounted for about eight percent. Given Ontario's clean electricity grid, electricity use in the home only accounts for under two percent of household GHG emissions.

PART B: Launching the Development of the 2019-2023 Community Energy Action Plan

Background - Challenges and Opportunities for Increased Actions

As previously noted, Londoners, London businesses, and institutions spent almost $1.6 billion on energy in 2018, and almost 90 percent of this money leaves London (i.e., leaves the local economy). Every percentage that Londoners and London businesses reduce energy use keeps about $13 million from leaving the local 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 distributed (i.e., "local") electricity generation and biofuel production keeps energy-related expenditures in London, as well as builds local capacity to develop these projects.

The investments that the City of London is planning to make on its transportation system, particularly through bus rapid transit, London's Cycling Master Plan and other transportation demand management (TDM) solutions, 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 over 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. However, given the reliance on the use of natural gas to meet peak power generation needs, conserving electricity will remain important for reducing energy costs as well as emissions, especially during peak demand periods.

The impact of Londoner's consumer choices on GHG emissions outside of London, referred to as "Scope 3 Emissions" will be an area of future study for the City of London. Through tools such as Project Neutral, Londoners are already able to estimate the "upstream" impact of food production from their diet choices on their GHG emissions at a household level, which helps to highlight the importance of reducing food waste.

What are Some Quick Actions for London?

Based on current data and experience in London (e.g., the information outlined in the 2018 Community Energy Use and Greenhouse Gas Emissions Inventory, information from other municipalities and related sources), the following "Top Five Actions" are very applicable for the majority of Londoners, London's businesses and employers, and senior levels of government for reducing energy use and GHG emissions. These also represent actions that can be and/or are being implemented now and should be strongly encouraged. Actions like these immediately reduce the consumption of fossil fuel.

What can Londoners do immediately?

- Drive less (or not at all) – make more trips by walking, cycling, transit, carpooling
- If you must own a vehicle, own an electric or hybrid vehicle, or a very fuel efficient one
- Make your home more energy efficient – and work towards net-zero energy
- Reduce food waste, especially for high-impact foods such as red meat and dairy
- Go local – for food, for products, for vacations

What can London's Businesses & Employers do immediately?

- Invest in energy efficiency measures for buildings and processes
- Apply green procurement strategies to the supply chain
- Invest in green fleet measures
- Reduce business travel, especially by air, through webinars and video conferences. If business travel is required, consider carbon offsetting
- Reduce employee commuting – promote cycling, transit, carpooling, telework

What can Senior Levels of Government do in the short to medium terms?

- Maintain carbon pricing (or an equivalent method) to help reduce fossil fuel use
- Assist Londoners and London's businesses & employers with their actions
- Keep Ontario's electricity GHG emissions as low as they are today, if not lower
- Start investing in regional public transportation for Southwestern Ontario
- Set a timeline for phasing out internal combustion engine only vehicles

What are the Next Steps?

We need to get started and elevate activity quickly. To achieve the CEAP's current 2030 goal, Londoners and London businesses will need to double their collective pace for reducing GHG emissions from the two percent per person per year reductions seen over the last five years (2013-2018) to four percent per person per year over the 2020-2030 period. Changing the timeframe of the goals to increase actions is doable but requires additional commitment and desire from residents and the business community. That is one key aspect of community engagement.

Over the next nine months, City staff will be undertaking the following:

Major Activity	Preliminary Timeframe
Complete steps of the community engagement process, background documents and finalize discussions with other City Service Areas	November – December 2019
Launch the development of the 2019-2023 Community Energy Action Plan	November 19, 2019
Undertake a broad community engagement process that evolves to meet the needs of the community – from residents through to businesses	Late November 2019 to June 2020
Discussions with London's key energy stakeholders and community leaders	December 2019 to March 2020
Develop Draft 2019-2023 CEAP	June to July 2020
Submit Draft 2019-2023 CEAP to Civic Works Committee	August 2020

In Summary

The results as demonstrated in the 2018 Community Energy Use and Greenhouse Gas Emissions 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. Londoners have also taken action by reducing the amount of energy they use at home and at work.

Transportation fuel use remains an area where progress is needed. 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.

Working with residents and businesses to development the 2019-2023 Community Energy Action Plan, with a focus on reducing our consumption and reliance on fossil fuels, is essential to moving forward.

PREPARED BY:
JAMIE SKIMMING, P. ENG. MANAGER, COMMUNITY ENERGY INITIATIVES

PREPARED AND SUBMITTED BY:	**RECOMMENDED BY:**
JAY STANFORD, M.A., M.P.A. DIRECTOR, ENVIRONMENT, FLEET & SOLID WASTE	**KELLY SCHERR, P.ENG., MBA, FEC MANAGING DIRECTOR, ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER**

Appendix A Additional Background Details

Documents found on the City of London website (www.london.ca) are:
2018 Community Energy and Greenhouse Gas Inventory – Executive Summary
2018 Community Energy and Greenhouse Gas Inventory

c Anna Lisa Barbon, Managing Director, Corporate Services and City Treasurer, Chief Financial Officer
Sandra Datars Bere, Managing Director - Housing, Social Services and Dearness Home
John Fleming, Managing Director, City Planning and City Planner
George Kotsifas, Managing Director, Development & Compliance Services & Chief Building Official
Cheryl Smith, Managing Director, Neighbourhood, Children & Fire Services
Scott Stafford, Managing Director, Parks & Recreation

Appendix A
Additional Background Details

Why is the Community Energy Use and Greenhouse Gas Emissions Inventory 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 GHG 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 information within the Community Energy Use and Greenhouse Gas Emissions Inventory report supports a number of important strategies, plans and programs including, but not limited to (in alphabetical order):

- Active transportation and transportation demand management activities
- Active & Green Communities program
- Corporate Energy Conservation & Demand Management (CDM) Plan including Green Fleet initiatives
- Cycling Master Plan
- The London Plan (including sustainability, resiliency strategies, completion of remaining Green Strategies, as well as Community Improvement Plans for Downtown, Old East, and SoHo)
- NeighbourGood London: London Strengthening Neighbourhoods Strategy
- Regeneration Plan for community housing, including the Affordable Housing Development Strategy and Affordable Housing Community Improvement Plan
- Smart City Strategy
- Smart Moves Transportation Master Plan (including higher-order transit projects and related initiatives)
- Urban Forest Strategy
- Waste management (including the Waste Disposal Strategy, the London Waste to Resources Innovation Centre, and the 60% Waste Diversion Action Plan)

How are 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 Enbridge (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.