Climate Emergency Action Plan

April 2022

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Note to Reader

Overview and How to Use this Report
The development of the draft Climate Emergency Action Plan (CEAP) started in January 2020 with the initial release of information, the formalized community engagement component was launched in August 2020, two update reports were submitted to Municipal Council (August 2020 and April 2021), and final report writing began in the fall of 2021. All policy and technical reports are found on the City of London's Get Involved website.

This report is referred to as Climate Emergency Action Plan. It serves several different purposes. Key pieces in this report are:

- The status of climate change in London, actions taken and the rationale for increasing actions immediately;
- New milestone community and Corporate targets and the rationale;
- 10 implementation workplans covering the majority of aspects of mitigation and adaptation (Areas of Focus) pertinent to London including who needs to be involved and how multiple actions can occur at one time from different participants;
- The level of effort and example actions required for different household types to do their "fair share" of greenhouse gas reduction by 2030.
- Key requirements for implementation success; and
- Leadership needs.

Background Information
The Climate Emergency Action Plan was created based on the supporting information collected and assessed by City of London staff, as outlined below and available to review on the City of London's Get Involved website. Thirteen supporting documents were prepared to capture the details that have been used to inform the development process:

1. Discussion Primer
2. eDemocracy's Climate Action Plan Simulator Engagement Report
3. Learning from People
4. Learning from Other Municipalities and Municipal Organizations
5. Impacts of Climate Change in London
6. Overview of City Plans and Strategies that Support Climate Action

7. Overview of Business and Employers Climate Action
8. Overview of Community Climate Action
9. Provincial Government – Climate Change Information, Roles and Responsibilities
10. Federal Government – Climate Change Information, Roles and Responsibilities
11. Overview of Current and Potential Climate Action Costs and Funding Opportunities
12. 2020 Community Energy Use and GHG Emissions Inventory
13. 2020 Corporate Energy Consumption and Activities Report

Areas of Focus and Implementation Workplans
To focus and coordinate efforts and acknowledge the need for leadership from the right places at the right times, specific actions that will contribute to achieving the expected results are organized into workplans (Appendix A) for 10 specific Areas of Focus:

1. Engaging, Inspiring and Learning from People
2. Taking Action Now (Household Actions)
3. Transforming Buildings and Development
4. Transforming Transportation and Mobility
5. Transforming Consumption and Waste as Part of the Circular Economy
6. Implementing Natural and Engineered Climate Solutions and Carbon Capture
7. Demonstrating Leadership in Municipal Processes and Collaborations
8. Adapting and Making London More Resilient
9. Advancing Knowledge, Research and Innovation
10. Measuring, Monitoring and Providing Feedback

Community Input on the Draft Climate Emergency Action Plan
The draft CEAP was approved for release at Council on February 15, 2022 for community input and feedback. Details received were identified in a new report to Strategic Priorities and Policy Committee, dated April 5, 2022. The comments received resulted in two new sections being added to the final CEAP:

- 9.4 What are the Preliminary Benefits and Costs at the Household Level, and
- 11.6 Development of a Process to Receive and Review Ongoing Feedback and Ideas;

Section 9.4 was added to address the need for additional details, in particular benefits and costs, at the household level since about 50 per cent of the greenhouse gas emissions in London are associated with how Londoners move and where they live.

Section 11.6 was added because Londoners, businesses and employees have indicated a desire to have an ongoing voice; not just provide comments and feedback when documents and materials are available for review. This voice includes providing ideas, actions, solutions and experiences.

Opening Remarks

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1. Why Should We Care About Climate Change?

Climate change is widely recognized as one of the great challenges of our time.

For more than two centuries now, human societies have tapped into a one-time gift from Earth (fossil fuels) to make technological advances that have benefited and advanced society in incredible ways. Fossil fuels in the form of coal, oil and natural gas have powered new machines, been the basis for remarkable new materials, facilitated vastly more productive agriculture and led to a technological information revolution that now connects humanity in ways unimaginable even a few short decades ago.

Advancements in human ingenuity and the harnessing of dense economical energy from fossil fuels has allowed for exponential growth of human societies on Earth. Now, however, with a deep understanding of the carbon cycle and how human actions impact climate, we must reduce and eventually eliminate greenhouse gas emissions from fossil fuels (and most other sources) to ensure the conditions we all enjoy on Earth are here for generations to come. In addition, we must work together to adapt to the changing climate we are experiencing because of historical emissions. We must also plan to become more resilient and adapt to climate changes still to come.

London has luckily remained relatively unscathed from the severe physical impacts of climate change such as forest fires, major floods and intense heat waves that have struck other parts of the world. As time progresses however, London will very likely experience more severe effects This may include increased flooding along London's 43 kilometres of rivers and 85 kilometres of creeks, heavier winter snow squalls, and increased heat and humidity in summers that would impact vulnerable populations and bring increased warm-weather diseases like Lyme Disease and West Nile virus.

In addition to the anticipated increase in physical impacts from increasing temperatures and extreme weather events, London will also see impacts arising from our connection to and reliance upon the global economy. The availability and variety of food we eat, the clothes we wear and the materials that are used every day to support our way of life now come from a global economy that is already being impacted by climate change. Increases in costs and decreases in availability of goods, rising insurance rates resulting from losses elsewhere and increasing costs for taxpayer-supported healthcare are just some of the non-physical impacts that London will continue to experience due to climate change.

While most conversations about climate change typically start with the physical science behind how and why the Earth is warming, it all really comes down to connections. The connection between the natural systems that clean and move air and water, grow food, and cycle materials around the planet; the connection between human activities and

those same natural systems; and, ultimately, the connection between every person on Earth to acknowledge and act on the collective responsibility to take care of the planet that takes care of us.

The connections between human actions and Earth's natural systems have been the focus of study for scientists for many years and it has become increasingly clear that humanity now has a significant responsibility for sustaining and maintaining these natural systems.

So, why should we care about climate change?

1. The science is clear that the course we're on is not sustainable.
2. It is everyone's responsibility to take action to correct our course.
3. There is incredible opportunity awaiting.

Technologies and solutions to solve the climate crisis currently exist and many are already being implemented. Some of these technologies and solutions can be easily implemented or adopted, while others require more significant effort and/or changes to the systems or ways things are done. The solutions to climate change also represent incredible opportunities to create wealth, healthier environments, increased equity and a healthier society.

Municipalities are uniquely positioned to act on these opportunities of a sustainable future through strong climate action. At the same time, municipalities are also forced to deal firsthand with the impacts of climate change on infrastructure that people rely on for basic needs (e.g., drinking water, wastewater, transportation, waste), so there is even more motivation to act quickly. Municipalities have the opportunity and responsibility to take strong action to address climate change in the interests of everyone.

The City of London's electric Zamboni ice resurfacer

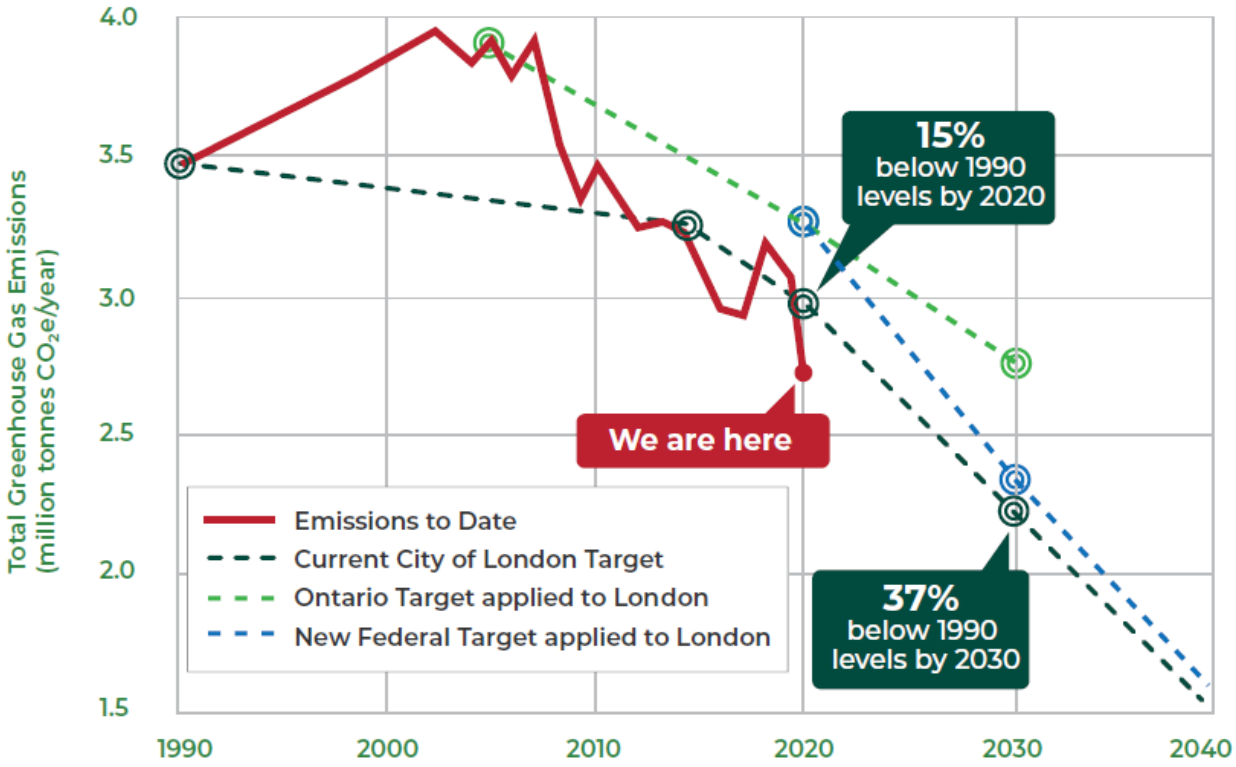
2. What Has Been Achieved So Far?

Unlike many parts of the world, city-wide greenhouse gas (GHG) emissions in London, and Ontario as a whole, peaked in the mid-2000s. Total community-wide greenhouse gas emissions in 2020 were about 2.7 million tonnes of equivalent carbon dioxide, 30 per cent lower than 2005, the new baseline year being use for measurement by the Federal and Ontario governments. Historically, the year 1990 was used as the baseline year (Figure 1).

This is well below the emission reduction target set for 2020. However, it is important to note the extraordinary impact of the COVID-19 pandemic on emissions.

Since 2005 there has been a downward trend driven by a combination of cleaner electricity generation in Ontario and improved energy efficiency in buildings and vehicles.

Figure 1: London's Greenhouse Gas Emissions Versus Federal and Provincial Reduction Targets



Source: City of London

Energy use is responsible for 95 per cent of all GHG emissions from human activity in London. Not only does burning fossil fuels such as gasoline, diesel, and natural gas produce carbon dioxide – the most common GHG associated with human activity – but the use of electricity also contributes to GHG emissions, although much less than it does in other parts of the world.

The remaining five per cent of GHG emissions are methane emissions from the anaerobic decomposition of organic materials in the active and closed landfills located in London as well as commercial sector waste disposed in landfills outside London, and nitrous oxide emissions from sewage sludge incineration. The installation of a landfill gas collection and flaring system at the W12A Landfill, which has expanded over time since the mid-2000s, now captures more than 65 per cent of the methane generated at the landfill.

Additional details pertaining to London's corporate and community GHG emissions inventories are available in the **2020 Corporate Energy Consumption and Activities Report** and **2020 Community Energy Use and GHG Emissions Inventory** supporting documents available on the City of London's Get Involved website.

In response to London being a 'river city' located at the Forks of the Thames, much has already occurred to keep our neighbourhoods safe from river flooding. London has 43 km of the Thames River and 85 km of tributary creeks and channels. Historically, the river and tributaries have frequently overflowed their banks and their flow rapidly increased in response to rainstorm events and spring snow melt.

Infrastructure has been constructed in partnership with Upper Thames River Conservation Authority, to hold back floodwater and assist in keeping neighbourhoods dry and people safe. These river flood protection devices include Fanshawe Dam and several upstream flood control structures along the Thames River in addition to 7 London dykes, the largest being West London Dyke located opposite Harris Park. Community resilience has historically relied on these large flood protection infrastructure items as well as accompanying rules and recommendations for floodproofing buildings behind these structures in vulnerable areas.

Most flood prone lands along the river have been acquired by the City of London and used as public park spaces established to permit flooding to occur without damaging nearby homes and businesses. Park spaces and facilities are designed and maintained to allow flood waters to cover them without causing extensive damages and the need for costly repairs. These parks create the Thames Valley Parkway, the 40 km multi-use trail which enables Londoners to walk, cycle or roll to many neighbourhoods in the city with many more trail linkages and connections planned for the future.

3. Why is London Ready to Take More Action?

3.1. People

Community engagement efforts informing CEAP development included thousands of interactions with interested Londoners and City staff received over 2,700 individual comments. For example, within these comments, many Londoners (non-random sample involving 158 participants – Feedback Form #1) told us the following:

- 89 per cent of Londoners participating in this feedback understand that climate change is caused by human activities;
- Participating Londoners have a good understanding about climate change – an average of "8" on a scale of 1 to 10 (1 being "very little" and 10 being "high level of understanding"); and
- 83 per cent of participating Londoners believe they have the ability to influence climate change and take climate action in at least some capacity.

The Climate Action Plan Simulator was available for use from December 20, 2020 until April 30, 2021. In total, 12,190 people visited Climate Action Plan Simulator website and 1,263 people participated in the Climate Action Plan Simulator engagement process. As part of the simulator engagement process, participants were provided a series of survey questions to help City staff understand their perspectives on taking climate action. Some of the highlights include:

- 74 per cent of participants were interested in someone who can manage the paperwork of all the different home energy retrofit incentives for them;
- 65 per cent of participants were worried about climate change's impact on the quality of life for their children and future generations;
- 57 per cent of participants were interested in reducing food waste;
- 56 per cent of participants were interested in buying an electric vehicle, or already own one;
- 53 per cent of participants were interested in solar hot water heating;
- 45 per cent of participants see cost as being the barrier to buying an electric vehicle;
- 40+ per cent of participants have already done some home energy renovations such as insulation, new furnace, new windows, and draft proofing; and
- 40 per cent of participants were interested in buying or building a net-zero energy home.

The top five barriers for taking climate change action mentioned by many Londoners (non-random sample involving 339 participants – Feedback Form #2) were:

- Need to expand city-sponsored composting, which will result in less waste going to landfill;
- Need to create more safe environments to walk or bike, including a network of protected bike lanes accessible for all ages and abilities;
- Need for more frequent, efficient, and well-distributed public transit services (including rapid transit);
- Access to financial resources to address the cost of taking climate actions, such as installing solar panels or purchasing electric vehicles; and
- Convenience of "business as usual" and not knowing where to get started.

The above details along with the results from other engagement activities highlight the willingness of many Londoners to take action. The details also highlight the need for help and action from the City of London, the federal and provincial governments, businesses and community groups. Additional details on the information and insight gained through engagement with Londoners are included in the **Learning from People** supporting document available on the City of London's Get Involved website.

3.2. Businesses and Institutions

Many London businesses and institutions have taken considerable action to acknowledge and begin to address the challenges of climate change. Almost two thirds of London's top 85 employers (by number of employees) have taken some form of climate action recently, including one or more of the following:

- Published an environmental, climate change and/or sustainability commitment;
- Committed to reducing greenhouse gas emissions;
- Committed to a net zero emissions target;
- Committed to a zero waste target;
- Established climate change adaptation goals or strategies;
- Established natural heritage protection, conservation and/or preservation commitments or goals; and
- Engaged in partnerships with Municipal, Community and/or non-profit organizations to advance climate action.

In addition, 19 of Canada's Greenest Employers (as selected by Mediacorp Canada Inc.) have operations in London and Green Economy London, one of seven Green Economy Hubs across Ontario, is supporting 45 London organizations as part of a wider network of businesses to set and achieve sustainability targets. Action on climate change from businesses and institutions across nearly all sectors of the economy and community shows a readiness and willingness to move even further towards a more resilient, net-zero emissions future.

Additional details on the readiness of London's business community to advance climate action can be found in the **Overview of Business and Employers Climate Action** supporting document available on the City of London's Get Involved website.

3.3. The City of London

The London Plan (Official Plan) was developed with climate action in mind. Strategic Direction #4 of The London Plan calls for London, Ontario to "become one of the greenest cities in Canada", supported by the following actions:

- Develop, implement, and lead plans to take action on climate change mitigation and adaptation;
- Use an ecosystems/watershed approach in all of our planning;
- Protect and enhance our Thames Valley corridor and its ecosystem;
- Protect and enhance the health of our Natural Heritage System;
- Manage growth in ways that support green and active forms of mobility;
- Reduce our human impact on the environment – reduce our carbon footprint as a city;
- Practice and promote sustainable forms of development;
- Promote green development standards such as Leadership in Energy and Environmental Design (LEED) Neighbourhood Development and LEED Building Design and Construction standards;
- Strengthen our urban forest by monitoring its condition, planting more, protecting more, and better maintaining trees and woodlands;
- Continually expand, improve, and connect our parks resources;
- Implement green infrastructure and low impact development strategies;
- Minimize waste generation, maximize resource recovery, and responsibly dispose of residual waste;
- Conserve water and energy and deliver these resources in a sustainable and affordable fashion;
- Pursue opportunities to remediate and redevelop brownfield sites;
- Strategically link and coordinate our environmental initiatives;
- Establish London as a key pollinator sanctuary within our region; and
- Promote linkages between the environment and health, such as the role of active mobility in improving health, supporting healthy lifestyles and reducing greenhouse gases.

Many plans are recently completed, currently underway or in development to support this, including the Mobility Master Plan, 60% Waste Diversion Action Plan, 2019-2023 Corporate Energy Conservation and Demand Management Plan, and Urban Agriculture Strategy

Additional details on existing and completed City Plans and Strategies that support climate action are included in the **Overview of City Plans and Strategies that Support Climate Action** supporting document available on the City of London's Get Involved website.

3.4. The Province of Ontario

As noted earlier, 93 per cent of Ontario's electricity was generated from emissions-free sources in 2020, such as nuclear and hydro-electric generating stations as well as renewable sources (wind and solar). However, it wasn't always this way.

Back in 2007, 25 per cent of Ontario's electricity was generated from burning coal. However, by 2014, the last coal-fired power station in Ontario was shut down. This energy transition has become "the single largest GHG reduction measure in North America".

This was accomplished by a combination of electricity conservation, nuclear power plant refurbishments, new natural gas power plants, and new renewable power projects (hydro-electric, wind, and solar). Ontario's current low emission power grid enables electric vehicles and heat pumps to be powerful emission reduction actions.

Additional details on the role of the province of Ontario and current and proposed action on climate change are included in the **Provincial Government - Climate Change Information, Roles and Responsibilities** supporting document available on the City of London's Get Involved website.

3.5. The Federal Government

The federal government's carbon pricing policy will be the largest contributor to greenhouse gas emissions this decade. With carbon prices increasing to $170 per tonne by 2030, many actions that are seen as being "not cost effective" today will become cost-effective later this decade. With the Climate Action Incentive provided at income tax filing time, those households that do take action or already have a low-impact lifestyle will get more money back through this incentive than the carbon price they paid on the fuels they use.

The federal government is also providing incentives to assist with actions such as purchasing electric vehicles, installing electric vehicle charging stations, and carrying out home energy retrofits.

Additional details on the role of the province of Ontario and current and proposed action on climate change are included in the **Federal Government – Climate Change Information, Roles and Responsibilities** supporting document available on the City of London's Get Involved website.

4. How Was This Plan Created?

The Climate Emergency Action Plan was created based on the supporting information collected and assessed by City of London staff, as outlined below, and found on the City of London's Get Involved website:

1. The **Discussion Primer** was a set of proposed climate actions, released previously on in October 2020, and used to engage Londoners and key stakeholders in 2020 and early 2021.

2. eDemocracy's **Climate Action Plan Simulator Engagement Report** summarizes the outcome of this tool as well as lessons learned from online engagements associated with this tool.

3. The **Learning from People** supporting document summarizes the outcomes of the public engagement processes including the City of London's Get Involved engagement process, comments received from the Discussion Primer, eDemocracy's Climate Action Plan simulator, and community-led and supported engagement activities.

4. The **Learning from Other Municipalities and Municipal Organizations** supporting document summarizes existing programs where municipalities are already working together on climate action, outlines what targets have been set and which actions are being taken by London's peer municipalities and summarizes what can be learned from actions taken to date.

5. The **Impacts of Climate Change in London** supporting document summarizes climate change impacts to date and forecasted impacts under different future emission reduction forecasts.

6. The **Overview of City Plans and Strategies that Support Climate Action** supporting document summarizes existing City of London plans and programs that provide a foundation for the Climate Emergency Action Plan.

7. The **Overview of Business and Employers Climate Action** supporting document summarizes existing climate actions being undertaken by London's top employers and examines current trends supporting climate action and sustainability in the global business community.

8. The **Overview of Community Climate Action** supporting document summarizes existing climate actions being undertaken by some of London's community organizations.

9. The **Provincial Government – Climate Change Information, Roles and Responsibilities** supporting document summarizes existing climate actions being undertaken by the Province of Ontario.

10. The **Federal Government – Climate Change Information, Roles and Responsibilities** supporting document summarizes existing climate actions being undertaken by the Government of Canada.

11. The **Overview of Current and Potential Climate Action Costs and Funding Opportunities** supporting document summarizes existing studies that have been undertaken by academia, the insurance industry, and dome other municipalities to assess the costs and benefits of climate change.

12. The **2020 Community Energy Use and GHG Emissions Inventory**, released previously in August 2021, summarizes community wide energy use and greenhouse gas emissions trends since 1990.

13. The **2020 Corporate Energy Consumption and Activities Report**, released previously in August 2021, summarizes energy use and associated greenhouse gas emissions trends from Corporation of the City of London activities since 2007 as well as recent (2020) corporate energy management activities.

The development of the Climate Emergency Action Plan was also supported by information and expertise gained through the development of the Climate Lens Process; a process designed to advance understanding and embed climate change considerations in municipal decision-making and uncover opportunities for municipally led climate actions. Development of the Climate Lens Process was part of the City's initial response to the declaration of a climate emergency and is an important component of the CEAP's implementation moving forward.

5. Understanding Climate Change Actions

Governments at all levels use a combination of incentives to encourage voluntary actions (e.g., incentives to purchase an electric vehicle) and regulations to enforce limits or minimum standards (e.g., vehicle fuel economy standards). Understanding the various levels of climate action and government leadership is important. It is essential that each level of government works together. A sample of what different levels of government are doing or can do to tackle climate change is identified on Table 1.

Table 1: List of Sample Actions, Programs, Policies by Level of Government for Climate Change

City of London	Province of Ontario	Government of Canada
• Building permits • By-laws • Community improvement plans • Cycling & pedestrian infrastructure • Development approval • Land use planning • Local improvement charges • Public awareness, engagement & collaboration • Public transit • Residential rental property licencing • Social housing • Transportation planning • Urban design standards • Vehicle-for-hire licencing • Waste reduction & management	• Carbon pricing • Clean fuel standards • Electricity & natural gas conservation programs • Electricity grid operation • Flood plan management (via Conservation Authorities) • Funding for public transit • Funding for social housing • Highway Traffic Act rules • Legislation & regulations • Natural gas distribution • Ontario Building Code • Provincial; land use policies • Regional & inter-city transit • Research	• Approval of new technologies • Carbon pricing • Clean fuel standards • Consumer product energy efficiency standards • Electric vehicle charging incentives • Funding for public transit • Funding for social housing • Inter-city railways • Interprovincial pipelines • Legislation & regulations • Model National Building Code • Research • Vehicle fuel economy standards

To date, many of the climate actions being undertaken by all levels of government have been designed to encourage voluntary action by individuals and businesses. This often involved the use of “price signals” to shift behaviour, either through incentives (or rebates) to encourage behaviour with positive impacts or through fees (or taxes) to discourage behaviour with negative impacts. Over time, these tend to shift towards a regulatory approach as actions or behaviours become more commonplace.

Additional details regarding the roles and actions taken and underway by higher levels of government are provided in the **Federal Government - Climate Change Information, Roles and Responsibilities** and **Provincial Government - Climate Change Information, Roles and Responsibilities** supporting documents, available on the City of London’s Get Involved website.

Cargo bike rider on the Dundas Street Cycle Track

6. Climate Emergency Action Plan Goals

The Climate Emergency Action Plan (CEAP) is a community-wide plan to achieve three main goals:

1. Net-zero community greenhouse gas (GHG) emissions by 2050;
2. Improved resilience to climate change impacts; and
3. Bring everyone along (e.g., individuals, households, businesses, neighbourhoods).

6.1. What Does Net-Zero Emissions Mean?

The Government of Canada defines net-zero emissions as "our economy either emits no greenhouse gas emissions or offsets its emissions, for example, through actions such as tree planting or employing technologies that can capture carbon before it is released into the air"

There are many factors that influence how much energy a city uses to function and thrive and the resulting local greenhouse gas emissions including:

- Land use and urban development – planning city growth sets the framework for how much energy is needed for a city to function. Mixed density balances the energy-efficiency of higher-density and social demand for living space. Mixed land use reduces the distance people and goods need to travel.

- Urban design – urban design can either negate or enhance the energy efficiency benefits of good functional planning (mixed land use and mixed density). This includes design factors such as connectivity between city blocks, streetscape design, and street orientation.

- Transportation – transportation planning accounts for the movement of people and goods. In an ideal world, you would minimize the interactions between the two. However, the reality is that a city's transportation network often must serve both needs at the same time. An energy-efficient transportation system is one that provides several competitive choices for the movement of people and goods.

- Buildings – the design, construction, and maintenance of all building types (homes, office buildings, industrial buildings) has a significant impact on the energy consumed by that building. New buildings can be designed that approach net-zero energy use, but most of London's buildings are old, inefficient designs that often have unseen problems with their insulation and draft-proofing. Building type can also affect energy use and associated emissions.

- Personal choices and actions – design and technology has its limits. For example, a programmable thermostat has no energy conservation benefit if its user does not program it. Social norms are a powerful influence on people's behaviour.

- Local economy – the nature of the economic base will influence how much energy it will use. For some businesses, energy use is a minor cost. For others, energy bills can make the difference between profit and loss. For many local employers, there are opportunities for energy conservation, energy-efficiency, and renewable energy generation waiting to be developed.

- Leadership – the words spoken, commitments made, and actions taken by leaders in the business, institutional, government and non-government sectors with respect to energy conservation, sustainable energy, reducing the use of fossil fuels, reducing GHG emissions and adapting to climate change.

Reducing GHG emissions in these areas is fundamental to achieving net-zero emissions by 2050. In addition, it will require quantification and verification of local actions that remove carbon dioxide from the atmosphere to offset any remaining greenhouse gas emissions. These include:

- Carbon dioxide removed by natural heritage systems within London (e.g., woodlots, Environmentally Significant Areas);

- Carbon dioxide removed by the urban forest and other green infrastructure within London (e.g., street trees, trees in parks, trees on private property, stormwater ponds designed to mimic wetlands);

- Carbon dioxide removed by the adoption of regenerative agricultural practices within London that increase the carbon content of soil;

- Carbon dioxide removed by engineered processes within London (e.g., direct air capture, point-source carbon capture, utilization of captured carbon dioxide, storage of captured carbon dioxide); and

- Purchasing verified emission reduction offsets from projects that capture carbon dioxide that are outside of London.

Components of carbon sequestration capacity, like estimates of the quantity of carbon removed from the atmosphere by trees on public property, have been identified and measured in some jurisdictions, including London. In 2012, the City utilized the Urban Forest Effects (UFORE) model to estimate that London's trees removed (on a net basis) about 35,000 tonnes per year of carbon dioxide from the atmosphere, or just over one per cent of current community-wide greenhouse gas emissions. This estimate does not include land outside of the Urban Growth Boundary, the capacity for carbon sequestration on agricultural land, or any other sequestration capacity associated with land use or land use change. Advancing municipal capabilities and capacity to measure and track sequestration potential on the landscape (and from engineered sources) is important and will be required as milestone emission targets approach and the purchase of GHG emissions offsets are considered.

6.2. What Does Improved Resilience Mean?

Creating a resilient city means that both the "bricks and mortar" and the "people and neighbourhoods" need to be ready for current and future changes to the climate and its impacts. It means taking measures and preparing for more extreme weather events and generally a warmer climate. These measures include:

- Helping people be more self-sufficient and ready for emergencies;
- Helping businesses to anticipate changes and adapt to them;
- Strengthening the durability of infrastructure to withstand extreme weather;
- Anticipating the impacts that may result from extreme weather;
- Building new and retrofitting older homes and buildings that can withstand the impacts of a changing climate;
- Providing transportation options that are less harmful to the functioning of our City and our natural environment and more helpful for individual physical health;
- Encouraging the production of local food and community gardens (e.g., the 'field to fork' concept);
- Strengthening our energy grid and creating opportunities for local energy production;
- Growing, strengthening, and protecting our natural "green" infrastructure to assist our city with both mitigation and adaptation measures; and
- Measuring and monitoring our actions to enable future adjustments to match changes to the climate impacts.

By striving for and investing in improved resilience, London will be a safer place to live for residents, some significant costs resulting from the impacts of climate change will be avoided and the business case for investment in London as a city with a strong future will be strengthened. Additional details pertaining to the observed and anticipated impacts of climate change in London are included in the **Impacts of Climate Change in London** supporting document available on the City of London's Get Involved website.

6.3. What Does Bring Everyone Along Mean?

Over time, everyone in London will feel the impacts of climate change, regardless of age or gender, income, or nationality. It will be in the form of flooding, severe wind, more invasive species, heat and droughts. It will also be in the form of higher prices for fossil fuels to drive the car, heat or cool a home, pay rent, or pay for groceries. It will also be felt by family and friends in other parts of Canada and the world experiencing even more issues like wildfires and sea level rise.

For children and grandchildren – our future generations – higher costs and impacts will be problems that they inherit in the future if we are too slow to become more resilient.

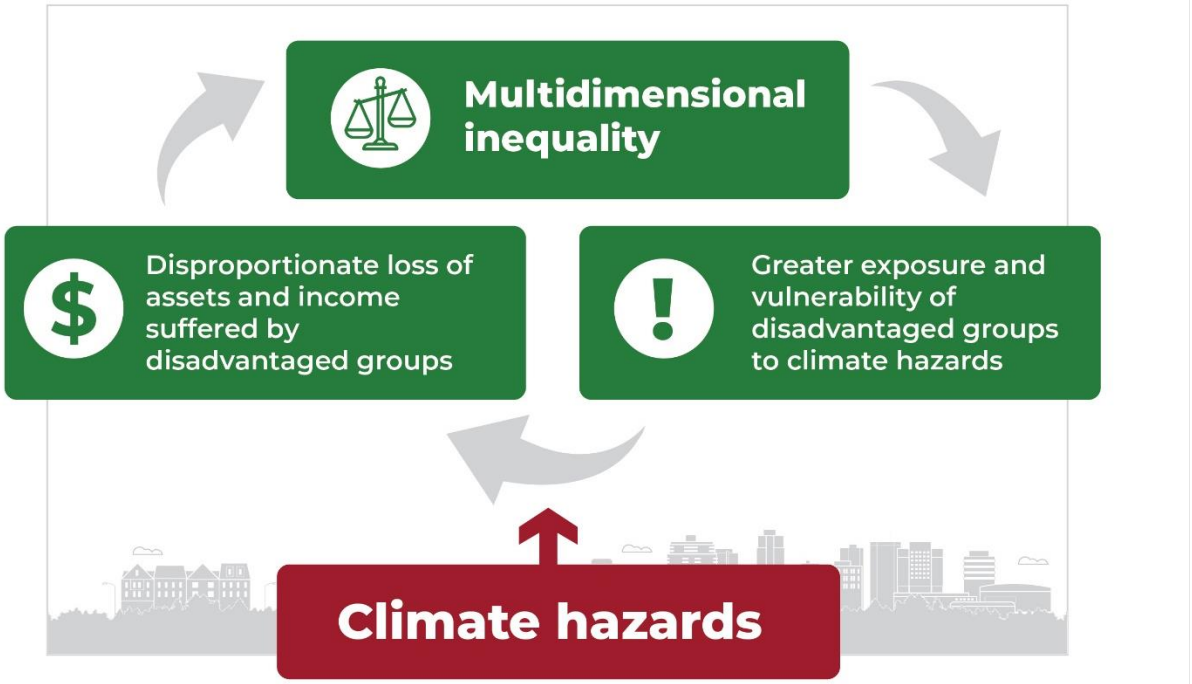
Climate change does not impact everyone equally. Furthermore, not everyone is equally able to take steps to reduce their greenhouse gas emissions or adapt to the impacts of climate change. Differences in physical ability, race, age, gender, immigration status, socio-economic status and many other factors contribute to multidimensional inequality in any society and climate change can act as a multiplier on inequality.

Researchers from the Department of Economic and Social Affairs within the United Nations Secretariat identify that available evidence indicates that the relationship between climate change and social inequality is characterized by a vicious cycle (Figure 2). Initial inequality causes disadvantaged groups to suffer disproportionately from the adverse effects of climate change, which then results in those groups experiencing greater subsequent inequality. The same researchers identify three main channels through which the “inequality-aggravating effect of climate change” materializes:

a) Increase in the exposure of equity-deserving groups to the adverse effects of climate change;
b) Increase in their susceptibility to damage caused by climate change; and
c) Decrease in their ability to cope and recover from the damage suffered.

Meeting climate change mitigation and adaptation goals must, therefore, be accompanied by an equally important goal to bring everyone along. All Londoners need to be considered within the planning and implementation of climate actions so that efforts do not disproportionately assist only certain residents, or favour solutions that are only actionable by a subset of Londoners who have sufficient financial or other means.

Figure 2: Inequality and Climate Change Vicious Cycle



Source: United Nations Department of Economic and Social Affairs - 2017

Nicholas Wilson Community Garden

7. Pathway to Community Net-Zero Emissions by 2050

7.1. New 2030, 2035, and 2040 Greenhouse Gas Emission Reduction Milestone Targets

London's Climate Emergency Action Plan is a commitment to collectively achieve net-zero emissions by 2050. However, it is important that short-term and medium-term milestone targets be set to ensure that emission reduction activities are accelerated in the near term and progress is being tracked towards the 2050 target. The primary purposes of milestone targets are to:

- Divide the overall 2050 target (about 30 years) into understandable phases and time periods;
- Create milestone dates that are within a reasonable horizon so people and businesses can more closely relate to what they will be doing and what the future could look like;
- Provide a defined period of time so budgets, financial commitments, investments can be considered as part of regular operations and lifestyles and spaced out to phase in the needed changes and adjustments;
- Highlight how the community is doing on an annual basis versus the milestone target;
- Share and celebrate achievements and/or share and focus on disappointments; and
- Show progress which allows for adjustments to the plan based on new information, scientific data, changes with senior levels of government, global matters and technological changes.

Over the 2015-2019 period, city-wide emissions averaged about 3 million tonnes per year, 22 per cent lower than 2005, reflecting the early actions taken already. Annual variation in weather, particularly extreme weather events like prolonged "polar vortex," cold snaps and "heat dome" heat waves will impact building energy use and associated emissions in the future.

Total community-wide greenhouse gas emissions in 2020 were 2.69 million tonnes of equivalent carbon dioxide, or 30 per cent lower than 2005. However, it is important to note the extraordinary impact of the COVID-19 pandemic on emissions.

The following community milestone targets for 2030, 2035, and 2040 are proposed (Figure 3):

- 55 per cent reduction in total annual city-wide emissions by 2030 (about 1.75 million tonnes per year), consistent with the 1.5°C science-based target established by the United Nations Framework Convention on Climate Change's Race to Zero campaign;
- 65 per cent by 2035 (about 1.35 million tonnes per year); and
- 75 per cent by 2040 (about 1 million tonnes per year).

For 2030, this would require a city-wide reduction in annuals emissions of about 1.25 million tonnes from pre-pandemic levels.

Targets adopted by cities are considered "science-based" if they are in line with what the latest climate science deems necessary to meet the goals of the Paris Agreement – limiting global warming to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C – and reflects a fair share of the 50 per cent global reduction in greenhouse gas emissions by 2030 identified in the United Nations (UN) Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°Celsius.

The "fair share" principle reflects the responsibility of nations and cities with high income and high emissions to do more to reduce emissions compared to those with lower income and emissions. Cities in North America, Australia, Japan, and Germany are considered high-income and high-emissions per capita cities.

Electric vehicle charger at the Tourism London office on Wellington Street

Figure 3: Proposed GHG Reduction Milestone Targets for 2030, 2035 and 2040

Source: City of London

7.2. Are These Emission Reduction Milestone Targets Realistic?

Achieving the milestone targets will require significant changes in how we live, work, commute, play and build. The level of effort of Londoners, employees, employers, and visitors to make the adjustments and changes required is unprecedented. This will be the same in all Canadian communities and most parts of the world.

Technology, solutions, programs, and lifestyles changes required to meet the 2030 milestone target are available today, however the willingness and desire to make these changes on a voluntary basis remains to be seen in most of the developed world.

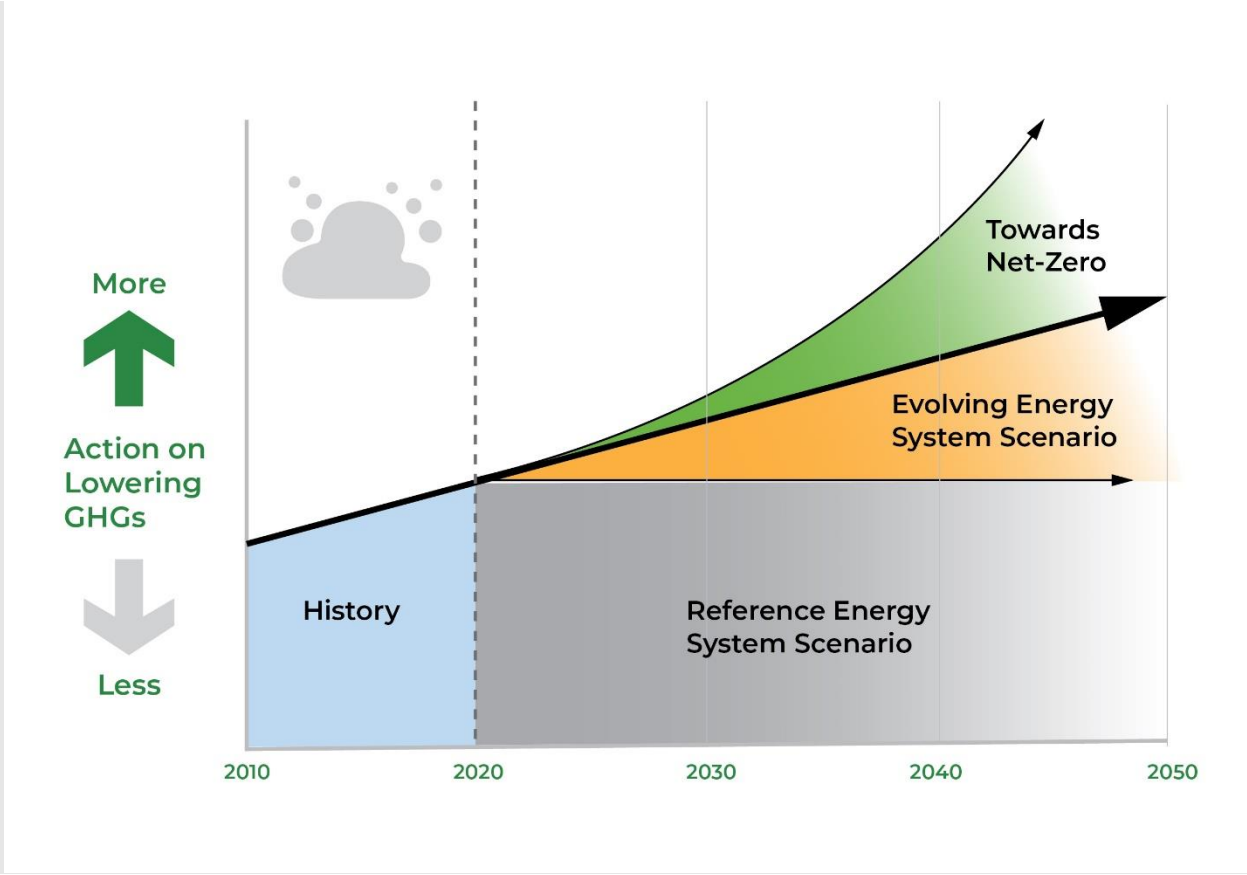
Whether or not the targets are realistic will depend on who is answering the question. Perhaps a better question is are these emission reduction targets required to minimize the impact of climate change? Current scientific information indicates “yes”.

To get a sense of how the 2030 milestone target for London could be achieved, two items were examined:

1. **Impact of current federal and provincial policies** - City of London staff looked at the provincial-level energy use forecasts provided by the Canada Energy Regulator (the federal agency in charge of regulating pipelines, energy development and trade in the Canadian public interest) in their report, Canada's Energy Future 2020: Energy Supply and Demand Projections to 2050. Specifically, City staff looked at the Evolving Energy System Scenario estimates for Ontario and applied these to London's community-wide energy use numbers.

   As noted in their report, illustrated in Figure 4, their Evolving Energy System Scenario continues the historical trend on increasing climate change mitigation action, but recognized that this pace is likely to accelerate in the 2020s and beyond. Note that this does not include additional measures announced in 2021.

Figure 4: Conceptual Illustration of Energy Future 2020 Scenarios and a Net-Zero Future



Source: Canada Energy Regulator – 2020

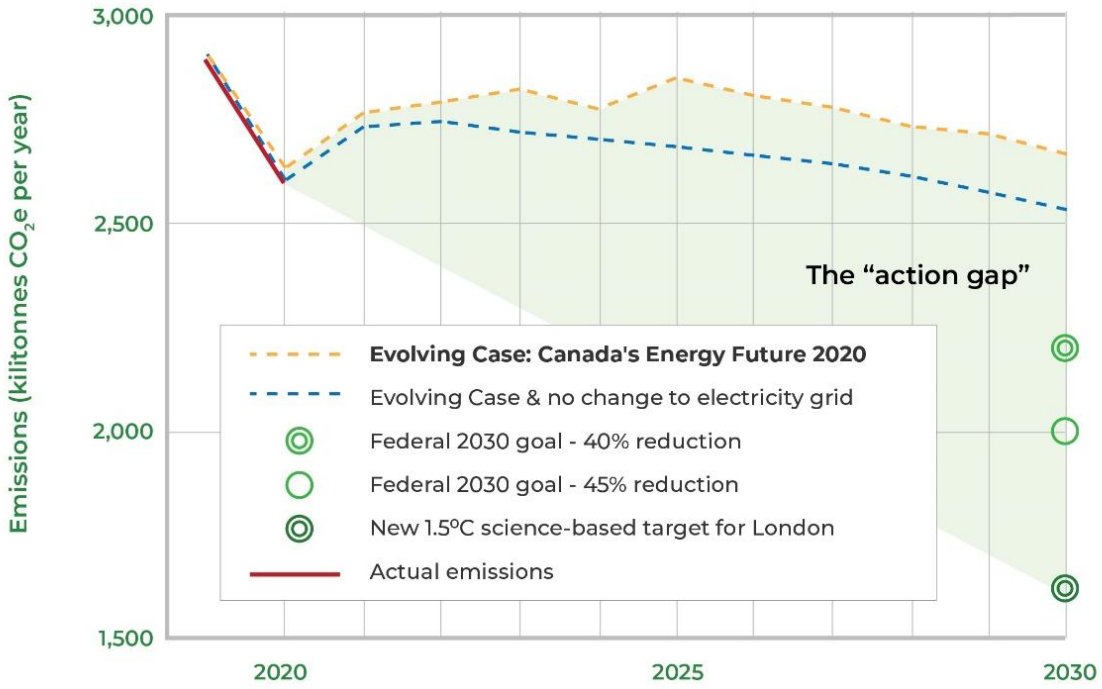
City staff then considered two scenarios for future estimates of greenhouse gas emissions from Ontario's electricity grid. One scenario involved grid emissions increasing, as forecasted by Ontario's Independent Electricity System Operator, as the Pickering Generating Station is scheduled to retire in 2025 and the Province of Ontario's plan to use natural gas fueled power plants to make up most of the difference. The other scenario assumed that greenhouse gas emissions from Ontario's electricity grid could remain unchanged from current levels.

As shown in Figure 5, a gradual increase in climate change mitigation action at the federal and provincial level clearly will not be enough for London to reach its proposed new target for 55 per cent reduction in total emissions from 2005 levels by 2030. There is a large (1 million tonnes per year) "action gap" between what a "gradual" increase in action would achieve and where London needs to be by 2030 to do our fair share to keep global warming at or below 1.5°C.

Even the federal government's goal of reaching a 45 per cent reduction by 2030 would leave London about 400,000 tonnes per year short of the reductions required to do our fair share to keep global warming within the 1.5°C science-based target.

Therefore, additional action will be needed at all levels of government as well as by individuals and businesses here in London.

Figure 5: Energy-Related Greenhouse Gas Emission Reduction Projections to 2030 for Ontario applied to London



Source: City of London

2. **Local greenhouse gas reductions by 2030** - High-level estimates of GHG reductions from a set of potential local activities were prepared to illustrate the level of effort required to close the "action gap" and reach the new 1.5°C science-based target for 2030 have been estimated (Table 2). The scenario presented is similar to the results produced by Londoners during the Climate Action Plan Simulator engagement exercise (refer to the **eDemocracy's Climate Action Plan Simulator** supporting document available on the City of London's Get Involved website).

   Some of the actions in the scenario presented would be enabled by accelerated action at the federal and provincial government level as well as by global and national businesses. However, local action is also required particularly with respect to mobility and buildings.

   The actions shown to close the "action gap" are cumulative in nature, in that the emission reductions from reducing the number of vehicle trips are accounted for before accounting for the impact of improved vehicle fuel economy (including electric vehicle adoption).

Table 2: Examples of Energy-Related Local Reductions Needed to Close the "Action Gap"

Sector	Actions (between 2022 and 2030) to Close the Action Gap	GHG Emission Reduction by 2030 (tonnes per year)
Transportation	Electrifying LTC bus fleet - 25% by 2030	4,000
Transportation	40% fewer in-town vehicle trips by car	100,000
Transportation	25% fewer out-of-town trips by car	60,000
Transportation	50% lower fuel use (L/100 km) for personal vehicles (e.g., through EV adoption, use of transit)	260,000
Transportation	75% lower fuel use (L/100 km) for local vehicle fleets (e.g., through EV adoption)	40,000
Energy/waste	Renewable natural gas produced locally	20,000
Energy	Solar PV – 270 MW of rooftop solar by 2030	20,000
Buildings	Natural gas use 50% lower than 2019	500,000
Buildings	100% replacement of local fuel oil heating with heat pumps	40,000
	Total Reductions to Close Action Gap	*1,044,000*

Source: City of London

Waste minimization and diversion activities will also have climate change mitigation benefits. The measures contained within the 60% Waste Diversion Action Plan are estimated to reduce GHG emissions by 17,000 to 27,000 tonnes annually, some with GHG reduction benefits in London and others with GHG reductions outside London (Table 3).

Table 3: GHG Reductions from Additional Waste Diversion Actions

Additional Waste Reduction Actions	Range of GHG Emission Reductions by 2030 (tonnes per year)
Food waste avoidance	2,300 - 6,000
Home composting	600 - 1,000
Community composting	100 - 200
Curbside Green Bin program	10,000 – 16,000

Source: City of London

In summary, it is important to note that achieving reductions of this scale in just eight or nine years will be very challenging and require commitments from the community, from London's businesses and institutions, and all City Services Areas. It will also require senior levels of governments to achieve their commitments. If Londoners are to do their fair share to keep the 1.5°C goal of the Paris Agreement within reach, these kinds of greenhouse gas reductions is what climate science says is required from Londoners, the Province of Ontario, and the Government of Canada.

7.3. Why is Setting Science-based Milestone Targets a Positive Step Forward?

As shown on the Climate Action Tracker website, a goal of net-zero greenhouse gas emissions by 2050 has been set or is being considered by over 140 countries including Canada, United States, United Kingdom, France, Italy, Japan and Mexico. A few countries including Germany and Sweden have set 2045 as the year for carbon neutrality. The world's largest greenhouse gas emitter, China, has set 2060 for net zero emissions.

To measure the path to net zero in London requires milestone targets. Setting science-based community GHG reduction milestone targets can:

- Demonstrate a commitment on the importance of aligning climate action with the science to support community and businesses actions, direction, and aspirations;
- Provide transparency about where GHG emission reduction commitments need to be according to the science and where the gaps are to help prioritize actions that

may be easier to achieve, while more challenging ones require more planning and longer periods of time;

- Bring a long-term target of 2050 into a more meaningful near-term timeframe (i.e., 2030) where today's generations can more closely relate to the challenges;

- Create more manageable steps that can be measured and reported annually;

- Build capacity in the community and with businesses to deal with budgets, resources, information needs and other requirements to meet milestone targets;

- Signal to new businesses and investors that London is committed to climate change action and environmentally sustainable practices; and

- Highlight to existing businesses that London is aligned, is a community of committed people, employees and employers, and ready for the challenges and opportunities in the short, medium and longer terms.

Setting science-based but achievable Corporate GHG reduction milestone targets can:

- Help prioritize the needs for sustainable funding sources, new funding sources and/or re-allocate existing funding for internal GHG reduction projects;

- Help prioritize actions that may be easier to achieve while more challenging ones require more planning and longer periods of time;

- Encourage the identification of additional reduction opportunities when direction for GHG reduction efforts has been set;

- Create more manageable steps that can be measured and reported annually; encourage innovation and creativity, improve staff morale, and help in the recruiting and retention of qualified employees;

- Showcase projects and programs to assist other with decision-making and fast tracking the learning curve; and

- Demonstrate leadership.

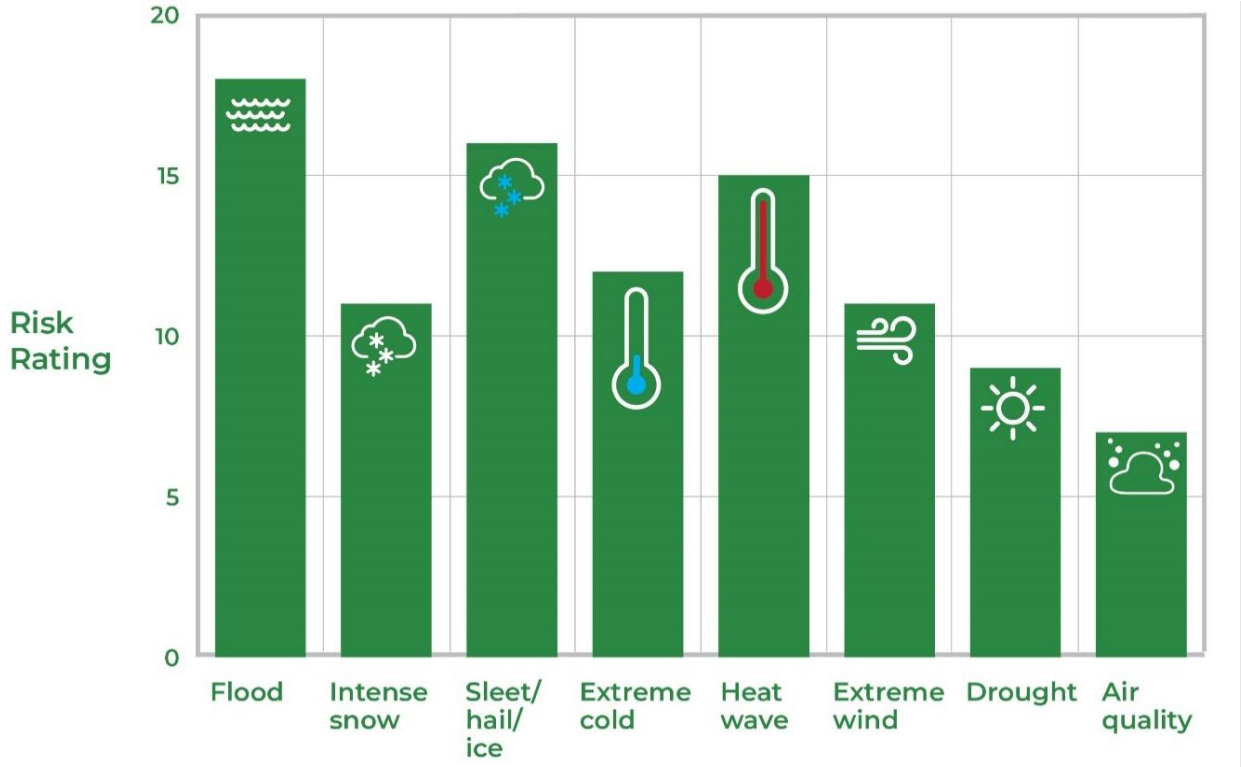
8. Adaptation Targets and Adaptation Plan

Adaptation is different from climate change mitigation although they are closely related and often complementary. Some actions such as tree planting and wetland preservation or expansion serve both as mitigation and adaptation actions. This is because they both result in carbon being removed from the atmosphere (mitigation) and reduce the severity of climate change related impacts by providing shade to reduce heat effects and absorbing water to reduce flood severity (adaptation).

Adaptation targets are more challenging to set and measure progress towards, but we need to understand and/or plan for the expected results in order to enable our city to bounce back after severe weather events driven by climate change.

To prepare for extreme weather events, assessment work for the Corporation was completed in 2014 by the City of London. This assessment identified eight weather events which London has been and will be further subject to in the future (Figure 6).

Figure 6: Risk Exposures by Weather Event to 2050



Source: City of London

The risk rating for each of the eight weather events combined the likelihood of occurrence with the probability of damages from these weather events to obtain a general score which was then compared across many City services (Figure 7). The impact was generally even across the Corporation with the impacts being most felt by the Middlesex London Health Unit (MLHU), emergency services (fire and police) and subsequently the remainder of the service areas.

Figure 7: Risk Exposure Rated by City Service

Source: City of London

The City of London has partnered with the Canadian office of the International Council for Local Environmental Initiatives (ICLEI) to update the previous work, confirm previous climate assumptions and assessments, and expand the focus to the entire London community. ICLEI, a non-profit organization that supports local governments for sustainability, and London along with 21 other Ontario municipalities, are actively participating in the Advancing Adaptation Program. ICLEI Canada has decades of experience assisting municipalities in completing Adaptation Strategies using industry-standard adaptation processes (e.g., Building Adaptive and Resilient Communities, or BARC, tool).

This approach has already guided many southern Ontario cities with creating adaptation plans and implementation. London has previously taken part and benefitted from several collaborations with ICLEI Canada and their partners (e.g., Showcase Cities in 2019). By partnering with others, we benefit from the knowledge gained by the ICLEI organization and their results in dealing with other Ontario and Canadian municipalities focused on climate change. Preliminary targets have been prepared to suggest that:

- By 2030, address 50 per cent of the areas where London is most vulnerable as identified by the Adaptation Plan and provide clear direction to address the remaining 50 per cent.

- By 2050, address 90 per cent of the areas where London is most vulnerable as identified by the Adaptation Plan and provide clear direction and timetable to address the remaining 10 per cent.

8.1. What has Been Done

City staff have incorporated climate change adaptation into many service areas and many residents, businesses and organizations in the community have already taken important action as well.

The earlier Climate Change Risk Assessment work informed decision-making and allowed for wise management of existing City infrastructure and services. Due to the London community containing 43 km of the Thames River in addition to 85 km of other waterways, flooding mitigation has been a major focus of past work. Several examples include:

- Flooding Matters Program – a response to basement flooding after heavy rainfall events led to incentive programs to assist homeowners;

- West London Dyke Master Plan – provided a phased approach to rehabilitating the 2.4 km structure that protects West London (Kensington Village and Blackfriars neighbourhoods) including 1,100 structures and over 1,200 residents. This work is ongoing;

- Dingman Creek constructed wetland – providing flood storage and erosion control for the creek and downstream Lambeth neighbourhood in addition to the wildlife habitat and ecosystem services associated with the creation of large wetland complexes; and

- Floodproofing at wastewater treatment plants – given their necessary locations next to the Thames River, federal climate change funding has been used to upgrade floodproofing systems at half of the plants located in the floodplain with work to complete the remaining half scheduled for 2022/2023.

8.2. What is Coming Next

The partnership with ICLEI Advancing Adaptation means that the experiences of other municipalities supported by ICLEI staff will inform our adaptation actions. Taking the earlier Risk Assessment work focused on the Corporation and expanding it to the entire community means that the issues and actions will be community-wide and include impacts to our vulnerable communities.

Currently, there have been 25 impact statements identified that will be confirmed by community and business engagement sessions and actions will be proposed to address the statements. The eight impacts identified with the highest risk rating are:

- **Urban Forest** - more extreme weather events causing damaging winds and winter sleet storms will damage the urban forest and kill vegetation.

- **Winter Emergencies** - more extreme weather events causing more heavy snowfall/ice/ sleet events will create challenges for transportation and snow clearing resulting in increased medical emergencies.

- **Straining EMS response** - more extreme weather events resulting in more response calls for EMS for rescue and evacuation due to flooding, severe winds and snow squalls will strain emergency services capacity and ability to respond (staff, and equipment resources).

- **Health Service Demands** - more extreme weather events will increase the demand for health services due to increased trauma, testing needs and mental stress.

- **Basement Flooding** - more extreme rainfall events leading to increased flooding in low-lying areas and basements will cause property damage/loss.

- **Sanitary Sewer Challenges** – more extreme rainfall events increasing inflow and infiltration of rainwater into sanitary sewer systems will cause sanitary sewer backup into residential/commercial properties.

- **Park Infrastructure Damage** - more extreme rainfall events will result in more frequent and intense localized flooding of environmentally sensitive areas and city park infrastructure will cause the need for repair/replacement of park pathways, structures and vegetation.

- **Floodplain Reassessment** - more extreme rainfall events resulting in flooding that expands the size of floodplains and will require property redesignations, acquisitions of the most impacted properties, and re-examination of overland water flow routes.

Flooding on Queens Avenue after heavy rainfall in August 2019

9. Climate Emergency Action Plan Expected Results

The goals identified in Chapter 6 will be achieved through actions that will be taken to deliver on a series of expected results. These expected results embody the changes required in London to address the climate emergency and are identified on Table 4:

Table 4: Expected Results

Expected Result	Description
Walkable, Complete Neighbourhoods	Ensure Londoners can access nearby daily needs while reducing automobile dependence and improving equity
Increased Active Transportation and Transit	Increase the viability and attractiveness of active transportation and transit to reduce automobile dependence, improve equity, and promote physical health
More Zero Emission Vehicles	Reduce or eliminate fossil fuel use in vehicles
More Net-zero Buildings	Improve energy efficiency and reduce or eliminate fossil fuel use in buildings
Lower Carbon Construction	Reduce the use of construction materials with high lifecycle GHG emissions from raw material extraction to manufacturing and final end-use/disposal. Design for less material use overall and utilize recycled products where possible
More Resilient Buildings and Infrastructure	Build and maintain civic infrastructure and buildings to increase public safety and reduce unexpected and long-term cost burdens as a result of climate change
More Carbon Capture	Protect, maintain, and improve London's natural heritage system, urban plantings and agricultural lands to reduce carbon in the atmosphere, support biodiversity, and reduce the effects of climate change
Move Towards a Circular Economy	Support our economy's transition to reduced emissions from consumption and waste, more efficient material use, and the creation of regenerative prosperity
Increased Community Resilience	Improve Londoners' ability to withstand, adapt, and recover from extreme weather events and other impacts of climate change
Increased Engagement on Climate Action	Improve education, awareness and engagement to accelerate action on climate change by businesses, employees, community groups, institutions and individuals

In 2022, City staff will confirm or establish baselines and 2030 milestone targets for each of the expected results as shown on Table 5.

Table 5: 2030 Milestone Target Outcome

Expected Result	2030 Milestone Outcome
Walkable, Complete Neighbourhoods	Ensure the majority of Londoners live within an easy walk/roll of their daily needs. Baseline data currently under development.
Increased Active Transportation and Transit	Strive to reduce the annual number of in-town automobile trips per person in London by 30-50% from 2019 levels Currently at around 550 trips per person (2019)
More Zero Emission Vehicles	Strive for at least 50% of the kilometres travelled on London's roads to be by zero emissions vehicles. Currently at around 0.5%
More Net-zero Buildings	Strive to reduce fossil fuel use by buildings to 50% of where it was in 2019. Buildings (excluding industrial) in 2019 used 20.7 million gigajoules of fossil fuel energy (natural gas, fuel oil, and propane).
Lower Carbon Construction	Strive for at least 40% less embodied emissions from new buildings and construction projects compared to 2019. Baseline data to be developed in 2022.
More Resilient Buildings and Infrastructure	Strive for at least one-third of buildings in London to have at least one or more climate resiliency measure. Baseline data to be developed in 2022.
More Carbon Capture	Strive for at least 25% higher carbon dioxide removal from the air in London by natural processes, agricultural practices, and engineered solutions than 2008. Baseline data from 2012 urban forest effects model is being updated.
Move Towards a Circular Economy	Strive for at least 60% waste diversion from landfill through reduced waste generation and improved material efficiency, driving towards a circular economy. Residential diversion rate is currently 45%, total waste diversion rate is 33%.
Increased Community Resilience	Strive for at least 50% of Londoners to have measures in place to withstand and recover from extreme weather events and other impacts of climate change. Baseline data currently under development.
Increased Engagement on Climate Action	Strive for at least 75% of Londoners to understand and acknowledge their contributions to and impacts from climate change. Baseline data to be developed in 2022.

9.1. Things Londoners Will Notice by 2030 with the Expected Results

In addition to reducing community GHG emissions and increasing resilience to climate change impacts, achieving the expected results, by 2030, will provide additional benefits to Londoners. Some of these benefits include:

- There will be more safe and attractive options available to get around London, with safe and connected cycling and walking networks city-wide and more frequent and reliable transit service;
- There will be more services meeting your daily needs within your neighbourhood;
- There will be a thriving local renovation economy, with attractive employment opportunities for HVAC technicians, plumbers, insulators, and other skilled trades;
- There will be additional resources and incentives to help with low-carbon renovations;
- There will be more buildings that are cooler in the summer and more comfortable in the winter;
- There will be a thriving circular economy which attracts businesses and people passionate about a sustainable, prosperous future; and
- There will be a connected local food system, including more plant-based products farmed with regenerative agriculture methods and increased urban agriculture.

By pursuing the expected results, London will open the door to opportunities for growth and prosperity that respect the natural systems of southern Ontario, create a higher quality of life for Londoners, and ensure that London is seen as a leader in forward-thinking municipal service delivery.

9.2. What are the Benefits and Costs?

The exact benefits and costs have not been determined for London at this time. Undertaking a detailed cost-benefit analysis of different measures to achieve the GHG emission reductions will be undertaken in 2022 (Area of Focus Demonstrating Leadership in Municipal Processes and Collaborations Workplan).

A few Ontario cities (e.g., Toronto, Ottawa, Guelph, Burlington, Hamilton) have undertaken detailed modelling of community-wide climate change mitigation plan costs under business as usual and future GHG emission reduction scenarios, including capital costs, operating and maintenance costs and savings, energy cost savings, carbon price savings, and local energy generation revenues. This has been used by a few communities to determine estimated costs and benefits for emissions reductions measures.

These studies have consistently shown that there is a net economic benefit to investing in science-based emission reduction measures compared to doing nothing just from an energy cost perspective alone. In addition, many of the measures may involve spending differently rather than being a true additional cost for residents and businesses.

For example, the analysis provided for Burlington's Climate Action Plan (2020) indicated that their Low Carbon scenario (consistent with a 1.5°C science-based fair share reduction target) would be less expensive than a Business-As-Usual approach, where no additional climate action efforts occurred. Over the 2020-2050 period, their Low Carbon scenario would save residents and businesses in Burlington about $6.7 billion in today's dollars.

The analysis provided for Ottawa's Energy Evolution: Ottawa's Community Energy Transition Strategy (2020) indicated that there would be a net savings of $12.4 billion in today's dollars over the 2020-2050 period.

It is important to emphasize that these are primarily investments made by individual households and businesses, with the municipal government investing in those actions that it has direct control over (e.g., municipal buildings, social housing, fleet, mobility infrastructure, transit) as well as making changes to support action by others (e.g., removing hurdles to better development in zoning, facilitating loans/grants for retrofits).

For adapting to extreme weather, the Federation of Canadian Municipalities and the Insurance Bureau of Canada estimate that, for Central Canada (Ontario and Quebec), the average cost for municipalities to adapt was estimated to be 0.12 per cent of Gross Domestic Product (GDP; the total value of goods produced and services provided in a region during one year).

This is a lot of money, but the cost of being unprepared can be a lot higher. For example, Toronto's December 2013 ice storm cost their municipal government alone almost $107 million in unplanned costs not including the costs incurred by residents and businesses in terms of property damage and lost business.

Additional details on the costs and benefits of climate action in other municipalities is provided in the **Overview of Current and Potential Climate Action Costs and Funding Opportunities** supporting document available on the City of London's Get Involved website.

9.3. What Does 2030 Look Like for Different Household Types in London?

As previously noted, the 2030 milestone target can be achieved using existing GHG reductions programs and technologies, financial investments for those that can make them and making the necessary lifestyle changes. To illustrate the level of effort required for eleven different household types to do their fair share to reach the new

1.5°C science-based target for 2030, examples have been developed. It is recognized that every single household in London will have their own unique conditions. It is also important to note that the different household types are not meant to be the same people today and in 2030, given that people's needs change over time such as when children are born or when children leave the home.

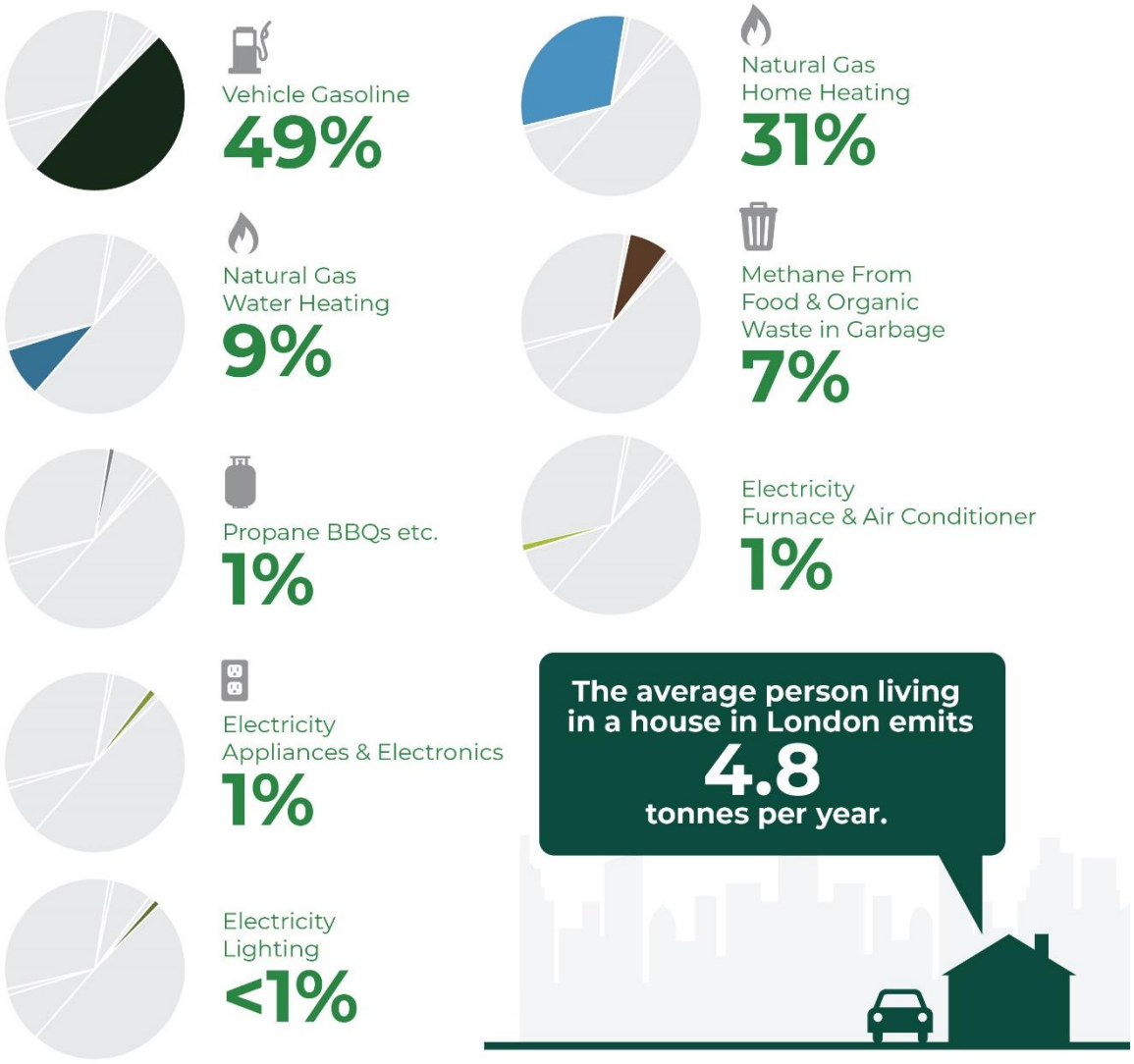
The concept of doing your "fair share" is important since some households will already have lower-than-average emissions while others will be higher than average. This is due to choices such as the type of housing they live in, how often they drive their own vehicles, and what types of vehicles they drive (if they drive at all). Therefore, those households with higher-emitting lifestyles will need to do more.

To determine what the "fair share" looks like, City staff used the average household emission estimates from the 2019 (pre-COVID pandemic) Community Energy Use and Greenhouse Gas Emissions Inventory report and estimated what they would need to be in 2030 to meet the new target. In 2019, the average household in a single-family home in London emitted 10.5 tonnes of GHG emissions or 4.8 tonnes per person given the average household size of 2.2 people per household (Figure 8).

In 2030, the average household GHG emissions per person needs to be reduced to 2.2 tonnes per person. As shown in the household examples, households living in apartments who drive very little (or not at all) already have low emissions, whereas people living in larger homes and who use personal vehicles may need to invest in green technologies (EVs, heat pumps, etc.) to get to the same level.

London Transit bus serving passengers in downtown London

Figure 8: Greenhouse Gas Emission Sources from the Average Household in London (2019)



Source: City of London

The impacts of the following actions were estimated at a high level as these reflect the most common actions that are likely to be taken between now and 2030 using available technologies and solutions, proven practices and behaviours that already exist with many London households:

- **Reducing heat loss** – this is done through the combination of adding more insulation, draft-proofing, smart thermostat use, and other actions that conserve natural gas. This action usually provides payback over time. Incentives are available for these measures today, including free home weatherization for qualifying households based on income.

- **Hybrid home heating** – heat pumps can be used to provide both air conditioning in the summer and heating in colder months. However, when the temperature drops well below freezing, heat pumps become expensive to operate and may not provide enough heat. Therefore, existing gas furnaces can be used as back-up heating on colder days. This action will be a net cost today, but as carbon pricing increases to $170/tonne by 2030, the payback will improve. Incentives are available for heat pumps today.

- **Cold climate air-sourced heat pump** – these are heat pumps can provide heat at temperatures as low as -15°C. However, back-up sources of heat are still needed for those rare days when temperature fall below -15°C. This action is more expensive than regular heat pumps, but as carbon pricing increases to $170/tonne, the payback will improve. Incentives are available for this action today. Incentives are available for heat pumps today.

- **Rooftop solar power** – in Ontario, homeowners can use solar power in a "net-metering" arrangement where excess solar power is credited for use at other times. This action is a breakeven cost today, but as the cost of panels decrease, the payback will improve. Incentives are available for solar panels today.

- **Reducing vehicle use** – in London, the average vehicle is driven about 15,000 kilometres every year. Up to one-half of these trips are in-town trips, with the rest being trips to and from London. In-town trips can be reduced by walking, biking, taking transit, and/or working from home, while out-of-town trips can be reduced by taking the train, carpooling, and/or web-based meetings. This action has instant cost-saving benefits.

- **Hybrid electric vehicles** – these are vehicles that use batteries to store energy when applying the brakes, which is then used to accelerate the vehicle when moving again. This action will be a breakeven cost today, but the payback will improve as carbon pricing increases to $170/tonne.

- **Plug-in hybrid electric vehicles** – these are vehicles that use batteries for local trips, while using a gasoline engine for longer trips. This action will be a breakeven cost today given the lower costs of driving and maintenance. As carbon pricing increases to $170/tonne and the cost of batteries decrease, the payback will improve. Incentives are available today.

- **Battery electric vehicles** – these are vehicles that only use batteries for power. Many affordable (under $45,000) 2022 model year vehicles can now travel over 350 kilometres, with some premium long-range models now capable of travelling over 600 kilometres. This action will be a breakeven cost today given the lower costs of driving and maintenance. As carbon pricing increases to $170/tonne and the cost of batteries decrease, electric vehicles will be cheaper than gas-powered vehicles later this decade. Incentives are available today.

- **Retiring vehicles** – vehicles are expensive to operate, maintain, and insure, so getting rid of a vehicle and using an e-bike or transit has instant cost-saving benefits.

- **Reducing organic waste** – through the combination of reducing food waste, using backyard composters, and using the upcoming Green Bin program, households can reduce the amount of organic waste going to landfill.

- **Battery back-up power** – either paired with rooftop solar panels or on their own, battery back-up power is a zero emission alternative to a portable generator. Incentives are available for battery back-up systems paired with solar panels today.

- **Vehicle-to-home back-up power** – A fully-charged electric vehicle has enough power stored to provide the average home with up to three days of emergency power. Trials are already underway in Ontario by Hydro One.

- **Shade trees** – Deciduous (leafy) trees planted on the south and west side of a house can provide shade for a house to reduce air conditioning demand during the summer.

- **Windbreak trees –** Coniferous trees planted on the north and west side of a house can provide relief from winter winds and reduce heating costs.

- **Basement flood protection** – measures for your basement to prevent flooding from sewer back-up and overland flow including sump pits, sump pumps with back-up power supply, sewer backflow prevention devices, proper lot grading and basement window well covers.

- **Increased permeable surfaces –** lot design features such as permeable driveways, rain gardens and bio swales that allow surface water to infiltrate the soil and reduce surface water runoff.

- **72-hour emergency kits** – power disruptions and other extreme weather caused emergencies can happen anytime so being prepared with kits (price ranges from $50 to $250) containing such items as flashlights, battery powered radio, solar mobile phone generators, bottled water and nutritious food for 72 hours can ease the disruption.

The level of effort required for eleven different household types to do their “fair share” by 2030 is identified in the following examples. Not all actions have to be done at the same time. They can be phased in to meet the needs, affordability and desire of the household.

High income household of three in older single-family house in established neighbourhood, two vehicles (one large, one compact)

Current GHG emissions by this household type:
6.3 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
1.9 tonnes per person (2030)

- ☑ 25% reduction in heat loss
- ☑ Cold-climate heat pump with gas back-up
- ☑ 1st vehicle 20% reduction in distance travelled
- ☑ 1st vehicle switched to plug-in hybrid EV
- ☑ 2nd vehicle switched to battery EV
- ☑ Reduction in organic waste
- ☑ Vehicle-to-home back-up power
- ☑ 72-hour emergency preparedness kit
- ☑ Permeable paver driveway and raingardens installed
- ☑ Basement flooding measures incorporated
- ☑ Net-metered solar power and battery back-up power

70% reduction in GHG emissions by taking these actions

High income household of five in large new suburban house, three vehicles (two large vehicles, one compact)

Current GHG emissions by this household type:
4.7 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
1.7 tonnes per person (2030)

- ☑ Hybrid (heat pump and gas) home heating
- ☑ Net-metered solar power and battery back-up power
- ☑ 1st vehicle switched to plug-in hybrid EV
- ☑ 2nd vehicle switched to battery EV
- ☑ 3rd vehicle replaced with e-bike
- ☑ Reduction in organic waste
- ☑ 72-hour emergency preparedness kit
- ☑ Permeable paver driveway and raingardens installed
- ☑ Shade trees planted

63% reduction in GHG emissions by taking these actions

High income single-parent household of two in renovated older single-family house in established neighbourhood, one compact hybrid

Current GHG emissions by this household type:
5.3 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
2.1 tonnes per person (2030)

- ☑ 10% reduction in heat loss
- ☑ Hybrid (heat pump and gas) home heating
- ☑ Net-metered rooftop solar PV and battery back-up power
- ☑ Vehicle 15% reduction in distance travelled
- ☑ Vehicle switched to battery EV
- ☑ Reduction in organic waste
- ☑ 72-hour emergency preparedness kit
- ☑ Basement flooding measures incorporated

57% reduction in GHG emissions by taking these actions

Average income household of four in new suburban townhouse, two vehicles (one compact SUV, one compact)

Current GHG emissions by this household type:
3.0 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
1.8 tonnes per person (2030)

- ☑ 1st vehicle switched to plug-in hybrid EV
- ☑ 2nd vehicle switched to battery EV
- ☑ Reduction in organic waste
- ☑ 72-hour emergency preparedness kit
- ☑ Permeable paver driveway and raingardens installed

39% reduction in GHG emissions by taking these actions

Average income household of two in new multi-family condominium building downtown (92 m^2 or 1,000 ft^2), one SUV hybrid

Current GHG emissions by this household type:
3.1 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
2.1 tonnes per person (2030)

- ☑ Vehicle 20% reduction in distance travelled
- ☑ Vehicle switched to plug-in hybrid EV
- ☑ Reduction in organic waste
- ☑ 72-hour emergency preparedness kit

32% reduction in GHG emissions by taking these actions

Average income household of four in older single-family house in established neighbourhood, two vehicles (one large, one compact)

Current GHG emissions by this household type:
3.4 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
1.9 tonnes per person (2030)

- ☑ 20% reduction in heat loss
- ☑ 1st vehicle 10% reduction in distance travelled
- ☑ 1st vehicle downsized to used hybrid
- ☑ 2nd vehicle replaced with bike
- ☑ Reduction in organic waste
- ☑ 72-hour emergency preparedness kit
- ☑ Basement flooding measures incorporated
- ☑ Permeable paver driveway and raingardens installed

44% reduction in GHG emissions by taking these actions

Low income household of two in older single-family house in established neighbourhood, one large vehicle

Current GHG emissions by this household type:
6.6 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
3.5 tonnes per person (2030)

- ☑ 35% reduction in heat loss
- ☑ Vehicle 20% reduction in distance travelled
- ☑ Vehicle downsized to used hybrid
- ☑ Reduction in organic waste
- ☑ 72-hour emergency preparedness kit
- ☑ Permeable paver driveway and raingardens installed
- ☑ Basement flooding measures incorporated

47% reduction in GHG emissions by taking these actions

Low income single-parent household of two in townhouse, transit user

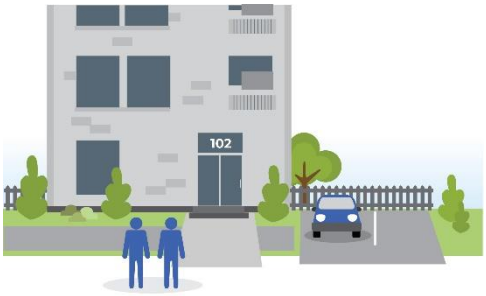
Current GHG emissions by this household type:
2.7 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
2.0 tonnes per person (2030)

- ☑ 20% reduction in heat loss
- ☑ Reduction in organic waste
- ☑ 72-hour emergency preparedness kit

26% reduction in GHG emissions by taking these actions

Low income household of two in multi-family apartment building (92 m^2 or 1,000 ft^2), one compact car



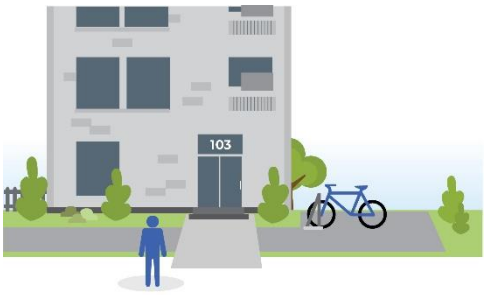
Current GHG emissions by this household type:
2.7 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
2.1 tonnes per person (2030)

- ☑ 10% reduction in heat loss
- ☑ Vehicle 10% reduction in distance travelled
- ☑ Vehicle replaced with used hybrid
- ☑ Reduction in food waste
- ☑ 72-hour emergency preparedness kit

23% reduction in GHG emissions by taking these actions

Low income single person household in multi-family apartment building (74 m^2 or 800 ft^2), walking and cycling for transportation



Current GHG emissions by this household type:
2.3 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
2.1 tonnes per person (2030)

- ☑ 10% reduction in heat loss
- ☑ Reduction in food waste
- ☑ 72-hour emergency preparedness kit

10% reduction in GHG emissions by taking these actions

Low income household of four in multi-family building (92 m^2 or 1,000 ft^2), one compact car and transit use

Current GHG emissions by this household type:
1.7 tonnes per person (2022)

2030 GHG emitted by this household type if the following actions are taken
1.6 tonnes per person (2030)

☑ 5% reduction in heat loss
☑ Reduction in food waste
☑ 72-hour emergency preparedness kit

4% reduction in GHG emissions by taking these actions

It is also important to recognize the fact that the production and transportation of the consumer goods we purchase also have an environmental impact, and that some types of goods (e.g., meat and dairy products) do have a larger impact than others. At this point in time, there is no easy-to-use methodology to estimate this at the community-wide scale for Scope 3 emissions (i.e., covers all other indirect emissions not included in Scope 1 and 2 local emissions, such as transmission and distribution of energy, manufacture and distribution of food). However, with the information contained within the Environmental Commissioner of Ontario report, *Climate Pollution: Reducing My Footprint*, consumption related GHG emissions per person for Ontario residents are estimated and shown on Table 6.

As can be seen from Table 6, GHG emissions associated with the manufacturing and delivery of the goods purchased is larger than the emissions from the direct use of energy and from waste. This highlights the importance climate change mitigation of several environmental initiatives such as:

- Food waste reduction;
- Buying durable products;
- Buying local products;
- Recycling and the circular economy (end-of-product-life material recovery and reuse); and
- Repurposing and renovating existing buildings.

Table 6: Estimated Average Consumption-Related GHG Emissions in Ontario

Household activity or purchases	Average Annual Lifecycle GHG Emissions (tonnes CO_2e per person)
Air travel – domestic	0.2
Air travel – international	1.2
Food – beef (e.g., enteric fermentation, processing, transportation)	0.5
Food – other (e.g., fertilizer, farm fuel use, processing, transportation)	0.9
Home – raw material extraction and processing, home construction	0.3
Home – natural gas extraction and processing, pipeline transportation	0.5
Other purchased goods and services (e.g., clothing, electronics, internet)	3.2
Vehicle – raw material extraction and processing, parts manufacturing and assembly	0.5
Vehicle fuel – oil extraction, fuel refining, pipeline transportation	0.7
Total Consumption (Scope 3) Emissions	**8.1**

Source: Environmental Commissioner of Ontario report, Climate Pollution: Reducing My Footprint, 2019

Tomatoes grown in the Meredith Community Garden

9.4. What are the Preliminary Benefits and Costs at the Household Level?

Moving ahead with any of the household actions presented in Section 9.3 will require varying amounts time and expertise to plan and execute and costs ranging from very little to potentially quite large. While every household is unique and the financial, time and expertise requirements to take on most climate actions can vary significantly based on many factors, the following household action preliminary cost estimates and associated cost-saving benefits have been compiled based on available information, with specific assumptions clearly identified.

These estimates are provided to help build a foundation of information to assist Londoners in understanding the potential magnitude of costs and efforts required for some of the household climate actions presented in the CEAP, but the specific requirements for any household may vary significantly.

Transportation and Mobility

For households considering electric vehicles, the Ontario-based non-profit organization Plug'n Drive provides an on-line calculator to estimate the costs and savings associated with all electric vehicle models compared to a gasoline-fueled vehicle of similar size and trim. For example:

- A new Kia Niro plug-in hybrid has a $9,300 net premium over an equivalent gas-fueled vehicle (Honda HR-V) but will currently have a payback time of around six years through annual fuel cost savings (1,200 L of gasoline per year) and lower maintenance costs.

- A new Kia Niro EV has a $19,200 net premium over an equivalent gas-fueled vehicle (Honda HR-V) but will currently have a payback time of around nine years through annual fuel cost savings (1,600 L of gasoline per year) and lower maintenance costs.

For households considering replacing their existing vehicle with an e-bike or a transit pass, the Canadian Automobile Association provides an on-line calculator to estimate the costs associated with owning and operating a vehicle by make and model. For example, a paid-off 2016 Toyota Corolla that is only driven 10,000 kilometres per year for in-town trips has about $5,000 in annual operating and maintenance costs:

- About $2,000 for maintenance;
- About $1,800 for insurance; and
- About $1,200 for fuel.

Given that the average costs of a new e-bikes are about $3,000 to $5,000, replacing this vehicle with an e-bike would pay for themselves within one year. Cargo e-bikes capable of carrying groceries, with a cost range of $5,000 to $10,000 depending on the make and model, would pay for themselves within about two years.

Replacing this vehicle with a London Transit monthly pass, at $1,140 per year, would save almost $3,900 per year (over $320 every month).

Home Energy Retrofits

The costs and savings associated with home energy retrofits is largely dependent on the age, condition and size of the house, with older homes generally having greater potential for savings. Incentives of up to $5,000 are available from both Enbridge Gas and the Canada Greener Homes program, but home owners are not able to use both programs for the same measure (e.g., cannot apply to both programs for draft-proofing). However, incentives for different measures can be combined between these programs to allow households to receive incentives up to $10,000. Both programs require a home energy audit before the retrofits can take place.

Based on background market research that has been carried out in support of a proposed home energy retrofit program for London, the most common older housing stock in London are single-family homes build in the 1950s through to the 1970s. These homes typically are heated with high-efficiency gas furnaces already, so future retrofits would likely involve improving insulation, draft proofing (air sealing), and hybrid heating with air-sourced heat pumps paired with existing high-efficiency gas furnaces. Net-metered solar power may also be of interest to some households.

High-level costs and estimated payback time from lower utility bills for these measures are as follows, noting that these will vary significantly depending on the age, size, and current condition of any house:

- **Smart thermostat** – about $350, with about a three-year payback currently. Enbridge Gas offers a $75 incentive as well as a free thermostat for qualifying lower income households.

- **Draft-proofing (air sealing)** – about $750, with about a three-year payback currently. Enbridge Gas offers a $150 incentive or free draft-proofing for qualifying lower income households. Canada Greener Homes also provides incentives.

- **Basement insulation** – about $3,000, with about a ten-year payback currently. Enbridge Gas offers a $1,250 incentive or free insulation for qualifying lower income households. Canada Greener Homes also provides incentives.

- **Attic insulation** – about $3,000, with about a 30-year payback currently. Enbridge Gas offers a $750 incentive or free insulation for qualifying lower income households. Canada Greener Homes also provides incentives.

- **Wall insulation** – about $7,500, with about a 25-year payback currently. Enbridge Gas offers a $3,000 incentive. Free insulation for qualifying lower income households. Canada Greener Homes also provides incentives.

- **Air-sourced heat pump** – about $4,000 premium over a new central air conditioning unit. Enbridge Gas is testing a new $3,200 incentive that does not require a home energy audit as part of their pilot project. The Canada Greener Homes program also offers a $4,000 incentive but requires a home energy audit. This measure is expected to break even, with more information expected once the pilot project has been completed.

- **Net-metered solar power** – about $15,000 to $17,500 for a 5-kilowatt system. The Canada Greener Homes program offers a $5,000 incentive. Payback time is currently about 17 to 21 years.

For Londoners in rented homes, the measures above would need to be undertaken by property owners. However, some draft-proofing measures can be undertaken by tenants at a low cost (well under $100), such as:

- Temporary window film for draft-proofing and insulation;
- Electrical outlet foam gaskets for exterior walls; and
- Draft-proofing tape for exterior doors.

Emissions Offset and Green Energy Credits

Emissions offset credits are greenhouse gas emission reductions or carbon sequestration (e.g., CO_2 captured by trees) from larger-scale, project-based activities that are sold to compensate for emissions made elsewhere. Offset credits can be generated and sold in both regulatory (for large industrial emitters) and voluntary programs (including small businesses and households) to help finance these projects.

Emissions offset credits and similar green energy credits are available to Londoners today. Companies such as Bullfrog Power offer the purchase the green energy credits for renewable electricity generation, renewable natural gas, and green fuels to offset the emissions from the customer's use of electricity, natural gas, gasoline and/or diesel. Other companies such as Less, Planetair, and Tentree offer offsets for flights as well as homes. For example:

- **Renewable natural gas** – about $41 per month for 220 cubic metres of gas ($0.19/$m^3$) in addition to what Enbridge Gas charges;

- **Renewable electricity** – about $21 per month for 850 kilowatt-hours (2.5 cents per kWh) in addition to what London Hydro charges;
- **Green fuel** – about $0.43 per litre (in addition to what local gas stations charge); and
- **Emissions offsets** - $20 per tonne for Canadian Standards Association (CSA) Standard-Certified Canadian Offsets, or about $18 per month for the average single-family household (in addition to the average household energy costs of about $460 per month in 2019). This cost is likely to increase over time as demand increases.

It is important to note that there are challenges regarding the use of offsets within the local community level, specifically around accounting for community wide greenhouse gas emissions. At this time, the City of London does not have access to any data from offset providers on the total number of offsets purchased (or sold) on an annual basis by Londoners and London businesses. As a result, City staff are unable to account for their use and contribution towards local emission reductions currently.

Although verified offset credits have been used to date by businesses and corporations wishing to demonstrate climate leadership, further research into community-wide greenhouse gas emissions accounting methods (i.e., the need to avoid "double-counting" of reductions) and other issues is required to determine the overall value of emission offset credits and green energy credits as a greenhouse gas emission reduction measure at the household level.

Food Waste Reduction (Avoidance)

Food waste reduction (avoidance) can be accomplished in many ways most of which will have only minor costs (e.g., reusable storage containers) and has the potential for significant savings (e.g., $450 to $600 per year for the average London household in 2019). Reducing the amount of uneaten food that goes to waste can be accomplished by meal planning prior to shopping to ensure only the needed amount of food is purchased and properly storing both perishable food and leftovers and consuming them before they go bad.

Londoners can reduce wasted food generated by retailers by purchasing "ugly" fruits and vegetables and taking advantage of deals on discounted fruits and vegetables for recipes that can accommodate them.

Looking for locally produced foods can reduce the amount of demand for foreign foods, which results in lowered transportation emissions, though sometimes locally-produced products may come with a cost premium. There are added benefits with supporting local agricultural producers through community supported agriculture programs as well, like getting to know your local farmers and learning to eat more seasonally (which has a lower carbon footprint).

Home and Property Resiliency

As listed in Section 9.3, several actions can be taken at home on private property to prepare for and adapt to our changing climatic conditions. The following is a short list of measures including high level costs that a homeowner may consider. Since flooding has been identified as one of the highest risks in London caused by climate change, basement flooding preventative measures have been identified as a theme of many of the actions to prioritize.

- **Basement flood protection** – measures for your basement to prevent flooding from sewer back-up and overland flow including sump pits, sump pumps with back-up power supply, and sewer backflow prevention devices.
    - Sump pump – about $100 to $300
    - Sump pit – about $100 to $200
    - Sump pump battery back-up – about $200 to $400
    - Back-flow preventor / backwater valve – about $100 to $150

  Note: the labour costs for installation of the above listed basement flooding prevention equipment will require a qualified plumber which will add to these costs. City of London incentive programs provide for 90% cost recovery up to maximum funding limits for each item. For example, a sump pit and pump in the basement can access 90% funding to a maximum of $2,500 through London's basement flooding grant program.

- **Outdoor Surface Drainage Protection** – measures for your yard to prevent surface water from entering your home including basement window well covers, downspout extensions, downspout splash blocks, and landscaping to maintain or create surface swales. Increasing permeable surfaces may also benefit drainage.
    - Basement window well covers – about $50 to $100
    - Downspout extension – about $15 to $25
    - Downspout splash block – about $25 to $30
    - Drainage swale landscaping
        - Grass seed – about $15 to $20
        - Topsoil – about $5 to $10
        - Shovel – about $20 to $50

  Note: the above measures do not typically require professional help to install, and the efforts required can normally be completed by the homeowner.

- **72 Hour Emergency Kit** – in the event of a power outage, neighbourhood disaster or any event that requires Londoners to shelter-in-place, these kits can help in the short term. Typical items contained in a 72-hour emergency kit include: bottled water, medications, food for 3 days, first aid kit, wind-up flashlight and radio, external battery pack or wind-up phone charger, dust mask and duct tape, whistle, personal sanitation items, important documents, cash in small bills

and coins, warm clothing, and blankets or sleeping bags. Pre-assembled kits range from about $200 for a two-person kit and $300 for a four-person kit, to about $500 for a four-person deluxe kit.

- **Tree Planting** – planting native trees around you house will provide shade in the summer and can act as a wind break in the winter months reducing the home energy needed for both summer cooling and winter heating. They also absorb carbon dioxide and provide oxygen, therefore providing both climate adaptation and mitigation benefits in addition to absorbing water in their leaves and roots. Boulevard trees also provide the same benefits, and their planting in appropriate locations should be encouraged whenever feasible.

    - tree prices will vary with size, species, and local abundance,
    - wood chips, soil and compost are commonly sold in bags at the City of London's Enviro Depots ($5 per 30 litre bag) or commercially available in bags from many London businesses,
    - wooden stakes to support newly planted trees range from $5 to $10 for a dozen.

    Note: tree planting initiatives and programs are often available by contacting City of London Urban Forestry, Upper Thames River Conservation Authority or ReForest London. Lists of appropriate native species type for London and planting advice are also available through these offices.

10. Implementation - Ten Areas of Focus

In designing the Climate Emergency Action Plan for London, it was determined that a comprehensive, multi-sector, collaborative approach is needed to address the three goals of mitigation, adaptation and equity. It is important that efforts begin immediately.

Progress towards the expected results will be made through efforts by individuals, community organizations, employees, businesses, institutions and the City. To focus and coordinate efforts and acknowledge the need for leadership and collaboration from the right places at the right times, specific actions that will contribute to achieving the expected results are organized into 10 specific Areas of Focus.

The Areas of Focus have been developed based on details provided during the community engagement; compiled or recommended from other municipalities, organizations, committees, and others specializing in climate change actions; approved by Council; and/or recommended by City staff.

The Areas of Focus reflect the sectors of the economy that have responsibility for significant emissions in London. Together, these Areas of Focus include all activities and sources that contribute to London's current GHG emissions inventory and include sectors and activities beyond the current GHG emissions inventory that will become more significant as data sources become more readily available and emission reduction efforts progress (e.g., Scope 3 emissions from consumption and agricultural emissions).

These Areas of Focus also capture the needs, partners and entities that will be instrumental to improving London's resilience to climate change impacts. For each Area of Focus, an implementation workplan has been designed that is grounded in action and will be led or co-led by those with relevant expertise, authority and collective responsibilities. City staff will have involvement in all workplans as noted in the responsible services area(s) section. City staff will lead, co-lead and/or provide backbone support where it makes sense or is desirable. In some cases, limited to no City involvement is needed. Community and business leads and champions are fundamental to implementing the workplans.

The workplans are designed to be inclusive with specific emphasis placed on reaching groups not traditionally engaged. The workplans have room for many refinements and improvements to meet the needs of those who will be engaged.

Alignment of where to take action to address climate change is essential. The workplans provide this framework for all to understand the general direction for moving forward. This allows many participants to get engaged, develop their own plans, undertake work and take action at the same time while heading in the same direction. It

also avoids duplication and creates a stronger network. The workplans tell a short story about the importance of the Area of Focus for climate change mitigation and adaptation.

In summary, the workplans demonstrate the need to focus on collaboration, celebrate success, create opportunities for local and regional job growth, grow businesses, be creative, foster innovation and be inclusive. The workplans are contained in Appendix A and summarized below:

1. **Engaging, Inspiring and Learning from People**
   - Increasing Londoners' understanding of climate change, the need to act and fostering partnerships for action; moving from engaging to engaged.

2. **Taking Action Now (Household Actions)**
   - Empowering and enabling households to make climate-wise decisions right now.

3. **Transforming Buildings and Development**
   - Reducing emissions from new and existing buildings and building London towards a low-carbon, equitable and inclusive future.

4. **Transforming Transportation and Mobility**
   - Reducing emissions associated with the movement of people and goods.

5. **Transforming Consumption and Waste as Part of the Circular Economy**
   - Supporting and promoting responsible consumption, reduced waste and the growth of the local circular economy.

6. **Implementing Natural and Engineered Climate Solutions and Carbon Capture**
   - Accounting for, protecting and enhancing our natural infrastructure to preserve vital ecosystem services and exploring engineered solutions to capture carbon.

7. **Demonstrating Leadership in Municipal Processes and Collaborations**
   - Continuing to strive for net-zero, resilient municipal operations.

8. **Adapting and Making London More Resilient**
   - Improving the physical and social resilience of existing communities in the face of climate change.

9. **Advancing Knowledge, Research and Innovation**
   - Supporting and facilitating the ever-improving understanding of climate systems, potential solutions and their implementation in academia, private and government sectors.

10. **Measuring, Monitoring and Providing Feedback**
    - Grounding actions in real data that can be used to measure and monitor progress and communicate it transparently.

10.1. Matrix of Workplans to Expected Results

Each Area of Focus and its accompanying workplan address more than one expected result. Presented in Table 8 is the matrix alignment (intersection) of each Area of Focus workplan with the expected results. For example, the Engaging, Inspiring and Learning from People Workplan has actions that will lead to progress on all the Expected Results. The Implementing Natural and Engineered Climate Solutions and Carbon Capture Workplan focuses primarily on six of the Expected Results.

Table 8: Alignment Matrix of Area of Focus and Expected Results (● = aligned)

Area of Focus Workplans	Walkable, Complete Neighbourhoods	Increased Active Transportation & Transit	More Zero Emission Vehicles	More Net-zero Buildings	Lower Carbon Construction	More Resilient Buildings and Infrastructure	More Carbon Capture	Move Towards a Circular Economy	Increased Community Resilience	Increased Engagement on Climate Action
Engaging, Inspiring and Learning from People	●	●	●	●	●	●	●	●	●	●
Taking Action Now (Household Actions)	○	●	●	●	○	●	○	●	●	●
Transforming Buildings and Development	●	●	●	●	●	●	●	○	○	●
Transforming Transportation and Mobility	●	●	●	○	○	●	●	○	○	●
Transforming Consumption and Waste as Part of the Circular Economy	○	○	○	●	●	●	○	●	○	●
Implementing Natural and Engineered Climate Solutions and Carbon Capture	●	○	○	○	○	●	●	●	●	●
Demonstrating Leadership in Municipal Processes and Collaborations	●	●	●	●	●	●	●	●	●	●
Adapting and Making London More Resilient	●	●	○	●	○	●	●	○	●	●
Advancing Knowledge, Research and Innovation	●	●	●	●	●	●	●	●	●	●
Measuring, Monitoring and Providing Feedback	●	●	●	●	●	●	●	●	●	●

11. Summary of Key Implementation Requirements and Leadership Needs

For the Climate Emergency Action Plan to be successfully implemented, key steps, actions, nudging/changing attitudes, collaboration, and leadership are required. This chapter summarizes what is vitally important.

It begins with a public statement in section 11.1 from the Federation of Canadian Municipalities (FCM), the national voice of municipal government since 1901 with a membership that includes more than 2,000 municipalities and 20 provincial and territorial municipal associations.

Listed in Section 11.2 are implementation requirements that will be very helpful in moving from our current greenhouse gas reduction levels to the 2030 milestone target. Sections 11.3 to 11.5 highlight leadership needs.

The challenges, opportunities, and rewards of achieving higher levels of greenhouse gas reduction and making London more resilient require everyone to embrace change, adjust lifestyles, revise investments, and make new investments. At the same time, Londoners, employees, and employers will be required to accept that new initiatives come with some frustration and inconvenience. However, reducing emissions and making London more resilient must be considered as a long-term community investment opportunity in a similar light as our investments in education and health care. All this can be achieved through leadership and commitment.

11.1. COP26: Local Leadership is Critical to Meet Canada's Climate Goals

The President of the Federation of Canadian Municipalities (FCM), Joanne Vanderheyden, issued the following statement at the close of the United Nations climate change conference (COP26) on November 12, 2021.

> "FCM was pleased to be part of Canada's representation at COP26, where crucial work was done to highlight climate innovations happening in our communities that can be scaled up to help meet national goals to stop climate change.
>
> FCM proudly brought Canadian municipal voices to the international fight against climate change. Local governments have influence over half of the country's greenhouse gas emissions (GHG) and are key to meeting Canada's climate

goals. From coast to coast to coast, communities of all sizes are on the front lines of climate change, but they are also at the forefront of climate action.

In advance of COP26, FCM's Big City Mayors Caucus declared support for the Cities Race to Zero pledge as part of the United Nation's Race to Zero campaign. FCM's priorities at COP26 were to align national and local climate action, and promote the importance of scaling-up investments in local pathways to net-zero.

At COP and beyond, FCM is supporting disaster mitigation, strengthening local capacity on climate, supporting communities transitioning to net zero, as well as expanding the federal-municipal collaboration on climate action in our shared mission to meet Canada's 2030 emissions reduction target.

Municipal leaders play a critical role in the mission to meet Canada's emissions reduction target and set the country on a pathway to net-zero by 2050. FCM's representation at COP26 continued building strong relationships with key partners, including Minister of Environment and Climate Change Steven Guilbeault, the Minister of Natural Resources Jonathan Wilkinson and Canada's Ambassador for Climate Change Patricia Fuller.

Deepening federal-municipal coordination, aligning national and local climate action and identifying opportunities to scale up local solutions for deeper GHG reductions were at the heart of our discussions. It was also an opportunity to promote the ways municipalities can partner with the federal government to retrofit buildings, electrify the transportation sector, reduce methane from landfills and implement natural-climate solutions.

Our delegation also engaged with mayors and organizations from around the world who are committed to taking urgent action on the climate crisis. That is why our delegation met with important organizations such as the federally mandated Net Zero Advisory Body, the Canadian Institute for Climate Choices, C-40 and the Global Covenant of Mayors, to name a few.

Whether we're looking at retrofitting buildings and switching to zero emission transit, restoring wetlands and other natural assets, building bike paths, diverting waste, or building resilient infrastructure, municipal leaders know how to build more sustainable communities. Our unique expertise makes us creative and innovative problem solvers, and empowered with the right tools, local leaders will play a vital role in this mission.

The climate crisis is the defining challenge of our time, and while our participation in COP26 has given us determination to act, we know how much work remains to be done. As our window to act is growing smaller, FCM remains committed to working with its federal partners to tackle climate change and make it a pillar of our post-COVID recovery efforts."

11.2. Summary of Key Implementation Requirements

The key implementation requirements, in brief, have been developed from successful initiatives in London, a review of peer communities in Ontario and across Canada, and successful implementation of programs in related services.

1. **Supportive elected officials and City Council.** Elected officials are key to engaging their constituents in a manner that meets their needs. Consistent information that contains easy to understand expectations for all involved is key. A common voice, whenever possible, builds confidence in decisions and direction made by Council.

2. **Sustainable program funding from different levels of government**. Programs must be funded to meet requirements, meet community expectations and balance other priorities in the community. Funding must come from different sources as the local tax base cannot be expected to go beyond its "fair share".

3. **The role and value of volunteers**. Volunteers matter to climate change. The role of volunteering in London has always been strong. With respect to the environment, it has been growing in the last five to ten years. Environmental volunteers undertake vital activities to improve environmental health and knowledge in London. This work is worth hundreds of thousands of dollars each year and could not be done by governments alone. Talking about local environmental issues within the community helps others to see and understand the importance of the environment.

4. **The role of media.** Media play a critical role in informing the community about climate change initiatives and programs. It is critical that information is easily accessible and that spokespeople are available to respond to media requests for additional information. This will help the community learn about new initiatives and programs, as well as encourage them to obtain further details to help them understand how to participate.

5. **The role of implementation workplans.** The number of undertakings in the Climate Emergency Action Plan is significant. Ten workplans have been designed to address the required direction, focus on collaboration, identify potential participants, reach deep into the community, leave plenty of room for new ideas, and align direction wherever possible.

6. **Demonstrate leadership through examples**. Members of Council, City staff and community leaders must demonstrate that they are part of the change and prepared to participate in the new programs and initiatives ("lead by example").

7. **Delivery of information, education and promotion on climate change**. Climate change literacy is fundamental for the community. Meeting the needs of various audiences is equally important. For example, there are important similarities and differences between information (e.g., how to participate), education (e.g., how climate change impacts London) and promotion (e.g., incentives for energy efficiency in your home).

8. **Convenient, accessible and understandable programs and initiatives.** The more Londoners and businesses are asked to do, the more challenges can occur. It must be recognized that action on climate change is not priority for many households and businesses. Programs and initiatives need to be considered in the context of all Londoners and be as accessible as possible.

9. **Willingness of many Londoners to embrace lifestyle changes.** Londoners need to be behind these climate change programs and initiatives and embrace a culture of change.

10. **Incentives and rewards need to be considered.** Wherever possible, incentives and rewards should be considered to help with achieving the new and/or adjusted behaviours.

11. **Strong collaborations to deliver the new programs.** Opportunities to have shared implementation experiences and other collaborations will assist in achieving results in different communities across London.

12. **Build local capacity in the community.** Many of the initiatives will not led by the City, rather they will be led by the community. This can be achieved by ensuring that resources are available and a collaborative approach is established at the start.

13. **Flexibility and transition capabilities**. Some initiatives and programs planned today may need to be adjusted prior to implementation or after implementation. A certain mind-set is required to allow some initiatives and programs to develop on their own. This can allow for additional creativity, innovation and fun. In addition, larger programs can be designed at the outset to have transition capabilities as new technology and techniques become available.

14. **Strong and enforceable by-laws also must be considered.** By-laws are a strong form of education coupled with appropriate levels of enforcement. Locally, they are an important tool that moves beyond voluntary action, when needed.

15. **Tracking and measurement systems.** It is imperative that understandable tracking and measurement systems are established. Tracking and measuring progress is essential for continually improving climate action programs.

16. **Regular feedback.** Opportunities to provide feedback and information to elected officials, residents, media, businesses, service providers, etc. will ensure that progress (or lack of progress) is being shared. An annual report on climate action in an easy-to-read format that can be widely shared (in different formats) will be key.

11.3. How the City of London Should Lead

Community Leadership

The City of London – elected officials and staff - plays a critical role in reducing emissions and adapting to climate change.

The City has numerous leadership opportunities through Council directions, policies, frameworks and by-laws that can reduce greenhouse gas generation and make London more resilient. Strong leadership, forging partnerships and creating a collaborative environment will foster innovation and creativity, contain costs as best as possible, and will create an environment favourable to change and investment.

The City's leadership can help mobilize community action where there is none, facilitate communities where people are already coming together, and convene powerful networks of community groups, businesses, partners, stakeholders and others.

The City of London is often the first to respond to localized climate change impacts and has strong connections to the community and local knowledge.

Corporate Leadership

The net-zero GHG emissions target for energy-related emissions from City of London activities will be moved ahead from 2050 to 2045, supported by the following revised short and mid-term milestone targets:

- 65 per cent reduction in total energy-related emissions from 2007 levels by 2030
- 75 per cent by 2035
- 90 per cent by 2040

Striving to achieve net zero GHG emissions and improved resilience will require commitment and work in all City Service Areas. Some key actions identified in the Area of Focus Workplan for Demonstrating Leadership in Municipal Processes and Collaboration for 2022 to 2025 include:

- Utilizing the Climate Lens Process throughout the Corporation and considering options for incorporating an internal carbon price within the 2024-2027 Multi-year Budget and future budget processes;
- Reviewing City of London employee commuting and parking policies to incent reduced GHG emissions and review and strengthen anti-idling measures;
- Identifying and assessing options and resource requirements for a carbon accounting/budgeting framework to potentially be used in parallel with existing financial practices;
- Establishing appropriate performance indicators and annual targets for the phased implementation of the Sustainable Purchasing section of the Procurement of Goods and Services Policy;

- Advancing corporate energy conservation and demand management efforts;
- Continuing collaboration with partners and stakeholders on climate actions;
- Investigate options for responsible investment and borrowing to ensure City resources are working to advance corporate climate action goals;
- Revising City of London fleet vehicle and equipment procurement plans; and
- Establishing GHG emissions offsets policy.

11.4. How People Should Lead

Climate change leaders already exist in London and they are already taking important actions. They can be found working for or volunteering with community groups, clubs, schools and local government. For the amount of work ahead on climate change, this level of commitment needs to be strengthened, expanded, recognized and empowered where possible.

Just as the actions listed in the Taking Action Now (Household Actions) and the Engaging, Inspiring and Learning from People workplans appended to this document detail, there will be opportunities for partners, organizations and Londoners to participate actively in the CEAP. Opportunities for community and individual leadership are embedded in actions detailed in the Engaging, Inspiring and Learning from People Area of Focus Workplan which include:

1. Leveraging work being done to support other major projects, convene and co-create a community-led, City-supported group to extend the reach of the CEAP into the community and further inform and support climate action in London.

2. Seek input from partners, institutions, businesses, and Londoners on where efforts should be allocated to empower community and individual action as part of revisions and updating of the Climate Emergency Action Plan. This may include requesting expressions of interest from organizations to address common challenges that will lead to lower community-wide emissions and improved resilience.

3. Work with community partners to develop tools and resources to help Londoners and London businesses identify their contributions to greenhouse gas emissions and prepare for extreme weather events.

4. Work with community partners to develop means to recognize those Londoners and London businesses who are providing local leadership on climate action.

5. Maintain an engagement portal to ensure that Londoners have a place to provide feedback. This feedback will be reviewed, analyzed and referenced as part of upcoming revisions to the CEAP.

Emphasis will be placed on reaching those segments of Londoners who are typically not heard from during civic engagement exercises in order to add more unique voices and experiences to the framing of challenges ahead. There are many community groups already taking action on climate change, as detailed in the **Overview of Community Climate Action** supporting document available on the City of London's Get Involved website, and wherever individuals and community organizations are motivated to lead action, the City will do what it can to support those efforts.

11.5. How Businesses and Institutions Should Lead

In the same way that community and individual leadership is being encouraged and reflected in the Area of Focus Workplans, so too is leadership from businesses and institutions. In many areas it is there now. Like the community, it needs to grow to keep pace with the action and changes required.

Wherever there are shared objectives, the City and London businesses and institutions should be coordinating efforts, whether that be through formal initiatives or informal. The Engaging, Inspiring and Learning from People workplan includes the following actions that directly relate to identification and implementation of such coordination:

1. Convene and co-create a business and institution-led group to extend the reach of the CEAP into the business community, further inform and support climate action in London, and focus on local and regional economic development opportunities small and large. A key focus of this group would include:
    a. creating the 'business case for climate action'
    b. supporting local business and the economy
    c. increasing the percentage of energy expenditures in the local and regional economy
    d. aligning CEAP actions and other related plans, where possible, to support local business planning, actions and future growth including sustainable purchasing practices, local economic development and supporting the circular economy

2. Facilitate the creation of partnerships with businesses, community organizations, non-profits and others to advance climate action in the community, where possible.

The businesses and institutions working in the development and building sectors will also have unique opportunities and responsibilities to lead on actions in their areas of expertise. The "Transforming Buildings and Development" Area of Focus Workplan refers specifically to advancing partnerships for action with London's Development Industry that will result in more energy efficient, lower emission and more resilient development.

London's business community is already taking strong action, including almost two thirds of London's 85 largest employers (by number of employees) as is detailed in the **Overview of Business and Employers Climate Action** supporting document available on the City of London's Get Involved website. All businesses and institutions can also lead by example on climate action and sustainability by taking advantage of the program offerings of Green Economy London, London's Green Economy Canada hub for sustainable business. Continued support and encouraged participation by London businesses and institutions is expected to raise the bar on energy efficiency, resilience and knowledge sharing on climate action across London's economy.

Many organizations will have opportunities to speak out and engage with the CEAP where initiatives or actions intersect with business interests. This may include through transportation demand management initiatives, a Transportation Management Association, waste reduction initiatives, and opportunities to advance circular economy principles.

11.6. Development of a Process to Receive and Review Ongoing Feedback and Ideas

Engaging community-wide is an essential part implementing the CEAP. Area of Focus 1, Engaging, Inspiring and Learning from People and the workplan lay out how this will be achieved. These actions align with Area of Focus 10, Measuring, Monitoring and Providing Feedback and how London will be kept informed on progress. Threaded throughout all workplans is the need for engagement, dialogue and understanding.

During the input and feedback phase for the draft Climate Emergency Action Plan (February to March 2022), it became clear that Londoners, businesses and employees want to have an ongoing voice; not just provide comments and feedback when documents and materials are available for review. This voice includes providing ideas, actions, solutions and experiences.

To address this, an action has been added to Area of Focus 1, Engaging, Inspiring and Learning from People to create ongoing opportunities to participate, comment and/or provide feedback in the CEAP. This will provide information to City staff, Council, community partners and/or stakeholders on a more frequent basis. It will also act as an input for the Area of Focus 9 Advancing Knowledge, Research and Innovation. It will also allow for participants to get engaged more frequently rather than wait until specific opportunities present themselves.

This can be achieved by using a combination of existing tools and techniques (e.g., use of the City of London Get Involved website, use of other websites, design charrettes, open space meetings, crowdsourcing) and creating opportunities for actions such as:

- Idea generation forums and community think tanks
- Focus groups and panels for idea testing

- Brainstorming and problem-solving sessions
- Community and social innovation approaches
- Community storytelling, sharing and replicating

Examples of the above approaches exist in London today through groups like Pillar Nonprofit Network and organizations outside London like the Tamarack Institute and the Centre for Social Innovation.

Key to this level of engagement is managing expectations. Not all ideas can be implemented, are practical or can be funded. Processes will need to be established to ensure participants understand how to engage and how the information will be used.

A working model with some similarities at the City of London is the Neighbourhood Decision Making Program. Residents submit their ideas and get to vote on which ideas they want to see come to life (i.e., the community decides). Neighbourhood Decision Making allows residents to be involved in making their neighbourhood a better place to live, while connecting with their neighbours and engaging with local government. Those ideas are screened by City staff to ensure they can be implemented in both a practical and financially responsible manner. Currently this program does accept ideas focused on the environment and climate change.

Visit the Get Involved website to help us respond to the climate emergency together.

Tree planting at the Celebration Forest with ReForest London

APPENDIX A
Workplans by Area of Focus to Implement the Climate Emergency Action Plan

1. Engaging, Inspiring and Learning from People
2. Taking Action Now (Household Actions)
3. Transforming Buildings and Development
4. Transforming Transportation and Mobility
5. Transforming Consumption and Waste as Part of the Circular Economy
6. Implementing Natural and Engineered Climate Solutions and Carbon Capture
7. Demonstrating Leadership in Municipal Processes and Collaborations
8. Adapting and Making London More Resilient
9. Advancing Knowledge, Research and Innovation
10. Measuring, Monitoring and Providing Feedback

Area of Focus 1 - Engaging, Inspiring and Learning from People Workplan

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
Purpose of this Workplan	The Engaging, Inspiring and Learning from People Workplan has been developed based on details: • provided during the community engagement, • compiled or recommended from other municipalities, organizations, committees, and others specializing in climate change actions, • approved by Council, and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion and action, as well as for measuring progress. Implementation strategies for the workplan are being prepared in early 2022. This workplan is designed as both a standalone item and is also connected and in support of the other nine workplans. A key component of this workplan is to ensure that implementation engagement is equitable and accessible, reflects the diverse needs of the community, and contributes to the success of the Climate Emergency Action Plan (CEAP) for all Londoners. This workplan uses guidance from the International Association for Public Participation (Equitable Engagement Best Practices and applying an Environment, Social, and Governance (ESG) lens. It has both a people focus and a business focus. Key priorities for Engaging, Inspiring and Learning from People include: • Talking climate change – driving climate conversations with all communities and, in particular, those communities traditionally marginalized from the climate conversation to overcome polarization, meet more needs, and inspire ambition and action for everyone. • Climate change literacy, knowledge and content – enabling more Londoners and employees to understand and see their connection with climate change, in particular through understandable information, local stories and images and other content in traditional and digital forms.

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
	• Personal and employee action – accelerating understanding of how to shift high carbon behaviours like single occupant vehicles to lower carbon behaviours like walking, cycling and transit. • People-focused policy – working with Londoners, businesses and groups to ensure the community and employees are central to key policies and decision-making. • All levels of government, businesses, institutions, Indigenous communities and neighbouring communities' actions and relationships – collaborating, aligning and sharing climate change goals, objectives and actions outcomes. • Co-creating the implementation specifics of this workplan – before the first phase of outreach begins, City staff will devise a plan to co-create portions of this workplan with the community, businesses, institutions, Indigenous communities and stakeholders. • Local and regional economic development – while climate change brings risks and uncertainties, it also brings business opportunities. The low-carbon transition creates opportunities to spend existing energy expenditures differently; creates opportunities for efficiency, growth and innovation; and creates opportunities for investments and to grow the circular economy.
Climate Change Expected Results	This workplan has been designed to measure and report on progress towards all expected results: Walkable, Complete Neighbourhoods Increased Active Transportation and Transit More Zero Emission Vehicles More Net-zero Buildings Lower Carbon Construction More Resilient Buildings and Infrastructure More Carbon Capture Move Towards a Circular Economy Increased Community Resilience Increased Engagement on Climate Action
Why Does this Matter?	This Workplan has four key words; Engage, Inspire, Learn and People. All four words are equally important with respect to climate change and they are intertwined. They must all lead to action on climate change.

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan

	In general, with respect to climate change, London can be described as a city where a small number of people are very engaged and many are somewhat engaged or not engaged at all. The number of Londoners in each of these three general categories has not been quantified. It is not uncommon to hear the phrase “people don’t care about climate change” and that it represents a lot of people. Most Canada-wide surveys do not support that notion. However, it must also be recognized that supportive survey responses do not always lead to action.
	
	In London, strong action on climate change has been demonstrated in the business, institutional and not-for-profit sectors, as well as by individuals, households, and at the City. In order to reach the targets outlined in the CEAP, however, all Londoners will need to elevate their level of understanding, engagement and action. To do this will require building on existing engagement and information approaches to provide Londoners with new information and motivation that supports their specific needs to take the actions they can on climate change. New approaches and ideas will also be needed.
	
	Two Canada-wide climate change polls shed some light on what Canadians think about climate change. While these polls are not London-specific, they provide a reasonable level of insight into the perspectives of Canadians that can be applied here:
	
	• Abacus Data; What do Canadians think about Climate Change and Climate Action survey https://abacusdata.ca/climate-change-cop26-canada/: 2,200 Canadians (a random sample of panelists conducted October 15 to 20, 2021) – “Generally speaking, how would you like to see governments in Canada emphasize policies that reduce GHG emissions?”
	  • 66% - more emphasis
	  • 19% - do nothing different from what is currently being done
	  • 15% - less emphasis
	
	• Leger; COP26 and the Future of Climate Change survey https://leger360.com/surveys/legers-north-american-tracker-november-9-2021/: 1,565 Canadians (representative panel conducted November 5 to 7, 2021) – “Do you think it is too late or that we still have time to reverse climate change?”
	  • 75% - I believe we still have time to put measures in place to stop climate change
	  • 25% - I believe it is too late and that the changes are irreversible

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
Background – How did we get here?	The City of London has undertaken energy conservation projects as far back as the early 1990s. The connection between energy use and greenhouse gas emission began to grow slowly in the London community as the focus tended to be on a wide variety of environmental impacts and actions. ReThink Energy London was the first city-wide community engagement program started in 2010 that focused on public awareness, encouraging stakeholder action and seeking input on sustainable energy and greenhouse gas emission mitigation actions. It resulted in the first draft Community Energy Action Plan (2013). The Community Energy Action Plan 2014 – 2018 was approved in July 2014. The final update on the plan was provided in April 2019. Rethink London was launched to engage Londoners in discussing what their city should look like in 2035. It concluded with The London Plan in 2016, the city's Official Plan. Policies that address climate change are included in almost every section of the plan. On April 24, 2019, Municipal Council declared a climate emergency. On November 26, 2019, Council recommended a series of actions to be completed to address the climate emergency, including the development of a CEAP and the creation and implementation of a Climate Emergency Evaluation Tool. The Climate Lens Process is now in use with two reports presented to the Civic Works Committee, a Standing Committee of Council, in August 2021. Over the last 10 to 20 years, many initiatives and actions have been implemented in many sectors in London that have a focus on sustainable energy, energy conservation, environmental protection, and climate change along with community engagement: • The City of London's CityGreen program is designed to help Londoners make 'greener choices'. CityGreen encompasses several Service Areas and divisions within the Corporation and includes such broad topics as sustainability and climate change. CityGreen displays have also been held at major events, such as the Lifestyle Home Show, Go Wild Grow Wild, Seedy Saturday, and at summer festivals in Victoria Park. • The London Environmental Network (LEN) officially launched in 2015, with a mission to build participation, collaboration, and capacity in London for community-led actions. There are about 50

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
	members currently in the network, many of which advance community knowledge and engagement on climate change issues. The LEN also delivers many of their own engagement programs. It is important to recognize that many of the members of LEN have been engaged in London for decades including Thames Region Ecological Association, ReForest London, Carolinian Canada, Nature London, Thames Talbot Land Trust, to name a few. • The Urban League of London (ULL) continues to support and encourage its members with environmental information and recently has been engaged climate change discussions. Many members of ULL such as Kensington Village Association have active projects. • Organizations such as Friends of Urban Agriculture London and the Middlesex London Food Policy Council engage in similar spaces with specific programs, actions and mandates. • Green in the City began in 2018 as a partnership between the London Public Library, LEN and the City of London as a method to engage Londoners in environmental topics and discussions. • Green Economy London, administered by the LEN, is one of seven membership-based Green Economy Hubs across Ontario supporting networks of businesses to set and achieve sustainability targets. Most of the 45+ member businesses of the Green Economy London program are small to medium enterprises, with a few larger businesses such as Libro and Trudell Medical. • The Environmentalist in Residence program is a partnership between the London Public Library and the City of London. One person from the community is competitively selected every year to act as the designated 'Environmentalist in Residence' for the Library. The City of London acknowledges that there are many equally important initiatives projects and programs not mentioned above by London individuals, groups and employers.
What has been done recently?	Specific to the development of the CEAP, the City of London led many engagement initiatives including: • The Get Involved website for feedback, surveys, documents, and related links;

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
	• used Ethelo's eDemocracy tool to provide Londoners with a Climate Action Plan simulator for both education and outreach; and • a range of videos for climate change education, including the 'Trouble with Bubbles' GHG emission visualization video. Summary data for the development of the Climate Emergency Action Plan indicates: • 2,700 individual, direct responses were received through engagement efforts; • Over 19,000 views/impressions (GetInvolved and eDemocracy site visits) occurred; and • Over 7,000 people attended live or viewed online recordings of City/LEN/London Public Library events in 2020-2021. The City of London acknowledges that many groups and people of London have not participated to date due to variety of reasons including challenges with COVID-19 pandemic, inability of the City to use different engagement methods, lack of awareness, trust, understanding and/or desire to participate, etc. These barriers will be addressed to the fullest extent reasonable during implementation. The London Environmental Network has launched a new program, Greener Homes London, offering virtual one-on-one calls with Londoners to help them make their home climate-friendly. Climate Action London has also hosted a number of initiatives in recent years including climate marches, movie screenings and providing climate action grants. Energy stakeholders, such as London Hydro and Enbridge, participate in pilot projects, offer incentives, information, and guidance. London businesses and institutions have also taken considerable action to acknowledge and begin to address the challenges of climate change. Almost two thirds of London's top 85 employers (by number of employees) have taken some form of climate action recently, including one or more of the following: • Published an environmental, climate change and/or sustainability commitment; • Committed to reducing greenhouse gas emissions; • Committed to a net-zero emissions target;

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
	• Committed to a zero-waste target; • Established climate change adaptation goals or strategies; • Established natural heritage protection, conservation and/or preservation commitments or goals; and/or • Engaged in partnerships with the City, the community and/or non-profit organizations to advance climate action.
Responsible City Service Area(s)	• Co-Led by Environment & Infrastructure, City Manager's Office, Enterprise Supports, Planning & Economic Development, and Neighbourhood and Community-Wide Services
Key Community Partners and Stakeholders	• City of London Advisory Committees • Community Networks (e.g., London Environmental Network, Urban League of London, Pillar Nonprofit Network, other networks) • Community Groups, Associations, Others (e.g., ReForest London, Carolinian Canada) • Other Organizations (e.g., Middlesex-London Food Policy Council, London Community Foundation) • Local First Nations and Urban Indigenous communities • Business Networks (e.g., Chamber of Commerce, London Economic Development Corporation, London Development Institute, London Home Builder's Association, Green Economy London, etc.) • Middlesex London Health Unit • Businesses, Institutions, Employers and Employees • Western University • Fanshawe College • London Transit Commission • Energy Stakeholders (London Hydro, Enbridge, Enwave) • Individuals, Students
Key Actions (and Milestones)	1. Leveraging work being done to support other major projects, convene and co-create a community-led, City-supported group to extend the reach of the CEAP into the community and further inform and support climate action in London. Before the first phase of broad implementation of the CEAP begins, City staff and partners will focus on networking and strengthening community connections. As per best practices, it is recommended that the community co-designs the engagement framework and participates in a 'task force'. To do this, staff will: a. Leverage existing structures (e.g., advisory committees, third-party organizations with established community networks) to

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
	ensure a range of perspectives and experiences are leveraged throughout the process; b. Work with other major initiatives and service areas, and in partnership with London's Community Diversity and Inclusion Strategy (CDIS) leadership and its working groups to develop, review and implement engagement plans that improve the inclusion of all Londoners; c. Ensure representation from Indigenous people, Black people and other equity-deserving groups on the workplan project team and ensuring the expanded project team provides a range of lived experience; d. Identify existing and historical engagement barriers as community connections are made, and form plans to remove/address them proactively; and e. Clearly define where each task lands on the spectrum of public participation as presented by the International Association for Public Participation (IAP2) Equitable Engagement Best Practices and to ensure there is a mutual understanding between practitioners, decision makers and the community about how input and ideas will be used. 2. Convene and co-create a business and institution-led group to extend the reach of the CEAP into the business community, further inform and support climate action in London, and focus on local and regional economic development opportunities small and large. A key focus of this group would include: a. creating the "business case for climate action;" b. supporting local business and the economy; c. increasing the percentage of energy expenditures in the local and regional economy; and d. aligning CEAP actions and other related plans, where possible, to support local business planning, actions and future growth including sustainable purchasing practices, local economic development and supporting the circular economy. 3. Seek input from partners, institutions, businesses, and Londoners on where efforts should be allocated to empower community and individual action as part of revisions and updating of the Climate Emergency Action Plan. This may include requesting expressions of interest from organizations to address common challenges that will lead to lower community-wide emissions and improved resilience.

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
	4. Work with community partners to develop tools and resources to help Londoners and London businesses identify their contributions to greenhouse gas emissions and prepare for extreme weather events. 5. Work with community partners to develop means to recognize those Londoners and London businesses who are providing local leadership on climate action. 6. Continue to provide Londoners with the latest information on local GHG emissions and the expected impacts of climate change. 7. Facilitate the creation of partnerships with businesses, community organizations, non-profits and others to advance climate action in the community, where possible. 8. Maintain an engagement portal to ensure that Londoners have a place to provide feedback. This feedback will be reviewed, analyzed and referenced as part of upcoming revisions to the CEAP. 9. Work with community partners to develop methods to receive input and feedback on a more frequent basis to capture new ideas, improved ideas, innovative ideas and solutions to reduce GHG emission and make London more resilient including any processes needed to support this action.
Examples of Measuring Progress	Measuring progress for this workplan will be co-created as the workplan is finalized. It will likely contain a mixture of simple to more complex metrics, outputs, and outcomes. Targets are typically part of the process. Examples would include: • Number of organizations engaged • Number of participants • Website view statistics • Social media statistics • Number of downloads by document • Number of communications to various media • Number of requests for information or invitations to speak • Number of new groups reached • Number of climate change champions

Area of Focus 1	Engaging, Inspiring and Learning from People Workplan
	These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.
Resources	• CEAP Supporting Documents • Project Neutral carbon footprint calculator for households • International Association for Public Participation (IAP2) Equitable Engagement Best Practices

Area of Focus 2 - Taking Action Now (Household Actions) Workplan

Area of Focus 2	Taking Action Now (Household Actions)
Purpose of this Workplan	The Taking Action Now Workplan has been developed based on details: • provided during the community engagement; • compiled or recommended from other municipalities, organizations, committees and others specializing in climate change actions; • approved by Council; and/or • recommended by City staff. The purpose of this workplan is to signal to Londoners that action needs to be taken now and support for many of these individual actions is available now or being developed. How the workplan is operationalized will be determined in early 2022. The key actions listed in this workplan are either already underway or represents the next actions that should be looked at to meet the needs of Londoners. Existing actions have a proven track record and are supported by different organizations and businesses. Many of these actions have multiple parts, which are referenced but not fully detailed in this workplan.
Climate Change Expected Results	This workplan has been designed to make progress toward the following expected results: Increased Active Transportation and Transit More Zero Emission Vehicles More Net-zero Buildings Move Towards a Circular Economy More Resilient Buildings and Infrastructure Increased Community Resilience Increased Engagement on Climate Action
Why Does this Matter?	Londoners, living their everyday lives, control the two largest sources of local GHG emissions, namely personal vehicles and household management decisions. Combined, the choices that Londoners make on the road and at home are responsible for half of all local GHG emissions. For the average London household living in a single-family home, the breakdown of GHG emission sources can be attributed to the following: • 50% vehicular gasoline emissions;

Area of Focus 2	Taking Action Now (Household Actions)
	• 40% natural gas burned for home heating and hot water supply; • 7% organic waste sent to the landfill; and • 2% electricity use, including air conditioning. Energy affordability and energy poverty are real issues for many Londoners. Some lower income households will spend over $1,000 per year more on energy bills than their middle-income neighbours because they cannot afford to invest in energy-saving measures for their home. Climate change will bring warmer, wetter, and wilder weather to London. This increases the risk of riverine/overland flooding, basement flooding, damaged roofs, and power outages. Prolonged heat waves also pose a major health risk for those Londoners who do not have access to air conditioning. It is also important to recognize that the production and transportation of consumer goods and services, made in other parts of Canada or outside of Canada, have an environmental impact. In fact, GHG emissions associated with the manufacturing and delivery of goods and services purchased by the average household is larger than the emissions from the direct use of energy. Therefore, if there is to be meaningful progress in climate action, Londoners need to be motivated to act. To achieve more resiliency across the city, Londoners will need additional assistance to act.
Background – How did we get here?	Starting in the 1950s, private home ownership and property was enabled by rapidly expanding single-family housing tracts that were made accessible by automobiles. As a result, over six decades of automobile-oriented land use planning and transportation planning has led to home ownership and vehicle ownership being priorities for most Londoners. The 1960s brought high-rise multi-family apartment buildings to most larger cities in Canada, including London. However, single-family homes continue to be the dominant form of desirable new housing today. A consumer culture has propagated increased consumption of non-essential goods, the majority of which are made outside of Canada. Manufacturing facilities in countries with less strict labour or environmental standards continue to be predominant. These facilities produce economical goods for the global consumer, all at the cost of higher GHG emissions worldwide.

Area of Focus 2	Taking Action Now (Household Actions)
	Many properties in London are in the floodplain or could be susceptible to overland flooding, as they were constructed prior to associated land use policies or stormwater management. Many property owners may not be aware that they are at risk of flooding and need to be very aware of the potential impacts of extreme weather events.
What has been done recently?	Londoners have been taking action on climate change in many ways, some of which include support from various levels of government, utilities and community organizations. Some notable recent actions include: • The City of London provides grants for basement flooding protection measures; • The City of London has been providing Project Neutral's carbon footprint calculator for use by Londoners and several community partners, including the London Environmental Network and Climate Action London; • The City of London used Ethelo's eDemocracy tool to provide Londoners with a Climate Action Plan simulator for both education and outreach; • The City of London has used a range of videos for climate change education, including the 'Trouble with Bubbles' GHG emission visualization video; • The City of London offers the Growing Naturally home inspection and consultation program to analyze household water usage with live water usage monitoring to identify leaks and opportunities to save water through behavioural changes, fixture updates, or gardening advice; • The City of London and London Hydro have upgraded the water meter reading capabilities for most customers to provide interval water consumption data down to the hour to assist with the identification of leaks and unnecessary water usage; • Enbridge Gas provides incentives for home energy retrofits, including free home weatherization for qualifying households (Home Winterproofing program), for homes heated with natural gas, and rebates up to $5,000 for various energy saving measures (Home Efficiency Rebate program); • The Independent Electricity System Operator provides incentives for home electricity conservation, including free home weatherization for qualifying households for homes heated with electricity; • London Hydro is running smart grid home pilot projects such as the London-2-London Pilot (distributed energy resources) and the Plus Pilot (peak demand management);

Area of Focus 2	Taking Action Now (Household Actions)
	• London Hydro and Enbridge Gas are collaborating on a pilot project, launched in 2021 and the first of its kind in Ontario, to determine how effectively electric air-source heat pumps, combined with homeowners' existing high-efficiency gas furnaces, are at reducing greenhouse gas emissions and decreasing energy consumption; • The London Home Builders Association (LHBA) has previously offered energy efficiency training to renovators, as well as provides information for residents about green renovations; • The Government of Canada's new Canada Greener Homes program provides incentives for home energy retrofits, including solar panels; • The Government of Canada provides incentives for purchasing new electric vehicles; • The London Environmental Network has launched a new program, Greener Homes London, offering virtual one-on-one calls with Londoners to help them make their home climate-friendly; and • Climate Action London has hosted a number of initiatives in recent years including climate marches, movie screenings and providing climate action grants.
Responsible City Service Area(s)	• Co-Led by Environment and Infrastructure, Enterprise Supports, Planning and Economic Development, Neighbourhood and Community-Wide Services, and Finance Supports
Key Community Partners and Stakeholders	• Federal and Provincial Government • Energy Utilities (Enbridge Gas, London Hydro, IESO) • Middlesex London Health Unit • Businesses, Institutions and Other Employers • Community Groups (e.g., London Environmental Network, Climate Action London, Urban League of London, ReForest London, Carolinian Canada, Thames Region Ecological Association, Urban Roots London, London Cycle Link, Big Bike Giveaway) • Other Organizations (e.g., Middlesex-London Food Policy Council, London Community Foundation)
Key Actions (and Milestones)	**1. Home Energy Retrofits (Timeline: 2022 - 2024)** a. Work with community partners to engage London homeowners on energy conservation, energy efficiency, and renewable energy climate actions b. Work with energy utilities to ensure all residents are aware of existing conservation programs, including options for a 'one window' information source for residents combining information from all local utilities together

Area of Focus 2	Taking Action Now (Household Actions)
	c. Work with energy providers on developing new and innovative energy conservation programs, including fuel-switching opportunities d. Finalize and present program design options for an FCM-funded home energy retrofit pilot project for launch in 2023, involving about 50 homes per year for three years, based on similar programs in place in Ottawa, Toronto, and other Ontario cities in 2022. Report back to Committee and Council on final pilot project design to obtain final approval. Reporting would occur at the mid-point of the pilot project and after completion including the next steps based on the findings. **2. Transportation and Mobility (Timeline: 2022 - 2024)** a. Continue to work with community partners (e.g., MLHU, London Cycle Link, etc.) to engage Londoners on walking, cycling, transportation choices such as carpooling, transit use, and intercity bus/rail travel **3. Zero Emission Vehicles and Equipment (Timeline: 2022 - 2024)** a. Work with community partners to promote existing provincial and/or federal programs that engage Londoners on adopting electric vehicles b. Review and provide options to reduce, restrict, or phase out fossil fuel consuming equipment (e.g., lawnmowers, trimmers, leaf blowers) by completing a study of emerging best practices, applicable legislation and jurisdiction, costs and benefits, potential incentive programs, and other factors (report back in 2023) **4. Addressing Energy Poverty (Timeline: 2022 - 2024)** a. Work with community partners to assist lower income Londoners with existing household energy conservation and efficiency measures (e.g., energy utility low-income support programs) and mobility (e.g., bicycle donation programs) b. Work with community partners to develop new programs that assist lower income Londoners with household energy conservation and efficiency measures (e.g., additional home energy retrofits) and mobility (e.g., discounted micromobility service fees) **5. Waste Reduction and Diversion (Timeline: 2022 - 2024)** a. Continue to work with community partners to implement waste reduction and diversion initiatives for households.

Area of Focus 2	Taking Action Now (Household Actions)
	6. Urban Agriculture (Timeline: 2022) a. Continue and grow the work of the Urban Agriculture Strategy to develop tools and resources to help Londoners grow their own food through community gardens or at-home gardening programs. b. Promote, support and help grow Middlesex London Health Unit, Middlesex-London Food Policy Council, and community partners encouraging climate-friendly diets and food choices (e.g., buying foods grown or produced locally) **7. Climate Resilience (Timeline: 2022 – 2024)** a. Continue to promote on-property stormwater management improvements for homeowners (e.g., property grading, placement of sheds, decks, and pools, minimizing hard surfaces, maximizing tree cover, rain gardens, etc.) b. Review effectiveness of existing City sump pump & sewer backflow valve incentive fund programs for homeowners. c. Promote climate resilience improvements for homeowners (e.g., hurricane clips, basement window well upgrades, grade adjustment for drainage, etc.) d. Work with energy utilities to promote low/zero emission backup power and/or energy storage systems to power essential services for residents to shelter-in-place in the event of loss of power from the electricity grid. e. Increase public awareness of flood risk and evacuation protocols for properties within the floodplain or flood-prone areas to support emergency preparedness. **8. Household Climate Change Action Information (Timeline: 2022 onward)** a. Work with community and business partners to continue to develop and compile details and information that will help households make decisions on climate action and ensure this information is promoted and easily accessible.
Examples of Measuring Progress	Some of these progress measures are exclusive to this workplan and others are duplicated in other workplans. **More Net-zero Buildings** • Number of existing programs and activities • Number of new programs and activities • Average natural gas use per residential customer (m^3/year) • Residential sector GHG emissions per person (tonnes/year)

Area of Focus 2	Taking Action Now (Household Actions)
	Increased Active Transportation and Transit • Number of existing programs and activities • Number of new programs and activities • % of in-town trips in London taken by active transportation and transit • % of trips to/from London taken by bus or rail • Number of registered vehicles per person **More Zero Emission Vehicles** • Number of existing programs and activities • Number of new programs and activities • % of new model year light-duty vehicles registered that are ZEV • % of all light-duty vehicles registered that are ZEV • Retail sales of fossil fuel (litres) per person per year • Retail sales of fossil fuel (litres) per registered vehicle per year **More Resilient Buildings and Infrastructure** • Number of existing programs and activities • Number of new programs and activities • Number of participants in basement flooding programs • Number of households with low/zero emission back-up power **Increased Community Resilience** • Number of existing programs and activities • Number of new programs and activities • % of households with indoor air cooling (e.g., air conditioning) • % of households experiencing energy poverty in London • Number of households provided with education materials about living in a floodplain or lot-level stormwater management best practices **Move Towards a Circular Economy** • Average amount of curbside waste disposed per households (kg/year) • % of curbside materials diverted from landfill • Number of participants in community gardens **Increased Engagement on Climate Action** • Number of participants by action These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.

Area of Focus 2	Taking Action Now (Household Actions)
Resources	• CEAP Supporting Documents • Project Neutral carbon footprint calculator • Enbridge Gas Distribution conservation programs • Independent Electricity System Operator conservation programs • London Hydro programs (smart grid, net-metered solar power) • Plug'n Drive website for information on electric vehicles in Canada

Area of Focus 3 - Transforming Buildings and Development Workplan

Area of Focus 3	Transforming Buildings and Development Workplan
Purpose of this Workplan	The Transforming Buildings and Development Workplan has been developed based on details: • provided during the community engagement; • compiled or recommended from other municipalities, organizations, committees and others specializing in climate change actions; • approved by Council; and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress. How the workplan is operationalized will be determined through additional consultation with Key Community Stakeholders and Partners.
Climate Change Expected Results	This workplan has been designed to make progress toward the following expected results: Walkable, Complete Neighbourhoods Increased Active Transportation and Transit More Zero Emission Vehicles More Net-zero Buildings Lower Carbon Construction More Carbon Capture More Resilient Buildings and Infrastructure
Why Does this Matter?	London's community GHG emissions inventory shows that buildings are a significant contributor to community emissions. Emissions from heating and powering buildings and building systems (including hot water) have represented around 1,160,000 tonnes of GHG emissions per year or about 43% of local GHG generated in recent years. Given the fact that most buildings have decades-long lifespans, addressing their emissions and the emissions from new buildings will be critical to achieving net-zero GHG emissions. The way in which London grows (locations, density and types of development) also has significant impacts on the availability and feasibility of different modes of transportation to satisfy the needs of all residents, how much infrastructure is needed, how energy is

Area of Focus 3	Transforming Buildings and Development Workplan
	generated and used, whether zero emission vehicles are accommodated, the space available for capturing carbon in forests, natural and urban areas, and whether communities are resilient in the face of the impacts of climate change on weather. Many of the construction materials used in new development and infrastructure, such as asphalt, concrete, and steel, also have large GHG upstream emissions. Therefore, changes in the types and methods of construction, building reuse and refurbishment and the use and management of recyclable building materials is important. In addition to emissions data and leading knowledge pointing to buildings and development being an important area to address, engagement work revealed that buildings and development was one of the most mentioned areas of concern where residents would like to see more action taken. Outside of London, other communities wrestle with the same issues around building energy use and emissions and the impacts and opportunities in development. This emphasizes the importance of coordinating with neighbouring communities to address shared priorities in this area.
Background – How did we get here?	Growth management in Ontario is governed by Provincial Policy Statements (PPS) that are periodically updated. Until the recent (2020) PPS update, limited climate change considerations were included within growth management direction, however the PPSs have had regard for promoting sustainable growth, active transportation and intensification (among other things). London had pursued development in a manner consistent with most municipalities prior to the acceptance of the London Plan (2016), which emphasizes a city structure and growth framework focusing on infill and intensification as a means to support the creation of complete communities, preserve more natural and agricultural lands, and increase the efficiency of and reduce the tax burden from public infrastructure. Work completed in several other municipalities on pathways to net-zero carbon all include significant workplans to address existing and new buildings' emissions. Many of these scenarios have been analyzed to determine that significant up-front costs are required in the next decade to realize far more in savings over the following

Area of Focus 3	Transforming Buildings and Development Workplan
	decades due mostly to the expected impacts of climate change on local weather and the escalating cost of carbon.
What are some recent actions?	• The London Plan sets out clear direction for building inwards and upwards around a public transit system based on nodes (i.e., clusters of major mobility and urban activity), creating mixed-use complete communities, supporting active and public transportation, and the protection and enhancement of the natural heritage system. • Community Improvement Plans make funds available for energy efficiency retrofits in certain areas of London where they apply. • Work on the Masonville Secondary Plan embeds the principles of climate friendly development at the secondary plan level. • West 5, a Sifton Properties development, is one of Canada's first and largest net-zero communities.
Responsible City Service Area(s)	• Led by Planning and Economic Development • Supported by Environment and Infrastructure, Finance Supports
Key Community Partners and Stakeholders	• Provincial and Federal Governments • London Development Institute (LDI) and developers not represented by LDI • London Home Builders Association (LHBA) and builders and contractors not represented by LHBA • London District Construction Association • Consultants/engineers supporting development and construction • London Chamber of Commerce • London Economic Development Corporation • Energy Utilities (London Hydro, Enbridge Gas, Enwave, Hydro One) • Community Groups (e.g., London Environmental Network, Urban League of London) • Conservation Authorities
Key Actions (and Milestones)	**1. Advancing Partnerships for Action with London's Development Industry (Timeline: 2022 – 2025)** a. Establish a shared understanding of the challenge and shared commitment from the City of London and the development and building industries to address climate change b. Collectively compile a list of hurdles and/or roadblocks preventing (or perceived to be preventing) more energy efficient and resilient development

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	c. Identify shared actions that will assist the development industry in overcoming existing and perceived hurdles and/or roadblocks preventing more energy efficient and resilient development d. Establish objectives, metrics and timelines that will result in reduced GHG emissions, reduced carbon intensity of materials, and improved resilience to local climate change impacts from new development and buildings **2. Addressing New Developments (Timeline: 2022 – 2025)** a. Reduce or eliminate parking minimums within the Zoning by-law b. Review and provide options to reduce, restrict, or phase out fossil fuel as the primary source of heat in all new buildings in London as of 2030 including a review of other municipalities, applicable legislation and jurisdiction, implementation benefit, and other factors c. Incorporate the detailed review of intensification targets, permitted heights, and other measures of intensity in relation to growth trends and climate change mitigation and adaptation as part of the 5-year comprehensive Official Plan review d. Review and incorporate climate change considerations into development application reviews, such as development-specific transportation demand management and energy management, including presentation of proposed development alignment with London's climate action goals and outcomes in staff reports e. Revise the Design Specifications and Requirements Manual to ensure climate change considerations are included f. Integrate climate change considerations into the Development Charges Background Study and associated growth infrastructure master plans g. Review options to encourage or mandate EV charging in new development h. Review and strengthen secure bike parking and storage in new development within the Zoning By-law i. Review and strengthen requirements for pedestrian, transit, and bike network access within the Zoning By-law j. Assist London Hydro as they continue to actively support GHG reduction projects such as new Net Zero communities **3. Addressing Existing Buildings (Timeline: 2022 – 2025)** a. Review opportunities for a targeted use of local improvement charges (LICs), Community Improvement Plans (CIPs) or other methods for funding major energy retrofits and climate adaptation measures for multi-family residential buildings

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	b. Review and provide options for purpose-developed CIPs for energy upgrades for buildings c. Advocate for Federal and Provincial incentives for building retrofits d. Encourage uptake of energy utility conservation programs and incentives for building energy retrofits e. Review and provide options to establish energy efficiency standards for residential rental properties including a municipal scan of applicable property related by-laws, applicable legislation and jurisdiction, implementation benefit, and other factors f. Review and provide options to establish temperature control requirements in property related by-laws to address extreme weather conditions including a review of other municipalities, municipal scan of applicable property related by-laws, applicable legislation and jurisdiction, implementation benefit, and other factors g. Review and provide options to establish requirements for “shelter-in-place" emergency power for high-rise, multi-unit residential buildings including a municipal scan of applicable legislation and jurisdiction, implementation benefit, and other factors h. Assist London Hydro as they continue to invest in local electricity distribution infrastructure to reduce power system losses including rebuilding 4kV infrastructure using modern 27.6kV technology
Examples of Measuring Progress	**Walkable, Complete Neighbourhoods** • % of development applications reviewed with climate lens • % of Londoners living within a 15 minute walk/roll of their daily needs **Increased Active Transportation and Transit** • % of new developments incorporating secure bike parking and storage • Number of parking spaces per unit for new development **More Zero Emission Vehicles** • % of applicable building permits including EV charging stations • Number of EV charging stations installed on private property city-wide

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	More Net-zero Buildings • Number of multi-family buildings utilizing LIC/Property Assessed Clean Energy (PACE) or other retrofit program(s) • Average GHG emissions per person from all single-family residential buildings • Average GHG emissions per unit floor area from all commercial and institutional buildings • Average GHG emissions per unit floor area from all new residential, commercial, and institutional buildings • % of new construction built to net-zero (or equivalent) standards • % of new construction built to net-zero ready standards • % of new construction built with one or more low-or-zero carbon solutions (e.g., heat pumps, solar panels, etc.). **Lower Carbon Construction** • % of new multi-family residential and commercial buildings constructed with mass timber • % of new multi-family residential and commercial buildings constructed with low-carbon concrete **More Carbon Capture** • Density of development (units/Ha.) for greenfield development • % of new units built within the built area boundary **More Resilient Buildings and Infrastructure** • % of high-rise, multi-unit residential buildings with "shelter in place" emergency power • % of high-rise, multi-unit residential buildings with minimum cooling standard adopted These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.
Resources	• CEAP Supporting Documents • The London Plan • Towards Low Carbon Communities: Creating Municipal Green Development Standards (Clean Air Partnership and Federation of Canadian Municipalities) • Briefing Note - Municipal Green Development Standards (Clean Air Partnership)

Area of Focus 4 - Transforming Transportation and Mobility Workplan

Area of Focus 4	Transforming Transportation and Mobility Workplan
Purpose of this Workplan	The Transforming Transportation and Mobility Workplan has been developed based on: • feedback obtained through the community engagement; • compiled or recommended from other municipalities, organizations; committees and others specializing in climate change actions; • direction from Council; and/or • input from various City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress. How the workplan is operationalized will be determined in early 2022.
Climate Change Expected Results	This workplan has been designed to make progress toward the following expected results: Walkable, Complete Neighbourhoods Increased Active Transportation and Transit More Zero emission Vehicles More Resilient Buildings and Infrastructure More Carbon Capture
Why Does this Matter?	Over the 2015-2019 period, before the COVID-19 pandemic, transportation represented about 1.4 million tonnes of GHG emissions per year or about 47% of local GHG emissions. This included in-town trips, trips to/from London, and goods movement. Personal vehicles account for most of London's transportation emissions, at almost 1 million tonnes of GHG emissions per year. Up to one half of these emissions are for in-town trips, many of which could be replaced by walking, cycling, and transit. In 2016, trips taken as the driver of an automobile represented 64 per cent of all daily trips made within the greater London area during the weekday rush hour. The extraction, refining, and transportation of petroleum-based fuels for use in London is a large source of upstream GHG emissions from sources such as Alberta's oil sands and Sarnia's oil refineries.

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	London's share of these emissions is roughly in the 500,000 tonnes per year range. Vehicle manufacturing, from raw material extraction through to vehicle assembly, is another large source of upstream GHG emissions. London's share of these emissions is roughly in the 400,000 tonnes per year range. Many of the construction materials used in transportation infrastructure, such as asphalt, concrete, and steel, also have large GHG upstream emissions. Providing more accessible mobility options is critical for ensuring equity for Londoners of all ages, abilities, gender, and income levels.
Background – How did we get here?	The convenience provided by automobiles has been so great that households are willing to spend over $10,000 per year per vehicle to operate and maintain them. On average, there are 1.6 vehicles owned per household in London. As a result, over six decades of automobile-oriented land use and transportation planning has led to dependency on automobiles for in-town trips (78% of in-town trips) and trips to/from London (99% of trips). (Source: Google's Environmental Insights Explorer) As noted in the 2016 Household Travel Survey Summary Report, trips taken as the driver of an automobile represented 64 per cent of all daily trips made within the London Census Metropolitan Area during the weekday morning peak period. This is better than it was in 2002, when surveys indicated that drivers represented 73 per cent of all daily trips. This dependency on automobile use adds a financial burden to many households in London. Those households that cannot afford to own a vehicle often cannot access employment opportunities, while many employers have difficulty finding employees if they are in a part of London without transit service or cycling opportunities.

What are some recent actions?	• The London Plan (Official Plan) has established a plan for London to grow inwards and upwards, supported by several mobility-related Key Directions:
	  ○ Direction #1 - Plan strategically for a prosperous city
	  ○ Direction #2 - Connect London to the Surrounding Region
	  ○ Direction #4 - Become one of the greenest cities in Canada

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	○ Direction #5 - Build a mixed-use compact city ○ Direction #6 - Place a new emphasis on creating attractive mobility choices ○ Direction #7 - Build Strong, healthy, and attractive neighbourhoods for everyone ○ Direction #8 - Make wise planning decisions • London's 2018 Complete Streets Design Manual is being implemented to provide streets which are design to be safe for everyone including pedestrians, cyclists, transit users and automobile users, and to include green infrastructure and low impact design features. • The new Masonville Secondary Plan sets policies to create a "Transit Village" with improved cycling, pedestrian, and transit connections and infrastructure. • Three bridges built on the Thames Valley Parkway to improve the connectivity of mobility infrastructure. • Higher-order cycling infrastructure (protected bike lanes) has been installed on sections of Dundas Street, Colborne Street and on Riverside Drive connected to the Thames Valley Parkway. • Implement Vision Zero road safety actions that make active transportation more appealing such as an annual implementation of pedestrian crossovers, pedestrian and bicycle signals, lower area speed limits and automated speed enforcement. • Added a staff position dedicated to the implementation of active transportation infrastructure • Secure bike parking (bike lockers) has been provided in three locations in downtown London as part of a pilot project. • Electrically assisted bicycles (e-bikes) have been introduced to support the delivery of municipal services such as parking enforcement. • Electric vehicle (EV) charging stations have been installed at most major City of London community centres in 2021 through an innovative land lease agreement with an EV charging service provider. Three curbside EV charging stations were installed by London Hydro in 2019 as part of a national pilot project with Natural Resources Canada. • Continued support for the growth of both conventional and specialized transit services across the city, making public transit a more viable option for more Londoners • At the April 28, 2021 meeting of the London Transit Commission, the Commission approved the award of a contract to the Canadian Urban Transit Research and Innovation Consortium (CUTRIC) for the completion of a Zero emission Bus (ZEB) Implementation

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	Strategy. The initial implementation step calls for LTC to procure 10 battery electric buses and 7 chargers (3 overhead and 4 plug-in). This project will also require facilities work to upgrade the grid connection, install the required charging equipment, and retrofit facilities to accommodate the zero emission buses. • Council refers a report from the Cycling Advisory Committee called Cycling Master Plan Review to Civic Administration (focus on greenhouse gas reduction from cycling) • Sections of Waterloo Street have been reconstructed with bioswales to improve stormwater management and minimize impacts on the environment.
Responsible City Service Area(s)	• Led by Environment and Infrastructure, Enterprise Supports, and City Manager's Office • Supported by Planning and Economic Development, Neighbourhood and Community-Wide Services, Finance Supports, London Transit Commission
Key Community Partners and Stakeholders	• Provincial and Federal Governments • City of London Advisory Committees • London Economic Development Corporation • London Transit Commission • Energy Utilities (London Hydro, Enbridge Gas) • Middlesex London Health Unit • Business Associations (e.g., London Chamber of Commerce, Green Economy London) • Community Groups (e.g., London Environmental Network, London Cycle Link, London Electric Vehicle Association, Urban League)
Key Actions (and Milestones)	**1. Mobility Master Plan (Timeline: 2021 - 2024)** a. Update Committee and Council on direction for the Mobility Master Plan (MMP) (November/December 2021) b. Launch MMP including community engagement, internal City teams and technical consulting team including comprehensive workplan for activities, analysis, feedback and reporting to Committee and Council. **2. Additional Active Transportation Actions (Timeline: 2022 - 2024)** a. Continue to implement active transportation infrastructure including sidewalks and cycling infrastructure in renewal, growth and standalone projects.

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	b. Continue to seek funding from senior levels of government for new bike infrastructure c. Continue to support the Active and Safe Routes to School Program. d. Review and provide options for alternative municipal funding sources to support new active transportation infrastructure and programming such as the introduction of a new fee for overnight on-street parking permits, increasing parking rates at municipally controlled parking stalls, and/or a new parking levy on owners of commercially owned parking stalls e. Review and provide options for winter maintenance practices to place a higher service level for snow and ice clearing on sidewalks, transit stops, and cycling infrastructure, including the relationship between winter maintenance standards and mode choice and life cycle cost implications. f. Review and determine types and appropriate level of support for micro-mobility (e.g., bike share) services g. Explore and test the use of time-specified car-free periods in high-volume pedestrian areas such as Dundas Place h. Finalize and implement a city-wide bike parking plan, including neighbourhood bike parking and secure bike parking services i. Use Cycling Performance Measures to track the progress and use of cycling infrastructure, supports and programs j. Assess options for “quick build” cycling infrastructure safety improvements to existing on-road cycling infrastructure (e.g., curb stops along bike lanes) **3. Additional Transit Actions (Timeline: 2022 - 2024)** a. Continue to implement priority rapid transit projects as per Council direction and Investing in Canada Infrastructure Program funding b. Continue to support the annual service improvements to the conventional and specialized transit services c. Review and provide options for integrating micro-mobility (e.g., bike share) services for first/last mile travel on public and/or private property d. Develop and promote programs to retain existing riders and attract new riders to public transit e. Support development of gateway parking and transit connection(s) (e.g., Park and Ride) f. Advocate for a regional transportation system that supports London as a regional transit hub and provides frequent and

Area of Focus 4	Transforming Transportation and Mobility Workplan
	reliable connections to the Greater Toronto Area, Waterloo Region and Windsor-Detroit **4. Transportation Management Association (Timeline: 2022)** a. Establish a Transportation Management Association (TMA) for London employers to support and encourage employees to commute by walk/bike, transit, carpool, and support remote work options. **5. Encourage Zero Emission Vehicles (Timeline: 2022 - 2025)** a. Develop a plan to convert 100% of LTC's bus fleet to zero emission vehicles, based on CUTRIC study results, LTC approval and City approval b. Assist London Hydro as they actively work with London Transit and their consultant on the electrification of transit and the development of rapid transit routes c. Develop an electric mobility plan for London including: i. Increase public charging stations, parking arrangements, options for local incentives and other ideas to increase the use of EVs, e-bikes and similar options ii. Encourage and support the use of zero emission delivery services iii. Encourage and support the use of zero emission car-share services iv. Review and provide options for the Vehicle-for-Hire By-Law to mandate the use of electric vehicles or other zero emission vehicles including municipal scan, applicable jurisdiction, implementation benefit, and complexity analysis v. Review and provide options for encouraging the adoption and use electrically assisted bicycles vi. Grow the network of public electric vehicle and e-bike charging stations at major community facilities vii. Assist London Hydro with their regular review of trends in the EV market to ensure the local electricity distribution system can meet emerging demands due to the electrification of vehicles and fleets d. Complete the strategy for connected and automated vehicles that discourages zero-occupancy use, encourages shared ownership/service models, complements London's public transportation system, prioritizes active transportation road users' safety, and uses zero emission vehicles

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	e. Work with London Hydro to test smart grid strategies such as EV-to-grid (power storage) and EV-to-home (emergency power) f. Work with Enbridge Gas to promote solutions for 'hard to electrify' diesel vehicles in the community such as heavy-duty construction equipment and vehicles, such as compressed natural gas, renewable natural gas, or hydrogen to power these vehicles. **6. Expand By-law Enforcement Opportunities (Timeline: 2022 - 2023)** a. Review and provide options for using the Administrative Monetary Penalty System to allow the use of private video evidence to report by-law infractions such as idling vehicles, parking in bike lanes, parking in accessible parking spots, and blocking access to electric vehicle charging stations. **7. Low Impact Design (Timeline: 2022 - 2023)** a. Continue to review and provide options for alternative road designs that preserve existing mature street trees when roadway reconstruction projects are initiated b. Prioritize the importance of street trees in providing shade for pedestrians. c. Continue to review projects for climate change adaptation and low impact development opportunities. **8. Review Existing City Plans (Timeline: 2022 - 2023)** a. Review existing City plans to reconcile previously established policy areas that may now conflict with the Climate Emergency Action Plan.
Examples of Measuring Progress	**Walkable, Complete Neighbourhoods** • % of Urban Growth Area streets without sidewalks • Number of street trees planted per kilometre of sidewalk **Increased Active Transportation and Transit** • % of in-town trips in London taken by active transportation and transit • % of trips to/from London taken by bus or rail • % of Londoners within 800 metres of a multi-use path or protected bike lane • Number of households within 400 metres of a regular service public transit stop

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	• Number of households within 800 metres of a rapid transit or express bus transit stop • Number of transit riders • Number of registered vehicles per person **More Zero Emission Vehicles** • % of LTC bus fleet that are ZEV • % of City of London fleet that are ZEV • % of vehicle-for-hire fleet that are ZEV • % of new model year light-duty vehicles registered that are ZEV • % of all light-duty vehicles registered that are ZEV • % of medium-duty and heavy-duty vehicles that are ZEV or use zero emission fuels (hydrogen, renewable natural gas) • Number of EV charge ports per thousand people for public use • Retail sales of fossil fuel (litres) per person per year • Retail sales of fossil fuel (litres) per registered vehicle per year **More Resilient Buildings and Infrastructure** • Area of low-impact development (LID) drainage installations incorporated into road projects (square metres) **More Carbon Capture** • % of length of sidewalk with shade and/or tree leaf cover • % of road projects' landscaped areas planted with native plant species (square metres) These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.
Resources	• CEAP Supporting Documents • Complete Streets Design Manual • Neighbourhood Bike Parking Guidelines • 2030 Smart Moves Transportation Master Plan • London ON Bikes Cycling Master Plan • Framework for Municipal Zero Emission Vehicle Deployment (Pollution Probe) • Zero Emission Vehicle Charging in Multi-Unit Residential Buildings and for Garage Orphans (Pollution Probe)

Area of Focus 5 - Transforming Consumption and Waste as Part of the Circular Economy Workplan

Area of Focus 5	Transforming Consumption and Waste as Part of the Circular Economy Workplan
Purpose of this Workplan	The Transforming Consumption and Waste as Part of the Circular Economy workplan has been developed based on details: • provided during the community engagement; • compiled or recommended from other municipalities, organizations, committees and others specializing in climate change actions; • approved by Council; and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress beyond the framework that has already been established with the 60% Waste Diversion Action Plan. How the workplan is operationalized will be determined in early 2022.
Climate Change Expected Results	This workplan has been designed to make progress toward the following expected results: More Net-Zero Buildings Lower Carbon Construction More Resilient Buildings and Infrastructure Move Towards a Circular Economy
Why Does this Matter?	It is important to recognize that the production and transportation of consumer goods and services that are purchased, many of which are made in other parts of Canada or outside of Canada, have an environmental impact. In fact, GHG emissions associated with the manufacturing and delivery of goods and services purchased by the average household in London is larger than the emissions from the direct use of energy and from waste (i.e., local community emissions). Agriculture, food production and distribution have significant upstream climate change and water consumption impacts. A significant portion of the food that is produced is wasted, often ending up in landfills.

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	Many of the materials used in consumer products and construction, such as asphalt, concrete, plastic, and steel, have large GHG upstream emissions. Reducing, reusing, and recycling of materials is an important first step in the creation of a circular economy that greatly reduces the need to extract and produce new raw materials. A circular economy also focuses on local actions and the creation of local jobs. In London, there is an active marketplace for used items like textiles, toys, housewares, furniture and building supplies as well as products made from recycled materials like wood chips, aggregates, and compost. Recently, companies are providing more and more packaging free solutions or reusable packaging to consumers. The City of London has responsibility for waste reduction, recycling, composting, resource recovery and disposing of material from the residential sector. The City also manages the disposal of waste from many businesses in London at its W12A landfill site. Currently there is a transition process underway whereby industry stewards will be assuming financial and operational responsibility for Blue Box and Blue Cart recycling programs starting July 1, 2023. The disposal of organic material in landfill sites generates methane, a potent greenhouse gas, through anaerobic decomposition over a long period of time. At the City's active landfill site, W12A, a landfill gas collection and flaring system is used to control odours and fugitive methane emissions. This system manages to capture and destroy about 70 per cent of the methane generated within the landfill. The gas collected at the W12A landfill is currently flared, but it has the potential to displace around 350,000 gigajoules per year of fossil fuel natural gas methane if upgraded to pipeline-quality renewable natural gas (or biomethane) that can be used as fuel for home heating and/or used as fuel for hard-to-electrify vehicles as part of a blend with compressed natural gas. Older, closed landfill sites do not have systems in place to capture and destroy methane due to the lower rates of methane generation in older landfill sites. However, fugitive methane emissions still occur. Food waste avoidance followed by the management of organic waste, in particular diversion from the landfill, is an important methane mitigation measure.

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	The City of London's current practice for sewage sludge biosolids management involves incineration of dewatered sludge. Although the carbon dioxide from burning sludge is carbon neutral, the nitrous oxides from burning this nitrogen-rich material is a potent greenhouse gas. London businesses, intuitions and the non-for-profit sector have responsibility for materials generated by their activities. The Ontario Provincial Government and the Federal Government has legislation, regulations, policies and frameworks that impact waste and consumption that it regulates.
Background – How did we get here?	Greenhouse gas increases and decreases, climate change and lifecycle of materials and processes have been considered a part of the City's Waste Management services since 1995. Since the mid-1990s, the City's Waste Management System has been based on a Continuous Improvement Strategy (management philosophy) and Sustainable Waste Management. This strategy, which was approved by Municipal Council in 1997, has been a successful foundation for the program. Major city-wide waste management planning engagements that have occurred in the last 25 years include: • 1997 - Continuous Improvement System and Sustainable Waste Management; • 2007 - A Road Map to Maximize Waste Diversion in London; • 2013 - Road Map 2.0 – The Road to Increased Resource Recovery and Zero Waste; and • 2018 - 60% Waste Diversion Action Plan. From the early 1990s until 2010, the London Chamber of Commerce, the Environmental Management Resource Centre for Businesses, Centre for Health, Environment and Safety had ongoing discussion and actions with respect to waste management and resource recovery. Active programs for waste diversion and waste management occur at Western University, Fanshawe College, school boards, businesses and institutions in London.
What are some recent actions?	**60% Waste Diversion Action Plan** The Action Plan proposes a set of 21 actions to achieve 60% diversion of residential waste by the end of 2022. The budget for the

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	multi-year implementation (2020-2023 Multi-Year Budget Business Case #1) was approved March 2, 2020. Shortly after this date, the COVID-19 state of emergency was declared provincially on March 17, 2020, and locally March 20, 2020. A revised implementation plan and budget was approved by Municipal Council on January 12, 2021 that includes the implementation of a Green Bin program and other actions. **London Waste to Resources Innovation Centre** The London Waste to Resources Innovation Centre was started in 2015. The NSERC Industrial Research Chair Thermochemical Conversion of Biomass and Waste to Bioindustrial Resources administered by Western University started in 2019. The primary goals of the London Waste to Resources Innovation Centre are to: • build on the existing foundation of traditional and innovative projects to divert waste from landfill and create value added products; • create a focal point (location or locations) for the ongoing examination of innovative solutions; • establish partnerships and collaborations between government, academia and businesses including forward thinking on value chains and the circular economy; and • be known as an innovative centre of excellence with shared facilities and resources providing leadership, knowledge and support to industry, while educating and training students, researchers and postdoctoral fellows in the various fields of resource and waste management. **Environmental Assessment for the Proposed W12A Landfill Site Expansion** The City of London is undertaking the development of a long-term Residual Waste Disposal Plan. A key part of this plan is the Environmental Assessment (EA) for the proposed expansion of the W12A Landfill that was completed in accordance with the Terms of Reference (ToR). It recommends that the W12A Landfill be expanded vertically over the existing waste footprint. It is expected the landfill expansion will accommodate 9,900,000 tonnes of waste and take 25 years to fill. The successful conclusion of this project will permit Londoners and London business to manage waste where it has been produced versus sending it to another jurisdiction.

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	Green Economy London In 2018, Green Economy London (GEL) was established. GEL is one of 10 Hubs across Canada (7 in Ontario) supporting networks of businesses to set and achieve sustainability targets in the areas of GHG emissions, water use, waste generation and environmental stewardship. **Circular Economy** The Circular Economy has many definitions. The Resource Productivity and Recovery Authority (https://rpra.ca/), the regulator mandated by the Government of Ontario to enforce the province's circular economy laws, describes it as follows: *Ontario is shifting from a linear to a circular economy. In a linear economy, natural resources are extracted, manufactured into products, consumed and then thrown away. In a circular economy, products and packaging are designed to minimize waste and then be recovered, reused, recycled and reintegrated back into production.* In Ontario, key organizations working on circular economy research and policy include Circular Innovation Council, formerly the Recycling Council of Ontario and the Circular Opportunity Innovation Launchpad (COIL) and the Activate Circular Accelerator. **Long-term Resource Recovery Plan (in development)** To plan for the future, the City is developing a long-term Resource Recovery Plan to go beyond the 60% Waste Diversion Action Plan, a plan that primarily focuses on residential waste. The Resource Recovery Plan involves the development of actions to maximize waste reduction, reuse, recycling and resource recovery in an economically viable and environmentally responsible manner.
Responsible City Service Area(s)	• Led by Environment and Infrastructure, Enterprise Supports • Supported by Planning and Economic Development, Finance Supports
Key Community Partners and Stakeholders	• Provincial and Federal Governments • City of London Advisory Committees • London Economic Development Corporation • Business Associations (e.g., London Chamber of Commerce, Green Economy London) • Energy Utilities (Enbridge Gas)

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	• Local First Nations and Urban Indigenous communities • Community Groups (e.g., London Environmental Network, Urban League of London) • Businesses (facilities) involved with the circular economy
Key Actions (and Milestones)	**1. Implement 60% Waste Diversion Action Plan (on-going)** **a. Focus – Food Waste Avoidance** i. Continue to work with community partners and business partners to implement food waste reduction initiatives ii. Develop and implement feedback information that highlights the connection between cost savings, food security, social aspects, climate change and other environmental factors iii. Finalize focused Food Waste Avoidance implementation plan as a lead to the Green Bin Plan **b. Focus – Green Bin Program** i. Finalize Green Bin materials to collect, household containers and processing ii. Finalize implementation plans (phased approach) to transition curbside collection from the current system to weekly Green Bin/Blue Box and bi-weekly garbage pickup iii. Finalize stages of outreach program for phased implementation **c. Focus – Textiles and Other Reusables** i. Update 2018 information and prepare draft implementation plans ii. Identify key partners, determine needs and requirements and finalize implementation plans and schedules **d. Focus – Other Actions** i. Determine next materials and actions to focus on as currently listed in the 60% Waste Diversion Action Plan **2. Growing the Circular Economy in London and Area (2022 – 2025)** a. Support and promote London businesses playing a role in developing local and regional circular economy solutions b. Develop steps and actions required to understand the existing state of London and area's socio-economic and policy context as it relates to the circular economy

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	c. Hold a workshop or similar activity to determine community, business, local government, academic and Indigenous communities' interest in growing a local circular economy d. Develop a framework for moving forward, including the prioritization of the growth of the Circular Economy in London's economic development strategy e. Obtain approval for items that require Council direction **3. Long-term Resource Recovery Plan (2022-2023)** a. Finalize current opportunities for advanced resource recovery and increased waste diversion through new, emerging and next generation technologies and where these technologies may play a role in London and area b. Finalize climate change impacts, areas to reduce or maintain current costs of City programs; ways in which to support local job creation efforts; and ways in which to maximize program convenience to Londoners c. Ensure plan aligns with Provincial direction and the *Waste Free Ontario Act, 2016* **4. Active and Closed Landfill Management - Renewable Energy and Emissions (2022 – 2025)** a. Finalize current and future opportunities for the production of renewable natural gas (RNG) from landfill gas collected at the W12A landfill as well as other potential biogas feedstocks (e.g., organic waste, biosolids from wastewater treatment) b. Update and complete the procurement process for RNG at W12A Landfill and report to Committee/Council on outcomes and next steps c. Research and report back on options for reducing fugitive emissions of methane from closed landfill sites as well as the W12A landfill (i.e., gas that escapes capture from the existing landfill gas collection wellfield) d. Review and report back on options to use closed landfill sites as well as sections of the W12A Landfill site (or near-by City-owned property) for use as large-scale ground-mounted solar PV power generation
Examples of Measuring Progress	**More Net-zero Buildings** • To be determined **Lower Carbon Construction** • To be determined

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	More Resilient Buildings and Infrastructure • To be determined **Move Towards a Circular Economy** Implement 60% Waste Diversion Action Plan • Percentage reduction in per capita waste generation • Percentage of residential waste diverted from landfill • Participation rate (household) in Recycling Program • Participation rate (household) in Green Bin Program Developing a Circular Economy in London and Region • Number of reuse, recycle, compost, digest, recover facilities in London and region • Percentage of business waste (industrial, commercial and institutional) diverted from landfill Long-term Resource Recovery Plan • To be determined Active and Close Landfill Management - Renewable Energy and Emissions • To be determined These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.
Resources	• CEAP Supporting Documents • 60% Waste Diversion Action Plan • Resource Productivity and Recovery Authority (https://rpra.ca/) • Circular Innovation Council (https://circularinnovation.ca/) • Circular Opportunity Innovation Launchpad (COIL) and the Activate Circular Accelerator (https://coil.eco/accelerator-landing-page/)

Area of Focus 6 - Implementing Natural and Engineered Climate Solutions and Carbon Capture Workplan

Area of Focus 6	Implementing Natural and Engineered Climate Solutions and Carbon Capture
Purpose of this Workplan	The Implementing Natural and Engineered Climate Solutions and Carbon Capture Workplan has been developed based on details: • provided during the community engagement; • compiled or recommended from other municipalities, organizations, committees and others specializing in climate change actions; • approved by Council; and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress. How the workplan is operationalized will be determined in early 2022.
Climate Change Expected Results	This workplan has been designed to make progress toward the following expected results: More Carbon Capture Move Towards a Circular Economy Increased Engagement on Climate Action
Why Does this Matter?	Industrialization of society has created a legacy atmospheric carbon load (estimated to be approximately 1,000 billion tonnes of carbon dioxide equivalent emissions) that is responsible for the impacts to climate. Many governments and businesses have set goals to achieve net-zero emissions, but what does “net-zero” mean? It means that any remaining greenhouse gas emissions for which non-emitting options have been hard to find, are being offset by processes that remove carbon dioxide from the air. Natural methods to remove carbon from the atmosphere and store it in plants and soil can be prioritized with relative ease and be part of a regenerative, circular economy (e.g., prioritization of mass timber construction from sustainably managed forests; increased labour employment to enable more profitable regenerative farming practices). Engineered methods of carbon capture and storage (e.g., direct air capture and sequestration in cement during manufacture)

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	are complex and expensive by comparison but have the potential to be key components of efforts to drawdown carbon on the large scale and short timeline needed to avoid dangerous global warming. If there is not enough carbon dioxide being removed within London, or if it is too expensive to do this locally, “offsets” can be purchased from projects outside of London. Even if society achieves net-zero emissions by 2050 or sooner, that legacy load of carbon in the atmosphere will continue to force a warming trend in the atmosphere. The way to address this issue once net-zero GHG emissions is achieved is to move as quickly as possible on methods to remove carbon from the atmosphere in a sustainable, permanent way. Implementing carbon drawdown solutions now will contribute to reaching net-zero emissions and eventually enable the transition to net-negative GHG emissions sooner. CEAP development engagement feedback from Londoners included numerous references to the importance of protecting nature and prioritizing natural solutions to climate change. In addition to the carbon sequestration benefits that can be achieved through the protection and enhancement of natural heritage systems, significant improvements in resilience (e.g., flood protection) as well as biodiversity loss reduction can also be achieved.
Background – How did we get here?	The City of London has been known as “the Forest City” since 1855 when it was described literally as a city built in the middle of a forest. Today the landscape is dominated by agriculture and urbanized areas, with remnant woodlands generally scattered along corridors that in the past were unsuitable for agriculture or difficult to access, such as river valleys and ravines. These areas now form the framework for London’s Natural Heritage System which protects approximately 55% of London’s vegetation. Canadian towns and cities have historically been planned with parks and roadside plantings, but it is only since the 1970s when the term ‘urban forest’ was first introduced, that urban areas across Canada started to develop formal urban forestry programs. The concept of urban forest management has now spread throughout the world and the value of trees as an asset in urban centres is increasingly being recognized because of the many ecological, economic, cultural, and social benefits provided.

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	In London, like in most other municipalities, establishing and maintaining a balance between accommodating growth and protecting natural heritage has been difficult and at times contentious. The regularly updated Provincial Policy Statement has been the driving force for the level of natural heritage system protection in urban planning and development.
What has been done recently?	The City has dedicated expertise and budget allocated to the management of urban forests, environmentally significant areas, parks and natural areas. The City has also created and implemented numerous policies and initiatives to protect and enhance the natural heritage system, including (but not limited to): • Urban Forest Strategy; • Million Tree Challenge; • Veteran Tree Incentive Program ; • Tree give-aways (e.g., TreeME Program); • Invasive Species Management Plan; • Prioritization of blue/green infrastructure such as the Dingman Creek Engineered Wetland Complex; and • Natural channel design for stormwater management (e.g., Dingman Creek / Skyway Industrial Development). Community organizations such as ReForest London, London Environmental Network and Conservation Authorities, are also very active in London to support and enhance the natural heritage system in many ways, including (but not limited to): • Community engagement; • Tree planting; • Rain garden promotion and planting; • Pollinator garden promotion and planting; • De-paving projects; and • Environmental advocacy and support for businesses and residents.
Responsible City Service Area(s)	Led by Environment and Infrastructure and Planning and Economic Development
Key Community	• City of London Advisory Committees • Conservation Authorities • Local First Nations and Urban Indigenous communities

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Partners and Stakeholders	• Community Groups (e.g., London Environment Network) • Middlesex London Food Policy Council • London Development Institute (LDI) and developers not represented by LDI • Ag and Agri Food Canada – London Research Facility • Energy Utilities (Enbridge Gas)
Key Actions (and Milestones)	**1. Addressing Agricultural Potential (Timeline: 2022 – 2025)** a. Assess London's potential for carbon sequestration in soils with regenerative agriculture practices b. Establish program(s) in consultation with agricultural stakeholders to remove barriers and increase the adoption of regenerative agriculture practices c. Extend invitation to local Indigenous Communities to engage and explore potential collaboration on regenerative agricultural land stewardship d. Work with partners to develop and test the reforestation of under-utilized agricultural land, or portions thereof, outside of the urban growth boundary but within city limits. **2. Advancing Tree Planting (Timeline: 2022 – 2025)** a. Assess available options to estimate London's current carbon sequestration rate from urban forests and other natural areas as part of the Urban Forest Strategy and other City initiatives b. Review tree planting policies and budget(s) for planting on City lands held by City Service Areas, boards, and commissions according to a planting prioritization strategy c. Promote and engage with Londoners regarding planting trees on private lands as part of the Tree Planting Strategy d. Facilitate a showcase project, and/or roll out more projects, to retrofit hardscaped/paved surfaces (e.g., surface parking lots) with raingarden and other sustainable designs, including mid-to-long-term tree planting for increased canopy cover **3. Protect and Enhance Existing Natural Areas (Timeline: 2022 onward)** a. Ensure the protection of natural heritage features and areas in the zoning by-law, Tree Protection by-law and Site Alteration by-law b. Complete and enforce revised Environmental Management Guidelines for new development

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	c. Explore potential for striving to achieve 'no net loss' carbon sequestration capacity requirements for greenfield development d. Enhance the resiliency and connectivity of the natural heritage System through ecological restoration with a focus on potential naturalization areas (including those identified on London Plan Map 5 - Natural Heritage) **4. Carbon Capture, Utilization, and Storage (Timeline: 2024 onward)** a. Work with Enbridge Gas to assess the feasibility and suitability of using carbon capture, utilization and/or storage solutions for large industrial natural gas users in London b. Work with Western University and others to assess the feasibility and suitability of using large-scale direct air carbon capture in London to contribute towards achieving net-zero emissions c. Explore and engage with community and industry partners to identify and evaluate local offset opportunities
Examples of Measuring Progress	**More Carbon Capture** • % tree cover within the urban growth boundary • % tree cover outside the urban growth boundary • Area of agricultural lands utilizing regenerative agriculture methods (hectares) • % of agricultural lands utilizing regenerative agriculture methods • Number of trees planted per year • Estimated carbon sequestered per year (tonnes CO_2 per year) • Surface area (square metres) made permeable • Number of local carbon offset projects verified **Move Towards a Circular Economy** • Number of regenerative agriculture jobs created • Value of agricultural produce produced by regenerative agriculture **Increased Engagement on Climate Action** • Number of participants in regenerative agriculture awareness initiatives These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.

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Resources	• CEAP Supporting Documents • Tackling the Farm Crisis and the Climate Crisis, National Farmer's Union, 2019 • City of London Urban Forest Strategy - Enhancing the Forest City, 2012 • Briefing Note - Municipal Natural Capital Valuation (Clean Air Partnership) • Nature-Based Climate Solutions Toolkit (Nature Canada)

Area of Focus 7 - Demonstrating Leadership in Municipal Processes and Collaborations Workplan

Area of Focus 7	Demonstrating Leadership in Municipal Processes and Collaborations
Purpose of this Workplan	The Demonstrating Leadership in Municipal Processes and Collaborations Workplan has been developed based on details: • provided during the community engagement; • compiled or recommended from other municipalities, organizations, committees and others specializing in climate change actions; • approved by Council; and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress. How the workplan is operationalized will be determined in early 2022.
Climate Change Expected Results	This workplan has been designed to make progress toward the following expected results: More Zero Emission Vehicles More Net-zero Buildings Lower Carbon Construction Move Towards a Circular Economy More Carbon Capture Increased Engagement on Climate Action
Why Does this Matter?	Municipal governments are the level of government closest to the people. The processes and structures in place within municipalities are responsible for managing critical infrastructure and supports upon which all residents rely to meet their daily needs. The alignment of these processes and structures with climate change action goals will ensure that the decisions being made to satisfy immediate needs of residents will also protect and ensure that those needs will still be satisfied in the future. To encourage and support other stakeholders and partners in climate change action, as the Corporation will be doing as part of the Climate Emergency Action Plan, it is important that municipal processes and structures embed and reflect the priorities of climate change action. In areas where Corporate actions can have direct influence on

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	community action (e.g., through procurement of goods and services), opportunities should be seized to lead by example. The Corporation can also be a leader among peers in the implementation of climate change action, but only if it is embraced systemically and seen as a key driver of operations.
Background – How did we get here?	The Corporation of the City of London has long recognized the significance of climate change and the need to act on it. The City has been tracking community wide GHG emissions since 1990 and conducting detailed analysis of Corporate energy use and emissions since 2007. Many actions have been taken to show leadership on climate change resilience (e.g., West London Dyke reconstruction, Dingman Creek Engineered Wetland construction, downspout disconnection program) and mitigation (e.g., greening the Corporate fleet, investment in the Organic Rankin Cycle Engine at Greenway Pollution Control Plant, LED streetlight conversions, W12A landfill gas management).
What has been done recently?	Numerous City initiatives, strategies, master plans and process changes have incorporated climate action objectives directly and indirectly in recent years. Some more recent and significant examples of climate action incorporation include: • The previous 2014-2018 Community Energy Action Plan provided a foundation for the city-wide climate change mitigation actions in the Climate Emergency Action Plan; • Corporate Energy Conservation and Demand Management plans have been in place and driving energy efficiency and reduction in the Corporation since 2014; • The 2019-2023 Strategic Plan for the City of London contains more than 30 specific strategies and actions that support climate change mitigation and adaptation; • The Climate Lens Process has been developed and implementation is underway across the Corporation, with some divisions having already implemented and utilized the Process to produce results for reporting to Council (Transportation Planning & Design and Solid Waste); • A detailed Corporate Asset Management Plan has been produced and is supporting the sustainable management of assets while also highlighting potential strategies to address a growing infrastructure renewal funding gap and incorporating climate change risks;

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	• The 2022 annual budget update amendment process requires that any submitted business cases address relevant climate change considerations; and • Master Accommodation Plan (MAP) for Alternative Work Strategies (2021) recognized the potential reduction of office space via the implementation of AWS and the reduction in Corporate greenhouse gas (GHG) emissions by 40 percent annually in comparison to the original Map (2016). Employees working from home would substantially reduce commute-related emissions.
Responsible City Service Area(s)	• Co-Led by Environment and Infrastructure and Finance Supports • Supported by all other Service Areas
Key Community Partners and Stakeholders	While the work of the City directly affects all residents and businesses in London, the initiatives in this workplan primarily relate to internal processes. Where external engagement is required (e.g., environmental assessments, changes to services, etc.), City staff will seek input and engage with affected stakeholders and partners. Specific actions have been noted to collaborate with and receive knowledge from: • Local First Nations and Urban Indigenous communities • Neighbouring Municipalities
Key Actions (and Milestones)	**1. Utilizing the Climate Lens Process (Timeline: 2022 onward)** a. Implement and monitor the use and effectiveness of the climate lens process in all Service Areas b. Consider options to incorporate future carbon prices, equivalent at a minimum to the federal carbon pricing up to 2030 (i.e., $170 per tonne by 2030) and an additional $10 per tonne per year beyond 2030 within the 2024-2027 Multi-Year Budget and future budget processes. c. Include a section in all standing committee reports identifying climate considerations and how they have been addressed, where appropriate d. Provide annual updates on the use and utility of the Climate Lens Process **2. Engaging City of London Employees (Timeline: 2023-2025)** a. Review City of London employee commuting and parking policies to incent reduced GHG emissions (e.g., address

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	incentives to drive alone and facilitate other options with bus passes, bike share, etc.) b. Update employee engagement activities within the Corporate Energy Conservation and Demand Management Plan to align with the new corporate GHG emissions targets c. Review and strengthen anti-idling measures and enforcement for City vehicle use **3. Engaging City of London Boards and Commissions (Timeline: 2022 and beyond)** a. Obtain current status of policies and actions with respect to climate change including future direction b. Ensure that beneficial City details are shared (e.g., use of the Climate Lens Process, public reporting systems) c. Determine opportunities for collaboration d. Request the City of London Boards and Commissions to provide an annual update to Council on climate change actions and progress. **4. Continuing Collaboration (Timeline: 2022 onward)** a. Continue to support and engage with other municipalities on climate change mitigation and adaptation efforts through organizations such as the Federation of Canadian Municipalities' Partners for Climate Protection program, the Clean Air Council, QUEST Canada, and ICLEI Canada's Building Adaptive and Resilient Communities program b. Engage with neighbouring municipalities on mutual climate change mitigation and adaptation matters including but not limited to land use development; regional public transit service; active transportation connections and transportation demand management solutions; and, natural heritage features and corridors, both land and waterway corridors c. Collaborate with and receive knowledge from local First Nations on the implementation of climate change plans **5. Wastewater Treatment Operations and Biosolids Management Master Plans (Timeline: 2022 – 2023)** a. As part of the Biosolids Management Master Plan, explore the potential to achieve net-zero carbon emissions from the wastewater treatment system and potential synergies in the management of biosolids that can support climate action goals (e.g., production of renewable natural gas, nutrient recycling opportunities, sewer waste heat recovery, etc.)

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	6. Updating Procurement, New City Buildings and Asset Management Processes (Timeline: 2023 – 2028) a. Starting in 2024, all new City of London buildings in the prefeasibility stage will be designed to achieve net-zero ready emissions, with construction implementation contingent on the availability of additional funding beyond baseline levels b. Require all City of London lifecycle renewal projects for existing buildings to make incremental energy efficiency and resiliency improvements to contribute to Corporate milestone targets (where heritage conservation is not impacted), contingent on the availability of additional funding beyond baseline levels c. Apply Climate Lens Process to future Operation Yard improvements via the Operations Master Plan (OMP) in order to accommodate future infrastructure required to support electric or other zero emission fuel vehicles. d. Develop refined cost estimates and a financing strategy for implementing required climate change mitigation and adaptation actions for inclusion in the Corporate Asset Management Plan, for consideration with the Multi-Year Budget and for use in advocacy efforts to secure Federal/Provincial funding. e. Establish appropriate performance indicators and annual targets for the phased implementation of the Sustainable Purchasing section of the Procurement of Goods and Services Policy f. Incorporate potential climate change impact risks and vulnerabilities for assets in the Corporate Asset Management Plan **7. Lower Carbon Construction for Infrastructure (Timeline: 2022 onward)** a. Explore, evaluate, and incorporate lower-carbon construction materials into civic infrastructure projects where possible (e.g., low-carbon concrete, mass timber, recycled materials) b. Explore, evaluate, and incorporate lower emission construction techniques and methods into civic infrastructure projects where possible (e.g., electric or compressed natural gas heavy equipment)

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	8. Revising City of London Fleet Vehicle and Equipment Procurement Plans (Timeline: 2023-2025) a. Develop procurement processes (report back in 2023), consistent with the Procurement of Goods and Service Policy, that ensure all fleet procurements fully examine alternatives and opportunities to reduce and/or eliminate fossil fuel use in City fleet, taking into account key operational factors such as product availability and performance, service levels, infrastructure and power supply requirements, financial feasibility and budgetary limitations, including: i. Developing plans for enhanced fleet vehicle utilization, idling reduction, vehicle sharing, vehicle reductions, and further adoption of Low-Speed Electric Vehicles (LSV), e-bikes and (potentially) cargo e-bikes ii. Requiring all new passenger vehicles (cars, vans, SUVs) procured to be electric vehicles or other zero emission vehicles as of 2025 iii. Requiring all new light and medium duty work vehicles and equipment (pick-up trucks, work vans, heavy duty diesel pick-ups) procured to be electric or other zero emission fuel alternatives where available as of 2028 iv. Requiring that all external fleet rental and lease contracts be amended to require supply of light and medium duty vehicles and equipment that are electric or other zero emission fuel alternatives as of 2028 v. Requiring the procurement of all new heavy-duty vehicles and equipment for the City of London's vehicle fleet be electric or other zero emission fuel alternatives as of 2030, subject to availability and performance vi. Requiring all new City of London hand-held, portable, and light-duty off-road equipment procured to be electric or other zero emission equipment as of 2025 b. Share information with London Hydro as they continue to investigate opportunities to reduce the GHG emissions footprint of their fleet operations, including implementation of electrical vehicles. **9. Assessing and Potentially Establishing a Carbon Accounting/ Budgeting Framework (Timeline: 2022 – 2027)** a. Undertake research on carbon accounting/budgeting frameworks for local governments

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	b. Identify and assess options and resource requirements for a carbon accounting/budgeting framework to potentially be used in parallel with existing financial practices (2023 – 2024) c. Subject to successful completion of action 9b: i. Establish an annual corporate carbon budget to provide accountability and transparency on progress to meeting corporate emissions reduction targets; ii. Consider potential mechanisms to drive Service Area compliance with the annual corporate carbon budget and any opportunities to generate internal revenue to support climate action projects **10. Investing and Borrowing Responsibly (Timeline: 2024 onward)** a. Investigate options for responsible investment and borrowing to ensure City resources are working to advance corporate climate action goals b. Join other municipal colleagues in continuing to advocate for Ontario Municipal Employees' Retirement System (OMERS) pension fund to fulfill its commitment to net zero emissions across its total portfolio by 2050 c. Explore green bonds, municipal impact investment funds and other existing and emerging financing strategies for more resilient, lower-emissions municipal infrastructure **11. Establishing GHG Emissions Offsets Policy (Timeline: 2024-2025)** a. Conduct review of the use of GHG emissions offsets to achieve corporate and/or community net-zero emissions by other Canadian municipalities b. Review and establish protocol requirements for offset quality and verification for use in achieving corporate and/or community net-zero emissions targets c. Establish policy for the use of offsets, including an intended upper limit for corporate GHG emissions that could be offset, the types and characteristics of acceptable offset projects and targets for the amount or proportion of verified GHG emissions offsets utilized from outside of London.

Area of Focus 7	Demonstrating Leadership in Municipal Processes and Collaborations
	12. Address Climate Change Considerations in Affordable Housing (Timeline: 2022-2025) a. Pursue high standards of energy efficiency and resilience to climate change impacts in new affordable housing units funded and created in partnership with non-profit organizations. b. Ensure that new affordable housing units constructed in partnership with Canada Mortgage and Housing Corporation (CMHC) meet or exceed CMHC's energy efficiency standards. c. Integrate improved energy efficiency guidance and requirements into the municipally administered Ontario Renovates Program for Homeowners that provides grants for seniors and low-income households for home improvements. d. Ensure that the retrofit of affordable housing units in partnership with London Middlesex Community Housing achieve high standards of energy efficiency and resilience to climate change impacts.
Examples of Measuring Progress	**More Zero Emission Vehicles** • % of light duty fleet vehicles that are zero emission vehicles • % of medium-duty and heavy-duty vehicles that are ZEV or use zero emission fuels (hydrogen, renewable natural gas) **More Net-zero Buildings** • Number of net-zero ready, net-zero and/or passive house corporate buildings **Lower Carbon Construction** • % of new corporate facilities built to net-zero standard • % of capital infrastructure projects with concrete requirements including lower-carbon concrete **Move Towards a Circular Economy** • % by total value of corporate investments in low-carbon, sustainable vehicles/portfolios • % of procurement contracts adhering to sustainable purchasing requirements **More Carbon Capture** • % of community GHG inventory requiring offset (based on pending offset policy) • Surface area (square metres) made permeable as part of infrastructure renewal projects

Area of Focus 7	Demonstrating Leadership in Municipal Processes and Collaborations
	Increased Engagement on Climate Action • Number of consultation engagements with neighbouring municipalities • Number of inter-municipality initiatives to address common climate action priorities • Number of engagement instances with First Nations dedicated to addressing climate action • City staff commute mode split These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.
Resources	• CEAP Supporting Documents • Corporate Asset Management Plan • Procurement of Goods and Services Policy • Corporate Energy Demand Management Plan • Briefing Note - Municipal Carbon Budgeting (Clean Air Partnership) • Briefing Note - Municipal Green Fleets Business Case (Clean Air Partnership) • Municipal Zero-Emission Vehicle Engagement Platform (Pollution Probe)

Area of Focus 8 - Adapting and Making London More Resilient Workplan

Area of Focus 8	Adapting and Making London More Resilient
Purpose of this Workplan	The Adapting and Making London More Resilient Workplan has been developed based on details: • Provided during community engagement; • compiled or recommended from other municipalities, organizations, committees, and others specializing in climate change actions; • approved by Council; and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress for both the corporation and the community. How the workplan is operationalized will be determined in early 2022.
Climate Change Expected Results	This workplan has been designed to make progress toward the following expected results: More Resilient Buildings and Infrastructure Increased Community Resilience
Why Does this Matter?	Warmer, wetter, and wilder weather events in addition to incremental changes to climate (e.g., temperature), will have impacts to citizens, communities, infrastructure and natural environment. Both the physical structures and community members need to be more resilient to the impacts of severe weather (e.g., snow squalls, heat waves, wind downdrafts, tornados) and the incremental climate changes (e.g., hotter summers, more frequent flooding) which are rapidly occurring. Preparing through adaptation for these weather and climatic changes will assist London to weather the storms and better position London towards sustainability. Adaptation to these changes which are already occurring, is necessary to safeguard Londoners, ensure municipal services are not disrupted and support continued prosperity.
Background – How did we get here?	London is a city that contains 45 km of the Thames River as well as 82 km of smaller creeks and waterways. Riverine flooding has always been part of London's history and will only be more challenging given

Area of Focus 8	Adapting and Making London More Resilient
	the increases in severe weather and related impacts. During watershed-wide storm events, properties within the floodplain are especially vulnerable to riverine flooding. During local storm events, older developed areas of the city do not have modern stormwater management and may be susceptible to overland flooding. London is also the 'Forest City' with an extensive tree cover susceptible to wind damage and health impacts caused by invasive species (e.g., Emerald Ash Borer, Lymantria dispar (LDD)). Vulnerable populations in London are the most susceptible to the impacts of climate change. The homeless, elderly, and economically disadvantaged will require greater support and assistance given these expected changes. Many of these challenges were made apparent during the COVID pandemic and the July 2021 heat wave. London's drinking water is supplied from both Lake Huron and Lake Erie. This dual supply gives London built-in resiliency; however, London's distance from these supplies is also a key vulnerability. The City's drinking water travels 50km from Lake Huron and 25km from Lake Erie before entering the City's water system. The supply relies on treatment plants, large pumps, and an underground network of large water mains that are susceptible to disruption during extreme weather events. Although significant redundancies are built into the system, climate change driven extreme events pose a risk to the City of London's drinking water supply. Climate change can also impact the quality of the raw water taken from Lake Huron and Lake Erie. Large storms can trigger a sudden decrease of the quality of the raw water making the water more difficult to treat. Increasing large storm events can cause temporary interruptions to the City's water supply.
What has been done recently?	The London Plan (Official Plan) has established a plan for London to grow inwards and upwards, supported with several climate change policies and directions. An internal Risk Assessment for Climate Change Adaptation was completed in 2014 to provide the city with direction for Asset Management Planning and assist Service Areas on impact adaptation. This work is being updated and built upon using the Building Adaptive and Resilient Communities (BARC) tool as further described below.

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	Flood hazard protection and mitigation has been a longstanding program designed to protect neighbourhoods, including the West London Dyke that safeguards 1,200 buildings and 2,500 people. This dyke is currently undergoing a major, multi-year reconstruction designed to increase flood protection. Seven of 11 phases have been completed with the assistance of National Disaster Mitigation Funding received in 2016. The anticipated timeline for completion is 2028. The Mud Creek rehabilitation project will reduce the frequency of flooding over Oxford Street at Proudfoot Lane, while having co-benefits of increasing pedestrian active mobility and creating a sustainable stream corridor. This project will be completed by 2023. Stormwater Management continues to adapt using more 'at source' techniques to reduce the amount of water runoff reaching the storm drainage system (e.g., low impact development approaches). Upgraded intensity-duration-frequency (IDF) curves are being used to design new stormwater infrastructure and new flood line mapping is in preparation along critical watercourses. Sensitivity analyses are conducted during the design of all stormwater infrastructure projects to ensure resiliency beyond the 100-year and 250-year regional storm events. The City's emergency preparedness and response during extreme flood events have been coordinated and managed at the Emergency Operations Centre. The City's Flood Coordinator works with staff at the Upper Thames River Conservation Authority to monitor and respond to riverine flood risks during large storm events. Actions taken during recent events have included road closures and evacuation of identified vulnerable properties. Combined sewers continue to be separated as part of an overall scheme to eliminate them altogether. Basement flooding prevention programs continue to provide incentives for homeowners to improve their building resilience (e.g., sump pump back-up power, sewer backflow prevention). The Middlesex London Health Unit completed an Assessment of Vulnerability to the Health Impacts of Climate Change (2014) with recommendations for adaptation. They also prepared an assessment of urban heat island effects.

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	The Urban Forest Strategy was completed in 2016 to effectively care for existing tree cover, plan for continued health and improve tree cover for the future. A Tree Planting Strategy update is underway which will also include an update to the Wildland Fire Risk rating (identified as 'low to moderate' for London in 2017 by Provincial Ministries). Guidance documents such as the Urban Design Guidelines, Complete Streets Manual and Parks and Recreation Master Plan are all promoting the increased use of street trees and vegetation to offset the impacts of the urban heat island effect. These heat impacts are exacerbated during heat waves making urban spaces less desirable and potentially harmful to human health. The City is in the process of constructing a new 100 million litre drinking water reservoir to be complete in 2023. This additional drinking water storage will increase the amount of water available during an emergency mass power outage or a drop in raw water quality caused by a major climate change event. Additional storage will provide an extend time that Londoners can receive drinking water while the cause of the disruption is being addressed. The City has partnered with the Canadian office of ICLEI, the International Council for Local Environmental Initiatives who support local governments for sustainability. ICLEI, a non-profit organization, and London along with 21 other Ontario municipalities are actively participating in the Advancing Adaptation Program. ICLEI Canada has decades of experience assisting municipalities in completing Adaptation Strategies using industry-standard adaptation processes (e.g., Building Adaptive and Resilient Communities, or BARC, tool). This approach has already guided many southern Ontario cities with adaptation plan creation and implementation. London has previously taken part and benefitted from several collaborations with ICLEI Canada and their partners (e.g., Showcase Cities in 2019). The Advancing Adaptation Program led by ICLEI will collaborate with London staff in the completion of an Adaptation Strategy in 2022. The Strategy will utilize the earlier work completed in London's Risk Assessment for Climate Change Adaptation in addition to earlier baseline climate change vulnerability work prepared by the Middlesex London Health Unit.

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Responsible City Service Area(s)	• Led by Environment and Infrastructure and Planning and Economic Development • Supported by Neighbourhood and Community-wide Services,, Enterprise Services
Key Community Partners and Stakeholders	• Middlesex London Health Unit • Conservation Authorities • City of London Advisory Committees • Community Groups (e.g., London Environment Network, Urban League of London) • London Development Institute (LDI) and developers not represented by LDI • Local First Nations and Urban Indigenous communities • Western University • Fanshawe College • Business Associations (e.g., London Chamber of Commerce) • London Community Foundation • ICLEI staff (as part of the Advancing Adaptation program) • Energy utilities (London Hydro, Enwave, Enbridge Gas)
Key Actions (and Milestones)	1. Finalize an Adaptation Strategy based on the updated Risk Assessment for Climate Change Adaptation (Timeline: 2022) a. Finalize London Working Group / Review Team b. Utilize program and expertise of ICLEI c. Develop list of focused actions under specific areas such as: i. Integrate Climate Change Thinking and Response ii. Protect Public Health and Safety iii. Reduce Risk to Buildings and Property iv. Strengthen Infrastructure Resilience v. Protect Biodiversity and Enhance Ecosystem Functions vi. Reduce Community Service Disruptions vii. Build Community Resilience 2. Update the Climate Lens Process to incorporate the latest information included in the Adaptation Strategy to ensure corporate decision-making takes full advantage of the latest information (Timeline: 2022 onward) 3. Identify and assess extreme weather events, impacts and data gaps (Timeline: 2022 and annually)

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	4. Implement recommendations guided by the timelines established in the completed Adaptation Strategy (2022 onward) 5. Monitor best management practises of other municipalities to take full advantage of new developments in adaptation methods (Timeline: 2022 onward) 6. Work with the Middlesex-London Health Unit and other community partners to review the effectiveness of existing extreme heat event response programs, including affordable access to indoor air cooling 7. Work with community partners to review the effectiveness of existing flooding event response programs, including access to current flood hazard mapping
Examples of Measuring Progress	**More Resilient Buildings and Infrastructure** • Key projects and initiatives identified and completed (e.g., completion of the West London Dyke rehabilitation work) • Progress on decreasing the number of damage centres and related losses • % of combined sewers that have been separated • % of sidewalks with shade (by tree cover or physical structures) **Increased Community Resilience** • Number of people, groups and businesses reached with their own adaptation strategies • Number of people, groups and businesses that have made the recommended adaptation changes • Number of households provided with education materials about living in a floodplain or lot-level stormwater management best practices These measures will be reviewed and updated upon completion of the ICLEI Advancing Adaptation Program currently underway (completion date in early 2022). In addition, these measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.

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Resources	• Climate data resources from Environment and Climate Change Canada including the Climateatlas.ca and Climatedata.ca • A Climate Resilience Roadmap for Ontario Municipal Infrastructure and Systems, Regional Public Works Commissioners of Ontario, 2020 • Mitigating Flood Risk in Canada, 2020. Clear Air Council webinar • Ahead of the Storm 2019, Intact Centre on Climate Adaptation • Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation, ICLEI (2019) • Characterizing the Urban Heat Island Effect in Middlesex London, Middlesex London Health Unit, 2015 • Assessment of Vulnerability to the Health Impacts of Climate Change, Middlesex London Health Unit, 2014 • City of London Risk Assessment for Climate Change Adaptation, 2014

Area of Focus 9 - Advancing Knowledge, Research and Innovation Workplan

Area of Focus 9	Advancing Knowledge, Research and Innovation Workplan
Purpose of this Workplan	The Advancing Knowledge, Research and Innovation Workplan has been developed based on details: • provided during the community engagement; • compiled or recommended from other municipalities, academia; organizations, committees and others specializing in climate change actions; • approved by Council; and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress. How the workplan is operationalized will be determined in early 2022.
Climate Change Expected Results	This workplan has been designed to help make progress on expected results in all 10 workplans as partnerships with academia and businesses is fundamental to all aspects of the Climate Emergency Action Plan.
Why Does this Matter?	Education is one of the most powerful tools in preparing for the local, regional, and global challenges associated with climate change. It helps individuals, communities, businesses, and governments build the capacity, understanding, skills, and attitudes needed to engage in lowering greenhouse gas emissions and creating climate-resilient communities. Education on climate change must not be considered as an 'add-on'; rather a key component of any plan(s) to address the effects of climate change, put into practice collaborative solutions and achieve short, medium, and long-term results and goals. Education is required to raise awareness, build capacity, change behaviours and attitudes, encourage creativity and solutions, and enable people to make informed decisions that impact others. Education and awareness about positive actions and positive results to climate change may help diminish both anxiety and apathy in response to climate change. Due to the wide-ranging impacts of climate change, education, knowledge, research, and innovation has a crucial role to play in not

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	only raising awareness about the urgency of addressing climate change but also in implementing the solutions. Formal and informal education is essential to raise awareness with residents and students of all ages. For example, educating the youngest who will be most impacted by climate change develops positive influences during the stages of an individual's early life that can contribute to a society that will require changing values, knowledge, and skills to address the causes and impacts of climate change. Educating and engaging today's older generations in London is equally important, but requires different tools and techniques to meet their needs and the adjustments required to change behaviours that my have been in place for years. Climate change education is central in making people sensitive to the local and global impacts of climate change. The term 'energy literacy' or 'climate literacy' has been used by many to demonstrate the need to foster an increased understanding of climate change and the need to take action. To ensure effective learning and deep understanding, climate change education can be further integrated into primary and secondary schools in London and region. The complexities of climate change require it to be addressed using a continuous and holistic approach that draws upon a range of disciplines and areas of expertise, including science, policy, law, ethic, sociology, economics, and culture. Opportunities exist for new ways of engaging children and youth in climate awareness by harnessing the creativity of teachers and students to develop and implement climate action projects in their homes, schools, and communities. Opportunities will also exist through clubs, organizations (e.g., Girl Guides, Scouts), City programs, etc. Local First Nations and Urban Indigenous communities are knowledge keepers and stewards of the land and routinely share experiences, history, sustainability practices and innovation. As leaders in knowledge, research and innovation, universities and colleges are in a unique position to leverage their expertise and make significant advancements in addressing climate change and the climate emergency. How these institutions operate, undertake

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	research, and teach their students can act as a catalyst for real and lasting change. In addition to the fundamentals of education, research and innovation, universities are at the forefront of data and analytics, applied research, technology development and commercialization, and creating and utilizing networks of individuals, organizations, businesses, and communities.
Background – How did we get here?	Over the last ten to twenty years, there has been a growing need for knowledge, research and innovation involving students, teachers, professors, researchers, businesses, and governments. This interest has been driven by the need for more education, awareness, and actions to address the growing impacts of climate change and the need for many adjustments and changes in lifestyle and how the economy is operated. London and area has a solid foundation of academic institutions, partnering businesses, governments and community groups and a proven track record that has developed over time. This track record includes demonstrated commitments of individuals to find solutions to the challenges presented by climate change. London and area has produced many recognizable names, projects and programs in the fields of environmental sustainability and climate change.
What has been done recently?	Over the last five years the number of small, medium, and large-scale initiatives is significant. A few would include: • Western University and Fanshawe College have numerous courses, programs and organizations that address environmental sustainability and climate change. This includes many faculty, professors, researchers and administrators involved with climate action projects in addition to corporate environmental sustainability projects and programs. A few examples include: ○ Western research and learning facilities such as the Biotron, Centre for Advanced Materials and Biomaterials Research, Fraunhofer Project Centre for Composites Research, International Composites Research Centre, Particle Technology Research Centre, Lake and Reservoir System (LARS) Research Facility, Ivey Energy and Management Policy Centre, Centre for Urban Policy and Governance, Lawrence Centre for Policy and Management, Centre for Building Sustainable Value;

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	○ Fanshawe College is using their Kestrel Court Net Zero project as a living laboratory for students to design and assess net-zero energy retrofits of existing inefficient housing stock; and ○ Western University the University of Waterloo have established the Thames River Experimental Stream Science Centre hosted at the Adelaide Pollution Control Plant to provide a research base for analysing changing local stream conditions in a changing climate. • Thames Valley District School Board and the London District Catholic School Board have focused environmental education programs and initiatives, have schools participating in the EcoSchools network, and have climate change built into several courses. In addition, corporate environmental sustainability projects and programs exist. • Businesses and business organizations have supported academic projects and programs, hired interns and summer students, many of which have led to them introducing sustainability and climate change into corporate commitments and operating practices, if not already in place. Business organizations such as Chamber of Commerce, Green Economy London, London Economic Development Corporation have held or supported various types of seminars, conferences and events. • Community groups have provided opportunities and supported projects and programs, hired interns and summer students for sustainability and climate change, and contributed to knowledge, research and innovation. Numerous workshops, seminars, movie screenings, events, etc. have occurred such as those held by London Environmental Network, Thames Region Ecological Association, ReForest London, Climate Action London, London District Renewable Energy Co-operative, to name a few. • City of London has sponsored, supported and/or invested in numerous climate change projects and programs with secondary and post-secondary institutions and collaborations with local and regional businesses such as: ○ a collaboration between the City of London, Fanshawe College, Western University (and affiliates), and Pillar Nonprofit Network that provides London's post-secondary students with opportunities to apply their skills, creativity, and

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	entrepreneurial spirit to real-world issues and challenges facing our community; ○ a Memorandum of Understanding with Western's Institute for Chemicals and Fuels from Alternative Resources to support research into the use of municipal waste to produce useful materials; ○ working with Western University's Human Environments Analysis Laboratory on a number of projects related to transportation demand management; ○ developed a Teachers Toolkit that provides London-specific information on climate change and our environment including topics of water quality, stormwater, wastewater management, and water efficiency for elementary school students to understand the value of water resources. This includes presentations, teacher's guides, and hands-on experiential workshops; and ○ working with partners such as Project Neutral to develop lesson plans built around the use of Project Neutral's carbon footprint calculator. • Many collaborative projects have been undertaken between the organizations mentioned above, with local First Nations and Urban Indigenous communities and others. In many cases additional support has been provided from businesses, utilities, senior levels of government, for these climate change relate initiatives.
Responsible City Service Area(s)	• Led by Environment and Infrastructure, City Manager's Office and Enterprise Supports, Planning and Economic Development
Key Community Partners and Stakeholders	• Provincial and Federal Governments • Western University • Fanshawe College • Thames Valley District School Board • London Catholic District Catholic School Board • London Chamber of Commerce • London Economic Development Corporation • Middlesex London Health Unit • Local First Nations and Urban Indigenous communities • Utilities (London Hydro, Enbridge, Enwave, Hydro One) • Conservation Authorities • Community groups

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	• Specialists in the field of climate change education, awareness and programming • Students
Key Actions (and Milestones)	1. Implement Memorandum of Understanding (MoU) with Western University for Action on Climate Change (The MoU is part of the report to the Strategic Priorities and Policy Committee report, February 8, 2022, Timeline: 2022) a. Finalize operating arrangements and logistics b. Update existing and upcoming projects c. Develop an Academic Research Agenda for Action on Climate Change that will assist with the implementation of the Climate Emergency Action Plan d. Establish objectives, metrics and timelines 2. Co-create a Partnership for Knowledge, Research and Innovation (Timeline: 2022/2023) a. Identify and invite potential partners and collaborators to a development session b. Complete a scan of existing courses, programs, educational opportunities (formal and informal) c. Identify existing relationships and connections with respect to climate change education and action d. Identify opportunities to pursue business and economic development opportunities and collaborations e. Develop a path(s) forward including objectives, metrics and timelines
Examples of Measuring Progress	These examples are very preliminary and will become a key discussion item under Key Actions • # of climate change courses being offered at the post secondary level in London • # of climate change courses being offered at the high school level in London • # of educational and awareness opportunities being offered to the community • # projects initiated • # companies and partners collaborating on projects • # signed Memorandums of Understanding (MoUs) • # City climate change projects completed in collaboration with educational institutions

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	• # community climate change projects completed in collaboration with educational institutions These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.
Resources	• CEAP Supporting Documents • Climate Science 2050: Advancing Science and Knowledge on Climate Change (Environment and Climate Change Canada, 2020) • Council of Ontario Universities • Ontario Colleges • Learning for a Sustainable Future (including Canada, Climate Change and Education survey, 2019) • Climate Change Learning and Action in Ontario's Certified EcoSchools

Area of Focus 10 - Measuring, Monitoring and Providing Feedback Workplan

Area of Focus 10	Measuring, Monitoring and Providing Feedback
Purpose of this Workplan	The Measuring, Monitoring and Providing Feedback Workplan has been developed based on details: • provided during the community engagement, • compiled or recommended from other municipalities, organizations, committees and others specializing in climate change actions, • approved by Council, and/or • recommended by City staff. The purpose of this workplan is to set an initial direction for collaborative discussion, action and measuring progress. It has been designed to increase collaborative data collection and reporting from key stakeholders that are involved with city-wide data. How the workplan is operationalized will be determined in early 2022.
Climate Change Expected Results	This workplan has been designed to measure and report on progress towards all expected results: Walkable, Complete Neighbourhoods Increased Active Transportation and Transit More Zero Emission Vehicles More Net-zero Buildings Lower Carbon Construction More Resilient Buildings and Infrastructure More Carbon Capture Move Towards a Circular Economy Increased Community Resilience Increased Engagement on Climate Action
Why Does this Matter?	Data-driven decision-making is transparent, grounded in the latest science and defensible. Achievement of any meaningful goals can only be realized if desired outcomes and progress are defined by key performance indicators and supported by data. There is significant potential for connection to Internet of Things (IoT), business intelligence (BI) solutions and artificial intelligence forecasting. Reporting on progress with meaningful and understandable indicators and metrics demonstrates accountability and transparency to the

Area of Focus 10	Measuring, Monitoring and Providing Feedback
	community, partners and stakeholders. Accountability and transparency are important to ensure collaborations and partnerships are functional and strong. Providing feedback, having reminders associated with progress, celebrating successes, encouraging actions, are all important parts of raising awareness and leading to further climate action.
Background – How did we get here?	The City of London has information on community-wide energy use and GHG emissions going back as far as 1990, with annual estimates provided from 2004 onwards. London was one of the first Canadian cities to include community-wide energy costs with this information, starting in 2010. The City of London has information on corporate energy use, cost, and GHG emissions going back to 2007. A detailed breakdown of energy use by subsectors, along with marginal cost abatement ($ cost/benefit per tonne GHG reduced) estimates, was carried out for London in 2011. The City of London has been reporting community and corporate energy use and GHG emissions data at both the national and global level through participation in the Federation of Canadian Municipalities' Partners for Climate Protection program, CDP Cities, and the Global Covenant of Mayors. The City of London used energy maps throughout the 2010s to illustrate residential energy use and efficiency at the neighbourhood scale. The City of London estimated carbon sequestration from London's urban forest through the UFORE tree inventory in the early 2010s. City Forestry staff have assembled a comprehensive database of tree type, age, location and health to provide baseline information for effective management (e.g., invasive pests and diseases). Water quality has been assessed (including temperature and chemistry) throughout the Thames River in London for over 40 years providing a long-term record to assist City staff and partners in wise management of the health of the river ecosystem.

Area of Focus 10	Measuring, Monitoring and Providing Feedback
	Routine infrastructure assessments (e.g., culverts, bridges) have been conducted for several years determining the condition, any weaknesses, and areas for remediation. Within London, many organizations and businesses currently report climate change and sustainability indicators.
What has been done recently?	Some of the recent reports, initiatives and projects related to measuring, monitoring and reporting on climate and environmental aspects include: • 2020 Community Energy Use and Greenhouse Gas Emissions Inventory report; • 2020 Corporate Energy Consumption and Activities Report; • ClimateSmart's Business Energy and Emissions Profile (BEEP) tool for small to medium-sized businesses was developed for use by Green Economy London; • London was amongst the first group of Canadian cities included within Google's Environmental Insights Explorer tool; • Additional stream flow gauges have been added to 3 tributary streams to better assess local flood prediction and impacts; • Additional rain gauges have been installed as an enterprise-wide system covering the entire city to ensure accurate rain amounts are captured in neighbourhoods to assist in implementation and improvements to the basement flooding program; and • Upper Thames Region Conservation Authority staff conducted an assessment of all tributary creeks and their hydrologic condition (e.g., eroding banks) to establish a baseline for ongoing management and future remediation.
Responsible City Service Area(s)	• Led by Environment and Infrastructure, Enterprise Supports • Supported by City Manager's Office, Planning and Economic Development, Neighbourhood and Community-Wide Services, Finance Supports
Key Community Partners and Stakeholders	• Federal and Provincial Government • Energy Utilities (Enbridge Gas, London Hydro, Enwave, Hydro One, Independent Electricity System Operator) • Business Associations and other organizations (e.g., London Chamber of Commerce, London Economic Development Corporation, Green Economy London, London Community Foundation) • Local First Nations and Urban Indigenous communities

Area of Focus 10	Measuring, Monitoring and Providing Feedback
	• Conservation Authorities • Middlesex London Health Unit • Businesses, Institutions and Other Employers • Community Groups (e.g., Pillar Non-profit Network, London Environmental Network, Climate Action London, Urban League of London) • Other Organizations (e.g., Middlesex-London Food Policy Council, London Community Foundation) • Western University • Fanshawe College • London Transit Commission
Key Actions (and Milestones)	Many of the actions below are tied to and/or contained in other workplans **1. Climate Change Mitigation (Timeline: 2022 onward)** a. Continue to provide Londoners with the latest information on local greenhouse gas emissions and the expected impacts of climate change b. Develop an updated detailed assessment of the economic cost and benefits of climate change mitigation actions (e.g., marginal abatement costs) needed to reach net-zero emissions by 2050. c. Create and regularly update estimates for global GHG emissions from the local consumption of goods and services (i.e., Scope 3 emissions) for inclusion in the community GHG emissions inventory d. Create and regularly update estimates for the climate impacts of land use, land use change, and urban forestry (e.g., carbon sequestration rates from trees, environmentally significant areas and other natural areas, and agricultural land) for inclusion in the community GHG emissions inventory e. Work with London Hydro (Lead) to review London's electricity distribution system to identify the capacity for additional renewable electricity generation f. Work with London Hydro (Lead) as they continue to facilitate the connection of low carbon and renewable distributed energy sources such as solar, biogas, hydro generation, batteries and microgrids. g. Work with London Hydro (Lead) as they continue to provide applications and tools like the Green Button, Commerce (formerly IDC), Property Management Portal, and

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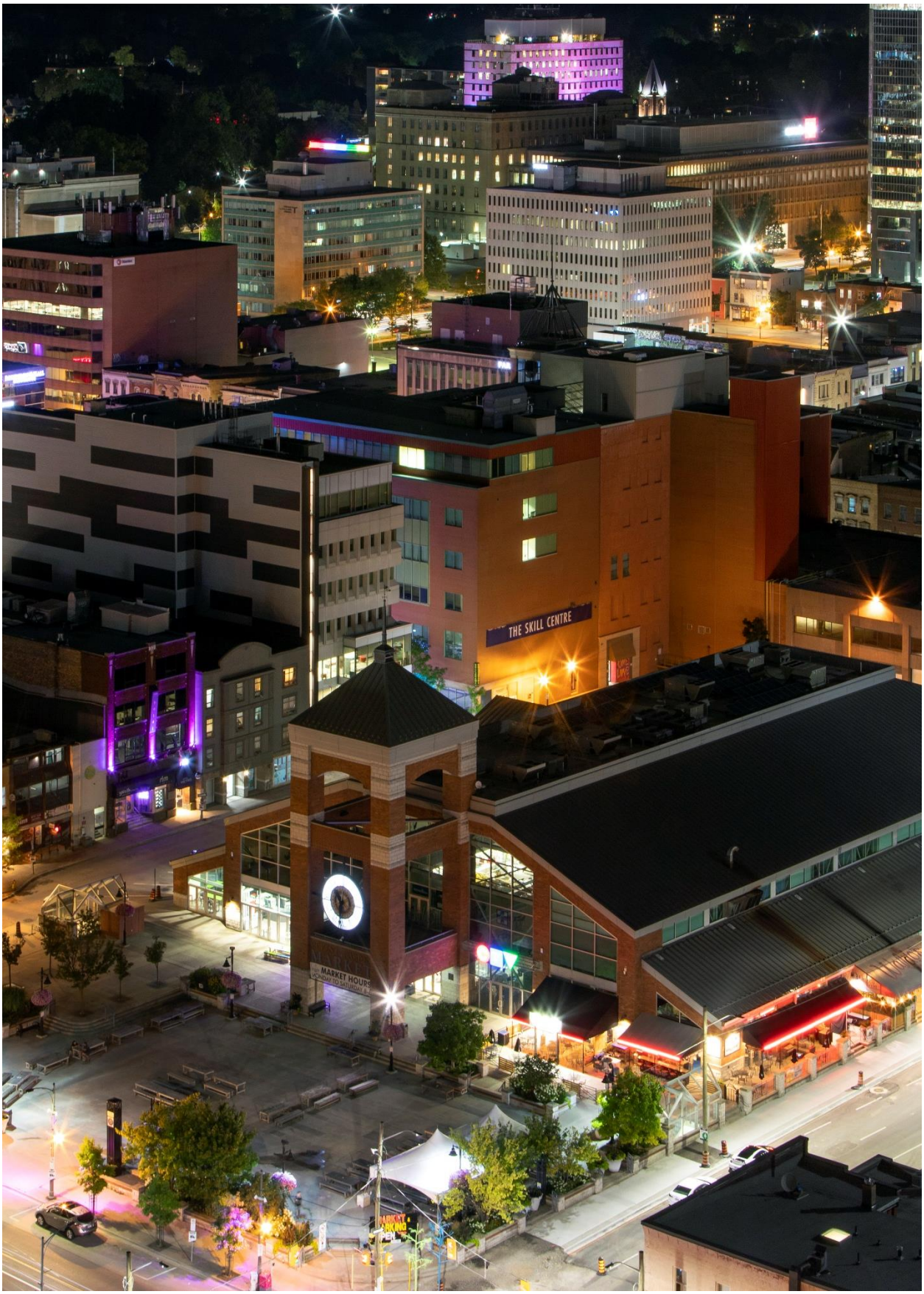
	MyLondonHydro for customers to review and manage their energy usage. h. Work with Enbridge Gas (Lead) to review London's gas distribution system to identify the capacity for additional "green gas" (i.e., renewable natural gas and/or hydrogen) gas injection i. Work with the London Economic Development Corporation (Lead) and the London Chamber of Commerce (Lead) to define and encourage the growth of employment in the green products and services sector in London j. Work with the London Chamber of Commerce, London Economic Development Corporation and Green Economy London to encourage London's business community to set GHG reduction targets for their business and track progress towards these targets k. Work with the Pillar Non-profit Network to determine how the United Nations Sustainable Development Goals can be addressed as part of public reporting with respect to climate action **2. Climate Change Adaptation (Timeline: 2022 onward)** a. On an annual basis, compile a summary of extreme weather events impacting London and list the actions taken or required to address the impacts to Londoners, as per the 'Building an Adaptive and Resilient Community' process and our partnership with ICLEI b. Assess through measurement the connectivity, ecosystem health, and area of the natural heritage system c. Work with the Middlesex London Health Unit to review and update the migration patterns and tracking of applicable human health impacts of climate change (e.g., lyme disease carried by ticks) d. Assess, track, and report on the change in permeability of urban lands through Low Impact Development (LID) and de-paving (removal of hard surfaces) initiatives e. Work with the Conservation Authorities and other emergency preparation and response partners to assess damage and remediation actions needed to address flooding impacts and recovery **3. Progress Reporting (Timeline: 2022 onward)** a. Confirm or establish the baseline data and 2030 objective for each Expected Result

Area of Focus 10	Measuring, Monitoring and Providing Feedback
	b. Provide Municipal Council with a report on Climate Emergency Action Plan implementation progress and performance on an annual basis c. Provide Municipal Council with a report on community-wide and corporate GHG emissions on an annual basis d. Provide the public with an easy-to-find and easy-to-use platform(s) and visuals for presenting information on Climate Emergency Action Plan implementation progress, community-wide GHG emissions, corporate GHG emissions, and progress on adaptation measures being undertaken e. Continue to report community and corporate energy use and GHG emissions data at both the national and global level through the Federation of Canadian Municipalities' Partners for Climate Protection program, CDP Cities, and the Global Covenant of Mayors f. Report on municipal adaptation efforts through ICLEI Sustainable Cities - Building Adapting and Resilient Communities (BARC), CDP Cities, and the Global Covenant of Mayors g. Make community and corporate energy use and GHG emissions data accessible via the open data portal
Examples of Measuring Progress	**Increased Engagement on Climate Action** • Website view statistics by action • Social media statistics by action • Number of downloads by document • Number of new data collection exercises implemented • Number of Top 100 City Employers (by number of employees) reporting sustainability indicators These measures are intended to evolve through the consultation and implementation process to ensure they are adding value to the progress of the CEAP.
Resources	• CEAP Supporting Documents • London's Business Energy and Emissions Profile (BEEP) • Google's Environmental Insights Explorer • UN Sustainable Development Goals


THE SKILL CENTRE