



## Taking Action on Climate Change in Hamilton – A Community Plan



Hamilton



## Thanks and Recognition

The Hamilton Community Climate Change Action Plan would not have been possible without the time, responses and effort provided to its development by the community in Hamilton, Ontario.

It took a total of 14 months for the Plan to be developed, starting with the creation of a steering committee of 18 individuals in May 2014. The “Let’s Talk About the Weather” community engagement campaign was initiated in July 2014 with over 100 attendees helping to launch a Community Discussion Paper. More than 200 citizens representing various wards in Hamilton were engaged in community climate change conversations at coffee shops, libraries, workshops and events throughout Hamilton. Additionally, over 400 individuals and 91 neighbourhood associations, businesses and community organizations received e-newsletters that provided project updates and promoted upcoming events. The project Twitter account, @ClimateConvo, has over 250 followers.

Over 65 individuals representing partners and citizens in Hamilton volunteered their time, energy, and knowledge for 10 months as members of one of eight Task Force groups. Task Force members were responsible for developing the local actions identified in this Plan to address climate change in eight theme areas: Agriculture and Food, Education and Awareness, Energy, Infrastructure, Land Use, Buildings and Built Form, Local Economy and Business, Transportation, and Water and Natural Ecosystems.

This work and effort would not have been possible without the following people/organizations being involved. We wish to thank you for your support, input and help to create this Community Plan.

### Members of our Community Climate Change Plan Steering Committee:

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<b>Built Form</b>	<b>Business</b>	<b>Mobility</b>	<b>Ecosystems</b>
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			Tys Theysmeyer
			Steven Watts

### **Locations and events that welcomed us to engage the community**

My Dog Joe, McMaster University – McMaster Water Week, Democracy, Brown Dog Café, Café Orange, Hamilton Farmer’s Market, Jackson Square, James North Art Crawl, Hive X – Sheraton Hotel, ArtWord Art Bar, Open Streets Hamilton, Liuna Station, Williams Coffee, AGH Design Annex, Waterfront Centre, 541 Eatery and Exchange, Platform 302, Green Venture Eco House, Concession Street Fall Fest, E23 Coffee Shop, Terryberry Library, Mohawk College, Saturday’s in the Creek, Winona Eco-Fest - St. John the Evangelist Anglican Church, Mount Hope Library, Binbrook Library, Ancaster Fair, Café Domestique, Dundas Town Hall, Dundas Farmer’s Market, TD Community Tree Planting Fest - Desjardins Canal, Rockton World’s Fair, Greensville Library, Jitterbug Café, and the Harry Howell Arena- Golden Horseshoe Electric Vehicle Association.

### **Groups, organizations and associations that engaged, supported and made this Community Plan possible**

City of Hamilton, Hamilton Public Health Services, Federation of Canadian Municipalities, ICLEI Canada, Clean Air Hamilton, Green Venture, Environment Hamilton, Sustainable Hamilton, Dundas in Transition, Hamilton-Wentworth Federation of Agriculture, Horizon Utilities, Hamilton Chamber of Commerce (Hive X), Hamilton Sustainable Professionals Network, Hamilton Association for Renewable Energy, Greening Sacred Spaces, Bay Area Restoration Council, Royal Botanical Gardens, McMaster University, Mohawk College, Hamilton Industrial Environmental Association, Hamilton Conservation Authority, Golden Horseshoe Electric Vehicle Association, Hamilton Public Library, GTHA Clean Air Partnership, McMaster Centre for Climate Change, Community Awareness and Emergency Response Group, and Hamilton350.



## Table of Contents

<b>Thanks and Recognition.....</b>	<b>ii</b>
<b>1. Executive Summary .....</b>	<b>1-1</b>
<b>2. What is this About? .....</b>	<b>2-6</b>
What is the Community Climate Action Plan? .....	2-6
What Are the Objectives of the Plan? .....	2-6
How was the Plan Developed? .....	2-8
<b>3. Our Top Priorities for Action.....</b>	<b>3-1</b>
How Were the Priority Actions Identified? .....	3-1
What Are Our Top Priorities? .....	3-1
What Are the Expected Benefits of Implementing Our Top Priorities? .....	3-5
<b>4. Implementing the Plan .....</b>	<b>4-1</b>
<b>5. Community Themes and Actions to Address Climate Change.....</b>	<b>5-1</b>
<b>AGRICULTURE AND FOOD .....</b>	<b>5-2</b>
<b>AWARENESS AND EDUCATION.....</b>	<b>5-6</b>
<b>ENERGY .....</b>	<b>5-9</b>
<b>INFRASTRUCTURE .....</b>	<b>5-12</b>
<b>LAND USE, BUILDINGS, AND BUILT FORM.....</b>	<b>5-15</b>
<b>LOCAL ECONOMY AND BUSINESS .....</b>	<b>5-18</b>
<b>PEOPLE AND HEALTH.....</b>	<b>5-21</b>
<b>TRANSPORTATION AND MOBILITY .....</b>	<b>5-24</b>
<b>WATER AND NATURAL ECOSYSTEMS.....</b>	<b>5-27</b>
<b>6. Where Can I Learn or Do More in Hamilton? .....</b>	<b>6-1</b>

## Appendices:

**Appendix A: Climate Change 101**

**Appendix B: Additional Opportunities**

# 1. Executive Summary

Climate change is a real issue that is affecting communities around the world, including right here in Hamilton. Climate change is the altering of long-term patterns of weather. We have seen this through changes in temperature, precipitation, wind and other indicators that have already been affecting the Hamilton community – and we can expect changes in climate to continue in the future.

We will all see the impacts of climate change. We all have a role to play in reducing our contributions to climate change and in preparing for the changes. This Plan is a plan for our community and our future. It was developed with the Hamilton community to help us address climate change and become more resilient to the impacts that we can expect to see in and around Hamilton over the coming decades. Our plan focuses on adapting and preparing our community for the risks of climate change, such as more variable and extreme weather, additional social and infrastructure stresses, risks to infrastructure, and insurance costs. It also focuses on reducing our community's contributions to climate change by focusing efforts on reducing the amount of greenhouse gases (GHGs) we emit.

This Action Plan subscribes to three principles of climate action:

**Mitigation** – moderation of climate change disruption by reducing contributions to emissions

**Resiliency** – social and natural systems being able to respond to and recover from climate change events

**Adaptation** – adjustments to social and ecological systems to reduce vulnerability to changing situations from climate change impacts

The main contributor to climate change is the increasing amounts of GHG emissions in the atmosphere. The types of activities that result in GHG emissions are largely influenced by decisions made locally, by businesses, schools, and industries in Hamilton, as well as by the people that live and work here. We all have a role to play! Our community has been working hard in the past several years to reduce our emissions and that work has been paying off. Community emissions in Hamilton have been reduced by 29% from 2006 levels to 2012. In those short six years, our annual emissions were reduced from an estimated 23,351,712 tonnes to 16,500,000 tonnes. While we have made good progress and met our 2020 reduction target of 20% ahead of schedule, we still have more work to do to reach our longer-term targets of 50% reduction by 2030 and 80% by 2050.

## Hamilton's Community Emissions Targets

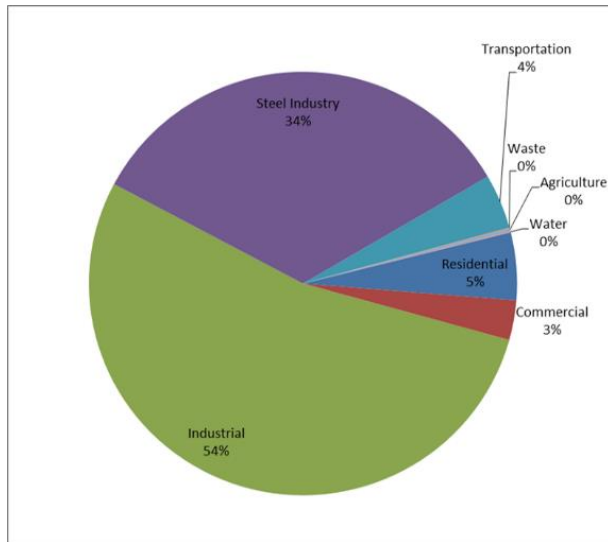
**20% reduction in GHG emissions from 2006 levels by 2020**

**50% reduction in GHG emissions from 2006 levels by 2030**

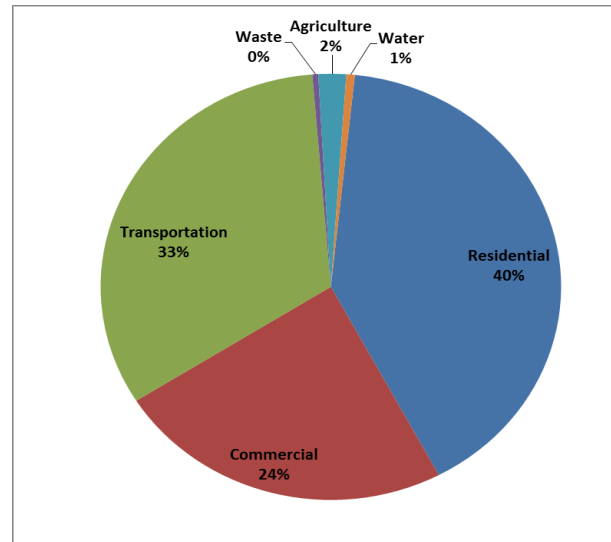
**80% reduction in GHG emissions from 2006 levels by 2050**

Looking at our 2012 emissions, Hamilton's main sources of GHGs are (from highest to lowest): industrial energy use, steel industry, residential energy use, transportation, and commercial energy use. Agriculture, water, and waste also generate GHG emissions, but are lower than the main sources of emissions. The Government of Ontario and the Government of Canada primarily lead regulations and programs to reduce or direct industrial GHG emissions and energy usage. Areas where we may want to focus our local community action include residential energy usage, transportation and commercial energy usage.

**Hamilton's Total Greenhouse Gas Emissions (2012)**

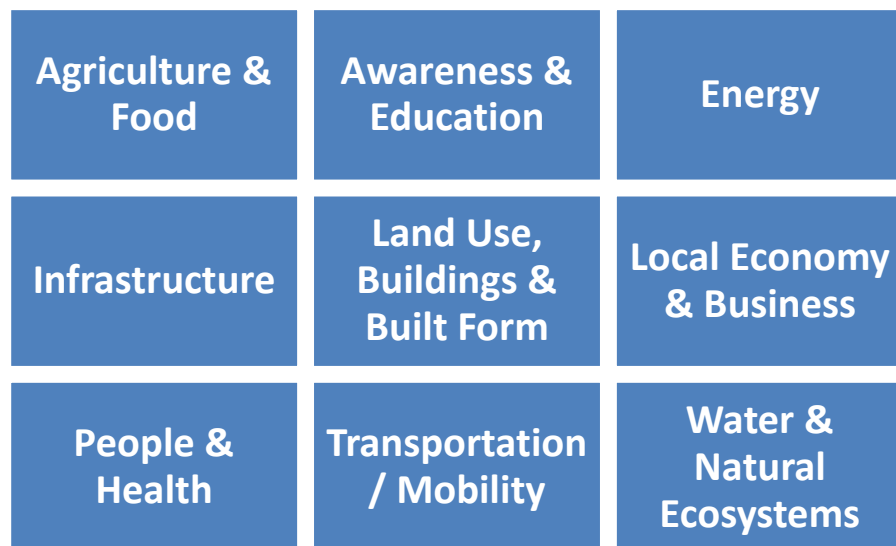


**Hamilton's Non-Industrial Greenhouse Gas Emissions (2012)**



According to the Intergovernmental Panel on Climate Change (IPCC) and other international organizations, climate change is underway and the impacts of climate change are and will be severe. Even if worldwide GHG emissions were reduced to zero today, temperatures and extreme weather events would increase, leading to more impacts on cities and communities locally and globally. Observed changes in Hamilton since the 1970s show that the average mean temperature has increased by 0.9°C, we are seeing warmer seasonal temperatures, and annual precipitation has increased by 26mm (a 3% increase in annual average precipitation). In recent years, we have already seen extreme weather events, flooding, increase daytime and nighttime temperatures, ice storms, and extreme temperature ranges. As these observed trends continue so does the frequency and possibility of increasingly extreme events.

Our Community Climate Action Plan outlines our approach to taking action in the Hamilton community to address climate change. It is organized into nine themes that have emerged as important areas to focus on amongst the Hamilton community to address climate change locally. Each of these themes are related and interdependent – actions supporting one area have the intention of being consistent and compatible with those in the other areas to limit unintended consequences.



Our Plan establishes long-term goals and directions within the nine theme areas to guide us on taking climate change action. A number of potential actions have been identified within each theme to help achieve each goal. Ten priority actions have also been identified to be undertaken in the community within the next 1 to 3 years. These ten priority actions are outlined in the table below:

<b>10 Priority Actions</b>
<b>Support local food production/consumption and integrate climate change mitigation/adaptation strategies into existing farm and food plans and initiatives</b>
<b>Establish ongoing education and awareness program/campaign for climate change</b>
<b>Develop a Community Energy Plan to guide the Hamilton community's energy future</b>
<b>Revise and update municipal infrastructure guidelines to prioritize Low Impact Development (LID) as a preferred method for stormwater management</b>
<b>Establish variable development charges to reflect real costs of buildings and maintaining infrastructure</b>
<b>Create an accessible toolkit for businesses to assist with impact analysis and business continuity planning</b>
<b>Conduct a local community vulnerability assessment of public health impacts from climate change</b>
<b>Expand public transit services to include dedicated rapid transit lanes where possible</b>
<b>Secure property that serves as source water storage or preserves wildlife corridors within the catchment</b>
<b>Establish an ongoing oversight and coordination body to guide implementation of the Hamilton Climate Change Action Plan and report back on community progress and success</b>

Our Plan is more than just a plan. Through our implementation framework, ongoing actions can be identified and advanced that help support our community vision and goals on climate change. Our Plan cannot be implemented by one organization alone; it requires collaboration amongst multiple organizations and ongoing partnerships. The top ten priority actions are a start, but not an ends to addressing climate change in Hamilton. Ongoing efforts will be required to continually work towards achieving our GHG reduction targets and preparing for climate change.

Implementation of the priority actions identified in our plan will result in significant GHG reductions as well as increased benefits to the provincial and local Hamilton economy. A dollar spent on a local program such as on expansion of local food production or on renewable energy circulates and re-circulates within the economy, multiplying the effects of the original expenditures on overall economic activity.

The expected results of the implementation of the ten priority actions are a total annual gross reduction of about 283,467 tonnes of CO<sub>2</sub>. The net reduction is of about 202,920 tonnes of CO<sub>2</sub>. The difference between the gross and net reductions arises on account of added emissions by the new economic expansions generated by the expenditures on the actions and/or their savings of energy and water that are re-spent. The reduction in CO<sub>2</sub> gases is not the only environmental positive impact. The increased vegetation and improvement in air quality and health are also predictable outcomes of these actions.

Equally significant is the total number of full-time equivalent jobs that are expected from the impacts of the programs estimated at 1,643.6 FTEs in Ontario, of which 1,123.5 FTEs will be in Hamilton. The local tax base is expected to increase by \$40.9 million as all levels of government will reap tax revenues on the positive impacts. The local government is expected to increase its revenues by \$3.3 million annually. Local incomes (City of Hamilton) will increase by \$97.2 million while Ontario's income would rise by \$133.5 million through the implementation of these actions.

A major indicator to note is the total estimate of avoided costs. These will exceed \$69.1 million and will represent savings to households, businesses and governments.



**Table**  
**Estimated Annual Impacts of the Climate Action Plan Priorities in Hamilton**

Climate Action Plan	A. Environmental Impacts			B. Province-Wide Economic Impacts					C. Regional Economic Impacts in Hamilton						
	GHG Emissions (tonnes CO2/year)			\$000's	Total Investment and Incremental Expenditures	\$000's	Gross Economic Activity	Value Added to Provincial Economy	Tax Revenue to all Levels of Government	\$000's	Avoided Cost	Gross Local Economic Activity	Value Added to Local Economy	Tax Revenue to Local Government	Local Employment (FTEs)
1 Support Local Food Production and Consumption	16,072	3,541	12,531	\$36,638	\$36,638	\$86,268	\$46,925	\$14,052	\$14,052	842.0		\$76,489	\$44,572	\$1,737	604.0
2 Establish On-Going Education and Awareness Program Campaign	34		34	\$40	\$40	\$116	\$42	\$13	\$13	0.5		\$61	\$22	\$1	0.3
3 Develop a Community Energy Plan to Guide Hamilton's Energy Future	5,467	8,585	-3,118	\$5,892	\$5,892	\$14,644	\$7,359	\$2,275	\$2,275	68.4	\$5,892	\$10,429	\$4,478	\$142	44.5
4 Revise/Update Infrastructure Guidelines (annualized)	11,412	23,692	-12,280	\$12,304	\$12,304	\$30,310	\$15,280	\$4,734	\$4,734	141.1	\$12,304	\$22,394	\$9,351	\$278	91.7
5 Establish Variable Development Charges and Water Rates set to reflect real cost (10%).	14,606	8,336	6,270	\$15,747	\$15,747	\$38,791	\$19,555	\$6,059	\$6,059	181.0	\$15,747	\$28,345	\$11,810	\$355	118.0
6 Create an Accessible Tool Kit for SMEs to assist with impact analysis and Business Community Planning (one-time cost)	209		209	\$250	\$250	\$639	\$334	\$106	\$106	3.2		\$488	\$251	\$7	2.1
7 Conduct a Local Community Vulnerability assessment of Public Health Impacts from Climate Change	8,634	7,045	1,589	\$9,343	\$9,343	\$23,015	\$11,602	\$3,595	\$3,595	107.2	\$9,343	\$16,537	\$7,101	\$211	69.7
8 Expand Local Transit Services to include a dedicated Rapid transit Lanes	23,024	231,738	-208,714	\$24,823	\$24,823	\$61,149	\$30,827	\$9,551	\$9,551	285.0	\$24,823	\$44,681	\$18,617	\$560	185.0
9 Protect and preserve green spaces	972	529	443	\$1,060	\$1,060	\$2,652	\$1,349	\$417	\$417	13.4	\$1,000	\$2,000	\$860	\$27	7.3
10 Establish an Ongoing Oversight and Coordination body to Guide and report on Hamilton's Climate Change Action Plan.	115		115	\$147	\$147	\$377	\$208	\$66	\$66	1.8		\$182	\$129	\$4	0.9
TOTAL	80,546	283,467	-202,920	\$106,244	\$106,244	\$257,961	\$133,481	\$40,868	\$40,868	1,643.6	\$69,109	\$201,606	\$97,191	\$3,321	1,123.5

Source: Econometric Research Limited

## 2. What is this About?

### What is the Community Climate Action Plan?

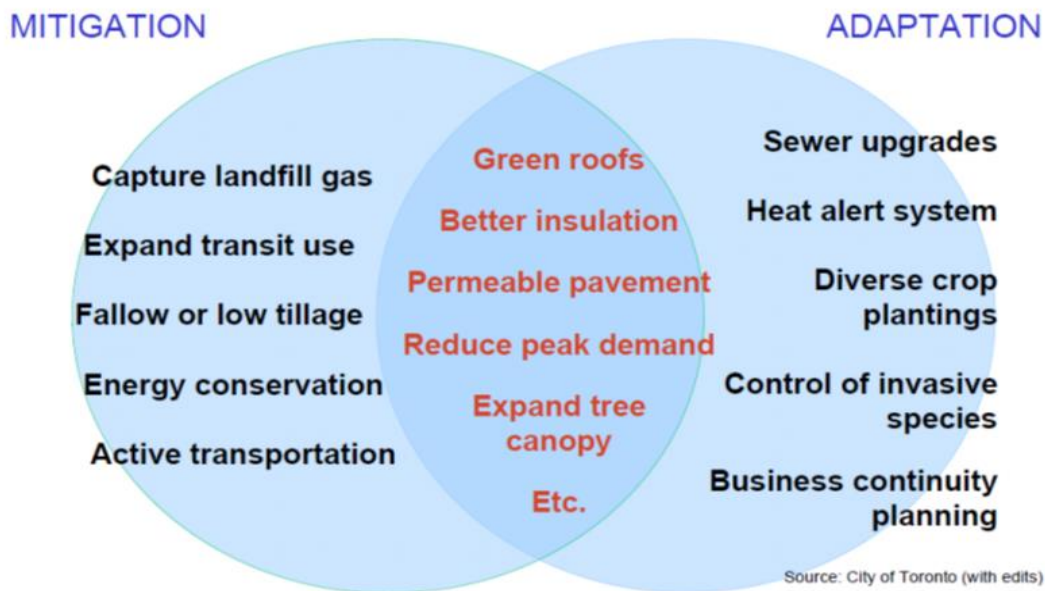
This Community Climate Action Plan (CCAP) is designed to provide our community with practical approaches to reducing greenhouse gas (GHG) emissions from our community and to help us prepare for the impacts of climate change. The Plan outlines long-term directions on what we want to achieve in our community by establishing principles for climate action, establishing GHG reduction targets and climate action goals, and outlining realistic and achievable actions and future opportunities to achieve our goals. It also outlines an implementation structure and mechanisms to help citizens and businesses contribute to a more sustainable and resilient Hamilton.

Our plan is more than just a plan; it is a call to action. We will need community, industry and government efforts to get there! By creating a CCAP, businesses and citizens can take the lead to address the 99% of GHG emissions that come from community sources in Hamilton to help meet reduction targets. Because most of our emissions are from community sources and the impacts from climate change will be felt predominately by the community, our plan is designed to be led by community partners. The City of Hamilton is a facilitator, to help foster and support partnerships and monitor and track progress in the community as well as take action to address climate change where they have a role.

### What Are the Objectives of the Plan?

The objective of this Plan is to increase the resiliency of Hamilton in the face of a changing climate. Resiliency comes from having the capacity to *mitigate* (reduce impacts) or *adapt* (respond to change). Our Plan aims to address climate change from both an adaptation and mitigation perspective with an overall goal of reducing the vulnerability of natural and human systems to actual or expected climate change effects.

We can help slow climate change and minimize the stresses human activities are imposing on the natural environment through mitigation efforts. Mitigation refers to proactively moderating climate change by reducing our overall contribution to emissions. Climate change mitigation is centred on taking action to reduce *further* contributions to global warming. There are a number of ways that local governments, businesses, and residents can take action to reduce or mitigate the amount of greenhouse gases emitted into the atmosphere.



We also know that the climate is changing – both globally and locally – due to the greenhouse gases that are already in the atmosphere. Even as we work to reduce the GHGs emitted, current GHGs will still persist in the environment and continue to influence climate change and the weather. As such, we need to adapt to observed and expected changes that may occur as a result of climate change. Adaptation is the process of adjusting our social and ecological systems in response to changing situations to reduce our vulnerability to the impacts of climate change. This involves adjusting policies and actions to minimize the negative impacts associated with the changing climate and where possible capitalizing on new opportunities. Adaptation can be reactive, occurring after we observe changes, or proactive, occurring before we experience any change<sup>1</sup>.

**Mitigation** – moderation of climate change disruption by reducing contributions to emissions

**Resiliency** – social and natural systems being able to respond to and recover from climate change events

**Adaptation** – adjustments to social and ecological systems to reduce vulnerability to changing situations from climate change impacts

Resiliency is the capability of our social and or natural systems to respond to and recover from climate change events. This means being prepared for and adapting to real or expected changes that may occur as a result of changing climate, many of which we are already seeing today. Changes like more extreme weather events (e.g. heavy rain, flash floods, tornados, etc.), more frequent and severe heat waves and smog days, higher demands for and stress on energy systems, declining lake levels and impacts on water quality and ecosystems, damage to urban trees and other vulnerable ecosystems, and damage to buildings, roads and other vital infrastructure are a few of the impacts we are already experiencing and can expect to see more of.

<sup>1</sup> <http://www.nrcan.gc.ca/environment/resources/publications/impacts-adaptation/reports/municipalities/10081>

Community emission reduction targets have been set out and the Plan identifies actions that can be taken by the community to reduce greenhouse gas emissions locally.

***20% reduction in GHG emissions from 2006 levels by 2020***

***50% reduction in GHG emissions from 2006 levels by 2030***

***80% reduction in GHG emissions from 2006 levels by 2050***

## **How was the Plan Developed?**

### **A Strong Foundation**

In 1992, the then Region of Hamilton-Wentworth (now the amalgamated City of Hamilton), in collaboration with the Hamilton community, decided what they wanted Hamilton and the Region to look like in the year 2020, creating a vision and identifying a number of ways that everyone could take action to make it happen. The Regional Council adopted the Vision in 1993 as a guide for all future decision making. The VISION reads:

*“Hamilton supports a population that allows us to maintain our environmental integrity together with our social quality and economic prosperity. People live in a city made up of compact urban core areas, surrounded by a rural landscape that includes productive family farms, hamlets and a continuous network of natural areas.*

*We are a caring community that gives opportunity and support to all its members, including children, the aged, people with disabilities, immigrants, refugees and the disadvantaged. People live longer in good health.*

*Hamilton is a vibrant community, which builds on existing strengths and attracts businesses that work in partnership with government and the community to create a diverse, sustainable economy. Economic growth incorporates businesses in new and existing sectors that are leaders in creating a competitive advantage through environmental and social responsibility.”*

### **Building on our Foundation**

The community visioning process (Vision 2020) created a focus or goal against which decisions made by government, business, community groups, and individuals could be measured. The community, as a whole, was given the opportunity to be part of the decision-making process and influence the future of the community. Vision 2020 identified fourteen key theme areas, many that are covered by the themes in this Plan including: Agriculture and the Local Economy, Consuming Less Energy, Local Economy, Changing our Mode of Transportation, Natural Areas and Corridors, Improving the Quality of Water Resources, Improving Air Quality, Personal Health and Well-being, and Community Well-Being and Capacity.

As such, eight Community Climate Change Action Task Forces consisting of over 65 people representing partners and citizens in Hamilton volunteered their time, energy, and knowledge for 10 months to develop the local actions identified in this Plan. The eight Task Force groups include Agriculture and Food, Education and Awareness, Energy, Infrastructure, Land Use, Buildings and Built Form, Local Economy and Business, Transportation and Water and Natural Ecosystems.

As Vision 2020 embarks on its new visioning and engagement exercise in the Hamilton community in 2015, this Community Climate Change Action Plan and its engagement can serve as a resource for actions that address climate change in Hamilton under the new visioning process.

### **Engaging our Community**

During the development of this Plan, “Let’s Talk About the Weather” in-person community conversations were held across Hamilton in both urban and rural areas and across Wards. Conversations took place in the community in 35 locations including coffee shops, branches of the Hamilton Public Library, McMaster University, Mohawk College and local events including the Ancaster Agricultural Fair, the Rockton World’s Fair, Saturday’s at the Creek and James North Art Crawl and at workshops held by community organizations.

More than 200 citizens representing Wards across Hamilton were engaged at these conversations, workshops and events. Approximately 400 individuals and 91 neighbourhood associations, business and community organizations signed up and were kept informed through notifications, invitations and on-line newsletters.

A Discussion paper was released to the community on climate change to inform and engage with the community on current actions and impacts on climate change and help develop awareness and actions to create the community climate change plan. This can be read online at

<http://climatechangehamilton.ca/plan/join-the-conversation/>.

On-line engagement was through the Hamilton Climate Champions website with a page dedicated to the Plan including Community Discussion Paper, an on-line questionnaire, results of engagement to date by themes, and a Workshop-in-a-Box for downloading and holding community workshops.



A Twitter page was also created for the “Let’s Talk About the Weather” Community Plan conversations (<https://twitter.com/ClimateConvo>) to inform the community of activities and had achieved 270 followers.

Through the engagement process, Hamilton residents were asked to explain their understanding of climate change, share their stories about how they have been impacted by extreme weather, and suggestions on how Hamilton can prepare for the observed and expected changes that may occur due to climate change.

### **What We Heard**

Residents associated climate change with extreme, drastic or unpredictable weather patterns, emissions and pollution, shifts in temperature, global warming, and as a natural cycle.

Residents identified local impacts as flooding, increased cost of energy and gas, feeling too cold or too hot, and more conscious of the weather. A number of respondents felt no impacts.

The top responses from the community in terms of what can be done and how we can prepare for climate change include:

- Increased education and awareness;
- Use of renewable resources;
- Reducing emissions;
- Better infrastructure and reduction of sprawl;
- More political intervention; and
- Doing nothing

### 3. Our Top Priorities for Action

#### How Were the Priority Actions Identified?

Through the process of developing our Plan, the Community Climate Change Action Task Forces worked hard to identify and prioritize potential actions to address climate change. Task Force members worked in collaboration to identify the top priority for each theme area based on the anticipated benefits, the feasibility and fit in Hamilton, level of acceptance and support, and the ability to be initiated within the next three years.

#### What Are Our Top Priorities?

##### **Support local food production/consumption and integrate climate change mitigation/adaptation strategies into existing farm and food plans and initiatives**

Hamilton contains 227,000 acres of land, which qualifies as prime agricultural land. Hamilton's economy contains an estimated \$1 billion a year in agriculture industry.

Agriculture is an important part of Hamilton's local economy, especially when linked to local food processing and retail distribution/consumption. According to the 2011 Census, Hamilton has 885 farms, most of which are less than 53 hectares. Approximately 4% of the provinces greenhouses are in Hamilton and almost 4% of the Ontario's vegetable and melon farming as well as fruit and tree nut farming. A majority of Hamilton farmland is producing corn, soybeans and hay while dairy and other livestock production contributes a large share of farm receipts.

The City's agriculture will become more important both locally and in Canada as the importance of local food and the potential migration of agricultural production increases due to changes in climate. Changes (extreme weather, droughts, floods, shifting produce, weeds and insect) in agriculture will affect the supply of food.

Many local farmers continue mitigating GHG emissions through efficient resource/energy management and carbon sequestration. As good business operators, farmers know better than anyone that economic success requires healthy agro-environmental conditions. Many of the actions required for ensuring that health will also help to address climate change impacts and GHG emissions reduction.

Local food production and consumption should be encouraged to support the local economy. There is a need to integrate climate change mitigation and adaptation into existing farm and food plans at the Provincial and municipal level, such as the Golden Horseshoe Food & Farming Action Plan, the Canada Ontario Environmental Farm Plan and the City of Hamilton Food Strategy to ensure food related actions reduce carbon emissions.

This action will involve partnerships with the Federation of Agriculture, the Ontario Ministry of Agriculture, Farming and Rural Affairs and the City of Hamilton – Economic Development, Community Services and Public Health Services. Partnerships should also be sought with the Community Stakeholders Food Security Committee and local organizations such as Environment Hamilton, Hamilton Farmer's Markets and Hamilton Community Garden's Network. Additionally, local farmers, agricultural producers, local gardeners and local consumers have an important role to play.



### **Establish ongoing education and awareness program/campaign for climate change**

The community conversations and engagement undertaken to develop this local action plan revealed a common action and request for increased community education and awareness. Through this Plan and initiatives in Hamilton around climate change, awareness has been raised. The community is aware of global warming or climate change, as a product of a carbon based-economy through media, associations, government and community-led programs. It is important to educate people and make them aware of local actions they can take and about the actions and opportunities under this Community Plan. Enhanced understanding of the issues and local impacts leads to action and keeps the community informed of new information around climate change as it emerges.

Raising awareness and educating the community on climate change, local impacts and actions involves many local groups and networks, such as the Hamilton Climate Change Champions, Green Venture, Environment Hamilton, Bay Area Restoration Council, Clean Air Hamilton, the Hamilton Regional Conservation Authority, Hamilton35 and Trees for Hamilton. Institutions such as the City of Hamilton, McMaster Centre for Climate Change and Mohawk College should also be involved. These partners can contribute collectively through a coordinating committee or within their respective areas of knowledge.

### **Develop a Community Energy Plan to guide the Hamilton community's energy future**

Community energy mapping for the City was undertaken in 2011. There are a number of energy related initiatives being undertaken locally by the City of Hamilton (with respect to its corporate assets), utilities and local groups to reduce and improve energy conservation; however, a central community plan with targets has not been established. Energy infrastructure is also vulnerable to a changing climate. As energy is a key link to climate change in the community and lowering our carbon footprint, a plan is required to address energy in the community to integrate actions towards common reduction and efficiency targets and examine alternative energy usage in energy and greenhouse gas emissions.

The City of Hamilton in partnership with the local utilities– Horizon Utilities Corp. and Union Gas would be key organizers in developing a Hamilton Community Energy Plan. Support to recognize the need for these types of community energy plans and mapping to integrate into land use planning and how cities are built would come from the Province through the Ministry of Municipal Affairs and Housing and the Ministry of Energy.

### **Revise and update municipal infrastructure guidelines to prioritize Low Impact Development (LID) as a preferred method for stormwater management**

Infrastructure is vulnerable to extreme weather events and more frequent and intense storm activity in Ontario as a result of climate change. These weather events are placing increasing stresses on an already aging private and public infrastructure. A widely recognized potential adverse impact associated with a changing climate in Ontario is increased frequency and duration of extreme weather events. These extreme weather events are anticipated to bring increased precipitation that can potentially lead to an increased risk of flooding, and an increased risk of suffering losses and/or damages to public and private property as a result.

Encouraging Low Impact Development and designing built areas with absorbent green spaces and permeable hard surfaces can reduce the risks associated with extreme weather events. This is because Low Impact Development seeks to replicate portions of the natural hydrologic cycle that have been compromised in urban areas by fostering natural interception, infiltration, groundwater recharge, and



base flow maintenance.

The City of Hamilton Public Works in partnership with Planning and Economic Development, the Building Division and the Hamilton Conservation Authority will work to examine and develop guidelines and tools to implement LID in development in Hamilton.

### **Establish variable development charges to reflect real costs of buildings and maintaining infrastructure**

Hamilton's population is expected to grow to 660,000 by 2031. Increasing population and increasing land use will result in increasing demand for resources and services. Although development is required to accommodate population growth, there are opportunities to create compact land use patterns that integrate energy efficiency and water efficiency to be better prepared for the potential impacts of climate change and extreme weather events.

Variable development charges would encourage more compact land use and incent Low Impact Development to reduce the impacts of a changing climate.

The City of Hamilton through Council, Planning and Economic Development and Public Works will need to lead this action through amendments to local development charges and work with the Province and Ministry of Municipal Affairs and Housing.

### **Create an accessible toolkit for businesses to assist with impact analysis and business continuity planning**

Climate change and extreme weather events are affecting all industries directly or indirectly within Hamilton and Ontario resulting in damages or costs due to weather, increased regulations and legal liability. Climate change presents both reduction and adaptation challenges to local business requiring reduced emissions to prevent further changes and adaptation to existing, unavoidable changes to climate. Reduction of emissions has been the focal point for business efficiency; however, as extreme weather events continue to increase, more focus for business is shifting towards business continuity in the face of the risks associated with climate impacts.

Opportunities for the development of a toolkit for businesses that can address climate change mitigation, impact, analysis and continuity planning reside with a number of partners, including: McMaster University DeGroote Business School and Centre for Climate Research, the Hamilton Community Emergency Response Group, Sustainable Hamilton, the Insurance Bureau of Canada, and the Hamilton Chamber of Commerce.

### **Conduct a local community vulnerability assessment of public health impacts from climate change**

Climate change has direct and indirect impacts on the health of communities and individuals – changes in air quality, higher humidity and warmer temperatures, more frequent extreme weather events and flooding which affect everyone including the vulnerable and at-risk populations in a community.

Although Hamilton delivers a number of initiatives that inform and aim to protect the health of the community (e.g. heat alerts, cold alerts, smog alerts, flood and emergency preparedness, West Nile, and beach inspections) a comprehensive vulnerability scan should be undertaken to identify gaps and opportunities for programs to protect the local health of citizens.

Hamilton Public Health Services with the support of Health Canada and the Ontario Ministry of Health

and Long-Term Care should lead the undertaking of a health vulnerability scan for the community of Hamilton. The results of this scan should then be used to create Public Health mitigation and adaptation plans and actions for the City.

#### **Expand public transit services to include dedicated rapid transit lanes where possible**

Transportation is a leading source of GHG emissions in Hamilton, contributing to 33% of City emissions. On an average day, residents of Hamilton make a total of approximately 1 million trips, or 2.5 trips for every person over 11 years of age. Between 1986 and 2001, local transit declined from handling 12% of morning peak period trips to 6%. Most of this was due to increases in the use of automobiles, which now handle about 85% of daily trips (driver and passenger combined). There is a shift required to more efficient low carbon transportation choices such as rapid mass transit and fostering alternative forms of transportation for pedestrians and cyclists to reduce emissions.

Increasing public transit requires coordination amongst the City of Hamilton, Hamilton Street Railway and Metrolinx with support from partners at the Hamilton Chamber of Commerce, Smart Commute Hamilton, Mohawk College, McMaster University, and citizens.

#### **Secure property that serves as source water storage or preserves wildlife corridors within the catchment**

Hamilton contains a diverse range of natural features that serve important economical, ecological, social and hydrological functions. Changes to the climate have significant implications to the overall water supply and management of our water resources. Natural heritage is also at risk resulting in threats to biodiversity and ecological functions of the local features in Hamilton. Preserving natural capital and green spaces provide carbon sinks that capture carbon emissions and improve water quality through natural water recharge and discharge. Securing, preserving, and reclaiming floodplains and greenspaces as well as modifying urban property to improve water storage and water recharge can lessen the impacts of floods and help capture emissions locally.

The Hamilton Conservation Authority and the City of Hamilton can play a role by updating flood plain mapping to lessen development in these areas as well as consider the future impacts of a changing climate. An integrated urban water management strategy can coordinate water resources and natural heritage through compatible stormwater, water and wastewater planning, infrastructure and management. Protecting and securing property can be supported by the Hamilton Conservation Authority, the Royal Botanical Gardens, the Bay Area Restoration Council, Ministry of Natural Resources and Forestry, Natural Resources Canada, and landowners.

#### **Establish an ongoing oversight and coordination body to guide implementation of the Hamilton Climate Change Action Plan and report back on community progress and success**

The actions and opportunities described within this Plan will require the efforts of many members of our community to move it from a plan to reality. Both the City of Hamilton and community partners have a large role to play in implementing components of the Plan. The City and community committee will work together in a shared partnership to act as facilitators and process stewards. A new Hamilton Climate Action Coordinating Committee will be required to monitor operations and activities and to provide strategic direction, input, and expert knowledge to the Climate Action Coordinator and partnership.

## What Are the Expected Benefits of Implementing Our Top Priorities?

Implementation of the priority actions identified in our plan will result in significant GHG reductions as well as increased benefits to the provincial and local Hamilton economy. A dollar spent on a local program such as on expansion of local food production or on renewable energy circulates and re-circulates within the economy, multiplying the effects of the original expenditures on overall economic activity.

Many of the actions will have numerous secondary benefits in terms of improving quality of life, positive effects on the local economy and preparing the community for the unexpected outcomes of climate change (adaptation). Some of these secondary benefits include but are not limited to:

- Improved air quality through reduced single occupancy vehicles and increased transit ridership;
- Increased public education, raising awareness and coordination of activities focusing on climate change mitigation and adaptation;
- Promoting low intensity development;
- Adopting full cost water charges that reflect the true price of water and its scarcity and full cost development charges that reflect the real cost of development;
- Expanding green spaces and local food production;
- Saving energy and adopting green and renewable energy sources;
- Improving the quality of the environment and promoting better health for all community members.

The expected results of the implementation of the ten priority actions are a total annual gross reduction of about 283,467 tonnes of CO<sub>2</sub>. The net reduction is of about 202,920 tonnes of CO<sub>2</sub>. The difference between the gross and net reductions arises on account of added emissions by the new economic expansions generated by the expenditures on the actions and/or their savings of energy and water that are re-spent. The reduction in CO<sub>2</sub> gases is not the only environmental positive impact. The increased vegetation and improvement in air quality and health are also predictable outcomes of these actions.

Equally significant is the total number of full-time equivalent jobs that are expected from the impacts of the programs estimated at 1,643.6 FTEs in Ontario, of which 1,123.5 FTEs will be in Hamilton. The local tax base is expected to increase by \$40.9 million as all levels of government will reap tax revenues on the positive impacts. The local government is expected to increase its revenues by \$3.3 million annually. Local incomes (City of Hamilton) will increase by \$97.2 million while Ontario's income would rise by \$133.5 million through the implementation of these actions.

A major indicator to note is the total estimate of avoided costs. These will exceed \$69.1 million and will represent savings to households, businesses and governments.

## Estimated Annual Impacts of the Climate Action Plan Priorities in Hamilton

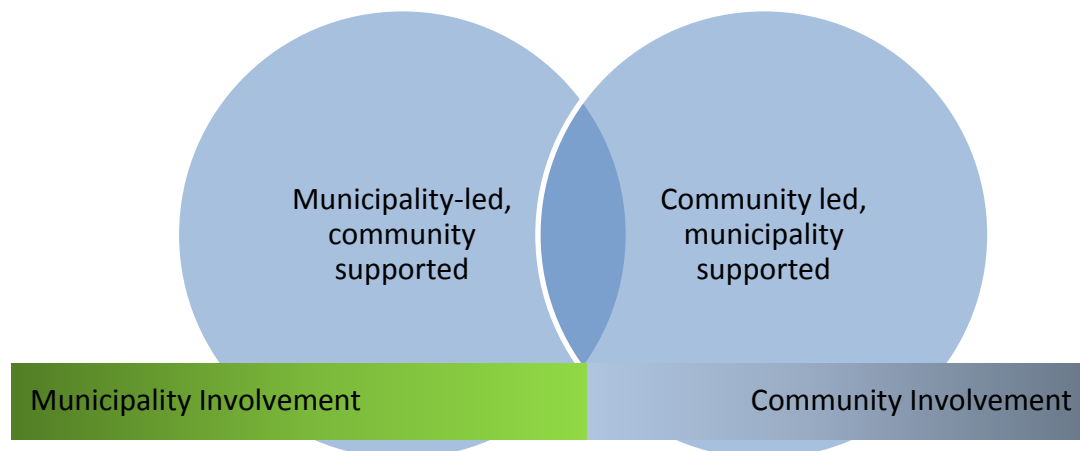
Climate Action Plan	A. Environmental Impacts			B. Province Wide Economic Impacts					C. Regional Economic Impacts in Hamilton				
	GHG Emissions (tonnes CO2/year)	Gross Reduction	Net	\$000's	Gross Economic Activity	Value Added to Provincial Economy	Tax Revenue to all Levels of Government	Provincial Employment (FTEs)	Avoided Cost	Gross Local Economic Activity	Value Added to Local Economy	Tax Revenue to Local Government	Local Employment (FTEs)
1 Support Local Food Production and Consumption	16,072	3,541	12,531	\$36,638	\$86,268	\$46,925	\$14,052	842.0		\$76,489	\$44,572	\$1,737	604.0
2 Establish On-Going Education and Awareness Program Campaign	34		34	\$40	\$116	\$42	\$13	0.5		\$61	\$22	\$1	0.3
3 Develop a Community Energy Plan to Guide Hamilton's Energy Future	5,467	8,585	-3,118	\$5,892	\$14,644	\$7,359	\$2,275	68.4	\$5,892	\$10,429	\$4,478	\$142	44.5
4 Revise/Update Infrastructure Guidelines (annualized)	11,412	23,692	-12,280	\$12,304	\$30,310	\$15,280	\$4,734	141.1	\$12,304	\$22,394	\$9,351	\$278	91.7
5 Establish Variable Development Charges and Water Rates set to reflect real cost (10%).	14,606	8,336	6,270	\$15,747	\$38,791	\$19,555	\$6,059	181.0	\$15,747	\$28,345	\$11,810	\$355	118.0
6 Create an Accessible Tool Kit for SMEs to assist with impact analysis and Business Community Planning (one-time cost)	209		209	\$250	\$639	\$334	\$106	3.2		\$488	\$251	\$7	2.1
7 Conduct a Local Community Vulnerability assessment of Public Health Impacts from Climate Change	8,634	7,045	1,589	\$9,343	\$23,015	\$11,602	\$3,595	107.2	\$9,343	\$16,537	\$7,101	\$211	69.7
8 Expand Local Transit Services to include a dedicated Rapid transit Lanes	23,024	231,738	-208,714	\$24,823	\$61,149	\$30,827	\$9,551	285.0	\$24,823	\$44,681	\$18,617	\$560	185.0
9 Protect and preserve green spaces	972	529	443	\$1,060	\$2,652	\$1,349	\$417	13.4	\$1,000	\$2,000	\$860	\$27	7.3
10 Establish an Ongoing Oversight and Coordination body to Guide and report on Hamilton's Climate Change Action Plan.	115		115	\$147	\$377	\$208	\$66	1.8		\$182	\$129	\$4	0.9
TOTAL	80,546	283,467	-202,920	\$106,244	\$257,961	\$133,481	\$40,868	1,643.6	\$69,109	\$201,606	\$97,191	\$3,321	1,123.5

Source: Econometric Research Limited

## 4. Implementing the Plan

The actions and opportunities described in our Plan will require the efforts of many members of our community to move from a plan to reality. The Plan cannot be implemented by a single organization, business, industry, or the City alone – to succeed, the Plan must be implemented by all members of the Hamilton community – and its community partners. Recommendations of how the implementation of Hamilton’s Community Climate Action Plan should take place are detailed below.

***Facilitate collaboration through a shared partnership with the City of Hamilton and community partners.*** Both the City of Hamilton and community partners have a large role to play in implementing components of the Plan. The City and community committee will work together in a shared partnership to act as facilitators and process stewards. The role of this partnership is to guide the overall process, annual work planning and action prioritization process. This role can be supplemented through the establishment of a City Climate Change coordinator. Each key player also has specific leading and supporting roles in a number of the Actions and Opportunities that will be coordinated on a project or action basis.



***Create a CCAP Coordination Committee.*** The Partnership will coordinate and facilitate a committee of community partners that meet on a regular basis each year to reflect on the actions and opportunities completed, GHG emission reductions achieved and to look at opportunities in the future work planning and prioritizing. The committee will consist of stakeholders with broad representation across the themes within the Plan and will include those partners leading community GHG emission reduction actions. We expect that the partners who are leading and participating in the delivery of specific actions will self-organize their team.

Thus, a new Hamilton Climate Action Coordinating Committee will be struck to monitor operations and activities and to provide strategic direction, input, and expert knowledge to the Climate Action Coordinator and partnership. Key Responsibilities of the Committee will include:

- Continuously monitor the progress of the implementation of the Plan;
- Provide expert knowledge as it relates to each member’s area of specialty;
- Provide advice relating to the overall implementation of the Plan; and
- Assist with the organization of workshops, conferences or presentations.

The Coordinating Committee will include community representation, which will be solicited through expressions of interest for two year terms.

***Establish Project Coordination and Plan Manager.*** It is recommended that a part-time coordinator position be established, with the overall responsibility to oversee and act as the one-window point of contact, based out of the City's office or a local community group, for the implementation of the Community Climate Change Action Plan.

The following tasks/roles will be part of the coordinators position:

- Promotion and communication of partners, actions or initiatives through social media, the Website, or media;
- Serving as the Coordinating Committee facilitator;
- Completing annual reporting/report card;
- Providing presentations and updates to Councils;
- Tracking progress of actions;
- Developing partnerships and aligning Partners with Actions; and
- Acting as collaborator and connector for Climate Action within the City.

While the presence of a coordinator will ensure that the tasks in the list above will be able to be achieved, there are no limitations on what a group(s) or organization(s) can achieve on advancing actions listed within the Plan.

***Monitor and collect results of community actions.*** Information would be collected from lead partners on an annual basis including implementation status and resulting impact (quantifiable GHG reductions and related environmental, economic and social benefits) and housed within a comprehensive database. Monitoring the results of specific projects and measures will support the Committee to consider and evaluate where efforts should be prioritized, and will be used to promote engagement and discussion within the community.

***Continue to report and share results annually with City Council and the community.*** The collective results of community actions and implementation progress will be shared with the community and City Council annually through a "Report Card" which reports on the results of the Climate Change Action Plan, shares significant successes, and evaluates performance against goals and progress indicators for each focus area of this Plan.

Since the baseline emissions inventory was conducted in 2009, it is recommended that the inventory be updated at regular intervals (e.g. every five years) to ensure that current best practices and standards are being achieved.

***Submit progress reports to the Partners for Climate Protection (PCP) program to achieve Milestones 4 and 5.*** According to the timeline below, progress reports and results will be submitted to the Federation of Canadian Municipalities (FCM) and ICLEI Canada for approval of PCP Milestones 4 and 5 completion.

***Refresh the Plan.*** Refresh the Plan every four years as new City Council term begins in order to take into account results achieved to date and new opportunities or actions that are discovered. This would mean refreshing the plan in 2019 and would happen after the re-inventory. The purpose of the refresh is to ensure that the Plan's framework including vision, goals and actions remain current, to educate Council about the Plan and progress, and to continue with engagement and outreach. Connecting the Plan review with each new Council term will also provide the opportunity to integrate new or existing goals such as the Community Vision or City's Strategic Plan.

***Continue with Ongoing Community Involvement and Conversations.*** Continuing the conversation about climate change is a priority. An engagement and communications strategy (including social media) will be developed as part of the first task of beginning the implementation of the Plan. This task will be completed by the coordinator and/or the Committee.

***Host an Annual Celebration and Action Planning Event.*** Hosting an annual event is recommended to communicate and celebrate the success of the Climate Change Action Plan. During the event, participants will be invited to learn about Partner successes, experiences, and action implementation, and to review potential initiatives that could be actions moving forward. New participants will also be invited to become action implementers or collaborators.

***Financial Considerations.*** The following identifies the basic potential expenditures associated with Plan implementation:

- Coordinator salary;
- Committee budget;
- Annual Report Card and progress reporting;
- Consideration of an annual community event and/or annual awards;
- Communications; and
- Implementation of selected actions.



## 5. Community Themes and Actions to Address Climate Change

Our actions are organized into nine themes that have emerged as important areas to focus on amongst the Hamilton community. Each of these themes are related and interdependent – actions supporting one area have the intention of being consistent and compatible with others.

<b>Agriculture &amp; Food</b>	<b>Awareness &amp; Education</b>	<b>Energy</b>
<b>Infrastructure</b>	<b>Land Use, Buildings &amp; Built Form</b>	<b>Local Economy &amp; Business</b>
<b>People &amp; Health</b>	<b>Transportation / Mobility</b>	<b>Water &amp; Natural Ecosystems</b>

Details on each theme are outlined on the following pages. Further details around longer-term actions and opportunities can be found in Appendix B.



## AGRICULTURE AND FOOD

Hamilton does not have the land area or climate to produce all of the food needed to feed its population so we will continue to import food from other regions and countries. That being said, these other sources of food will also be affected by climate change and population growth, with many indications that food will become more in demand, scarcer and more expensive. As such, we need many local actions to protect and increase the food system capacity that we have in Hamilton as much as possible.

Agriculture is one dimension of the food system in Hamilton. Sustainable agriculture requires social, environmental and economic sustainability. Socially, this means ensuring the rural communities around Hamilton continue to thrive. Environmentally, this means ensuring high quality air, soil, water and bio-diversity are all sustained. Economically it means farmers can make a living producing food people can afford to buy.

Community food security has dimensions of availability, accessibility, and use, unrelated to climate change, but as climate change leads to changes in economic and social conditions, it will affect food security.

**GOAL:** We will have a sustainable food and agriculture system that minimizes greenhouse gas emissions while ensuring community food security

Directions	Practice sustainable agriculture
	Preserve local farmland
	Support and encourage local food producers and urban agriculture
	Reduce the amount of food that is wasted
	Educate and raise awareness of the greenhouse gas impact of the food system

### QUICKFACTS

- ✓ Hamilton is one of the smallest regions in the province of Ontario, but it ranks 26th in number of farms out of 49 regions.
- ✓ In 2006, there were 975 census farms in Hamilton, covering an area of 133,205 acres
- ✓ The majority of the 227,000 acres of land within Hamilton qualify as prime agriculture land (Canada Land Inventory Classes 1, 2 or 3 soils).
- ✓ The average farm size in Hamilton is 137 acres (2008), which is below the provincial average of 233 acres.
- ✓ Hamilton's economy contains an estimated \$1 billion a year agricultural industry.
- ✓ Hamilton has 58 community gardens.

**PRIORITY ACTION: Support local food production / consumption and integrate climate change mitigation/ adaptation strategies into existing farm and food plans and initiatives**

<b>Near-Term Initiatives</b>	➤ Develop public awareness campaign for farmland preservation
	➤ Integrate climate change mitigation / adaptation into the City of Hamilton’s food strategy to include education and awareness of greenhouse gas impacts on the food system
	➤ Conduct an assessment to identify where waste occurs in the Hamilton food system and create a plan to reduce it

**What is it?**

Local food production and consumption should be supported through municipal policies. Citizens should be encouraged to buy local to support and grow the food production capacity and economy of the surrounding region. There is a need to integrate climate change mitigation and adaptation into existing farm and food plans at the provincial and municipal level, such as the Golden Horseshoe Food & Farming Action Plan, the Canada Ontario Environmental Farm Plan and the City of Hamilton Food Strategy to ensure food related actions reduce carbon emissions.

**Why is it a priority?**

Agriculture produces significant levels of greenhouse gas emissions. It is also heavily dependent on fossil fuels. As societies take action to reduce fossil fuel consumption, farmers will need to find ways to reduce their fossil fuel dependency.

The agricultural economy - both large and small producers - in Hamilton is exposed to and is dependent on good growing conditions and weather. Weather is determined by changes in climate and can result in both opportunities and risks, such as warmer weather, extended growing seasons, changes in crops, increased precipitation and floods, drought conditions, and increased exposure to pests. Food security globally is exposed to climate and weather risks as well. Ontario currently imports approximately 30% of produce from California, which in recent years has suffered 4 years of drought conditions. The City’s agriculture will become more important both locally and in Canada as the importance of local food and the potential migration of agricultural production increases due to changes in climate. Supporting local production and consumption can reduce emissions associated with food, but also ensure the local food economy is strengthened.

Who are the potential lead implementers?	Who are the potential supporting implementers?
<ul style="list-style-type: none"> <li>Hamilton Economic Development (Agricultural Cluster)</li> </ul>	<ul style="list-style-type: none"> <li>Federation of Agriculture (Hamilton/ Wentworth)</li> <li>Ontario Ministry of Agriculture, Farming and Rural Affairs</li> <li>City of Hamilton (Economic Development, Community Services and Public Health Services)</li> <li>Community Stakeholders Food Security Committee</li> <li>Mustard Seed Food Co-op</li> <li>Environment Hamilton</li> <li>Christian Farmers Federation</li> <li>Hamilton Farmer's Markets</li> <li>Hamilton Community Garden's Network</li> <li>Local farmers and agriculture producers</li> <li>Local consumers</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>Redirected Carbon Taxes</li> <li>Local Food Act Support Program</li> </ul>	<ul style="list-style-type: none"> <li>Updated Golden Horseshoe Food &amp; Farming Action Plan</li> <li>Local food production volumes</li> <li>Farmers market numbers, attendance &amp; sales increase</li> <li>MUSH sector % Local Food procurement annual increase</li> <li>Sales volumes at all local food producers and retail outlets</li> </ul>

### When will the action be implemented?

1-3 years upon acceptance of the Community Climate Change Action Plan by City Council. A number of community actions already underway tie directly into the action, including the City's Food Strategy.

## How Can I Help?

- Purchase locally grown in season food at farmer's markets, food co-operatives or through community supported agricultural shares. Ask for local at your grocery store.
- Plant a vegetable garden or container garden at home, work or at school or join and support a community garden (<http://hcgnc.ca/>)
- Encourage the preservation of local agricultural lands and local farming (<http://ontariofarmlandtrust.ca/>)
- Consider the greenhouse gas emissions of the food you purchase (travel time, packaging, water and energy inputs).
- Consider becoming a Canadian-Ontario Environmental Farm Plan recognized farmstead ([http://www.ontariosoilcrop.org/en/programs/environmental\\_farm\\_plan.htm](http://www.ontariosoilcrop.org/en/programs/environmental_farm_plan.htm)).

# AWARENESS AND EDUCATION

Changes associated with a changing climate will require knowledge and skills that are not common today. New technological advancements will result in new ways of doing things, new areas of expertise and new ways of doing business. Climate change adaption and mitigation in Hamilton requires action from local businesses, institutions, residents and the local government. Engaging all stakeholders in the climate change conversation will help prepare the community for these changes. An engaged community is aware and capable of reducing greenhouse gas emissions and are better prepared for responding to risks.

**GOAL:** We will have an informed and engaged public that understands potential impacts of climate change and that are ready to act to help mitigate and adapt to climate change

## Directions

Build community awareness related to climate change and what is being done and can be done to help reduce our impacts and prepare for changes

Engage community members in climate change related learning opportunities to encourage behavioural change and establish climate friendly social norms

Foster collaboration and partnerships to support action on climate change

Communicate and demonstrate progress towards managing climate change



## QUICKFACTS

- ✓ Green Venture, Environment Hamilton, Sustainable Hamilton, Hamilton Climate Champions, Dundas in Transition, Hamilton 350, Hamilton Industrial Environmental Association, Clean Air Hamilton, Bay Area Restoration Council, and a number of other organizations, are working in and with the community to deliver education and increasing awareness on climate change to the community.
- ✓ Ontario has introduced climate change and energy into the Ontario curriculum for grades 1 to 8 and grades 9 to 12.
- ✓ LEARN- CC (the Local Education and Action Resource Network on Climate Change) is a tool that allows members of the community to report actions they are taking to help limit climate change, as well as identify the local impacts of climate change that they have noticed.

## **PRIORITY ACTION: Establish ongoing education and awareness program/campaign for climate change**

Near-Term Initiatives	➤ Establish oversight and coordination body for implementation of climate education and awareness plan and report back on community progress and success
	➤ Engage youth in ongoing forum on climate change action to raise awareness and motivate action
	➤ “Project Neutral” – Household based carbon emission survey and education program (including resource guide for homeowners / businesses and home adaptation audit program
	➤ Profile / recognize community members or organizations that have demonstrated success related to climate action

### **What is it?**

On-going education and awareness should continue to inform the community of climate change impacts as well as new information on sources. This helps ensure an informed community that supports local actions on climate change under the Community Plan.

### **Why is it a priority?**

The community conversations and engagement undertaken to develop this Action Plan revealed a common action and request of community education and awareness. Through this Plan and initiatives in Hamilton around climate change, awareness has been raised. The fact that the community is aware that global warming, over and above natural climate variation, is one of the by-products of a carbon-based economy is positive. It is important to educate people and make them aware of local actions they can take under this Plan. Understanding the issues and local impacts leads to action and keeps the community informed of new information around climate change as it emerges.

Who are the potential lead implementers?	Who are the potential supporting implementers?
<ul style="list-style-type: none"> <li>• Green Venture</li> <li>• New coordinating body</li> </ul>	<ul style="list-style-type: none"> <li>• City of Hamilton</li> <li>• Hamilton Climate Change champions</li> <li>• Environment Hamilton</li> <li>• Bay Area Restoration Council</li> <li>• Clean Air Hamilton</li> <li>• Hamilton Regional Conservation Authority</li> <li>• McMaster Centre for Climate Research</li> <li>• Mohawk College</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>• City of Hamilton</li> <li>• Ontario Trillium Grant</li> <li>• Eco Action Ontario</li> <li>• Province of Ontario</li> <li>• Hamilton Community Foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Numbers of communications to various media, government representatives and public meetings.</li> <li>• Invitations to speak to schools and community groups.</li> </ul>

### When will the action be implemented?

1-3 years upon acceptance of the Community Climate Change Action Plan by City Council. An engagement and communications strategy (including social media) will be developed as part of the first task of Plan implementation. This task will be completed by the coordinator and/or the Implementation Committee.

### How Can I Help?

- Learn more about climate change and support local organizations taking action in Hamilton (see Section 6 of the Plan for resources and contacts).
- Spread the word about what you have learned in the Community Plan to others – neighbours, youth, etc.
- Keep informed of local actions through the Hamilton Climate Change Champions program (<http://climatechangehamilton.ca/>)
- Advocate for leadership on climate change through public engagement with politicians, business associations, neighbourhood groups, school trustees and boards, utilities, and with fellow citizens.

# ENERGY

Climate change and energy are strongly linked together. Current and potential future energy sources heat our buildings, allow us to move in our vehicles and are used to generate electricity that powers our devices, powers our work places, and provides light in our homes and places of work. All of these energy sources emit greenhouse gases. The more fossil fuels used in these activities, the more greenhouse gases are emitted. Available alternatives that have zero or low emissions include wind, hydro (water), geothermal, nuclear and solar. Reducing the amount of energy we currently use lowers emissions. Energy use (electricity and natural gas) by residents and industry contributes to 62% of our local emissions in the community. More frequent and intense storm activity is expected in Ontario because of climate change, placing more stress on public and private energy infrastructure. Energy infrastructure is vulnerable to extreme weather events and power grids are more likely to fail.

**GOAL:** We will be a world leader in all aspects of energy through our integrated smart energy network that reduces our overall energy intensity

Directions	Plan for energy generation, distribution, and consumption through a coordinated and regional approach
	Foster a culture of energy conservation
	Encourage the efficient use of energy
	Use cleaner and more renewable energy
	Diversify and localize energy generation
	Encourage a shift to more efficient vehicles that use cleaner sources of energy

## QUICKFACTS

- ✓ The City of Hamilton (with respect to its Corporate assets) currently spends about \$48 million annually on its energy and water utilities.
- ✓ More than half (54%) of the City's total energy costs is associated with electricity, with the remainder going to fuel costs (32%) and natural gas costs (8%).
- ✓ Between 2000 and 2012, emissions from Ontario's electricity sector were reduced by more than 66 percent.
- ✓ Ontario has phased out coal in the Provincial energy mix in 2014 which was the largest greenhouse gas reduction initiative in North America- equal to taking 7 million cars off the road.
- ✓ Hamilton has a diversity of energy options that could expand – solar, geothermal, district energy, electric vehicle charging stations.



## **PRIORITY ACTION: Develop a Community Energy Plan to guide the Hamilton community's energy future**

<b>Near-Term Initiatives</b>	➤ Advocate for more aggressive energy efficiency requirements in the Ontario Building Code
	➤ Implement local improvement charges for residential energy projects

### **What is it?**

A Community Energy Plan is an integrated approach to local energy planning by aligning energy, infrastructure and land use planning to help meet community energy goals and reduce greenhouse gas emissions. These plans identify opportunities for conserving energy, improving energy efficiency and increased use of renewable energy where feasible.

### **Why is it a priority?**

Community energy mapping for the City was undertaken in 2011. There are a number of energy related initiatives being undertaken locally by the City of Hamilton, utilities and local groups to reduce and improve energy conservation; however, a central community plan with targets has not been established. Energy infrastructure is also vulnerable to a changing climate. As energy is a key link to climate change in the community and lowering our carbon footprint, a plan is required to address energy in the community to integrate actions towards common reduction and efficiency targets and examine alternative energy usage in energy and greenhouse gas emissions.

<b>Who are the potential lead implementers?</b>	<b>Who are the potential supporting implementers?</b>
<ul style="list-style-type: none"> <li>• City of Hamilton (as lead agency to get funding)</li> <li>• Community members (as lead to complete Plan)</li> <li>• Local utilities (Horizon Utilities Corp., and Union Gas)</li> </ul>	<ul style="list-style-type: none"> <li>• Ministry of Municipal Affairs and Housing</li> <li>• Ministry of Energy</li> <li>• Architects and engineers</li> <li>• Community residents</li> <li>• Leading home builders</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>• City of Hamilton</li> <li>• Local utilities (Horizon Utilities Corp. (in – kind), and Union Gas)</li> <li>• Ministry of Energy</li> </ul>	<ul style="list-style-type: none"> <li>• Ontario Building Code exceeds North America’s best</li> <li>• Community-wide measurable targets</li> <li>• Better air quality</li> <li>• Energy use per person per household or per sector (e.g., health care, residential, commercial, etc.)</li> <li>• Fewer smog days, blackouts/brownouts</li> <li>• Increased renewable energy portfolio</li> </ul>

### When will the action be implemented?

1-2 years to complete and seek input for a Community Energy Plan. A working group with representation from the City of Hamilton, local utilities including Horizon and Union Gas, Industrial, Commercial, Institutional organizations, Building and Development Associations, energy non-profit organizations, and community representation will be established.

### How Can I Help?

- Get more energy efficient in your home, school or work (<https://saveonenergy.ca/>).
- Learn about energy conservation and alternative energy options through your local utility provider (Horizon, Union Gas, Hydro One) or community groups.
- Support renewable energy applications
- Support proven private sector new technology developers (LED’s, electric vehicles, etc.).

# INFRASTRUCTURE

Infrastructure refers to the physical structures that support a society, such as roads, bridges, water supply, sewers, electrical grids and telecommunications. Infrastructure is highly vulnerable to extreme weather events. One of the recognized impacts of a changing climate in Ontario is increased precipitation and increased frequency in extreme weather events such as heavy storms and rains that can lead to flooding and increased risk of floods in built areas. More frequent and intense storm activity in Ontario, because of climate change, is placing increasing stresses on an already aging private and public infrastructure.

**GOAL:** We will have a resilient and decentralized infrastructure network that maximizes long-term needs and benefits of our community

Directions	Transition municipal infrastructure towards green stormwater management approaches such as Low Impact Development
	Build weather hardened stormwater management infrastructure that is able to withstand the stresses associated with the anticipated changes in climate
	Improve stormwater infrastructure to better manage more rainfall and flooding
	Reduce strain on stormwater management infrastructure by improving homes and businesses to better manage stormwater on site
	Reduce the impacts of new developments and manage stormwater runoff through Low Impact Development

## QUICKFACTS

- ✓ The City of Hamilton owns and operates over \$14.4 billion (value to replace infrastructure) in core Public Works infrastructure which services the needs of residents, local businesses and visitors to the City.
- ✓ The City Of Hamilton facility portfolio consists of approximately 280 structures totaling 4.8 million square feet.
- ✓ There are 6,326 paved lane kilometers in the City and 53 unpaved lane kilometers.
- ✓ The City of Hamilton currently owns and operates two wastewater treatment plants.
- ✓ There are 1,332 kilometers of storm water pipes in the City.
- ✓ On average (2008-2012), 85,846 megalitres of drinking water is treated annually.
- ✓ Over 2800 kms of sewer lines in Hamilton (sanitary, combined & storm)
- ✓ 71 Wastewater Pumping Stations and 21 Pumping Stations
- ✓ 2014 kms of water lines in Hamilton (equivalent in distance to the drive to Florida)

**PRIORITY ACTION: Revise and update municipal infrastructure guidelines to prioritize Low Impact Development (LID) as a preferred method for stormwater management**

Near-Term Initiatives	➤ Reduce the impacts of new developments and manage stormwater runoff through Low Impact Development and create a separate stormwater rate structure
	➤ Restructure funding mechanisms to separate stormwater rates from water rates to create equity between residential and commercial / industrial users
	➤ Encourage / facilitate the use of storm water best management practices on private property (rain barrels, rain gardens, green roofs, disconnecting downspouts)
	➤ Develop updated flood mapping and publicize to promote awareness of risk

**What is it?**

Low Impact Development (LID) allows for the infiltration, maintenance of groundwater recharge and base flow, erosion control and reduction of stormwater runoff in line with naturally occurring hydrological conditions and systems.

**Why is it a priority?**

Heavy storms and increased rainfalls occur but encouraging and understanding Low Impact Development and designs with decreased impervious cover in compact urban and suburban settings can reduce the risks and costs (insurance, damage, replacement) of these impacts to homes and business.

Who are the potential lead implementers?	Who are the potential supporting implementers?
<ul style="list-style-type: none"> <li>City of Hamilton (Planning Department, Economic Development, Public Works)</li> </ul>	<ul style="list-style-type: none"> <li>Home builders/developers</li> <li>Province of Ontario</li> <li>Third party consultants/architects</li> <li>Green Venture (Education/Outreach)</li> <li>Hamilton Conservation Authority</li> <li>Home owners</li> <li>Ministry of Municipal Affairs and Housing</li> <li>Insurance Bureau of Canada</li> <li>Institute of Catastrophic Loss Reduction</li> <li>Home owners</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>• Development charges</li> <li>• Provincial Government</li> <li>• Developers</li> <li>• Water , sewage and stormwater rates</li> </ul>	<ul style="list-style-type: none"> <li>• See LID as the standard</li> <li>• Quantify the amount of LID features used in the city</li> <li>• Interactive LID documenting</li> </ul>

### When will the action be implemented?

1-3 years depending on the Master Plan updates. City of Hamilton Public Works in partnership with Planning and Economic Development and the Hamilton Conservation Authority to examine and develop guidelines and tools to implement LID in development in Hamilton.

### How Can I Help?

- Reduce and conserve your water consumption at home, school or work.
- Assess your home, school or workplace for flooding and overland flooding risks (<http://www.slowrain.ca/en/about-us/>) (<http://www.iclr.org/flooddroughthandbook.html>)
- Move any unreplaceable valuables above ground or above the basement where water can and will accumulate.
- Learn about the features of your landscape (weeping tiles, septic beds, that manager water and help prevent floods from happening and do not build upon (sheds, pools) or change those features.
- Keep more stormwater on your property by using rain barrels, permeable pavements and raingardens.
- Disconnect downspouts from the municipal storm sewer system.

## LAND USE, BUILDINGS, AND BUILT FORM

Buildings and their construction account for 25% of Canada's overall greenhouse gas emissions through the processing of new construction, combustion of fossil fuels to meet water and space-heating requirements and electrical consumption in lighting and air conditioning. Hamilton's population is expected to grow to 660,000 by 2031. Although development is required to accommodate population growth, there are opportunities to create compact land use patterns that integrate energy and water efficiency and are better prepared for the potential impacts of climate change and extreme weather events.

**GOAL:** : We will have a system of land use patterns and built form focusing on the human scale that minimizes the use of fossil fuels and allows us to adapt to known and unknown impacts

Directions	Reduce impacts of buildings by building net zero/net positive buildings
	Align climate change adaptation and mitigation with land use and built environment management structures, processes, and decision-making
	Build an innovative and adaptive built form
	Plan for human scale with integrated land use patterns

### QUICKFACTS

- ✓ Hamilton's population is expected to grow to 660,000 by 2031 (up 150,000 from 2001).
- ✓ The total value of building permits issued in 2012 was approximately \$1.5 billion.
- ✓ The City developed Corridor Planning Principles and Design Guidelines in 2012, providing planning and design directions for developing compact, mixed use urban environments that support transit and active transportation.

### PRIORITY ACTION: Establish variable development charges to reflect real costs of buildings and maintaining infrastructure

Near-Term Initiatives	➤ Require greenhouse gas assessments for buildings. Incentivize by refunding permit fees if thresholds are met
	➤ Integrate climate change analysis into the city's statutory Official Plan review
	➤ Develop a Climate Change CIP with incentives to adapt and mitigate climate change impacts on private development
	➤ Promote innovative building practices and flexible building design / urban forms that are resilient

## What is it?

Development charges are one-time fees collected from developers at the time a building permit is issued. The fees help pay for the cost of infrastructure required to provide municipal services to new development, such as roads, transit, water and sewer infrastructure, community centres and fire and police facilities.

## Why is it a priority?

Hamilton's population is expected to grow to 660,000 by 2031. An increasing population can result in higher demand for resources and services. Although development is required to accommodate population growth, there are opportunities to create compact land use patterns that integrate energy and water efficiency and are better prepared for the potential impacts of climate change and extreme weather events.

Development charges should more accurately reflect the infrastructure costs induced by the location, type and density of the development. Variable development charges would encourage more compact land use and incentivise Low Impact Development to lower the impacts of a changing climate.

Who are the potential lead implementers?	Who are the potential supporting implementers?
<ul style="list-style-type: none"> <li>City of Hamilton</li> <li>New coordinating body</li> </ul>	<ul style="list-style-type: none"> <li>Architects, engineers and planners</li> <li>Community NGOs focused on urban sustainability (Environment Hamilton, Green Venture, BARC, HPC, Evergreen, etc.)</li> <li>Hamilton Chamber of Commerce</li> <li>Leading urban home builders</li> <li>McMaster University</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>Incentives by refunding permit fees for infill development</li> <li>Development charges</li> <li>City budget</li> </ul>	<ul style="list-style-type: none"> <li>More infill development</li> <li>Less and more expensive servicing for greenfield development</li> <li>More innovative green building designs</li> <li>Implementation of Low Impact Development</li> </ul>

## When will the action be implemented?

1-3 years depending on acceptance of the need to investigate and undertake variable development charges by City Council as a means to increase compact urban development.

## How Can I Help?

- When choosing where to live consider access to health, education, food, green spaces and low carbon transportation to get to these needs.
- When building a new building consider energy, water, waste and transportation needs of occupants and encourage lower carbon options.
- In existing buildings, consider educating occupants to lower energy, water, waste consumption and consider low carbon transportation options.
- Get more energy efficient in your home, school or work (<https://saveonenergy.ca/>).
- Learn about energy conservation and alternative energy options through your local utility provider (Horizon, Union Gas, Hydro One) or community groups.

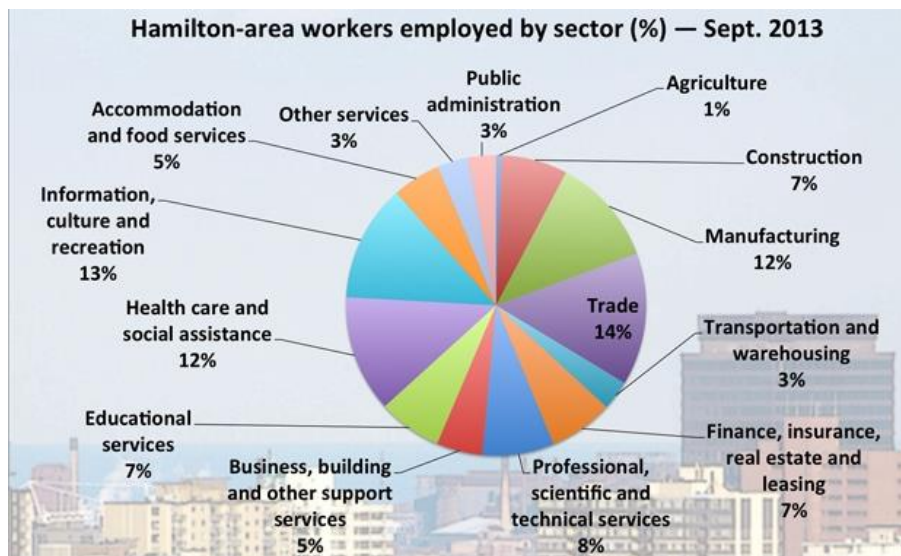


## LOCAL ECONOMY AND BUSINESS

Climate change and extreme weather events are affecting all industries within Hamilton and Ontario. Canadian business will be impacted directly through damages or costs linked with extreme weather, and indirectly as a result of changes in customer preferences, stricter government regulations and legal liability. Climate change presents both reduction and adaptation challenges to local business – reduce emissions to prevent further changes, and deal with existing, unavoidable changes to climate. Reduction of emissions has been the focal point for business efficiency; however, as extreme weather events continue to increase, more focus for business is shifting towards business continuity in the face of the risks of climate impacts.

**GOAL:** We will have a diverse business community in Hamilton that embraces innovation and sustainable practices to achieve a thriving, resilient economy

Directions	Engage the business community in understanding and being prepared for local climate change
	Encourage business sustainability practices and measure outcomes
	Facilitate collaboration and sharing amongst the Hamilton business community in support of sustainability and climate change
	Communicate and celebrate successes to generate greater awareness and buy-in to adoption of sustainable business practices
	Support and develop the local economy through sustainability focused economic development, research, and innovation in sustainability and climate change



### QUICKFACTS

- ✓ The labour force in Hamilton is 411,300 people (May 2014) and 383,000 people are employed.
- ✓ In 2003, 22% of the workforce in the Hamilton Census Metropolitan Area was employed in manufacturing jobs and by 2014 that number had dropped to 12%.

## **PRIORITY ACTION: Create an accessible toolkit for businesses to assist with climate change impact analysis and business continuity planning**

Near-Term Initiatives	➤ Create a 'body' (team) to coordinate and implement the plan. Start with full time person at the City with mandate and budget
	➤ Local and central resource of climate change information coordinating with local organizations to avoid duplication of efforts
	➤ Research and report on leading business sustainability best practices that address both adaptation and mitigation
	➤ Provide regular ongoing learning opportunities – business focused workshops and conferences

### **What is it?**

Local business and industry need information to support cost effective activities that reduce emissions but also help them to understand and reduce exposure to the risks of a changing climate (weather impacts, asset management, investors, changing regulations, interruptions in supply chain) resulting in business opportunities. A central hub of business information on climate change can assist local business in planning for changes in climate in their operations and reduce exposure while addressing cost efficiency and reduced emissions.

### **Why is it a priority?**

Climate change and extreme weather events are affecting all industries directly or indirectly within Hamilton and Ontario – damages or costs due to weather, increased regulations and legal liability. Climate change presents both reduction and adaptation challenges to local business – reduce emissions to prevent further changes, and deal with existing, unavoidable changes to climate. Reduction of emissions has been the focal point for business efficiency; however, as extreme weather events continue to increase, more focus for business is shifting towards business continuity in the face of the risks of climate impacts.

Who are the potential lead implementers?	Who are the potential supporting implementers?
<ul style="list-style-type: none"> <li>• New coordinating body</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable Hamilton</li> <li>• Insurance Bureau of Canada</li> <li>• Hamilton Chamber of Commerce</li> <li>• McMaster University - Centre for Climate Research and DeGroote Business School</li> <li>• Hamilton Industrial Environmental Association</li> <li>• Hamilton Community Awareness and Emergency Response Group</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>• Federation of Canadian Municipalities</li> <li>• Ministry of Environment and Climate Change, Environment Canada</li> <li>• Local foundations</li> <li>• Businesses Associations</li> <li>• Insurance Bureau of Canada</li> </ul>	<ul style="list-style-type: none"> <li>• Update adoption by business community</li> <li>• Endorsement by any business</li> <li>• Organizations – e.g., chamber of commerce</li> <li>• Broaden out our concerns</li> </ul>

### When will the action be implemented?

1-2 years upon acceptance of the Community Climate Change Action Plan by City Council. An engagement and communications strategy for business (including a business toolkit) will be developed as part of the first task of beginning the implementation of the Plan. This task will be completed by the coordinator and/or the Implementation Committee.

### How Can I Help?

- Reduce and conserve your energy and water consumption at home, school or work.
- Track your carbon emissions using a climate change calculator (<http://www.epa.gov/climateleadership/index.html>).
- Ask your workplace or business associations what they are doing to address climate change.
- Be prepared for extreme weather events and prepare for emergencies (<http://www.ontario.ca/law-and-safety/emergency-preparedness>).

## PEOPLE AND HEALTH

Climate change has direct and indirect impacts on the health of communities and individuals as a result of changes in air quality, warmer and humid temperatures, more frequent extreme weather events and flooding. The impacts of climate change on public health affect everyone including the vulnerable and at-risk populations in a community.

Although Hamilton delivers a number of initiatives that inform and aim to protect the health of the community (e.g. heat alerts, cold alerts, smog alerts, flood and emergency preparedness, West Nile, and beach inspections) a comprehensive vulnerability scan should be undertaken to identify gaps and opportunities for programs to protect the local health of citizens.

**GOAL:** We will have a healthy community and strengthen resilience to climate change

Directions	Protect community health
	Increase community social and health resiliency to a changing climate
	Develop and implement healthy policies related to climate change
	Increase public awareness of health risk factors associated with climate change

### QUICKFACTS

- ✓ The economic impact of smog in Hamilton on individual health in 2005 was \$2.13 million in Health Care.
- ✓ Air pollutants contribute to about 186 premature deaths, 395 respiratory hospital admissions and 322 cardiovascular hospital admissions each year in Hamilton.

**PRIORITY ACTION:** Conduct a local community vulnerability assessment of public health impacts from climate change

Near-Term Initiatives	➤ Use climate change models to help identify health risks in Hamilton
	➤ Increase education and communication of the health risks of climate change in the community
	➤ Integrate climate change adaptation into health programs and services to the community to reduce vulnerability and exposure

## What is it?

A health vulnerability scan can assist local health departments and providers with understanding the adverse health impacts associated with climate-related exposures modified by climate change and where in the population exposures can occur. This health vulnerability assessment can be used to implement more targeted public health action to reduce harm to people and areas identified.

## Why is it a priority?

Climate change has direct and indirect impacts on the health of communities and individuals – changes in air quality, warmer and humid temperatures, more frequent extreme weather events and flooding affecting everyone including the vulnerable and at-risk populations in a community.

Although Hamilton delivers a number of initiatives that inform and aim to protect the health of the community (e.g. heat alerts, cold alerts, smog alerts, flood and emergency preparedness, West Nile, and beach inspections) a comprehensive vulnerability scan should be undertaken to identify gaps and opportunities for programs to protect the local health of citizens.

Who are the potential lead implementers?	Who are the potential supporting implementers?
<ul style="list-style-type: none"> <li>Public Health Services</li> </ul>	<ul style="list-style-type: none"> <li>Health Canada</li> <li>Ontario Ministry of Health and Long-Term Care</li> <li>Ontario Public Health Association</li> <li>Hamilton Community and Emergency Services</li> <li>McMaster University</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>Health Canada</li> <li>Ontario Ministry of Health and Long-Term Care</li> </ul>	<ul style="list-style-type: none"> <li>Health Vulnerability Assessment conducted</li> </ul>

## When will the action be implemented?

1-3 years. Hamilton should begin the health assessment vulnerability under the Ministry of Health and Long-Term Care's Vulnerability Assessment & Adaptation Guidelines Tool as part of the Ontario Public Health Standards for health hazards and climate change.

## How Can I Help?

- Pay attention to weather notices and alerts to reduce your risks (<http://weather.gc.ca>).
- Protect your health and reduce your exposure during poor air quality days (smog days) ([www.airhealth.ca](http://www.airhealth.ca)).
- Reduce your exposure and risks during extreme heat days – learn to beat the heat! ([www.hamilton.ca/heat](http://www.hamilton.ca/heat)).
- Check on neighbours, friends and family members, especially those who have health problems or live alone during heat alerts, smog days or cold alerts.

## TRANSPORTATION AND MOBILITY

Transportation involves how people and goods move around, into and out of Hamilton. Transportation is a leading source of emissions in Hamilton, contributing to 33% of City emissions. On an average day, residents of Hamilton make a total of approximately 1 million trips, or 2.5 trips for every person over 11 years of age. Between 1986 and 2001, local transit went from handling 12% of morning peak period trips to 6%. Most of this was due to increases in the use of automobiles, which now handle about 85% of daily trips (driver and passenger combined). Both commuter transport and goods movement emit pollution into the atmosphere and are vulnerable to impacts of climate change. Hamilton is one of the major North American Gateways for global goods movement, logistics and distribution, with the Port of Hamilton, John C. Munro Hamilton International Airport, links to international trucking and rail lines, and access to 400 series highways/QEW.

**GOAL:** We will have a more efficient transportation network that reduces the use of single occupancy vehicles and balances the needs of all users for walking, cycling, transit, carpooling, and movement of goods

Directions	Change behaviour social norms to support sustainable modes of transportation
	Build complete and integrated streets and networks
	Engage community members in decision-making related to their mobility network through demonstration and outreach
	Support and invest in higher order public transit and supportive land uses
	Move goods and deliver services efficiently by using low carbon alternatives that are less prone to impacts from climate change



### QUICKFACTS

- ✓ On an average day, residents of Hamilton make a total of approximately 1 million trips
- ✓ Approximately 81% of trips made by residents stay within the City of Hamilton
- ✓ Hamilton CarShare officially launched in 2009
- ✓ Hamilton introduced a new bike share program, Social Bicycles Hamilton, in summer 2014



## **PRIORITY ACTION: Expand public transit services to include dedicated rapid transit lanes where possible**

<b>Near-Term Initiatives</b>	➤ Optimize the price and supply of parking. Eliminate free parking and increase parking fees
	➤ Implement complete streets with an integrated cycling network (adopt 80% target for new growth inside built boundary)
	➤ Institute road tax / tolls and direct revenue to transit and active transit
	➤ Institute a local carbon tax and incent low carbon vehicle (EV) use

### **What is it?**

Local transportation is dependent on automobile infrastructure and design, which increases local emissions. Expansion of public transit services in Hamilton is required to assist in lowering community emissions associated with local transportation. Transit ridership has decreased in Hamilton over many years. Between 1986 and 2001, local transit went from handling 12% of morning peak period trips to 6%. Expansion of public transit can increase mobility options for citizens and increase lower carbon transportation options while encouraging compact communities and land use.

### **Why is it a priority?**

Transportation is a leading source of emissions in Hamilton, contributing to 33% of City emissions. On an average day, residents of Hamilton make a total of approximately 1 million trips, or 2.5 trips for every person over 11 years of age. A shift to more efficient low carbon transportation choices such as rapid mass transit, walking and cycling to reduce local emissions is required.

<b>Who are the potential lead implementers?</b>	<b>Who are the potential supporting implementers?</b>
<ul style="list-style-type: none"> <li>• HSR</li> <li>• Metrolinx</li> </ul>	<ul style="list-style-type: none"> <li>• McMaster (M.I.T.L)</li> <li>• Chamber of Commerce</li> <li>• Mohawk Collage</li> <li>• Community Car share</li> <li>• Hamilton Bike share</li> </ul>

<b>What are the potential funding sources?</b>	<b>How will the action be measured for success?</b>
<ul style="list-style-type: none"> <li>• Increase Parking Fees</li> <li>• Carbon Tax</li> <li>• Provincial &amp; Federal Government</li> <li>• Gas Tax – Spend only on transit</li> <li>• Area rating reform</li> </ul>	<ul style="list-style-type: none"> <li>• An Increase in ridership</li> <li>• Greenhouse Gases down from Transportation</li> <li>• Modal Split Improvement</li> <li>• Decrease single occupancy vehicle ridership</li> </ul>



### **When will the action be implemented?**

Under 3 years upon acceptance of the Community Climate Change Action Plan by City Council.

### **How Can I Help?**

- Reduce your transportation emissions and vehicle usage by walking, cycling, taking public transit or ride sharing where you can (<http://smartcommute.ca/hamilton/home/>).
- Organize your errands and trips to reduce transportation emissions and number of trips to increase efficiency.
- Support public transit as a user or a supporter (<https://www.hamilton.ca/CityServices/Transit/>) (<http://www.hamiltontransit.ca>)
- Try out car sharing ([www.hamiltoncarshare.ca](http://www.hamiltoncarshare.ca)) and bike sharing (<https://hamilton.socialbicycles.com/>) if available to you.
- Keep informed of the weather, road repairs or closures to reduce aggravation and side trips.

# WATER AND NATURAL ECOSYSTEMS

The City of Hamilton contains a diverse range of natural features that serve important ecological and hydrologic functions. The natural features of the area include forests, woodlots, wildlife reserves, Escarpment lands, ravines, wetlands and Lake Ontario shoreline. Changes to our climate system will result in significant implications to the overall water supply and management because water resources in a region are highly dependent on climate conditions such as temperature, precipitation, evaporation and snow and ice cover. Natural heritage or ecosystems in Hamilton region may also be at risk resulting in threats to biodiversity and ecological functions<sup>2</sup>.

**GOAL:** We will have climate resilient water resources and ecosystems based on the principles of integrated urban water management

Directions	Reduce our water and energy related footprint
	Improve and communicate our understanding of the connection between water, natural ecosystems, human health and well-being in the region
	Manage and restore natural ecosystems
	Apply a systems approach to better understand water systems in urban settings



## QUICK FACTS

- ✓ The Hamilton Region Source Protection Area encompasses 447 square kilometres of land at the western end of Lake Ontario.
- ✓ 1 Water Treatment Plant
- ✓ The Woodward plant treats 213+ million litres of water a day to drink
- ✓ The Hamilton Conversation Authority (HCA) owns and manages over 10,000 acres of natural lands.
- ✓ Overall forest cover within HCA's jurisdiction is approximately 19% with the majority of forest cover occurring in the western and central regions.
- ✓ The City of Hamilton is home to more than 1,000 species of native plants, 171 species of birds that breed in the area, 43 species of mammals and 87 species of fish.

<sup>2</sup> [http://www.gwp.org/Global/Activities/News/August%202013/GWP%20Policy%20Brief\\_TEC%2016\\_FINAL.pdf](http://www.gwp.org/Global/Activities/News/August%202013/GWP%20Policy%20Brief_TEC%2016_FINAL.pdf)

## **PRIORITY ACTION: Secure property that services as source water storage or preserves wildlife corridors within the catchment**

Near-Term Initiatives	➤ Identify financing options for water resources management
	➤ Promote behavioral change for household level water conservation and storm water management
	➤ Establish demonstration projects (e.g., Waterfront development piers 7 & 8)
	➤ Support and encourage local organizations with existing water / climate related outreach and educational programing (BARC, Green venture, RBG, Environment Hamilton, McMaster Centre for Climate Change, McMaster Water Network)

### **What is it?**

Greenspaces and forested lands provide a multitude of ecosystem related services. Securing, restoring and managing lands that serve as headwater storage is a particular priority as this under pins maintaining stream flow quality and quantity providing clean water to the overall Lake Ontario ecosystem, as well as minimizing downstream erosion rates, flooding and infrastructure needs. Stream corridors and the floodplains themselves also serve as water storage areas, habitat, and routes for wildlife movement. Stream corridors create linkages between greenspaces naturally utilizing road bridges as wildlife underpasses resulting in much larger areas of habitat available. Securing and rehabilitating property for water management is most important in areas where soils are impervious (clay based) and surface storage is the natural situation. Restoring and maintaining clean water is the most important element of maintaining the Lake Ontario basin ecosystem.

### **Why is it a priority?**

Hamilton contains a diverse range of natural features that serve important economical, ecological, social and hydrological functions. Changes to the climate have significant implications to the overall water supply and management of our water resources. Natural ecosystems are also at risk resulting in threats to biodiversity and ecological functions in the Hamilton region. Preserving natural capital and planting trees or establishing forested lands, greenspaces and wetlands provide carbon sinks. It also helps to improve water quality through natural water recharge and discharge processes. Securing, preserving, and reclaiming floodplains, forested lands and greenspaces as well as encouraging urban property owners to improve water storage and water recharge can lessen the impacts of floods and help offset local CO<sub>2</sub> emissions. It also influences the pattern of land use by protecting green corridors and open-space resources.

Who are the potential lead implementers?	Who are the potential supporting implementers?
<ul style="list-style-type: none"> <li>• City of Hamilton</li> <li>• Hamilton Conservation Authority</li> </ul>	<ul style="list-style-type: none"> <li>• Landowners</li> <li>• Royal Botanical Gardens</li> <li>• Ministry of Natural Resources and Forestry</li> <li>• Natural Resources Canada</li> <li>• Ministry of Environment and Climate Change</li> </ul>

What are the potential funding sources?	How will the action be measured for success?
<ul style="list-style-type: none"> <li>• Green Municipal Fund</li> <li>• Stormwater Tax</li> <li>• Carbon Tax</li> <li>• Provincial and Federal Grants</li> <li>• Parkland dedication fees</li> </ul>	<ul style="list-style-type: none"> <li>• Number of secured lands annually</li> <li>• Effectiveness of flood avoidance / impact reduction</li> <li>• Insurance claims statistics</li> <li>• Maintenance cost reductions</li> </ul>

### When will the action be implemented?

The priority action is an immediate need, particularly as some areas to be secured may take more than a decade to resolve.

### How Can I Help?

- Plant trees or create a rain garden on your residential, commercial, school or industrial property.
- Join the Hamilton-Halton Watershed Stewardship Program if you have property in the watersheds in or surrounding Hamilton (<http://www.conservationhamilton.ca/hhwsp-overview>)
- Consider permeable pavement or bioswales on your commercial, residential or industrial property to capture water and let it slowly soak through.
- Consider agreeing to protect 'provincially important' natural heritage features on your property (<http://www.ontario.ca/environment-and-energy/conservation-land-tax-incentive-program>).

## **6. Where Can I Learn or Do More in Hamilton?**

Having read this Community Climate Change Action Plan, you are probably having a few thoughts. What can I do? How can I help? Where can I learn more?

Successful climate change action in Hamilton takes place at the local community and municipal level and involves everyone - including you, your family and your neighbours. Action can take place in your home, your neighbourhood, your Ward and your place of employment. Your choices can make a difference!

**We are all in this together!**

**What can you do to address climate change?**

**Take personal action**

Reduce your own emissions and prepare for the impacts of climate change and extreme weather.

Take action in one or more of the themes presented in this Plan: Agriculture and Food, Awareness and Education, Infrastructure, Energy, Land Use, Buildings and Built Form, Local Economy and Business, People and Health, Transportation and Mobility, and Water and Natural Ecosystems.

Within each theme of the Community Plan, you will find a section called “How Can I Help?” which identifies actions you can take to support the Plan.

Accompanying the Plan, you will find a checklist of actions you can take when you are at home, at work, on the move, at school or shopping. Please use these as a guide to what actions you can take and check off the actions you have already taken.

If you wish to do more, check out the Hamilton Climate Change website (<http://climatechangehamilton.ca/>) for more information on actions you can take to reduce your emissions or prepare for the impacts of severe weather.

### **How Can I Help?**

**Join or support an existing group**

A number of organizations in Hamilton are involved in action on climate change through the nine themes identified in this Community Action Plan. These organizations are always looking for individuals who are willing to donate time or resources to help support them in local actions. You can also reach out to these organizations to learn more about specific issues associated with climate change (such as water, food, energy, transportation, business and natural systems) and what you can do locally.

Some of these organizations are described on the following pages.

#### Awareness & Education:

- Green Venture - Connecting ideas and people to facilitate sustainable living and realize a cleaner, healthier community (<http://www.greenventure.ca/>).
- Environment Hamilton - Offer locally relevant solutions to achieve food security, sustainable transportation, and clean air, water, and land (<http://www.environmenthamilton.org/>).
- Hamilton 350 - Inspire the world to rise to the challenge of the climate crisis to create a new sense of urgency and possibility for our planet (<http://www.hamilton350.lets-doit.ca/index.html>).
- Dundas in Transition - Help drive down the overall community energy footprint, reduce our dependency on fossil fuels and increase local resiliency (<http://www.dundasintransition.ca/>).
- Clean Air Hamilton - A multi-stakeholder group dedicated to improving air quality in Hamilton's community (<http://www.cleanair.hamilton.ca/>).
- Greening Sacred Spaces - To assist faith communities in taking practical actions towards a more sustainable and energy efficient place of worship and to educate members of the community about ecological issues ([http://www.environmenthamilton.org/view/page/greening\\_sacred\\_spaces\\_hamilton](http://www.environmenthamilton.org/view/page/greening_sacred_spaces_hamilton)).

#### Water & Natural Ecosystems:

- Hamilton Conservation Authority - The area's largest environmental management agency, which is dedicated to the conservation and enjoyment of watershed lands and water resources (<http://www.conservationhamilton.ca/>).
- Bay Area Restoration Council - A community not-for-profit group that assesses and promotes clean-up projects in the Hamilton Harbour and its watershed (<http://www.hamiltonharbour.ca/>).
- Trees for Hamilton/Releaf Hamilton - A unique network of stakeholders from diverse backgrounds, all of whom have an interest in the future of Hamilton's natural heritage and landscape (<http://www.releafhamilton.ca/>).
- Earth Day Hamilton - Burlington -To improve the environment by providing hands-on education covering a wide range of environmental issues to local youth and the community (<http://earthdayhamilton.ca/>).
- Royal Botanical Gardens - Dedicate our expertise in horticulture, conservation, science and education – together with our unique gardens, facilities and natural lands – to inspire and nurture society's commitment to the environment (<http://www.rbg.ca/>).

#### Transportation & Mobility:

- Smart Commute Hamilton - An association led by the City of Hamilton that works with local businesses and community organizations to provide programs and initiatives that encourage the use of active and sustainable transportation (<http://www.smartcommute.ca/hamilton/>).
- Open Streets Hamilton - A community-based partnership dedicated to promoting active, healthy, and inclusive lifestyles by temporarily transforming streets into a shared space for everyone to experience (<http://openstreetshamilton.ca/>).

### Local Economy & Business:

- Sustainable Hamilton - To inspire Hamilton business organizations to adopt sustainability as a strategy for greater prosperity. Through learning, networking, stimulating action and celebrating success, we will inspire Hamilton businesses to discover opportunities to grow and prosper by reducing their environmental impact and providing greater social value (<http://www.sustainablehamilton.ca/>).
- Hamilton Industrial Environmental Association Community Advisory Panel - Made up of local neighbourhood representatives and environmental advocates dedicated to improving Hamilton's environment through their volunteer efforts who meet regularly to provide a forum for industry, individuals, neighbourhood groups, regulators and local environmental community-based initiatives to exchange information and discuss issues of concern (<http://www.hiea.org/community-advisory-panel.aspx>).

### Agriculture and Food:

- Hamilton Food Security Committee - To move Hamilton towards being a place where all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes self-reliance and social justice (<http://www.hamilton.ca/HealthandSocialServices/PublicHealth/FoodSecurity.htm>).
- Hamilton-Wentworth Federation of Agriculture – The local County Federation of the Ontario Federation of Agriculture representing the voice of Hamilton-Wentworth region and works with all levels of government, commodity and rural groups to meet the needs of members and farming families (<http://www.ofa.on.ca/about/county-federation-sites/hamilton-wentworth/contact.aspx>)
- Ontario Soil and Crop Improvement Association - Facilitates responsible economic management of soil, water, air and crops through development and communication of innovative farming practices ([www.ontariosoilcrop.org](http://www.ontariosoilcrop.org))
- The Canada-Ontario Environmental Farm Plan – ([http://www.ontariosoilcrop.org/en/programs/environmental\\_farm\\_plan.htm](http://www.ontariosoilcrop.org/en/programs/environmental_farm_plan.htm))
- Hamilton Eat Local ([http://www.environmenthamilton.org/view/page/hamilton\\_eat\\_local](http://www.environmenthamilton.org/view/page/hamilton_eat_local)).
- Hamilton Good Food Box ([http://www.environmenthamilton.org/view/page/good\\_food\\_box](http://www.environmenthamilton.org/view/page/good_food_box)).
- Hamilton Community Garden Network (<http://hcgnc.ca/>).
- Hamilton Victory Gardens - Team of community volunteers dedicated to alleviating hunger and food insecurity in our communities by transforming empty city lots into places of community, education and growth (<http://www.hamiltonvictorygardens.org/>).

### Energy:

- Hamilton Association for Renewable Energy - A community-based association working to increase the production and use of renewable energy in the City of Hamilton (<http://hamiltonhare.org/>).

## Air Quality

- Clean Air Hamilton – A multi-stakeholder group dedicated to improving air quality in Hamilton (<http://www.cleanair.hamilton.ca/>)

## **Endorse the Hamilton Community Climate Change Action Charter**

The Charter is a voluntary agreement that outlines the need for local action and a commitment to take action from individuals, organizations and businesses of all types and sizes in Hamilton. By signing the Charter, you show your support to taking local action on climate change in Hamilton and are kept informed.

The Charter was created in 2011 and Hamilton is the first community in Ontario with such a Charter. As of 2014, 53 organizations and 391 individuals have signed this community Charter.

The Charter can be found online at <http://climatechangehamilton.ca/>.

## **Take a photo of what you're doing**

The Hamilton Climate Change Action Map allows you to see what others in Hamilton are doing to address climate change and an opportunity for you to show others what you're doing.

Are you taking action in energy, transportation, buildings, business practices, water or gardening? Take a photo of your action and send it to the Hamilton Climate Change Action Map! Already over 100 actions and photos have been submitted and your action might be recognized as an action of the month!

Have you seen local impacts of climate change or extreme weather in Hamilton? Flooding, freeze or thaw damage, heavy rainfall, drought, invasive species, heat waves or wind damage? Take a photo of what you've seen and send in to the Hamilton Climate Change Action Map!

The Hamilton Climate Change Action Map is available at <http://www.mapclimatechange.ca/>.

## **Work with others in the community process for taking action under the Climate Change Action Plan**

The actions identified in this Community Plan, need support and assistance in the community if the Plan and actions are to be successful. An implementation and coordination group will be formed to continue the work that has begun in the community conversations and the development of actions under this Plan. If you are interested in helping take action on climate change, contact us at [climatechnage@hamilton.ca](mailto:climatechnage@hamilton.ca).

## **Spread the word**

Youth, seniors, school councils, faith groups, businesses, hospital and education administrators, employees, parents, NGOs, neighbourhood associations, teachers, and interested citizens all have a role to play in local action. Let them know what you have learned about climate change and local action, and encourage and inform them to join and to be part of the community action.



## Where Can I Learn More?

Interested in learning more about climate change and being kept informed of local, provincial, federal or international actions? A number of websites at the local, provincial, federal or global level can provide you with more information.

### Local Information:

In Hamilton, a few local sources to look for more information and to keep informed about climate change are:

- Hamilton Climate Change Champions - <http://climatechangehamilton.ca/>
- McMaster Centre for Climate Change - <http://climate.mcmaster.ca/>
- City of Hamilton Climate Change information – [www.hamilton.ca/climatechange](http://www.hamilton.ca/climatechange)

You can also keep informed on Twitter with the following feeds:

- Climate Change Hamilton - <https://twitter.com/climatehamilton>
- McMaster Centre for Climate Change - <https://twitter.com/MACClimate>

### Provincial Information:

In Ontario, responsibility and coordination of Provincial actions on climate change is with the Ministry of the Environment and Climate Change. The Ministry of the Environment and Climate Change protects and improves the quality of the environment and coordinates Ontario's actions on climate change leading to healthier communities, ecological protection and economic prosperity for present and future generations.

To learn more about Provincial action on climate change, including research and incentives visit: <http://www.ontario.ca/environment-and-energy/climate-change>.

You can follow the Ministry of the Environment and Climate Change on twitter at <https://twitter.com/environmentont>.

A number of Provincial Ministries have roles to play in addressing climate change in areas of land use planning, agriculture and forestry, energy, health, transportation, innovation and education. These Ministries are:

- Ontario Ministry of Municipal Affairs and Housing – <http://www.mah.gov.on.ca/page11.aspx>
- Ontario Ministry of Agriculture, Food and Rural Affairs – <http://www.omafr.gov.on.ca/english/index.html>
- Ontario Ministry of Transportation – <http://www.mto.gov.on.ca/english/index.shtml>
- Ontario Ministry of Energy - <http://www.energy.gov.on.ca/en/>
- Ontario Ministry of Health and Long Term Care – <http://www.health.gov.on.ca/en/>
- Ontario Ministry of Natural Resources and Forestry – <https://www.ontario.ca/ministry-natural-resources-and-forestry>
- Ontario Ministry of Economic Development, Employment and Infrastructure - <https://www.ontario.ca/ministry-economic-development-employment-and-infrastructure>

- Ontario Ministry of Research and Innovation - <https://www.ontario.ca/ministry-research-and-innovation>
- Ontario Ministry of Training, Colleges and Universities - <http://www.tcu.gov.on.ca/eng/>
- Ontario Ministry of Education – <http://www.edu.gov.on.ca/>

#### **Ontario Research and Information:**

- Ontario Climate Change Consortium - [www.ontarioclimate.org/](http://www.ontarioclimate.org/)
- Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR) - <http://www.climateontario.ca/>

#### **Canada Information:**

In Canada, responsibility and coordination of Canadian and global actions on climate change is with Environment Canada.

To learn more about Canadian action on climate change visit <http://www.climatechange.gc.ca> and:

- Environment Canada – <http://www.ec.gc.ca>
- Health Canada – [www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)
- Natural Resources Canada - <https://www.nrcan.gc.ca/home>

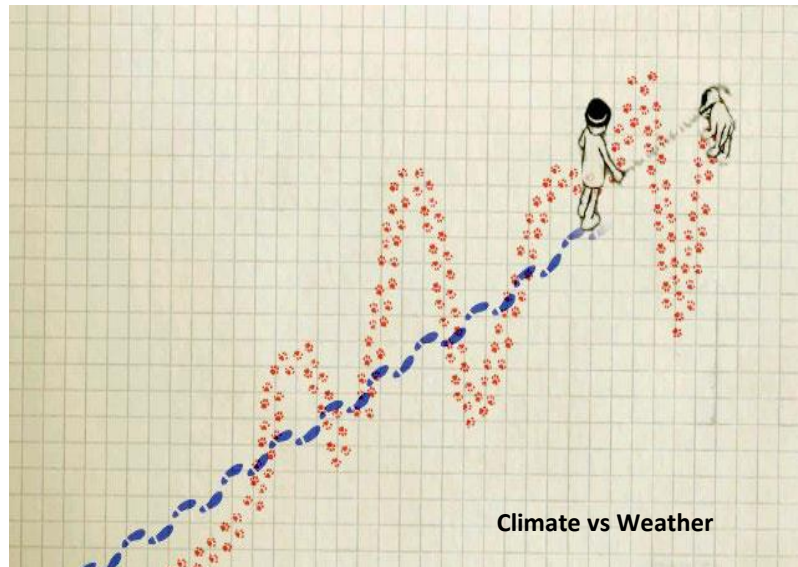


## Appendix A

### Climate Change 101 - Hamilton

#### What is Climate Change and What Does it Mean?

Climate change is the altering of long-term patterns of weather identified by changes in temperature, precipitation, wind and other indicators<sup>3</sup>. The term 'weather' refers to what happens each day, while 'climate' is the trend over a long period of time. The image below illustrates the difference between weather and climate by showing the path taken by a man walking his dog. If you look at the path taken by the dog (representing 'weather'), at any point, he is travelling north, then south, then north. If you were just to look at the dog at a single point in time, or over a short period of time, you might conclude "he is moving south" or "he is moving north". However, if you look at the long distance path of the man (representing 'climate'), you would conclude that regardless of the dog's movements south and north, they are both moving in a northeast direction<sup>4</sup>. This is the same difference between weather and climate.



It is natural for the climate to change slowly over thousands of years; however, in the last 100 years, we have experienced dramatic changes in the global climate<sup>5</sup>. The International Panel on Climate Change (IPCC) has concluded the following:

- The atmosphere and oceans have warmed;
- Snow and ice cover have decreased;
- Sea levels have risen; and
- Extreme weather events have occurred more frequently<sup>6</sup>.

<sup>3</sup>[http://www.mnr.gov.on.ca/en/Business/ClimateChange/2ColumnSubPage/STDPROD\\_090050.html](http://www.mnr.gov.on.ca/en/Business/ClimateChange/2ColumnSubPage/STDPROD_090050.html)

<sup>4</sup><http://americablog.com/2013/06/uk-environment-minister-paterson-climate-change-denial.html>

<sup>5</sup>[http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@climatechange/documents/document/stdprod\\_090231.pdf](http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@climatechange/documents/document/stdprod_090231.pdf)

<sup>6</sup>[http://www.climatechange2013.org/images/report/WG1AR5\\_SPM\\_FINAL.pdf](http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf)

### Potential Impacts of Climate Change in Hamilton

- Vulnerability of infrastructure to several types of extreme weather events
- Impacts on water supply and quality as a result of decreasing and variable average water levels in the Great Lakes
- Changes in the frequency of severe storms and associated safety risks
- Changes in agriculture (extreme droughts, floods, shifting produce, weeds and insects) affecting the supply of foods

While the rate of change for each indicator varies, the observed trends are consistent with climate warming and together demonstrate a change in the climate system. The observed trends of change are expected to continue over the coming decades and beyond.

While climate change is a global issue, the rate of change and impacts differ from one region to another. In Canada, changes in climate are affecting the natural environment, economy and health of citizens<sup>7</sup>. Climate change is a global issue, but the rate of change, the impacts, and influences differ from one region to another. Global trends will influence local responses.

GLOBAL INFLUENCE	LOCAL IMPACT
An <b>increasing population</b> results in global migration pressures to Canada from countries where climate impacts are severe.	The desire to constrain growth to urban areas, make communities more compact, and reduce sprawl through initiatives such as the Provincial Places to Grow Act. Municipalities like Hamilton are saddled with aging infrastructure designed for old weather conditions, with an increasing gap in funding for replacement and improvement to accommodate this legislated growth.
<b>Energy security</b> , ensuring that energy is readily available, affordable and able to provide a reliable source of power without vulnerability to long- or short-term disruptions, is threatened.	The forecast growth in energy demand and with increased local growth means that we will need a variety of energy sources now and into the future.
<b>Water security</b> , the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, public health, and preserving ecosystems are threatened.	Ensuring our local population is resilient to water-related hazards, including floods, droughts, and pollution in the Great Lakes Area has been an under-recognized challenge.
<b>Food security</b> , to ensure all people have access to an affordable, nutritional and sustainable diet is threatened by all of the above influences.	Our ability to and maintain the livelihoods of small and large scale producers and the day-to-day food needs in our community means less reliance on the global food supply-chains we have become accustomed to.

<sup>7</sup>[http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/Full-Report\\_Eng.pdf](http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/Full-Report_Eng.pdf)

<p><b>Economic growth and energy consumption</b> will rise and fall in unison. The growth rate of atmospheric CO<sub>2</sub> depends on three classes of factors: global economic activity (generated from the use of fossil fuels and land-use change), the carbon intensity of the economy, and the functioning of unmanaged carbon sources and sinks on land and in oceans.</p>	<p>Economic activity and energy consumption of Hamilton will follow the global pattern, but the impacts can be lessened through economic and energy diversity.</p>
<p>The good news is there is hope. Energy-related CO<sub>2</sub> emissions actually flat-lined globally in 2014, while the world economy grew, indicating that economic growth could continue without the associated emissions through changing consumption patterns and focus on low carbon emitting practices and policies. Traditionally this occurred in the past due to recessional economies, but it is apparent that <b>new economic realities are emerging.</b></p>	<p>The bad news is that even with a decrease in carbon emissions, the impacts of a changing climate and extreme weather will continue to be felt in through agriculture, infrastructure, the economy and health as <b>current GHGs will still persist in the environment and continue to influence local weather and climate change impacts.</b></p>

## How Has Climate Changed in the Hamilton Region?

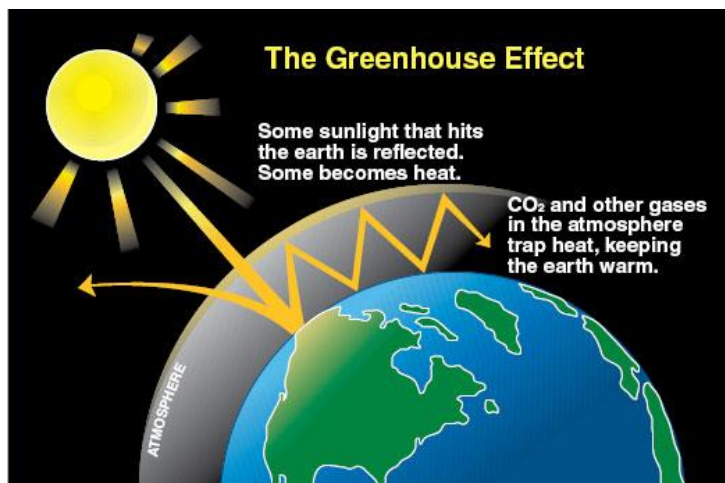
Since 1950, the average temperature over land in Canada has increased by 1.5<sup>0</sup>C, representing a rate of warming that is double the global average reported over the same time period<sup>8</sup>. More locally, changes in the climate system have been observed in Ontario and within the City of Hamilton. The Hamilton Conversation Authority Climate Change Strategy (2012) outlines the following observed changes in Ontario's climate:

- Annual average air temperatures across the province has increased from 0 to 1.4°C; the greatest warming occurred in the spring for the period 1948 to 2006.
- Annual average mean temperature in Hamilton has increased by 0.9°C since 1970.
- Total annual precipitation increased 5-35% since 1900 and the number of days with precipitation (rain and snow) increased.
- Total annual precipitation in Hamilton increased 26mm; this equates to approximately 3% increase in annual average precipitation since 1970.
- Increased night-time temperatures in the summer has been linked to more intense convective activity and rainfall contributing to greater annual precipitation totals.
- Heavier, more frequent and intense rainfall events have been detected in the Great Lakes Basin since the 1970s.
- Precipitation as snow in the spring and fall has decreased significantly in the Great Lakes-St. Lawrence basin between 1895 and 1995, although total annual precipitation has increased.

<sup>8</sup> [http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/Full-Report\\_Eng.pdf](http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/Full-Report_Eng.pdf)

## What is Causing Climate Change?

There are two causes of global climate change: natural causes and human causes. Natural causes can be defined as factors that occur naturally and are external to the climate system, such as volcanic activity and the Earth's orbit around the sun<sup>9</sup>. In contrast, human causes do not occur naturally and are a result of human activity, such as the burning of fossil fuels<sup>10</sup>. Human influences on the climate system have significantly increased in correlation with rapid growth in industrialization. Human activities contribute to climate change primarily by emitting greenhouse gases (GHG) into the atmosphere. Common GHGs include carbon dioxide, methane and nitrous oxide. GHGs surround our planet and act as a barrier to prevent the loss of heat and energy into the outer space, in turn causing the atmosphere to warm. GHGs occur naturally and are required to support life on earth; however, in excess quantity, the gases can change the Earth's climate and negatively impact the health of the environment and humans<sup>11</sup>.



Source: State of Washington, Department of Ecology

## How Much Greenhouse Gases Are We Emitting?

In 2012, Canada's total GHG emissions were estimated to be 699 megatonnes of carbon dioxide. The Energy Sector, which includes GHG emissions from stationary combustion sources (i.e. furnaces, heaters, dryers) and transportation sources, accounts for 81% (566 megatonnes) of the nation's emissions. The remaining 19% of total emissions are generated from the Agriculture Sector (8% of total emissions), Industrial Processes Sector (8%) and the Waste Sector (3%)<sup>12</sup>.

Ontario's main 2012 GHG sources are transportation (34%), industry (30%), buildings (17%), electricity (9%), agriculture (6%) and waste (4%).

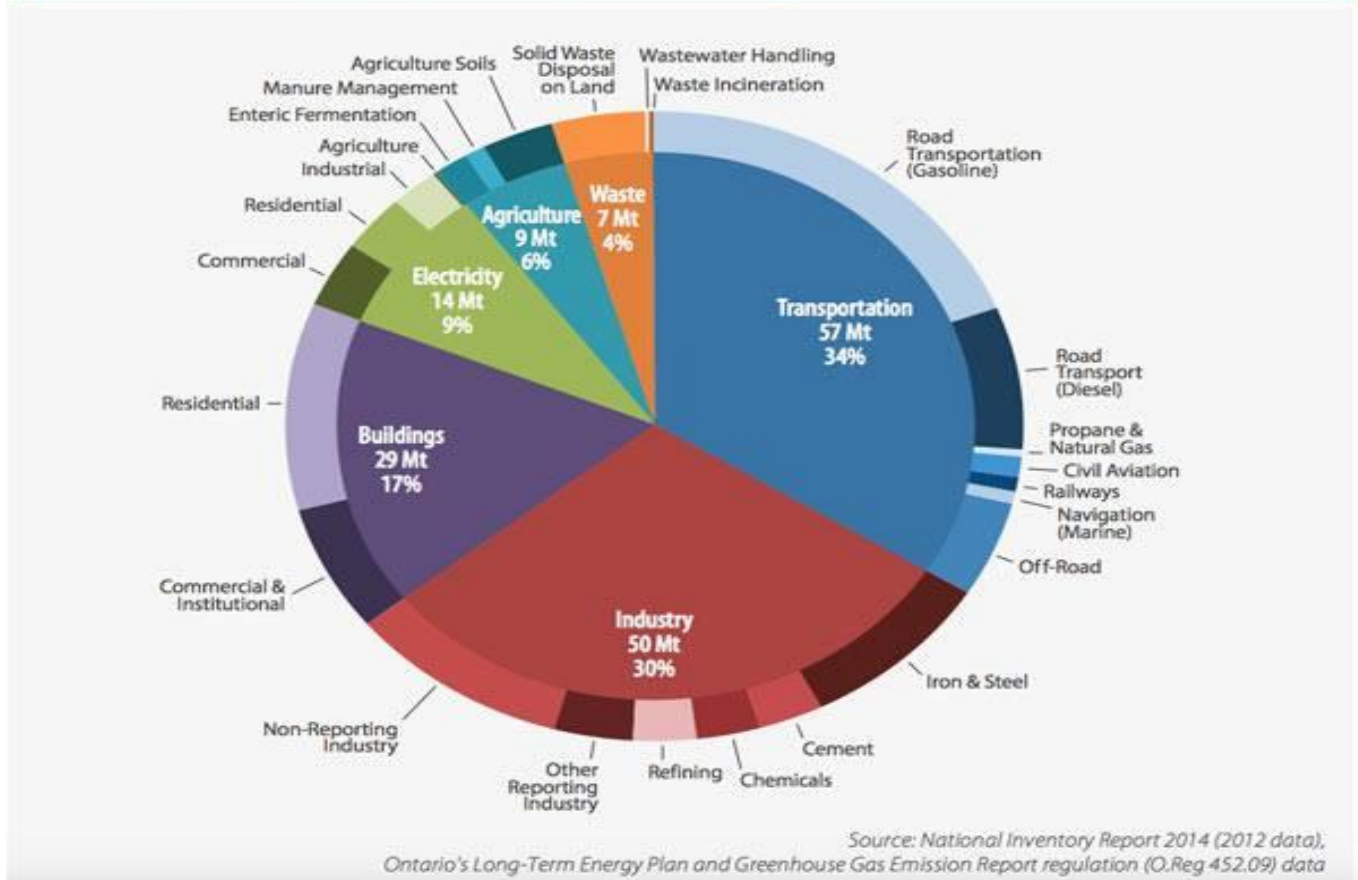
<sup>9</sup> <http://www.climatechange.gc.ca/default.asp?lang=En&n=65CD73F4-1>

<sup>10</sup> Ibid

<sup>11</sup> <http://www.epa.gov/climatechange/basics/>

<sup>12</sup> <http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=3808457C-1&offset=2&toc=show>

**FIGURE 3 Ontario's 2012 Greenhouse Gas Emissions by Sector**

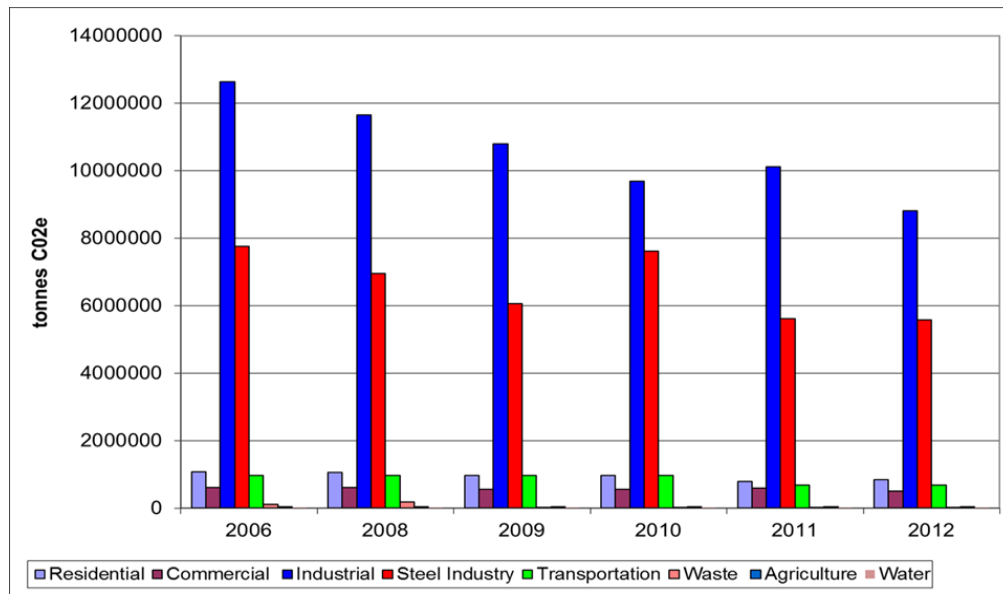


The City of Hamilton's total emissions from corporate operations (e.g. buildings and facilities, fleet, sewage treatment, etc.) in 2012 was 108,433 tonnes, down from 135,038 tonnes in 2005<sup>13</sup>. Municipal operations account for 1% of local emissions. In contrast, residential emissions from household heating, electricity, and waste generation, contribute 5% of local emissions. Commercial and transportation account for 7% of local emissions. The rest is made up of energy usage and production in local industry. In 2012, the total emissions in the community were 16,481,699 tonnes, down 29% from 23,231,799 tonnes in 2006. The charts on the following page show the total greenhouse gas emissions sources and changes in the community in 2012.

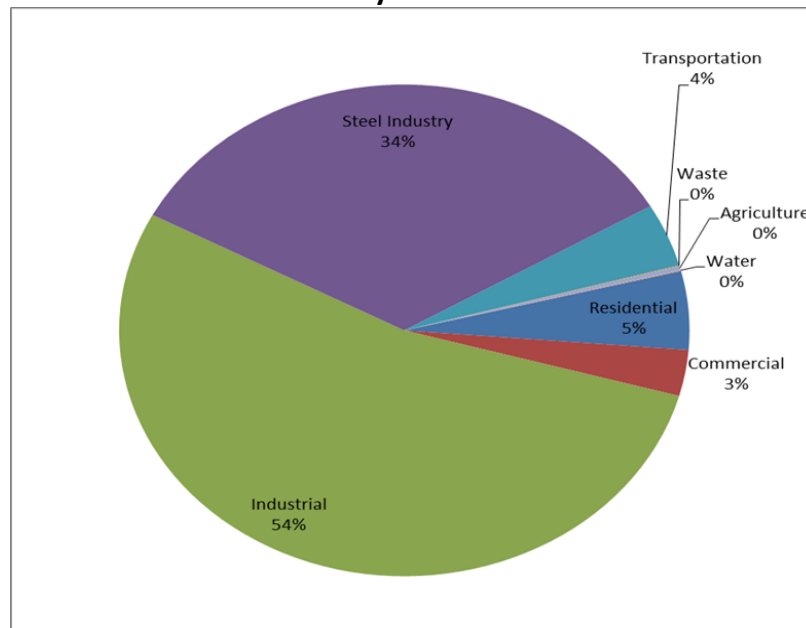
<sup>13</sup> <http://climatechangehamilton.ca/the-city-of-hamilton>



### Community Emissions Changes 2006-2012



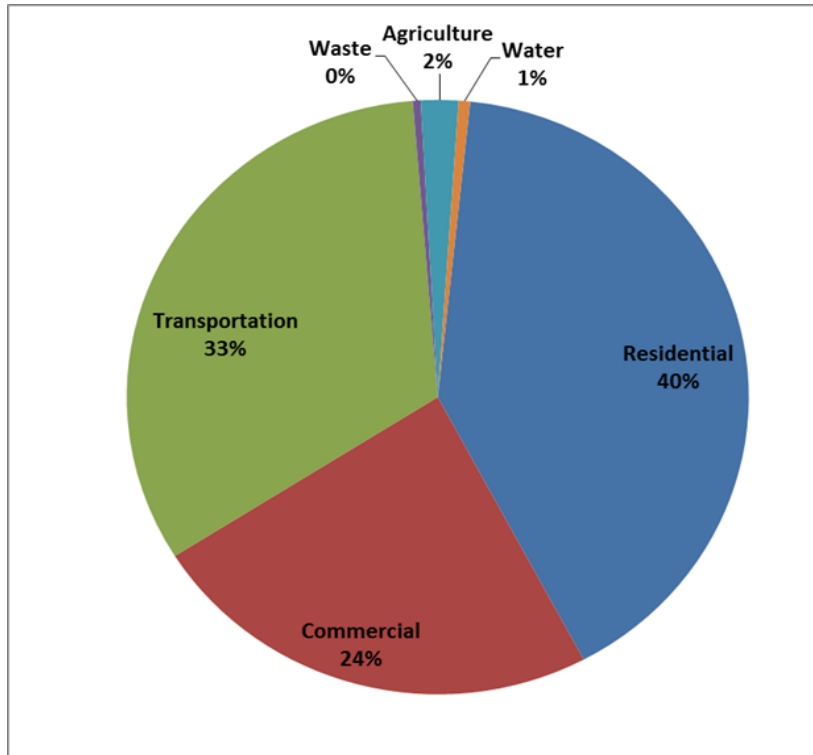
### Community Emissions 2012



Industrial sources and energy usage makes up the bulk of emission sources in Hamilton, however these sources are regulated by the Province and the Canadian government. Where local action and reductions can occur in the community is in the transportation, residential, commercial, waste, water and agriculture sources. When local industrial sources are removed from the community climate picture, the following emissions values can be seen: residential at 40%, transportation at 33%, commercial at 24%, agriculture at 2% and water at 1% making up an estimated total of 2,097,166 tonnes of greenhouse gas emissions.



## Community Emissions 2012 (minus industrial sources)



### What Has Already Been Done in Hamilton?

Hamilton has been undertaking action on climate change through the work of organizations in the community and through community climate change initiatives and programs such as the Hamilton Climate Change Champions (2009), the Hamilton Climate Change Action Charter (2011) and the Hamilton Climate Change Action Map (2013).

In Hamilton, every October since 2009 has been Climate Change Action Month, raising awareness of climate change in Hamilton and recognizing the achievements and actions of the community. Every year since 2009, the City of Hamilton has reported annually on its corporate reductions and tracking the emissions in the Community.

Building upon the work and actions in the community, a Hamilton Community Climate Change Action Plan will help Hamilton address climate change further and become more resilient to the impacts of climate change that can be expected to occur in and around Hamilton over the coming decades. The plan focuses on adapting and preparing the community for the risks of climate change, such as more variable and extreme weather, more social and infrastructure stresses, risks to infrastructure, and insurance costs. It will also address reducing the community's contributions to climate change, such as the emission of greenhouse gases, a major contributor to climate change.

### Spotlight on the City of Hamilton

The City of Hamilton was recognized as one of the Top 10 Canadian Cities tackling Climate Change by the World Wildlife Fund in 2011, and here are a few reasons why:

- ✓ In 2006, Council moved forward on Phase 1 of a Corporate Air Quality & Climate Change Action Plan
- ✓ In 2008, the city adopted a set of corporate and community-wide emission reduction targets, and by 2011-2012, community emissions had decreased by 23.1% based on 2006 levels
- ✓ In 2009 and every year since, the City undertook an emissions inventory of greenhouse gas emissions in Hamilton
- ✓ In 2011, Hamilton was the first municipality in Ontario to launch its' Community Climate Change Action Charter (<http://climatechangehamilton.ca/hamilton-climate-change-action-charter>)
- ✓ In 2013, Hamilton achieved Milestone 5 for its Corporate initiatives under the Federation of Canadian Municipalities Partners for Climate Protection Program and 5 Milestone Framework
- ✓ Hamilton has a new community target of 80% emission reductions by 2050, in line with other cities globally.

## **APPENDIX B – Additional Opportunities**

# AGRICULTURE AND FOOD

## Directions and Opportunities

<b>Direction:</b> Practice sustainable agriculture	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>Request that the Province extend the Golden Horseshoe Food and Farming Action Plan to fully integrate climate change impacts mitigation and adaptation strategies.</li> <li>Work with farming associations (OFA, NFU) to assess the need for further educational resources for farmers on mitigating causes and adapting to impacts of climate change</li> <li>Examine issues/constraints of simplifying regulation and permitting for on-farm based energy generation</li> <li>Work with the Greater Golden Horseshoe Agricultural Committee, the University of Guelph, and the Vineland Research Station to investigate local production issues to create a Climate Change Risk And Opportunity Assessment For The Hamilton Agricultural Sector</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>Work with farming associations (OFA, NFU) to advocate for increased support for existing farm programs/plans that contribute to adaptation and mitigation (e.g. the Environmental Farm Plan)</li> <li>Explore opportunities to offer ecological service credits for farmers to provide further financial incentives to adopt mitigation/adaptation practices (e.g. Alternative Land Use Services)</li> <li>Work with the University of Guelph and the Vineland Research Station to undertake research to assess what produce will grow best in the Hamilton region given the possibility of warming temperatures and shifting weather patterns in the face of climate change</li> </ul>
<b>Direction:</b> Preserve local farmland	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>Develop public awareness campaign to Increase public's awareness of the need for stronger farmland preservation/protection through policies such as the Green Belt</li> <li>Establish/strengthen land use policies that encourage farmland preservation</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>Explore financial and tax-based incentives for preserving or rehabilitating farmland such as an <i>Agricultural Gifts Program</i></li> </ul>
<b>Direction:</b> Support and encourage local food producers and urban agriculture	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>Undertake a community food system assessment to identify gaps and opportunities for local food production and consumption</li> <li>Integrate climate mitigation and adaptation food related actions into the City of Hamilton Food Strategy (under development)</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>Work with farming associations (OFA, NFU) to coordinate and link established farmers with those interested in entering farming to support sustainability of local agriculture</li> </ul>

<ul style="list-style-type: none"> <li>• Review zoning obstacles to on-farm food processing, and for farmers markets, urban farms, hydroponics and aquaponics in non-residential zones</li> <li>• Encourage and support urban agriculture</li> <li>• Expand promotion of farm gate initiatives to promote sales (e.g. maps, tours, signage)</li> <li>• Extend the City tree planting programs to include edible fruit and nut trees</li> <li>• Identify suitable sites for additional community gardens, urban farms and urban greenhouses</li> <li>• Encourage citizens to purchase locally grown food at food co-ops, farmers markets and supermarkets</li> <li>• Encourage citizens to participate in and promote community-supported agriculture (CSA)</li> <li>• Review how licensing supports on-farm food processing</li> <li>• Set targets for the municipal operations, universities, school boards and hospitals (MUSH) located in Hamilton to procure local food (e.g. as in Markham)</li> </ul>	
<b>Direction:</b> Reduce the amount of food that is wasted	
<p><b>Potential Med-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Conduct an assessment to Identify key points in Hamilton’s food system where waste occurs and create a plan to reduce waste</li> <li>• Explore the potential for recovering (gleaning) unused crops from farmers</li> <li>• Implement a consumer education program on food waste in the home and how to avoid it</li> <li>• Explore elimination of retail food waste (e.g. sales incentives, ugly vegetables promotion)</li> <li>• Expand the Green Cart program to multi-residential buildings</li> </ul>	<p><b>Potential Long-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Conduct study into Industrial/Commercial/ Institutional (ICI) food waste disposal practices to identify opportunities to reduce food wastage and better utilize food waste</li> </ul>

<b>Direction:</b> Educate and raise awareness of the greenhouse gas impact of the food system	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"><li>• Incorporate the GHG impact of food choices into food education programs</li><li>• Extend community gardening opportunities between schools and the community</li><li>• Advocate for the integration of growing, cooking, and food preservation methods into school programs/ curriculum</li></ul>	<b>Potential Long-Term Opportunities</b>

# AWARENESS AND EDUCATION

## Directions and Opportunities

<b>Direction:</b> Build community awareness related to climate change and what is being done and can be done to help reduce our impacts and prepare for changes	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>Establish ongoing education and awareness campaign/program building on <i>Let's Talk About the Weather</i> to raise awareness and facilitate ongoing dialogue (face-to-face, online, etc.)</li> <li>Establish media partnerships to include climate related coverage and linkages to local weather events</li> <li>Explore/develop "gamification" strategy as educational tool about mitigation and adaptation techniques and processes</li> <li>Host regular events focus on climate change (speaker series, annual event, etc.)</li> <li>Engage youth in an ongoing forum on climate action to raise awareness and motivate further action</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>Host art competition to capture creative interpretations of sustainable living</li> <li>Display artist renderings of positive visions of future sustainable ways to living in public spaces</li> <li>Establish a coordinated knowledge sharing hub or mechanism to further communicate climate related events, activities, initiatives, etc.</li> </ul>
<b>Direction:</b> Engage community members in climate change related learning opportunities to encourage behavioural change and establish climate friendly social norms	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>Expand/further promote the Climate Change Champions program to encourage more community champions and leadership</li> <li>Organize/promote community clean-ups and tree planting events</li> <li>Establish Hamilton as a Project Neutral community</li> <li>Show energy use comparisons with neighbours on utility bills</li> <li>Prepare climate change resources guide with relevant information/ resources for home owners/businesses</li> <li>Develop a home adaptation audit program to provide guidance to homeowners on how to safeguard their homes from climate impacts, tap into</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>Establish a household climate stewardship program to reward and encourage action</li> <li>Identify specific behaviours to target for behaviour change and develop Community-Based Social Marketing programs to foster positive behaviour change</li> </ul>

<p>program, incentives, etc.</p> <ul style="list-style-type: none"> <li>• Develop programs such as bike repairs at schools or library, recycling exchange, etc.</li> <li>• Organize field trips to conservation areas to relate impacts in these areas</li> <li>• Host series of reading events for kids at local libraries – themed book</li> </ul>	
<p><b>Direction:</b> Foster collaboration and partnership to support action on climate change</p>	
<p><b>Potential Med-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Seek buy-in and endorsement/support for the shared vision and goals of Community Climate Change Action Plan from existing groups and organizations in Hamilton</li> <li>• Establish oversight and coordination body for implementation of the Community Climate Change Action Plan</li> <li>• Advocate for political leadership on climate change through public engagement (e.g. how to contact MPs)</li> <li>• Explore establishing a formal partnership program for implementation of climate actions</li> <li>• Host/facilitate networking opportunities amongst partners in climate action</li> </ul>	<p><b>Potential Long-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Establish a community project fund to encourage community groups to come up with projects (that support the CCAP vision and goals) and receive some funding to implement</li> </ul>
<p><b>Direction:</b> Communicate and demonstrate progress towards managing climate change</p>	
<p><b>Potential Med-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Profile community members or organizations that have demonstrated success related to climate action</li> <li>• Develop an annual public report card to report on community GHG emissions, progress towards targets, and initiatives undertaken and/or planned</li> <li>• Expand and further promote the Hamilton Climate Change Map initiative</li> <li>• Celebrate successes through the Hamilton Climate Change Charter</li> </ul>	<p><b>Potential Long-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Seek opportunities to establish or participate in a climate change learning forum/process to monitor and document changes and the learning process of adapting and changing to living in a new climate</li> </ul>

# ENERGY

## Directions and Opportunities

<b>Direction:</b> Plan for energy generation, distribution, and consumption through a coordinated and regional approach	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Develop a community energy plan</li> <li>• Continue to map/ monitor/measure and verify Hamilton's energy usage</li> <li>• Implement requirement for site-level energy planning for new developments</li> <li>• Develop a regional smart energy network strategy</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Establish Hamilton as an energy neutral community</li> </ul>
<b>Direction:</b> Foster a culture of energy conservation	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Continue/expand utility based conservation and demand management programs</li> <li>• Develop/expand education and awareness campaign on energy conservation</li> <li>• Explore mechanisms to encourage the undertaking of energy audits or energy benchmarking before a transfer of property ownership takes place</li> <li>• Offer incentives/support to encourage strategic tree planting for energy conservation on private property</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Support neighbourhood energy conservation through grassroots initiatives and local organizations</li> </ul>
<b>Direction:</b> Encourage the efficient use of energy	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Promote mandatory Operator Training program to educate building operators and managers on ways to improve building performance (e.g. BOMA)</li> <li>• Develop checklist/ resources for homeowners and small businesses to assess their own energy use and level of efficiency</li> <li>• Establish a central source of expertise and advice to assist different sectors to improve energy efficiency</li> <li>• Continue to deliver coordinated residential energy conservation and</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Undertake auditing of fleets to assess use and where efficiency improvements can be made</li> <li>• Advocate for more aggressive energy efficiency requirements in the Ontario Building Code</li> </ul>



efficiency retrofit program to deliver existing/new initiatives to existing homes	
<b>Direction:</b> Use renewable energy	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Continue to identify opportunities for local renewable energy generation (e.g. wind, solar, hydro, biomass, biogas)</li> <li>• Expand renewable natural gas generation</li> <li>• Assess and support solar hot water heating through financing program (e.g. Halifax Solar City)</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Explore opportunities for energy storage through multiple local channels (utilities, City, local neighbourhoods)</li> <li>• Establish a target for local percentage of energy to be generated through renewable sources</li> </ul>
<b>Direction:</b> Diversify and localize energy generation	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Pursue opportunities associated with community-owned renewable energy initiatives as incented under Ontario's Feed-in Tariff program</li> <li>• Identify/establish community energy cooperatives</li> <li>• Expand existing district energy systems</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Explore feasibility of smart grid and micro-grids in Hamilton</li> <li>• Expand natural gas infrastructure and natural gas transportation network</li> </ul>
<b>Direction:</b> Encourage shift to more efficient vehicles that use cleaner sources of energy	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Install and mandate electric vehicle charging stations to expand the electric vehicle charging network</li> <li>• Green corporate fleets to improve Corporate Average Fuel Efficiency (CAFE)</li> <li>• Implement wide-spread use of compressed natural gas, electricity and hybrid vehicles</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Electrify transit, commuter rail and freight rail where feasible</li> <li>•</li> </ul>

# INFRASTRUCTURE

## Directions and Opportunities

<b>Direction:</b> Transition to the use of green infrastructure to make use of natural ecological processes	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Review city planning policy to encourage diversification and decentralization of infrastructure to make the systems more resilient and responsive to local needs</li> <li>• Update/revise infrastructure guidelines to encompass green infrastructure</li> <li>• Integrate bio retention swales into new roadway/boulevard construction</li> <li>• Integrate engineered soils (e.g, SilvaCell™) on paved sites, urban plaza areas and streetscapes to improve tree habitat conditions</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Daylight and restore waterways as infrastructure is being replaced</li> </ul>
<b>Direction:</b> Build weather hardened infrastructure that is durable and can withstand anticipated climate changes over the long-term	
<b>Potential Short-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Advocate Federal and Provincial governments for adequate funding to address infrastructure deficit</li> <li>• Engage local and provincial political leaders to emphasize the importance of infrastructure in risk management</li> <li>• Establish collaborative mechanism/forum/ dialogue to increase political awareness of climate impacts on infrastructure between the insurance industry and other stakeholders</li> <li>• Restructure funding mechanism to separate stormwater rate from water rate</li> <li>• Create equity between residential and commercial users in terms of infrastructure user fees</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Increase infrastructure lifespan standards for new infrastructure</li> <li>• Explore life-cycle accounting for decisions-making related to infrastructure investments</li> </ul>

<b>Direction:</b> Improve stormwater infrastructure to better manage more rainfall and flooding	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Require existing downspouts be disconnected from stormwater system</li> <li>• Develop updated flood mapping and publicize to promote awareness of risks</li> <li>• Conduct assessment of existing stormwater infrastructure to identify opportunities to improve (underway)</li> <li>• Establish a 250-year storm standard for stormwater system design to replace the 100-year storm standard (e.g. Stratford)</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Upgrade capacity and separate combined sewer infrastructure</li> <li>• Upgrade stormwater infrastructure (e.g. bridges, culvers, stormwater ponds, etc.) to increase capacity</li> </ul>
<b>Direction:</b> Reduce strain on infrastructure by improving homes and businesses to better manage more rainfall and flooding	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Encourage use of rain barrels through outreach program/incentives</li> <li>• Further expand/promote the RAIN Home Visit Program</li> <li>• Enhance enforcement related to private storm systems</li> <li>• Develop and distribute a Business Adaptation Toolkit to help businesses become better storm-ready</li> <li>• Develop an incentive program to encourage rainwater capture systems on private properties or at the community scale</li> <li>• Further promote/ encourage participation in the City's Protective Plumbing Program that provides grants for improvements to protect against flooding</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Explore development of a stormwater credit system for all properties to encourage stormwater best management practices (e.g. Kitchener)</li> <li>• Expand City's Backflow Prevention Program to all residences to require property isolation from the water distribution system</li> <li>• Explore opportunities/ promote rainwater capture systems at the community scale</li> <li>• Develop Low Impact Development retrofit program for homes and ICI sector</li> </ul>
<b>Direction:</b> Reduce the impacts of new developments and manage stormwater runoff through Low Impact Development	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Develop Low Impact Development standard for all new developments</li> <li>• Showcase successfully implemented projects that used the City's Innovative Stormwater Source Control Policy (ICI land uses)</li> <li>• Develop commercial parking guidelines to integrate low impact design (e.g.</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Require some amount of Low Impact Development be incorporated into new developments</li> </ul>

<p>permeable pavement, storm swales, source control, etc.)</p> <ul style="list-style-type: none"><li>• Amend zoning by-laws to increase requirements for number of trees planting per parking space in surface parking lots</li><li>• Revise the City's commercial surface parking requirements to limit parking lot surface areas to encourage stacked parking rather than larger parking areas</li></ul>	
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# LAND USE, BUILDINGS, AND BUILT FORM

## Directions and Opportunities

<b>Direction:</b> Reduce impacts of buildings by building net zero/net positive buildings	
<b>Potential Med-Term Actions</b> <ul style="list-style-type: none"> <li>• Advocate for more aggressive requirements in the Ontario Building Code to support reduced GHG emissions</li> <li>• Require GHG assessments for buildings through incentives by refunding permit fees if thresholds met</li> <li>• Seek partnerships to build demonstration net zero/net positive buildings</li> <li>• Implement the ultra-high efficiency energy use scenarios for buildings (existing and new) as recommended in the City of Hamilton's Integrated Energy Mapping Strategy (February 2011)</li> <li>• Establish GHG targets that new developments have to meet</li> <li>• Establish operator training program to educate building operators and managers on ways to improve building performance</li> <li>• Educate/engage developers on emerging markets/consumer trends and how they can influence consumer behaviour through their product offerings</li> <li>• Require/encourage major new development areas (e.g. waterfront rail yards) to be energy neutral</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Establish recognition program for buildings that achieve net zero or net positive</li> <li>• Explore financial incentives to encourage net zero/net positive buildings</li> <li>• Retrofit existing buildings for ultra-high efficiency as per recommendations in the City of Hamilton Integrated Energy Mapping Strategy</li> </ul>
<b>Direction:</b> Align climate change adaptation and mitigation with land use and built environment management structures, processes, and decision-making	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Explore development of mechanisms/best practices to integrate climate adaptation and mitigation into the development review processes to ensure</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Structure development the decision making criteria and weighting to minimize fossil fuel use</li> <li>• Establish variable development charges and water rates to reflect real costs of</li> </ul>

<p>development proposals are consistent with GHG targets</p> <ul style="list-style-type: none"> <li>• Require a GHG footprint assessment in support of building and land use proposals</li> <li>• Explore mechanism to have GHG impacts and adaptation impact considered in decision-making process (e.g. project scoping, staff reports, etc.)</li> <li>• Integrated climate change analysis into the City's statutory Official Plan review and develop climate change policies</li> </ul>	<p>buildings and maintain infrastructure</p>
<p><b>Direction:</b> Build an innovative and adaptive built form</p>	
<p><b>Potential Med-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Required green roofs in new developments</li> <li>• Implement a design awards program to recognize sustainable innovation in building</li> <li>• Implement green development standards for new construction to encourage high environmental standards</li> <li>• Review condominium rules to encourage efficiency and adaptation</li> <li>• Develop landscaping requirements to encourage adaptation best practices</li> <li>• Promote innovative buildings and flexible building designs / built forms that are resilient</li> </ul>	<p><b>Potential Long-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Reuse, renovate, retrofit and restore existing buildings in place of rebuilding</li> <li>• Develop program/ incentive to retrofits of current residential/commercial buildings</li> </ul>
<p><b>Direction:</b> Plan for human scale with integrated land use patterns</p>	
<p><b>Potential Med-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Maintain local scale institution and community facilities</li> <li>• Limit urban boundary expansion</li> <li>• Re-evaluate population growth projections and associated land requirements arising from the needs of environmental refugees and other migrants into Hamilton and southern Ontario as a result of adverse climate change impacts (i.e., droughts and sea level rise) elsewhere in North America and the world</li> </ul>	<p><b>Potential Long-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Review official plan, zoning and administrative provisions on an ongoing basis so as to make adjustments to meet the emerging needs this growth poses in order to accommodate these changes in as orderly and responsive manner as possible</li> <li>• Develop a climate change Community Improvement Plan (CIP) with incentives to adapt and mitigate climate change impacts on private development</li> </ul>

<ul style="list-style-type: none"><li>• Re-evaluate the land and policy requirements so as to accommodate the re-location of agricultural production and manufacturing activities arising from adverse climate change impacts (i.e., droughts and sea level rise) from elsewhere in North America and the world</li><li>• Encourage urban intensification and compact communities in conformity with the growth plan</li><li>• Strengthen planning standards to encourage compact and transit-oriented communities</li><li>• Increase minimum density requirements</li><li>• Explore taxing parking lots at commercial property tax rates to encourage intensification</li><li>• Advocate for/participate in cross-border collaboration/forms between southern Ontario municipalities and those of Great Lakes States to address community, social, economic, housing and physical needs as migrants resettle and agricultural and manufacturing activities relocate in the Great Lakes Region</li></ul>	
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# LOCAL ECONOMY AND BUSINESS

## Directions and Opportunities

<b>Direction:</b> Engaged the business community in understanding and being prepared for local climate change	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Create, maintain, and communicate a central resource of local climate change impact scenarios that is readily accessible to the business community (Conservation Authority, MOECC, City of Hamilton – Climate Change group, local NGOs)</li> <li>• Educate and promote adoption of sustainable business practices (Sustainable Hamilton, Chamber of Commerce, Innovation Factory, Economic Development Department)</li> <li>• Build a toolkit for Hamilton businesses to assist with impact analysis and business continuity planning (Sustainable Hamilton, Innovation Factory, SBEC, McMaster or Mohawk students) <ul style="list-style-type: none"> <li>○ Set aside emergency funds as contingency</li> <li>○ Conduct impact analysis and modelling</li> <li>○ Create a business continuity plan for severe weather events</li> </ul> </li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Develop business continuity plans for extreme weather (Community Awareness and Emergency Response Group)</li> </ul>
<b>Direction:</b> Encourage business sustainability practices and measure outcomes	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Conduct ongoing review and research into leading business sustainability practices addressing both adaptation and mitigation (McMaster, Sustainable Hamilton, consultants, University of Waterloo – Climate Change Adaptation, Insurance companies)</li> <li>• Develop resource guide for businesses on benefits of sustainability, opportunities to improve efficiencies/reduce emissions, and cost savings (Sustainable Hamilton, MOECC, HIEA)</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Encourage business to set emissions reductions goals by leveraging/endorsing the Community Emission Reductions Targets</li> <li>• Develop business report card demonstrating progress towards GHG emission reduction goals</li> </ul>



<ul style="list-style-type: none"> <li>• Provide guidance to businesses on establishing green teams and completing sustainability audits/plans</li> <li>• Conduct Green Team Audits to explore opportunities to reduce GHG emissions (green roofs, insulation, equipment efficiency)</li> <li>• Implement system to calculate, track, and report energy use and GHG emissions for local businesses</li> <li>• Initiate local and sustainable purchasing policies</li> </ul>	
<b>Direction:</b> Facilitate collaboration and sharing amongst the Hamilton business community in support of sustainability and climate change	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Encourage businesses to sign onto the Hamilton Climate Change Charter (City of Hamilton and other supporters)</li> <li>• Hold an annual business climate change symposium – address all economic sectors, including input from scientific community, all levels of government, academia, and ensuring wide participation from all sectors of society (Sustainable Hamilton, Chamber of Commerce, Economic Development, City)</li> <li>• Support B Corps/seek B Corp certification</li> <li>• Encourage businesses to pursue B Corp certification to meet standards of social and environmental performance, accountability, and transparency</li> <li>• Create a “green” team/ committee to develop a coordinated approach to implementing sustainability strategies amongst businesses (e.g. energy reduction, purchasing, etc.)</li> </ul>	<b>Potential Long-Term Opportunities</b>
<b>Direction:</b> Communicate and celebrate successes to generate greater awareness and buy-in to adoption of sustainable business practices	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Develop profiles/success stories (e.g. publication, at the annual symposium, other recognition events) (Sustainable Hamilton, Chamber of Commerce, City of Hamilton, Innovation Factory)</li> </ul>	<b>Potential Long-Term Opportunities</b>

<ul style="list-style-type: none"> <li>• Encourage businesses to communicate successes to stakeholders</li> <li>• Measure and communicate/showcase results of carbon and other resource utilization and associated emissions as well as business benefits resulting from reductions and greater efficiencies (Sustainable Hamilton, MOECC, HIEA)</li> </ul>	
<b>Direction:</b> Support and develop the local economy through sustainability focused economic development, research, and innovation in sustainability and climate change	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Conduct/obtain credible research on anticipated local climate change impacts (Conservation Authorities, MOECC, McMaster, Mohawk, consultants, City of Hamilton)</li> <li>• Develop a shop local program/campaign to encourage Hamilton community members to purchase products/services locally in support of local businesses</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Explore opportunities to establish an eco-district for green industries</li> </ul>

# TRANSPORTATION AND MOBILITY

## Directions and Opportunities

<b>Direction:</b> Change behaviour social norms to support sustainable modes of transportation	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Participate in Smart Commute Hamilton</li> <li>• Offer alternative transportation/telecommuting for employees</li> <li>• Provide employees with rewards for sustainable transportation (e.g. financial/material, parking spot priority)</li> <li>• Provide information and support programs to encourage sustainable mobility (e.g. BIA programs)</li> <li>• Optimize the price and supply (ratio) of parking by developing a parking policy and strategy for the City that eliminates free parking and increases parking costs</li> <li>• Install carpool parking and signage in spots in parking lots</li> <li>• Develop employee incentive programs for sustainable mobility (carpooling, cycling, transit)</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Institute transport taxes or tolls (e.g. vehicle registration) and dedicated revenue to investments in transit and active transportation</li> <li>• Institute a local “carbon tax” to make green and lower carbon fuels a more attractive option</li> </ul>
<b>Direction:</b> Build complete and integrated streets and networks	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Complete an integrated cycling network</li> <li>• Implement complete community strategy <ul style="list-style-type: none"> <li>○ Complete streets policies to encourage street design for all ages, abilities, and modes of travel</li> <li>○ Encourage mixed use, dense developments along transit corridors through planning policy</li> </ul> </li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Redesign existing roadways to prioritize transit, cycling and walking</li> </ul>

<b>Direction:</b> Engage community members in decision-making related to their mobility network through demonstration and outreach	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Have open street events every week on at least 25 km of roads three seasons of the year</li> <li>• Establish a sustainable transportation advocacy group(s)</li> <li>• Engage with neighbourhoods through participatory planning to set their own speed limits</li> <li>• Utilize tactical urbanism to demonstrate and engage communities in decision-making</li> </ul>	<b>Potential Long-Term Opportunities</b>
<b>Direction:</b> Support and invest in higher order public transit and supportive land uses	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Expand transit services – routes and headways</li> <li>• Invest in shared mobility infrastructure (carshare, bikeshare, transit)</li> <li>• Explore financial incentive program to encourage transit ridership</li> <li>• Establish investment in rapid transit and transit supportive land uses a priority for Hamilton</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Develop Rapid Transit corridors with transit in its own Right-of-Way</li> <li>• Update transit fees to encourage ridership and impose real costs on road use by private vehicles</li> </ul>
<b>Direction:</b> Move goods and deliver services efficiently by using low carbon alternatives that are less prone to impacts from climate change	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Support/use local green/active transportation couriers</li> <li>• Implement anti-idling policies amongst corporate fleets</li> <li>• Explore opportunities for shared delivery of goods</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Support rail-based and water-based goods movement?</li> </ul>

# WATER AND NATURAL ECOSYSTEMS

## Directions and Opportunities

<b>Direction:</b> Reduce our water and energy related footprint	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Implement and report progress regarding Low Impact Development (LID) projects annually</li> <li>• Develop rainwater capture program/incentives to encourage reuse of water to mitigate urban stormwater erosion and water quality issues</li> <li>• Develop/implement policies that favour on site use of rainwater</li> <li>• Establish baseline levels of water and energy consumption</li> <li>• Encourage household water and energy conservation behaviours through behavioural change</li> <li>• Research and adopt new water conservation technologies</li> <li>• Set urban stormwater runoff reduction targets for impervious surfaces and report on status annually</li> <li>• Quantify costs and energy inputs of managing watercourse erosion reflecting nature systems against impervious urbanized systems</li> <li>• Quantify added wastewater plant treatment costs associated with increasing stormwater runoff treatment</li> <li>• Implement stormwater management tax programs</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Implemented green energy technologies to treat waste water to reduce carbon based energy use</li> <li>• Secure/reestablish lost watershed wetlands to mitigate stormwater channel erosion/ flooding and energy costs associated with infrastructure protection along channels in identified subwatersheds with issues</li> </ul>
<b>Direction:</b> Improve and communicate our understanding of the connection between water and natural ecosystems and human health and well-being locally	
<b>Potential Med-Term Opportunities</b> <ul style="list-style-type: none"> <li>• Support organizations providing climate change related outreach and education (e.g. BARC)</li> <li>• Research and create a factsheet/document identify local benefits of water and ecosystem service for human health and the negative consequences associated with</li> </ul>	<b>Potential Long-Term Opportunities</b> <ul style="list-style-type: none"> <li>• With research and health organizations, quantify the value and savings of a healthy environment to human health including child development and mental well-being to factored into the health care investment choices</li> </ul>

<p>degraded environments</p> <ul style="list-style-type: none"> <li>• Provide outreach events to demonstrate the connection between environment and human health and its links with climate changes</li> </ul>	
<p><b>Direction: Manage and restore our ecosystems</b></p>	
<p><b>Potential Med-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Develop Urban Ecosystem Conservation Plan for Climate Resilience by matching plant species with future climate conditions and soil characteristics.</li> <li>• Naturalize channel designs in historically ditched water courses to support Lake Ontario fish community recovery and a return to local food.</li> <li>• Invest in existing wetland restoration and reforestation projects within the official plans of natural heritage system</li> <li>• Establish/encourage rural reforestation programs as well as residential turf to meadow conversion programs to improve biodiversity</li> <li>• Communicate environmental health status of existing ESA areas</li> <li>• Expand/promote opportunities for land securement of natural land/forest/wetlands for protection to ensure a balanced mix of habitats and diversity of species are retained support various future climate regimes</li> <li>• Review the natural ecosystem dimension of the official plan for natural area corridors and connectivity, focusing on water courses to Lake Ontario system, floodplains, and the Niagara Escarpment as the corridors to allow plant and wildlife dispersal/ recolonization and Lake Ontario function.</li> </ul>	<p><b>Potential Long-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Set a carbon capture targets for natural ecosystem focusing of tree planting, reforestation and reestablishment of wetlands and report on status at regular intervals</li> <li>• Secure natural ecosystem corridors based on the connectivity review</li> <li>• Link provincial and federal biodiversity strategies with the natural heritage or natural ecosystem component of the official plan and participate in ecosystem status workshops</li> </ul>

<b>Direction:</b> Apply a systems approach to understand our water system better and enhance our urban systems to work with our natural systems	
<p><b>Potential Med-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Review and update the stormwater management masterplan</li> <li>• Develop Integrated Urban Water Management System Plan for the region</li> <li>• Use/provide links to landscape plantings that do not require watering</li> <li>• Identify groundwater recharge zones throughout the city to enhance/direct onsite infiltration projects and wetland securement as well as protect downstream watercourse water quality were groundwater emerges</li> <li>• Develop and implement an urban forest strategic management plan for natural forests, street trees, and private trees quantifying the energy conservation savings and health benefits of trees and identifying mechanisms to encourage tree and urban forest protection, enhancement, and long-term sustainability</li> </ul>	<p><b>Potential Long-Term Opportunities</b></p> <ul style="list-style-type: none"> <li>• Secure recharge zones and reestablish zones lost to impervious surfaces in urban areas.</li> <li>• Provide status updates on Lake Ontario fish use of local watercourse systems to council</li> </ul>