Kingston Climate Action Plan

KINGSTON

where history and innovation thrive

“The warnings about global warming have been extremely clear for a long time. We are facing a global climate crisis. It is deepening. We are entering a period of consequences.”

Al Gore[1]

Table of Contents

Grantor

Federation of Canadian Municipalities (FCM)

Partner Organizations

Sustainable Kingston
Kingston Environmental Advisory Forum (KEAF)
Cataraqui Region Conservation Authority (CRCA)
Kingston Utilities and Kingston Hydro
KFK&A Public Health
Hearthmakers Energy Cooperative
City of Kingston. City council adopted this plan on June 3, 2014

Roundtable Participants

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Allan McLuskie, Kingston General Hospital
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Anne Macphail, Local Public Health
Bardi Vorster, Individual Landscape
Bernie Huisman, Union Gas
Beth Pater
Bob Foster
Brendan Hulme, Hotel Dieu Hospital
Brent Bellamy, Kingston Student Housing Co-operative
Bridget Doherty, Organizer/Educator
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Cynthia Beach, City of Kingston
Dale Williams, National Farmer's Union
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Steve Lawrence, Kingston by Bike
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Tom Carpenter, Queen's Institute for Energy & Environmental Policy
Tyson Champagne, SWITCH
Viviane Paquin, Royal Military College of Canada
Wilson Wood, VRTUCAR
Yves Filion, Queen's University

A Message from Mayor Mark Gerretsen:

Our daily behaviours and habits release greenhouse gases that contribute to a global warming trend. Collectively, Kingston residents release 1.5 million tonnes of greenhouse gas emissions into the atmosphere. Kingstonians acknowledge the reality of climate change and have come together in the creation of the Kingston Climate Action Plan to guide our efforts as we address climate-related challenges in our community.

Kingston's Climate Action Plan is the product of months of community engagement across key themes of climate change and climate action. Residents contributed to this plan offering solutions to reduce the amount of harmful greenhouse gasses we release into the atmosphere and how we can best adapt to extreme weather. This climate action plan further demonstrates our continued commitment to sustainability.

Thank you to all those who participated and contributed to the building of this community plan. The Kingston Climate Action Plan represents a significant milestone, but is also the beginning as we now look to community members to support and help us realize our goal of becoming Canada's Most Sustainable City!

What is the Kingston Climate Action Plan?

Climate change is today's most significant global threat to our quality of life. This generation's response to climate change will be our most important legacy. Our children and our grandchildren's economic, social, cultural and environmental well-being hinges on our ability to take action and realize sustained greenhouse gas (GHG) emission reductions. It will take all of us working together at a global, national and community level to effect the change that is needed.

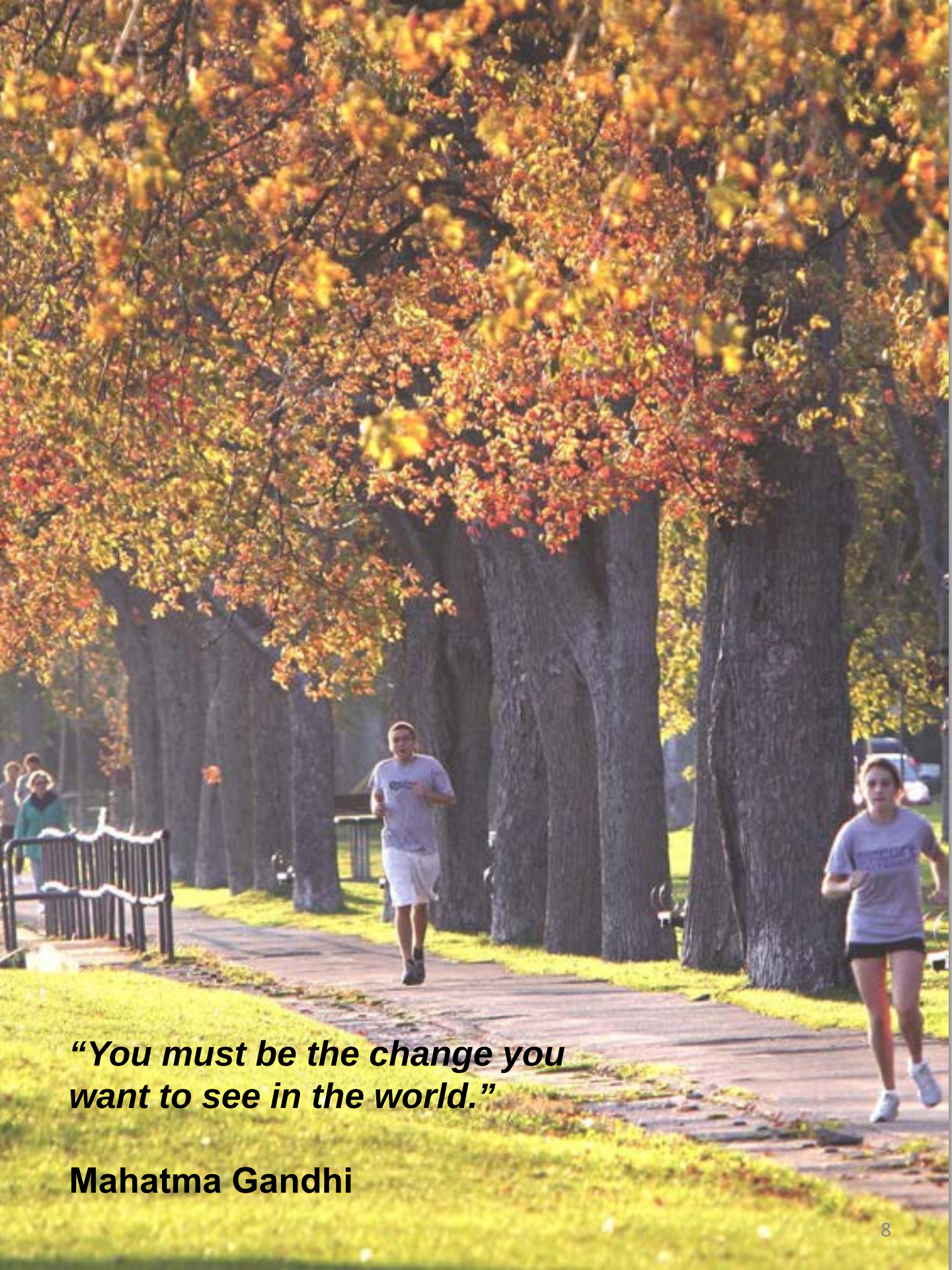
The Kingston Climate Action Plan is a community based plan and builds on the work of the community in the development of the *Sustainable Kingston Plan*.[2] The energy and enthusiasm that the community has brought to the development of this plan proves that Kingston is engaged and is motivated to effect change!

Through the *Sustainable Kingston Plan* outreach, the community developed the Sustainable Kingston Vision: Kingston – Canada's Most Sustainable City.

The Kingston Climate Action Plan Vision was derived from the energy theme of the *Sustainable Kingston Plan*.[3]

Kingston Climate Action Plan Vision

Kingston is capable of producing all of the energy that residents and industry consume, and is responsible for offsetting all GHG emissions created by the community. Kingston has clean, fresh, and breathable air because the community has minimized emissions harmful to the health of the community, the environment, or the atmosphere. Kingston is a resilient community and is able to mitigate the risks and benefit from the opportunities presented by a changing climate.



"You must be the change you want to see in the world."

Mahatma Gandhi

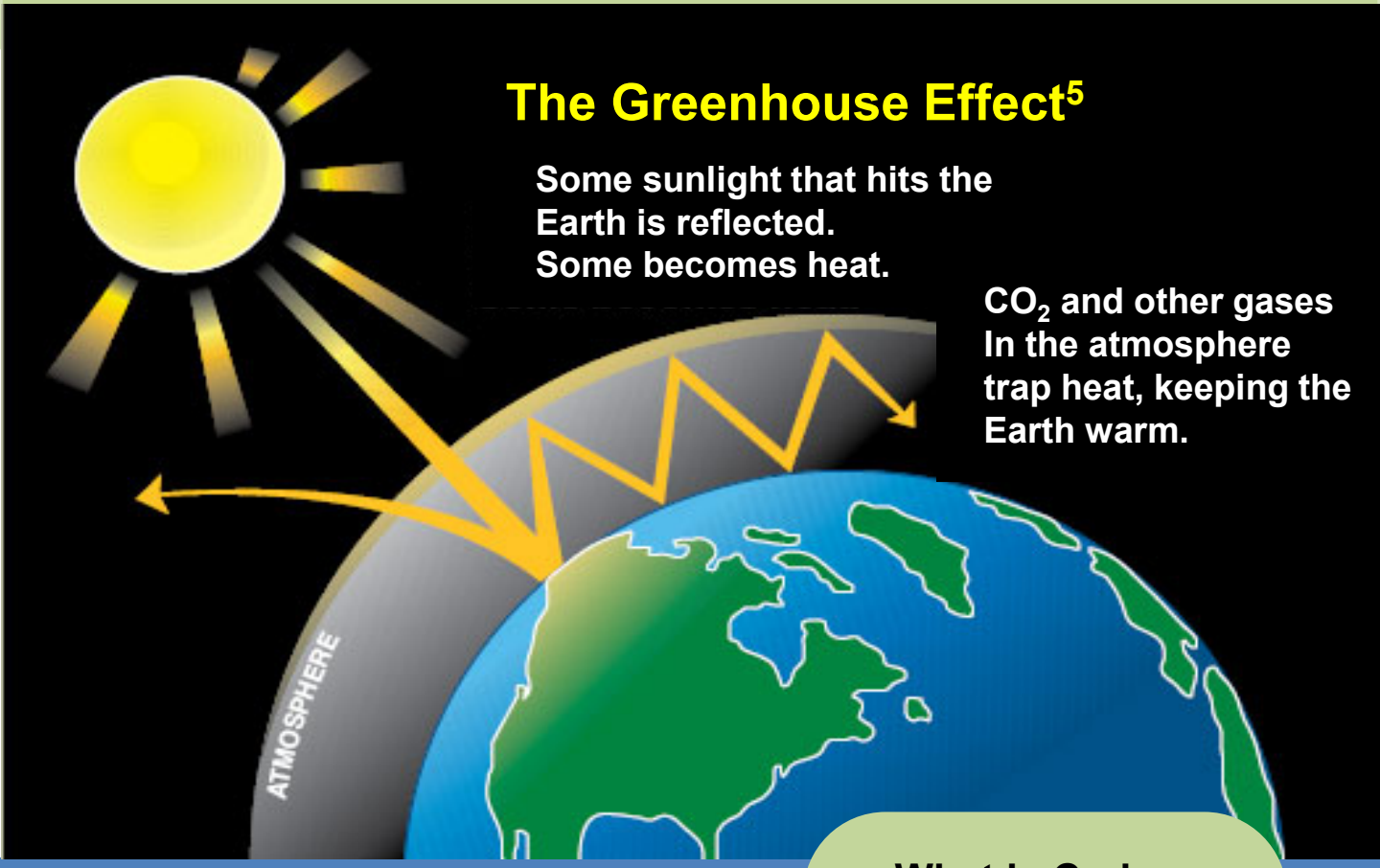
1.0 The Climate for Action

The energy we consume to heat, cool and power our homes and workplaces as well as to transport ourselves and the goods/services we consume generates GHG emissions. Our everyday decisions as residents, employers and employees add up and are important! Section 1 provides an overview of what climate change is, what the greenhouse effect is, the global impacts of climate change, Kingston's weather projections as well as the risks and benefits of a changing climate.

1.1 What is Climate Change?
1.2 Global Impacts
1.3 Local Weather Projections
1.4 Infrastructure Risk Management
1.5 Health and Ecosystem Risk Management
1.6 Economic Opportunities

1.1 What is Climate Change?

As Canadians, we emit GHG emissions daily by burning fossil fuels to heat, cool and power our homes and businesses as well as to transport ourselves and the goods we consume. An increasing build-up of GHG emissions in the Earth's atmosphere is trapping more heat and is increasing the Earth's temperature. This warming of the planet is referred to as global warming and is explained by the greenhouse effect.



Impact of Primary GHG Emissions

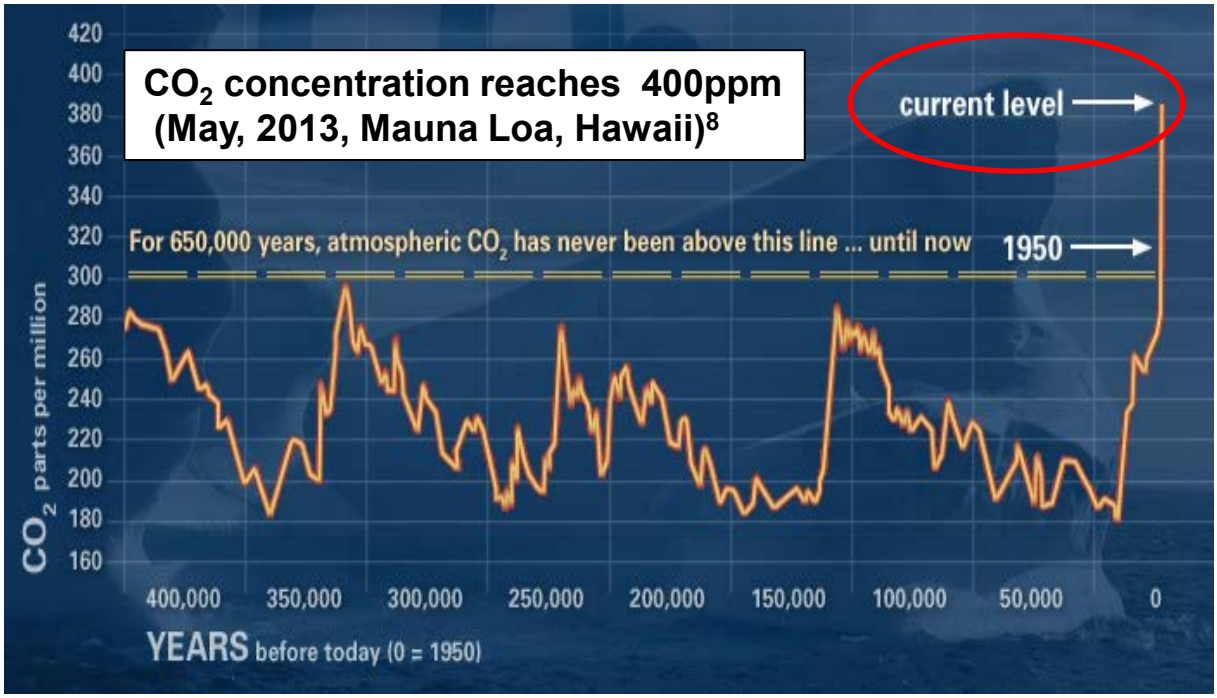
Primary GHG Emissions	Global Warming Potential (GWP)
Carbon Dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous Oxide (NO_2)	298

What is Carbon Dioxide Equivalent CO_2e?

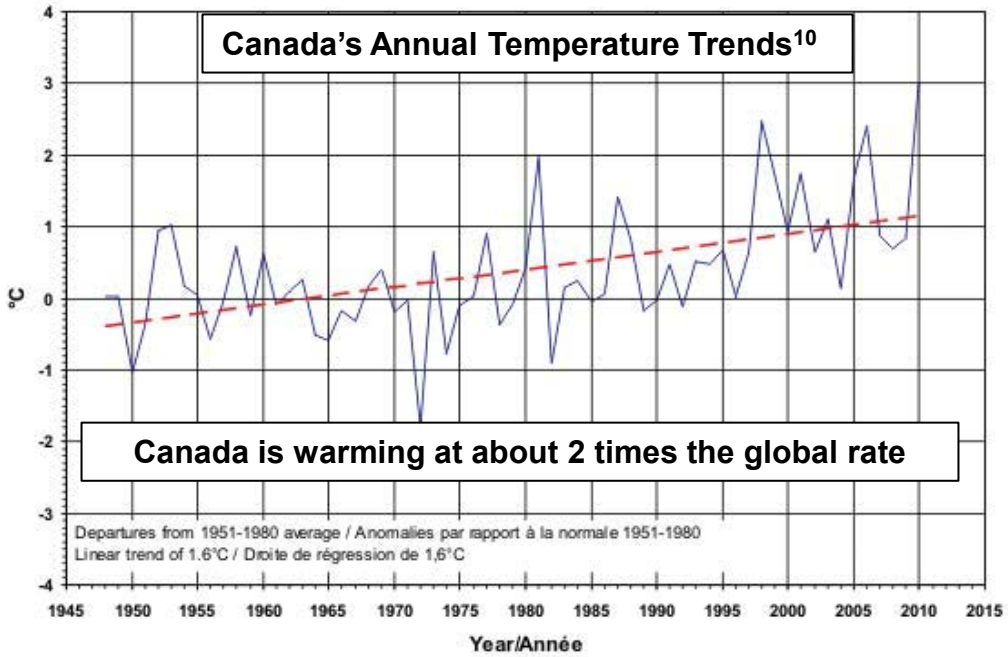
To allow GHG emissions to be compared, they are converted using their global warming potential to their value as if it was carbon dioxide.

The Concentration of Carbon Dioxide in the Atmosphere is Increasing and the Global Average Temperature is Rising

On May 2nd 2013 the recording station at the volcanic peak of Mauna Loa, Hawaii measured the highest concentration of CO_2 in the atmosphere of 400 parts per million (ppm) since prehistoric times.[6] "The international community of nations has agreed that 450 ppm - linked to a rise of 2 degrees Celsius in global average temperatures - should not be exceeded."[7]

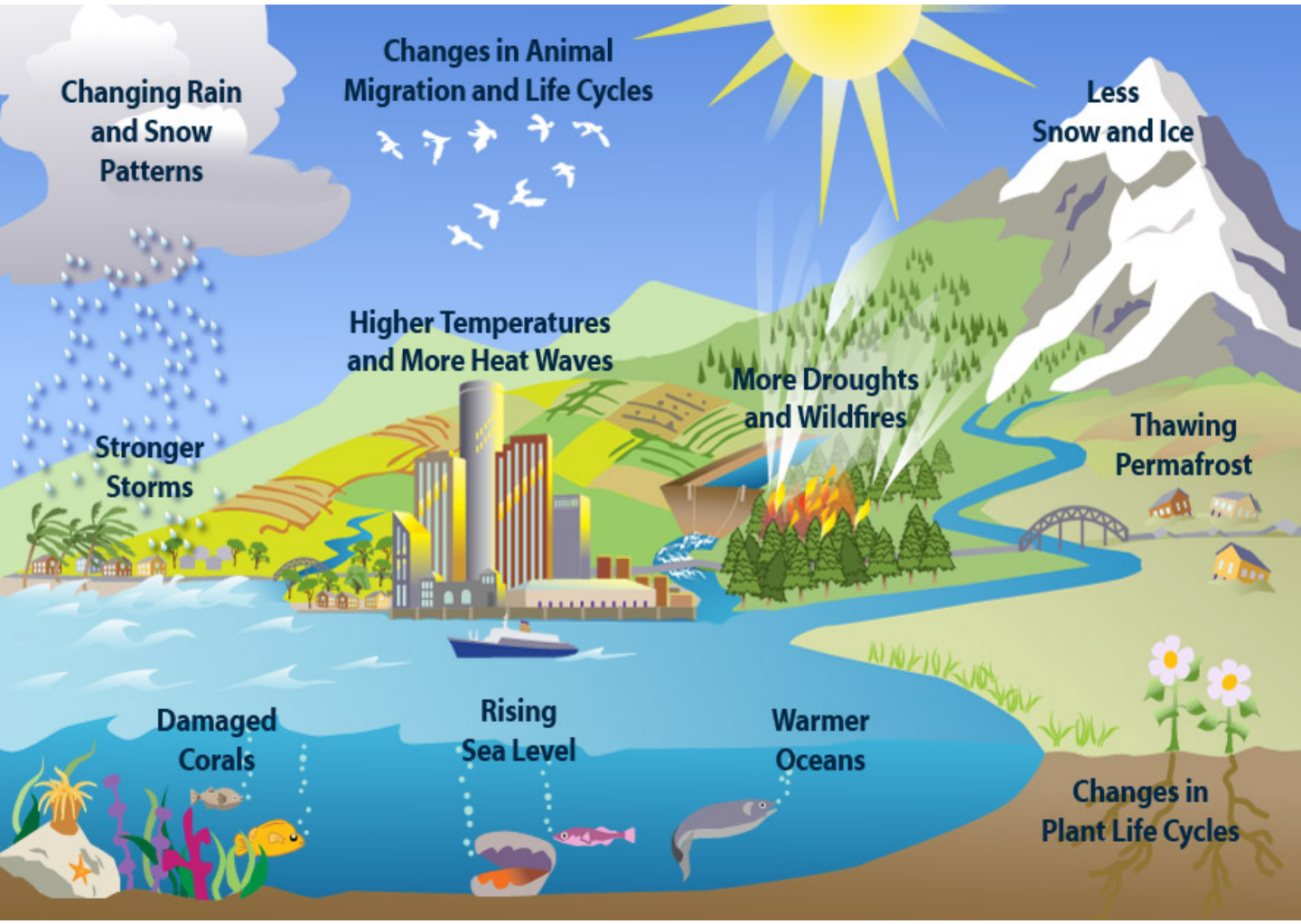


The following Environment Canada chart illustrates Canada's annual temperature trends. Canada is warming at approximately two times the global rate.[9]



1.2 Global Impacts

The rising concentration of CO_2 in the atmosphere is leading to an increase in the average global temperature. This temperature increase is having significant global impacts including: more extreme rain and snow storms, changing rain and snow patterns, higher maximum temperatures and more heat waves, more droughts and wildfires, less snow and ice, thawing permafrost, rising sea levels, warmer oceans, changes in plant life cycles, changes in animal migration and life cycles and an increased presence of vector borne disease.[11]



On September 27th, 2013, the Intergovernmental Panel on Climate Change (IPCC) released the IPCC Assessment Report Summary for Policy Makers.[12] NASA has summarized the four (4) key findings from this report.

NASA's Key Findings of the Intergovernmental Panel on Climate Change (IPCC) Report[13]

1. **There is 95% certainty that human activities are responsible for global warming**.
2. **Carbon dioxide (CO_2) is at an "unprecedented" level not seen for at least the last 800,000 years.**
3. **Over the last decade, the Greenland and Antarctic ice sheets have been melting and glaciers have receded in most parts of the world.**
4. **Sea level is set to continue to rise at a faster rate than over the past 40 years**.

"If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO_2 will need to be reduced ... to at most 350 ppm." [14]

Dr. James Hansen
Former NASA Climatologist

1.3 Local Weather Projections

Kingston is the first municipality in Canada to apply new United Nations Intergovernmental Panel on Climate Change modeling data to the development of its climate projections. All of the climate change modelling and downscaling results used for the Kingston study have been internationally peer-reviewed and are based on IPCC reviewed climate change model results. The Risk Sciences International (RSI) team that developed and tailored these climate projections for the Kingston area and are nationally and internationally recognized experts.

The Kingston weather modeling, is based on ensembles of up to 40 models from the latest IPCC AR5 climate models (2013) reviewed for the IPCC AR5 climate change assessment. These outputs were obtained from the IPCC data repository and were adjusted and quality controlled against historical Kingston area climate data. Other studies of extreme climate conditions involve complex downscaling methodologies and are based on the existing IPCC AR4 model results. Due to their complexity, these studies and projections of future climate extreme events have all been additionally scientifically peer-reviewed and published in international climate journals.

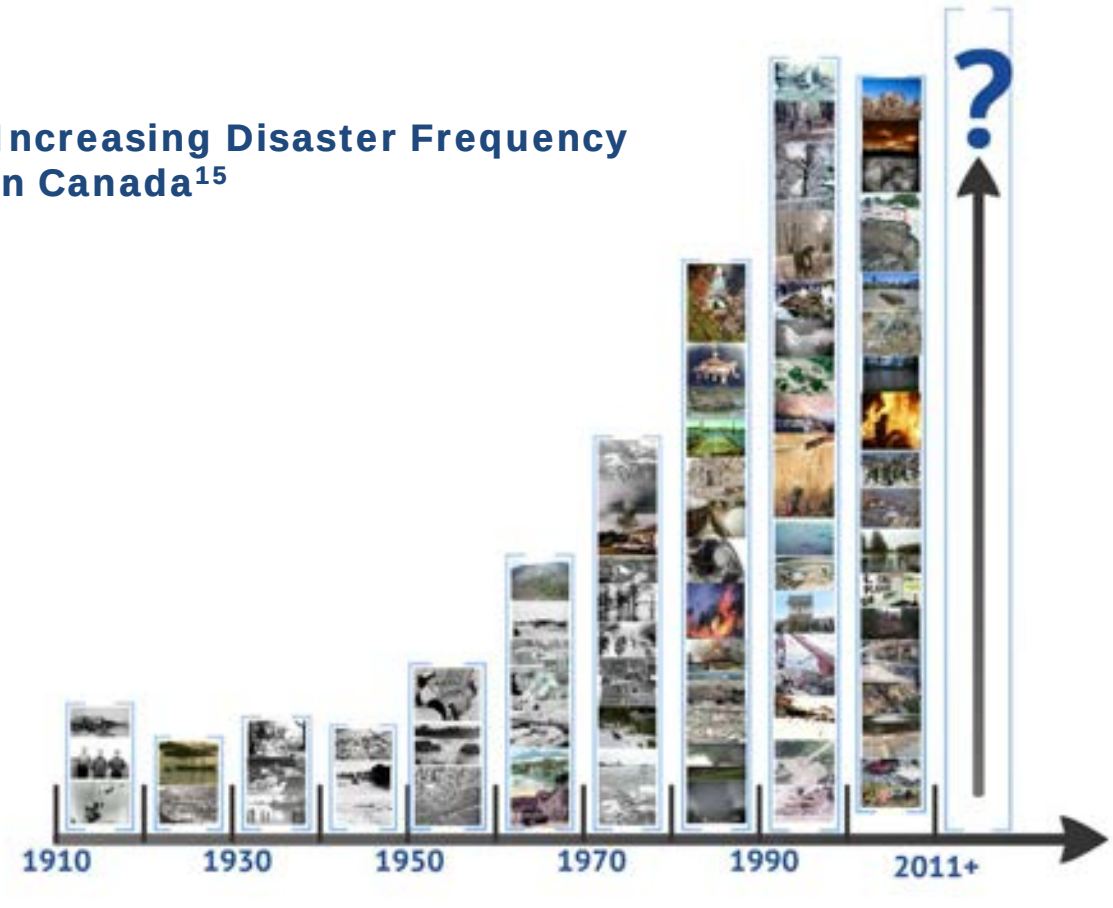
Kingston's Weather Modeling Projections

	Climate Variable	Current (1981-2010)	2020 Projection	2050 Projection
Temperature (°C)	Average	7.8 °C	9.2 ± .4 °C	11.1 ± .7 °C
	Winter	-5.1 °C	-3.4 ± .6 °C	-1.2 ± .9 °C
	Spring	6.3 °C	7.5 ± .6 °C	9.4 ± .8 °C
	Summer	20.2 °C	21.5 ± .4 °C	23.4 ± .8 °C
	Autumn	9.7 °C	11.0 ± .4 °C	12.8 ± .7 °C
Extremes (°C)	Cold (min)	-34.0 °C	-32.2 °C	-29.7 °C
	Heat (max)	35.0 °C	36.4 °C	38.5 °C
	Days/Yr >30 ˚C	4 days/yr	12 days/yr	30 days/yr
Indices	Cooling Degree Days (CDD)	280	404	611
	Heating Degree Days (HDD)	3984	3597	3096
	Growing Season Days	203 days	219 days	233 days
	Freeze-Free Days (>0˚C)	172 days	190 days	206 days
Precipitation (mm)	Total Annual	951 mm	980+/-28 mm	1024+/-39 mm
	Average Winter	232 mm	247 +/- 12 mm	266 +/-18 mm
	Average Spring	219 mm	228 +/-11 mm	347+/-14 mm
	Average Summer	218 mm	218 +/- 11 mm	217+/-14 mm
	Average Autumn	283 mm	289+/-15 mm	299 +/-11 mm
Extreme Precipitation (mm)	Average Annual # Days with >25mm	4.6 days/yr	5.9 days/yr	8.1 days/yr
	Max. Daily	72 mm	76 mm	83 mm
	50 day max	91.2 mm	95.5 mm	101.9 mm
Ice Storms	# Freezing Rain events lasting 6 hrs or more during Dec. – Feb.	1.5 events/last 40 yrs	N/A	50% increase (3.2 events/40yrs)
Wind	# days with wind gusts > 90 kph	0.7 days/year	N/A	15-20% increase

1.4 Infrastructure Risk Management

This increase in frequency and severity of extreme weather events including heat waves, intense rain, strong winds, ice storms and periods of drought translates into increased infrastructure risks. By having a proactive approach to the changing climate, the Kingston community can adapt to this adversity and in doing so minimize health and cost impacts.

Increasing Disaster Frequency in Canada[15]



According to Dr. Gordon McBean, Institute for Catastrophic Loss, severe weather is jeopardizing lives, property and livelihoods. Losses from natural catastrophes in Canada are rising.[16]

Insurance claim payouts from severe weather have doubled every five to ten years since the 1980s.[17]

In both 2009 and 2010, Canadian losses due to extreme weather was $1 billion.[18] In 2011, this loss increased to $1.6 billion.[19] The year 2013 was a year of unprecedented flooding in Canada and resulted in losses of approximately $6 billion.[20]

Bracebridge and Huntsville, Ontario

$18 million

Toronto, Ontario

$850 million

Calgary and Southern Alberta

$5 billion

Ontario Cottage Country Flood (April 2013)

Seven Ontario cottage country municipalities, including Huntsville and Bracebridge, declared states of emergency due to the April 2013 flood. The estimated value of loss is $18 million.[21]

Toronto Flood (July 2013)

On July 8th 2013, Toronto experienced the greatest amount of rainfall in a single day ever recorded. Roads, transit infrastructure and basements were flooded. [22] The estimate loss of the Toronto July 2013 flood is $850 million. [23]

Calgary and Southern Alberta Flood (June 21st 2013)

The June 2013 Calgary and Southern Alberta flood resulted in river levels rising 8 times their normal levels, 32 communities (including Calgary) declaring states of emergency, the evacuation of 120,000 people and 14,500 damaged homes.[24] The total damage estimates exceed $5 billion. In terms of insurable damages, this is the most expensive Canadian disaster.[25]

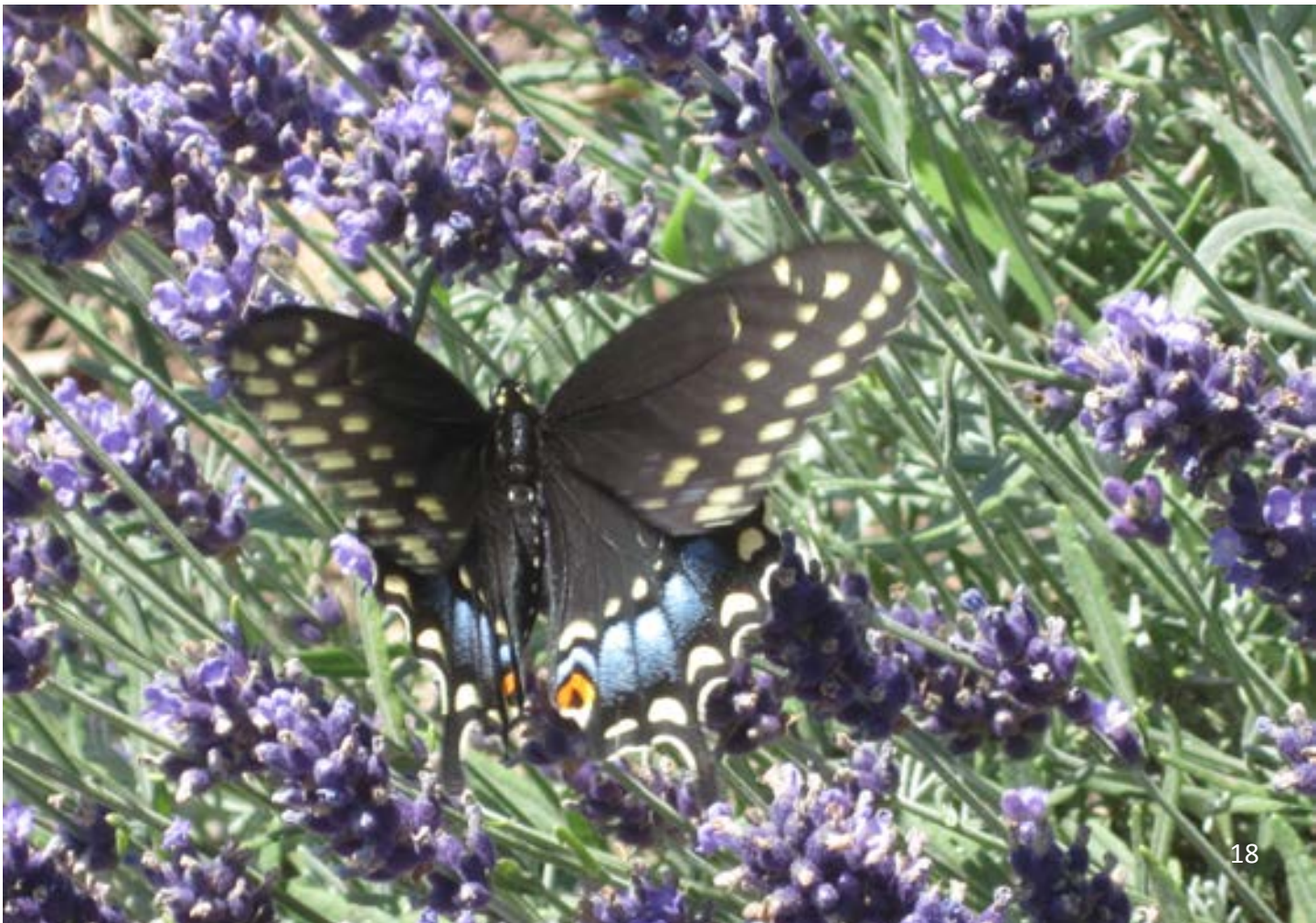
1.5 Health and Ecosystem Risk Management

Health Risk Management

The changing climate creates increased health risks including: heat stress; respiratory illness associated with poorer air quality in high temperatures; water borne, food borne and other vector borne disease outbreaks (i.e. Lyme disease) as well as health risks associated with cold weather. Infrastructure distress creates an increased risk of casualties from severe weather events. This is further discussed in the theme area, climate resilience (Section 3.7).

Ecosystem Risk Management

Increased frequency and duration of extreme winds, intense rain, ice storms and drought challenges our ecosystems. Increased winds and ice has victimized Kingston's older silver maples in the city core. The Kingston community will have to remain vigilant and proactive to respond to the multitude of challenges to our ecosystems.



1.6 Economic Opportunities

Managing our Energy Expenditures and Growing our Local Economy

In 2011, the Kingston community spent $599 million on the energy required to heat, cool and power our homes and workplaces as well as to transport ourselves and our goods and services. Money saved by Kingston residents and businesses through conservation and energy efficiency can be used for other purposes. These savings may be used for investment in local enterprise, paying down debt, retirement savings or investment in education. Energy expenditure savings will strengthen our economy and quality of life. Home and workplace audits and retrofit services can be carried out by Kingston area service providers, thereby simultaneously reducing our energy costs and improving our local economy. Through our purchasing decisions to buy Energuide rated homes, energy efficient appliances and right-size efficient vehicles we contribute to the local economy while managing our long-term energy costs. Through our decisions to carpool/car share, take transit, cycle and walk, we reduce our annual expenditures associated with transportation. By supporting local food, we encourage local entrepreneurship, increase our food security and community resilience.

Kingston Energy Generation: Renewables

Based on the recently published *Ontario Long Term Energy Plan* (Dec., 2013), the Ontario government projects that the renewable component of Ontario's generating capacity will grow from 31% in 2013 to 46% in 2025.[26] Kingston is well positioned to seize this economic opportunity. Kingston is home to SWITCH, renewable energy cluster, and has seasoned renewable energy service providers, entrepreneurs, researchers and post-secondary educators.

“ We must not, in trying to think about how we can make a big difference, ignore the small daily differences we can make which, over time, add up to big differences that we often cannot foresee.”

Marian Wright Edelman[27]

2.0 A Plan for Action

The foundation for Kingston community action on climate change has been built. The Kingston community has joined over 247 communities nationally and over 600 communities world-wide in a commitment to mitigate GHG emissions. The *Sustainable Kingston Plan* and the *Kingston Community Energy Consumption and GHG Emission Inventory Update (2011)* provide a basis for the Kingston Climate Action Plan. With a good understanding of our community GHG emissions, the Kingston community has the opportunity to take strategic actions to reduce its GHG emissions.

2.1 The Process

To address climate change at a local level, Kingston became a member of the Federation of Canadian Municipalities (FCM) Partners in Climate Protection (PCP) Program. Through this partnership and participation in a five milestone process, the Kingston community joins 247 Canadian communities nationally and 600 communities globally committed to the reduction of their GHG emissions.[28] Nationally, the FCM has facilitated the investment of $2.3 billion in over 800 GHG emission reduction initiatives realizing an annual GHG emission reduction of 1.8 million tonnes.[29] In Kingston, Milestone 1 has been completed and the Kingston Climate Action Plan will revisit Milestone 2 and complete Milestone 3.

Partners in Climate Protection Program

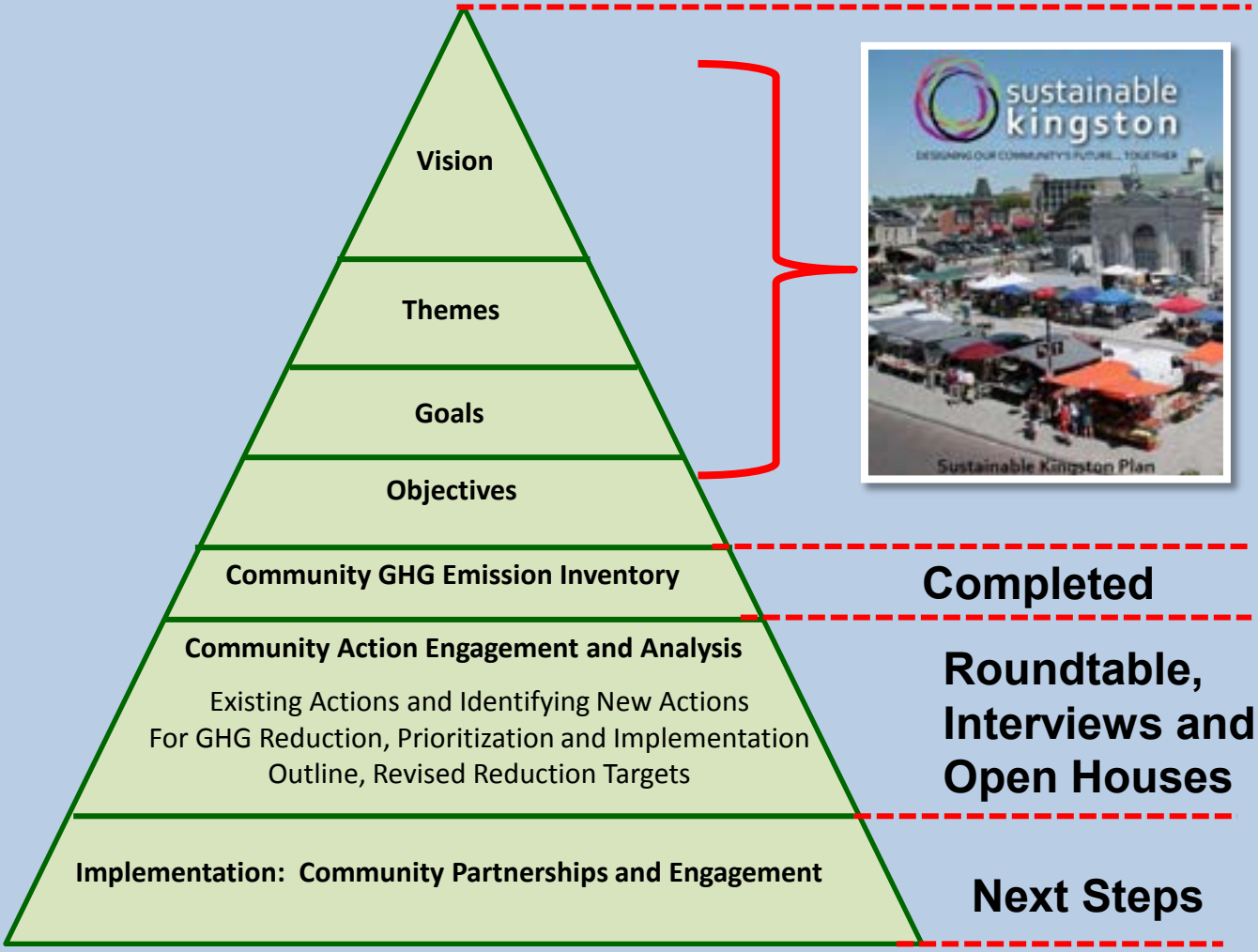
- **Milestone 1: Community GHG Inventory**
- **Milestone 2: Emission Reduction Target**
- **Milestone 3: Develop a Local Action Plan**
- **Milestone 4: Implement the Local Action Plan**
- **Milestone 5: Monitoring Progress and Reporting**

TIME

2002	2003	2004	2007	2010
Council passes a resolution to sign on to the FCM PCP program.	Community GHG emission inventory completed for baseline (2000).	Council endorses a 10% community GHG reduction target by 2014 compared to a 2000 baseline.	Trends in Kingston's community GHG emissions (2000 to 2006).	 *Sustainable Kingston Plan* launched.

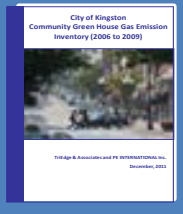
2.2 The Framework

The vision, themes, goals and objectives of the Kingston Climate Action Plan are derived from the extensive public consultation of the *Sustainable Kingston Plan*.



LINE

2011



GHG Inventory Update (2000 and 2006 to 2009).

2012

GHG Inventory Update (2000 and 2006 to 2011).

2014

Kingston Climate Action Plan, Community Action Toolbox, Corporate Climate Action Plan.

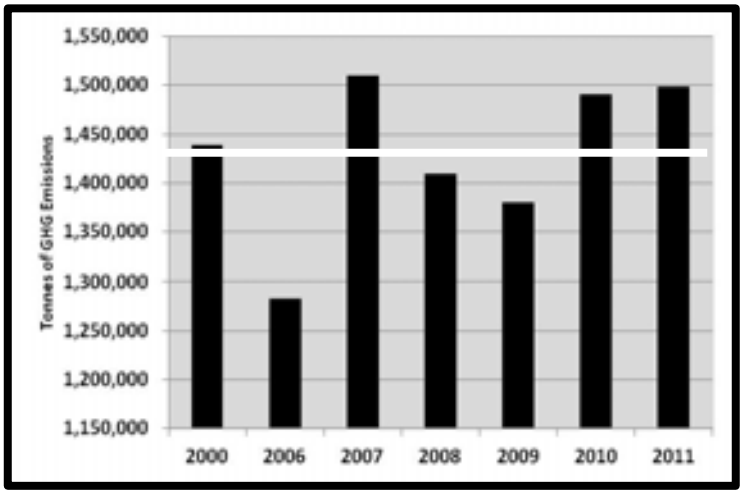
2015

Community Implementation (Sustainability CoLab), Municipal Energy Plan.

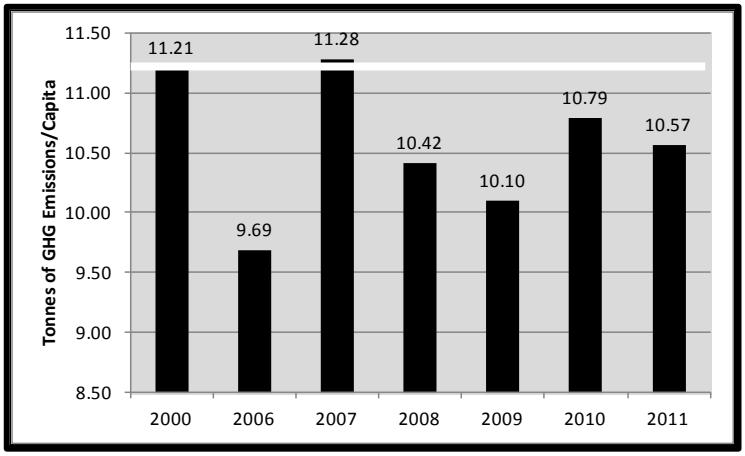
2.3 Community GHG Emission Inventory

A community energy consumption and GHG emission inventory has been completed for the years 2000 and 2006 to 2011. In addition, energy expenditures have been compiled for the years 2006 to 2011. Inventory details are available from the *Kingston Community Energy Consumption and GHG Emission Inventory Update (2011).* [30]

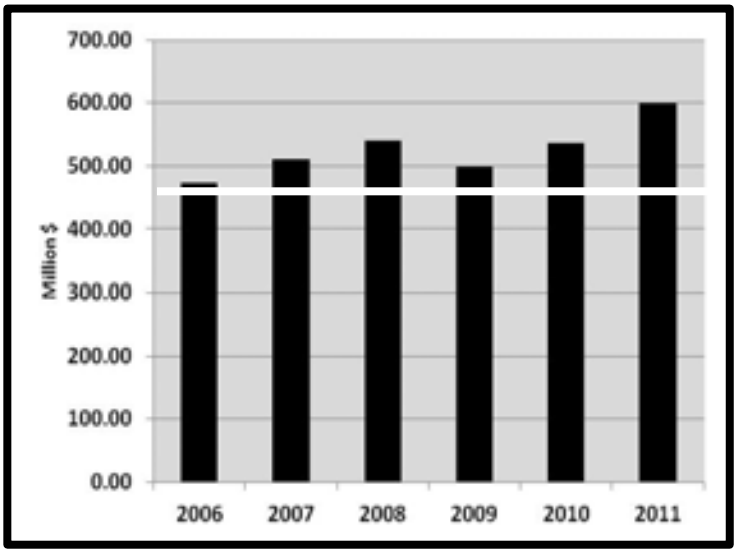
From 2000 to 2011 Total Community GHG Emissions increased by 4%



From 2000 to 2011 GHG Emissions per resident decreased by 5.7%



From 2006 to 2011 the total energy expenditure increased by 27%



2011

The Kingston community released:
1.5 Million tonnes CO_2e
10.6 tonnes CO_2e/person

Where our Emissions Come From

Residential
18%
270,890 tonnes CO_2e

Transportation
30%
451,082 tonnes CO_2e

Our Waste
1%
15,732 tonnes CO_2e

Workplaces
Industry/Commercial/Institution (ICI)
51%
761,064 tonnes CO_2e

What is 1 tonne of CO_2e?

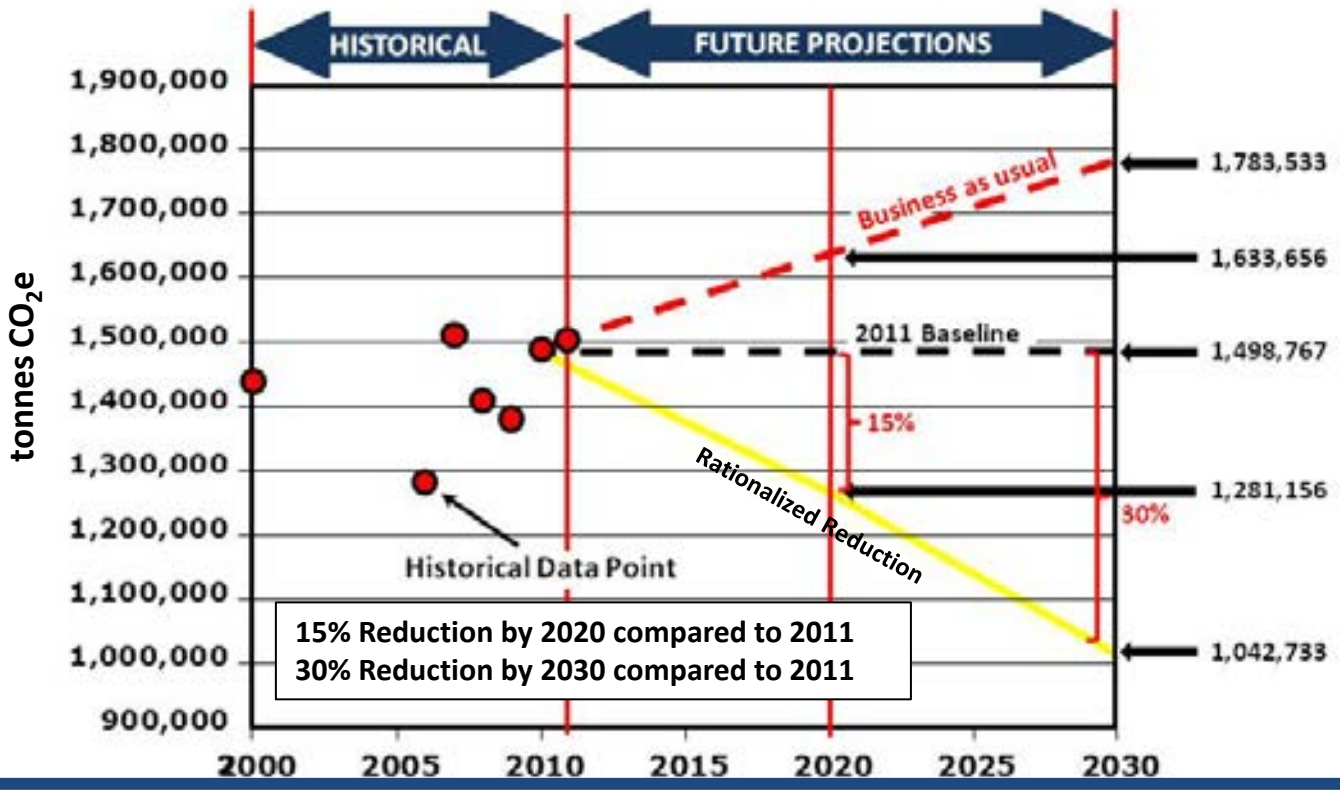
1 Tonne CO_2e =

10 **Round-trips from Kingston to Toronto in an average mid-sized car.**[31]

20% **of the annual energy used to heat, cool and power an average Kingston household.**[32]

2.4 Future GHG Emission Projections and Reduction Targets

Kingston Community Historical and Forecasted GHG Emissions



Baseline:

A baseline year of 2011 has been selected as the starting point for the business as usual (BAU) projections as well as reduction targets. 2011 is the most recent year in which a community GHG emission inventory has been completed.

Business As Usual (BAU) Projections:

The BAU projections assume an increase in GHG emissions based on simple population growth. It is assumed that population growth will continue as it has in the past at approximately 1% each year. This assumes that GHG emissions will increase with population and corresponding job growth going forward. This simple BAU scenario attempts to estimate what the GHG emissions would be if there were no interventions to mitigate GHG emissions. This BAU assumes that the 2011 per capita GHG emissions remain constant going forward. Based on this scenario it is anticipated that the GHG emissions will increase from 1,498,767 tonnes CO_2e in 2011 to 1,633,656 tonnes CO_2e in 2020 and to 1,783,522 tonnes CO_2e in 2030.

Rationalized Reduction Targets:

Rationalized reduction targets have been developed with the intention of assigning targets that are both aggressive and achievable. Two targets are proposed. A mid-term GHG emission reduction target of 15% below the 2011 baseline by 2020 and a longer-term GHG emission reduction target of 30% below the 2011 baseline by 2030. In order to achieve these reduction targets it is important to consider the impact of the BAU. In order to achieve a 15% GHG emission reduction below the baseline by 2020, a 22% GHG emission reduction compared to the BAU must be obtained. Similarly, to achieve a 30% GHG emission reduction below the baseline by 2030, a 42% GHG emission reduction compared to the BAU must be obtained.

For context, the Province of Ontario has targeted a reduction of GHG emissions of 15% by 2020 and 80% by 2050 compared to a 1990 baseline and the Federal Government has targeted a 17% reduction of GHG emissions by 2020 compared to a 2005 baseline.

How Will We Reach These Targets?

Section 2.5 discusses the community engagement process. Through this collaboration, individuals and organizations within the community identified actions already underway and potential new actions to reduce community GHG emissions. Section 3 provides details on these GHG emission reduction actions.

2.5 A Community Ready to Respond

Roundtable

- Sept. 6th, 2013
- Memorial Hall
- 87 participants

On-Line Survey

- Jan. 21st to Feb. 21st, 2014
- 65 participants

Open Houses

- Feb. 6th, 2014
- Central Library and INVISTA
- 65 participants

Kingston Climate Action Roundtable: (September 26th, 2013)

On September 26th, 2013, 87 key stakeholders (individuals and organizations) and local subject matter experts from the community participated in a full-day roundtable. The roundtable was advertised on the City of Kingston website and within local newspapers. To maximize the efficiency of the day, a background primer was provided to participants in advance.

The day was kicked-off by a keynote presentation from internationally recognized climatologist, Heather Auld, and Nobel Peace Prize winner Don MacIver. An overview of climate change from a global, national and local perspective was presented and Kingston-specific climate modeling data for 2020 and 2050 was revealed.

Through an interactive process, participants identified community GHG emission reduction actions already underway and proposed new potential GHG emission reduction actions. In addition, participants discussed existing actions underway and potential new actions to promote climate resilience. Participants provided feedback on the implementation framework of potential new actions (i.e. timeline, lead and supporting organizations, level of effort and level of impact).

The enthusiasm and energy that participants brought to the Roundtable was contagious! The feedback and input from the day framed the development of the Kingston Climate Action Plan.

On-Line Survey:
(Jan. 21st,2014 to Feb. 21st, 2014)

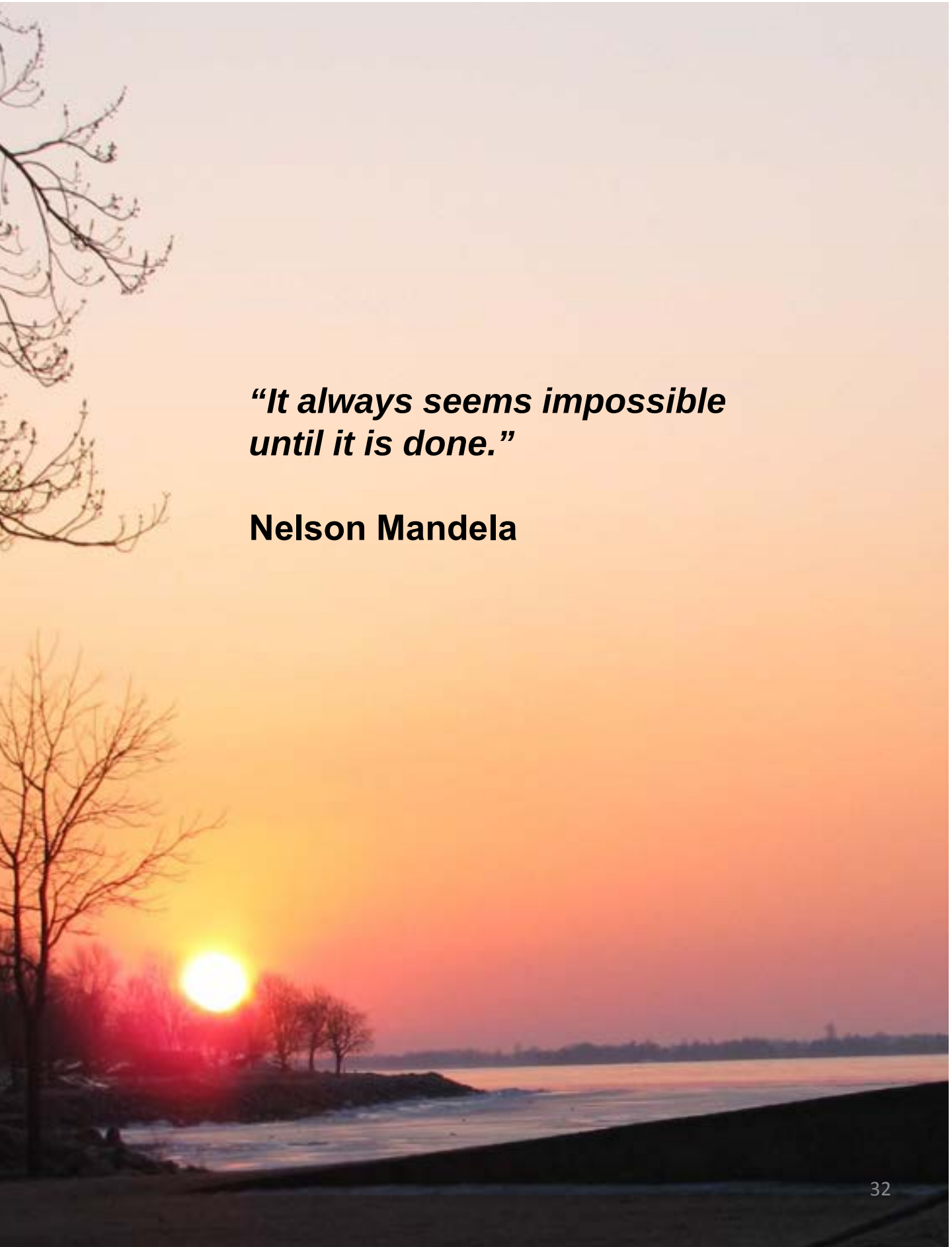
The Kingston Climate Action Plan survey was posted on the City of Kingston website from Jan.21st to Feb. 21st, 2014. The uptake of the survey by residents was impressive. Responses and input was received from 65 respondents. The survey provided posters for each of the five (5) theme areas describing actions that are currently underway within the community to reduce GHG emissions and respond to the changing climate. As well, potential new actions were listed. Respondents were asked to add any existing actions or new proposed actions that they felt were missing. Respondents were also asked how they would like to be involved in the implementation process going forward.

Kingston Climate Action Plan Open Houses: (Feb. 6th, 2014)

On Feb. 6th, 2014, two Kingston Climate Action Plan open houses were held and approximately 65 residents took part. An afternoon session was held at the Central Library and an evening session was held at the INVISTA Centre. This was an opportunity to share the current status of the Kingston community GHG emissions and projections for future GHG emissions.

Local organizations shared initiatives and programs that they currently have underway to reduce GHG emissions. It is impressive how Kingston residents and organizations are already engaged and committed to realizing GHG emission reductions and energy savings!

Participants were asked to review the existing GHG emission reduction actions as well as existing actions supporting climate resilience. In addition, participants were asked to review potential new GHG emission reduction actions and to identify any gaps. Open House participants also indicated how they would like to be involved in the implementation of the plan.


“It always seems impossible until it is done.”
Nelson Mandela

3.0 Taking Action

The Kingston community has been busy!

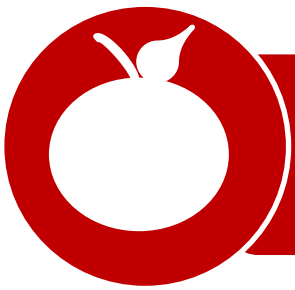
A current status review was done to capture actions that the community is already doing to reduce GHG emissions and address the goals and objectives of the five theme areas. There is tremendous involvement by organizations and individuals across the municipality. Community identified potential actions are detailed within this section and, where possible, GHG reductions have been quantified.

3.1 Theme Areas

TRANSPORTATION

ENERGY

RESOURCES and NATURAL SYSTEMS



AGRICULTURE and FOOD SECURITY

CLIMATE RESILIENCE

Overview of Theme Areas

The Kingston Climate Action Plan has been categorized into five (5) key theme areas. There is cross-integration between all of the theme areas.

- Transportation
- Energy (including homes, workplaces and renewables)
- Resources and Natural Systems (including waste)
- Agriculture and Food Security
- Climate Resilience

For each theme area, a summary of the GHG emissions (where applicable), a compilation of existing and potential new actions as well as proposed indicators (where applicable) is provided.

Existing Actions Description

A compilation of existing actions already underway by the community to reduce GHG emissions and meet the goals and objectives of the theme area is provided. The lead organization of each of the initiatives is identified.

Potential Action Description

There are two types of potential actions: qualitative and quantitative. Quantitative actions are those for which it is possible to estimate GHG emission reductions. Qualitative actions are those actions for which it is not possible to estimate the associated impact on GHG emission reductions (i.e. education initiatives, plans, lobby activities, studies). Quantitative actions have been developed for the Transportation, Energy and Resources and Natural Systems (waste only) theme areas. Potential actions have been further described by their status.

Concept: This is a new action and although a possible lead organization has been identified there is no commitment to deliver this action. The uptake of this action will be dependent on availability of resources.

Proposed: This action is part of the mandate of the lead organization but implementation has not started.

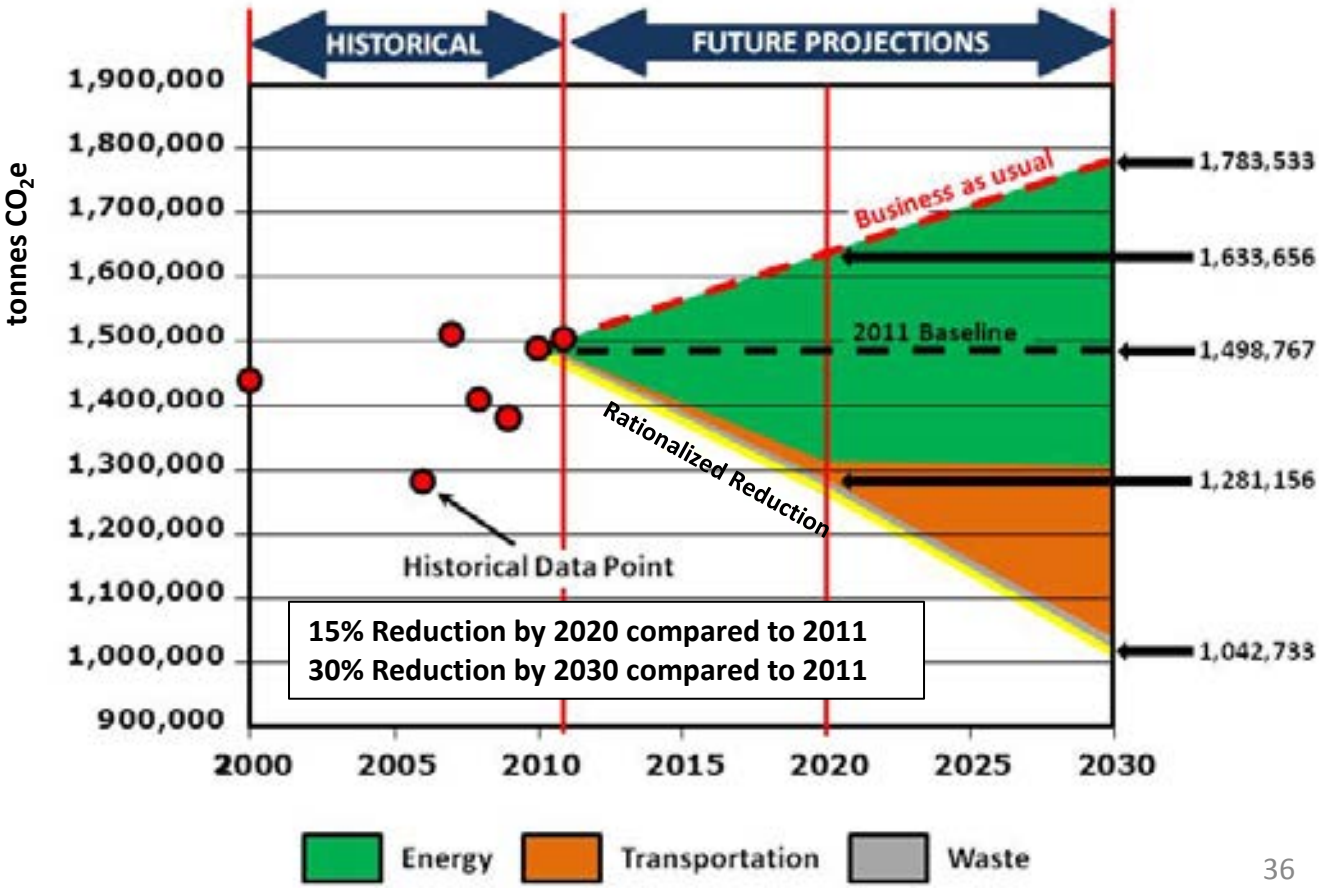
In-Progress: This action is part of the mandate of the lead organization and implementation is in progress.

3.2 Potential GHG Emission Reduction Summary

Sections 3.3 to 3.7 provide details of existing and proposed actions to realize the goals and objectives of each of the theme areas.

In Section 2.4, the Kingston community historical and projected business as usual GHG emissions were discussed. The rationalized GHG emission reduction targets of 15% by 2020 and 30% by 2030 compared to a baseline year of 2011 were presented. The graph below illustrates where the proposed GHG emissions will come from. The green wedge represents the estimated GHG emission reductions from the energy sector (homes and workplaces) if proposed actions are implemented. Similarly, the orange (transportation) and grey (waste) represents the estimated GHG emission reductions if proposed transportation and waste actions are implemented. The summary of potential GHG emission reductions table further details estimated GHG emissions reductions anticipated from each of the actions within the transportation, energy and waste sectors.

Estimated GHG Emission Reduction Wedges



Summary of Potential GHG Emission Reductions from 2011

Transportation Potential Action	2020 (tCO_2e)	2030 (tCO_2e)
Increased Transit Ridership	1,600	10,200
Increased Carpooling	3,400	11,400
Active Transportation	600	4,700
Federal Fuel Standards	6,800	145,600
Vehicle Efficiency: Anti-Idling	3,500	5,800
Vehicle Efficiency: Proper Maintenance	3,800	9,600
Vehicle Efficiency: Non-Aggressive Driving	7,700	15,400
Transition from Old Cars	300	48,400
Total Potential Transportation GHG Emission Reductions	27,700	251,100

Energy Potential Actions (Homes and Workplaces)	2020 ($t\ CO_2e$)	2030 ($t\ CO_2e$)
Incentives for Energy Retrofits: Local Improvement Charges (LIC), On-Bill Financing; Community Improvement Plan (CIP) Program for Energy Retrofits	6,000	18,000
SaveOnEnergy Incentive Program	21,100	32,600
Natural Gas Local Distributing Company Incentives	72,300	155,400
Energy Audits at Time of Sale	7,000	12,200
Incentive for Energy Audits through Permit Process	1,300	5,300
Ontario Electricity Mix: Retiring of Coal-Fired Plants	157,000	173,000
Reg.397/11: GHG Inventories and Energy Plans	40,800	45,100
Ontario Building Code Update	3,800	8,500
Queen's Climate Action Plan	11,500	31,700
Total Potential Energy GHG Emission Reductions:	320,800	481,800

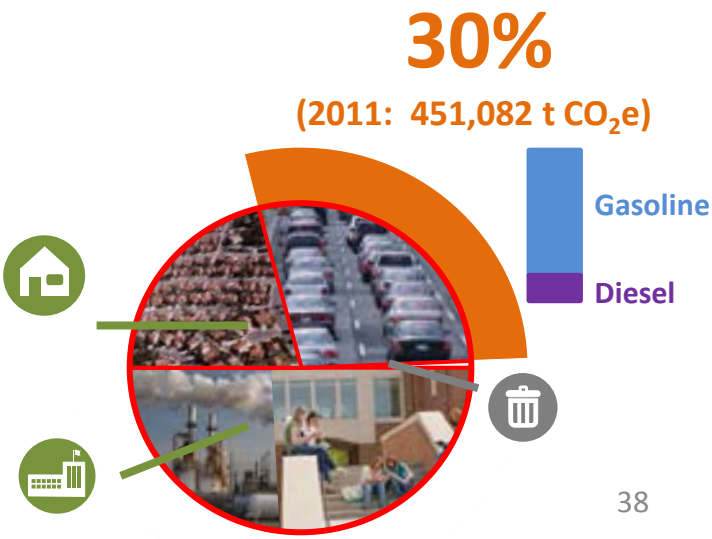
Waste Potential Actions	2020 (tCO_2e)	2030 (tCO_2e)
Increased Diversion of Organics from Landfill	4,000	7,900
Total Potential Reductions ($t\ CO_2e$)	**352,500**	**740,800**

3.3 Transportation

While transportation is vital to our lives enabling people, goods and services to move from place to place, our transportation practices have an adverse impact on the environment and our health. Internal combustion engines that burn fossil fuels (gasoline, diesel and natural gas) release contaminants that contribute to smog and air pollution as well as GHG emissions. The Kingston community expenditure on transportation fuel is significant and is on the rise. In 2011, Kingston residents spent $225 million on transportation fuel and generated 451,082 tonnes of CO_2e.

The transportation theme area provides:

- historical emissions and modal choices;
- goal and objectives;
- existing actions underway;
- potential actions;
- GHG emission reduction estimates, and
- proposed indicators to measure progress.

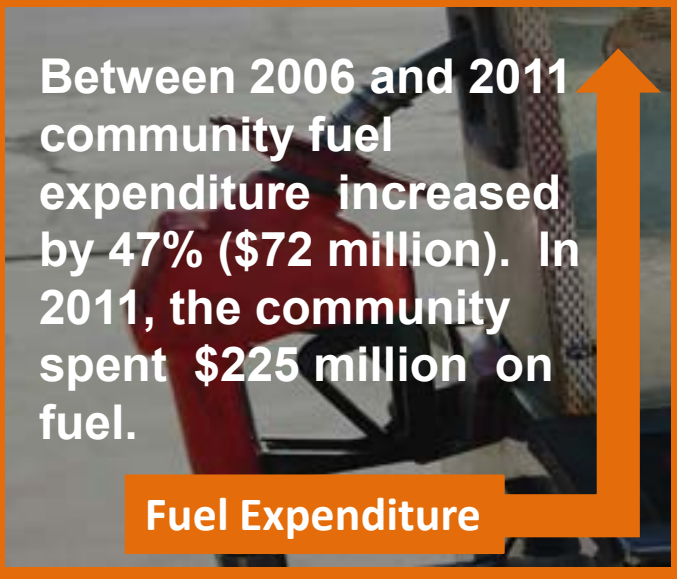


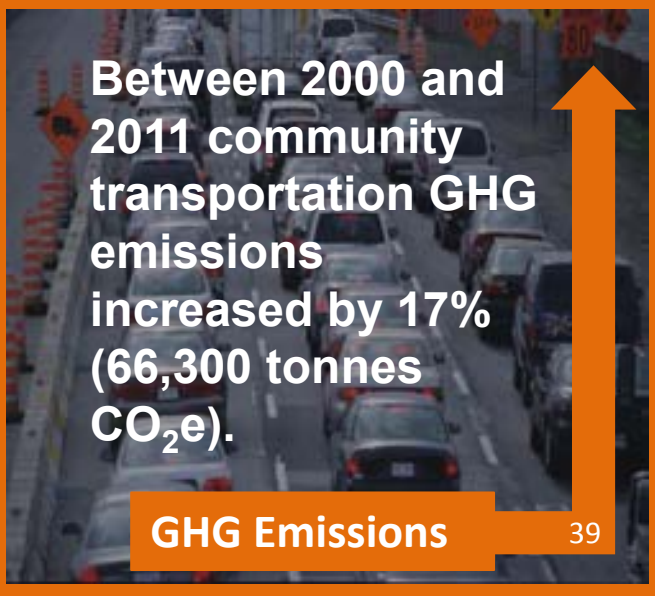
Historical Transportation GHG Emissions and Expenditures

Between 2000 and 2011, total annual transportation GHG emissions increased by 17% (66,300 tonnes CO_2e) and the GHG emissions per capita increased by 7% (0.2 tonnes CO_2e/capita). Between 2006 and 2011, annual transportation fuel expenditures increased by 47% ($72 million) and the annual expenditure per capita increased by 38% ($433/capita).

Transportation: Historical GHG Emissions and Fuel Expenditures

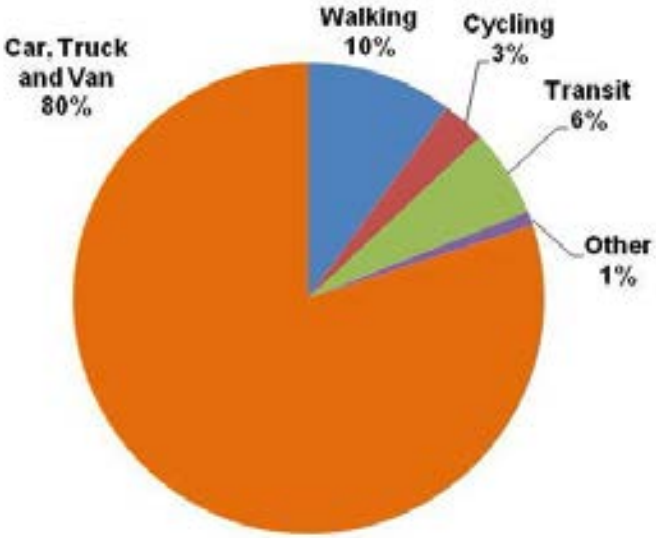
Year	GHG Emissions (kilo tonnes)	GHG Emissions per Capita (tonnes/capita)	Million $	$/Capita
2000	385	3.0	n/a	n/a
2006	400	3.0	$152	$1,150
2007	431	3.2	$179	$1,336
2008	449	3.3	$191	$1,414
2009	442	3.2	$164	$1,203
2010	466	3.4	$196	$1,418
2011	451	3.2	$225	$1,583





2011 Kingston Commuting Modal Share

Based on 2011 Statistics Canada data, 80% of the Kingston workforce travels to work by either car, truck or van and 71% of Kingston commuters drive to work alone.[33] The average Kingston vehicle commuting duration is 15.5 minutes.[34]

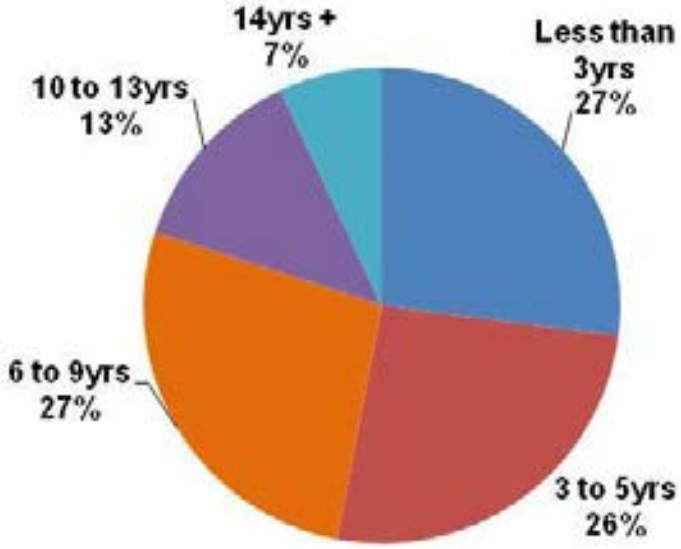


Kingston

71% of Kingston commuters drive to work alone

Light Vehicle Ownership in Kingston: 0.57 vehicles/captia.[35]

The Age of Canadian Cars Vans and Trucks [36]



Canada

20% of Canadian cars, trucks and vans are over 10 years old

Supporting Community Policies and Plans

Federal Government:

Passenger Automobile and Light Truck GHG Emission Regulation[37]: Existing regulations cover model years 2011 to 2016 and require vehicles to be 25% more efficient than 2008 models. It is expected that model years 2017 to 2025, will be required to achieve an annual 5% reduction in GHG emissions. It is projected that 2025 vehicles will be up to 50% more efficient than 2008 vehicles.

Supporting Community Policies and Plans

Municipal Government:

Official Plan (June 2013): The Official Plan strongly supports a transportation system that is focused on reducing dependence on the single occupancy vehicle (SOV), encourages active transportation, as well as a land use distribution that supports density, infill and mixed-use.

Municipal Transportation Master Plan (Update)

Kingston Transit Redevelopment Plan

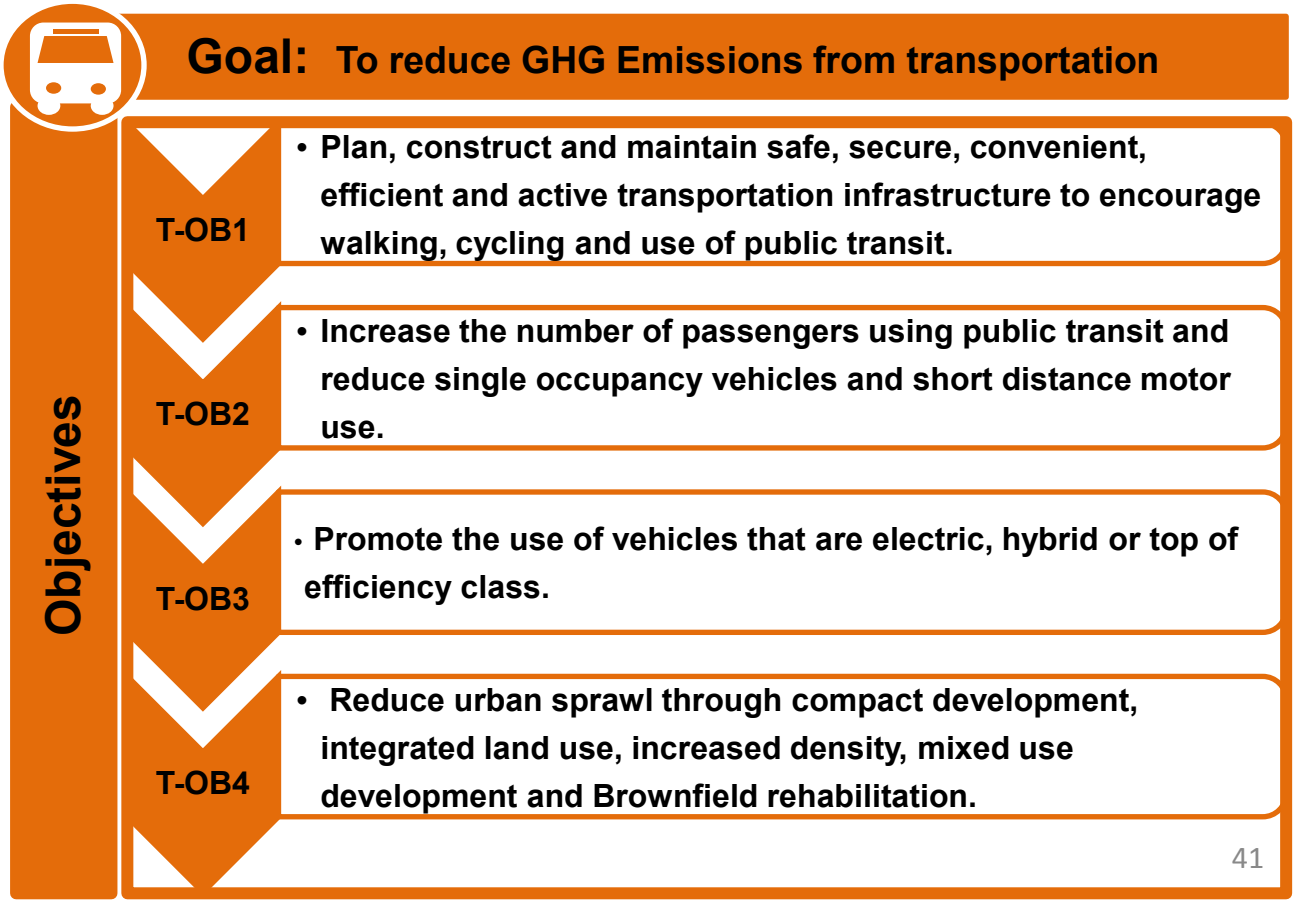
Kingston Transportation Demand Management (TDM) Strategy

Anti-Idling Bylaw

Community Improvement Plan (CIP): Kingston has a CIP within the downtown area. Through provincial authority, a CIP is a tool that allows municipalities to direct funds towards a specifically defined geographic area. The intent of a CIP is to encourage rehabilitation initiatives and/or stimulate development. The CIP allows municipalities to provide tax assistance, grants or loans.

Goal and Objectives

The transportation theme goals and objectives were derived from the *Sustainable Kingston Plan*.



Community Actions Already Underway

Kingston Transit

Transportation Master Plan: Increase total transit modal share from 3% in 2004 to 11% in 2026

- Sept. 2013: Increase transit service to the core to 15 min during peak and 30 min during off-peak
- Grade 9 & 10 free bus pass pilot
- Queen's and St. Lawrence College have cost of bus pass in student fees
- Rack and Roll available all year
- Employee Transit Program (Transpass)
- $8 million invested in new buses and shelters 2013 to 2015

Cycling, Walking and Wheeling

Local Public Health - Kingston Coalition for Active Transportation (KCAT):

- Website for walkability: proximity to amenities
- Kingston cycling path routes (online)
- Lead the commuter challenge
- Developed the Kingston Active Living Charter
- Honourable mention from WALK-Friendly Ontario
- Support active transportation in schools: walking and cycling school buses, anti-idling, walk a block program

Cycle Kingston: Promotes and encourages cycling in Kingston through education and public outreach

Yellow Bike Action: Promotes cycling and teaches repair and maintenance

Kilometers of City Cycling Paths: 40 km

Share the Road Bike Friendly Communities: Bronze Rating

Kingston Parking

Parking Fees:

- Regulate parking prices to ensure that a monthly bus pass is more affordable than a monthly parking pass
- Price on-street parking at a higher rate than off-street

Bike Parking: By the end of 2013, 400 bike parking spaces in the downtown core

Car Sharing / Carpooling

VRTUCAR: Car sharing service available in Kingston and Ottawa

Carpooling: Provided by select employers

Electric Vehicle Charging

St. Lawrence College: Installed EV charging stations on each campus

City Planning

Kingston Brownfield Program:

This program promotes infill and provides greater resident access to active transportation. Provides financing incentives for the redevelopment of Brownfield Properties located within the CIP. There are three financing opportunities:

1. Grant (Municipal): Provides grant funding to support the development of an initial study;
2. Tax Assistance (Municipal and Province): Provides tax relief for 3 yrs based on pre-development; Brownfield Financial Tax Incentive Program (BFTIP);
3. Tax Incremental Based Rehabilitation Grant Program (TIRGP): Grant to cover eligible costs paid by 80% of tax increment over a 10 year period.

Development Charge Credit:

To promote more residential units within the core, a development charge credit is available for the conversion of non-residential floor area to residential floor area.

Opportunities to Reduce Transportation GHG Emissions

A summary of selected potential actions are provided in this section. The status of the action and the identified lead organization (where applicable) is presented.

Kingston Active Transportation Plan (Concept; City): Develop an Active Transportation Plan that integrates both walking and cycling to meet the objectives of the Kingston Official Plan, Transportation Master Plan and the Transportation Demand Management Strategy. Examine the potential for additional bike lanes and dedicated bike lanes to enhance safety.

Bike Lending Program (Concept; Volunteer cycling organization)

Traffic Circles (Concept; City): Consider the merits of traffic circles as an option to reduce idling.

Demonstration Examples

Guelph Cycling Master Plan (2013): To meet the policy objectives within their Official Plan, this Plan proposes improvements to Guelph's cycling infrastructure and culture. This program has the objective of tripling the city-wide cycling modal share of daily travel by improving the cycling network, enhancing road and fostering a better understanding between cyclists and motorists about sharing the road.

Region of York Pedestrian and Cycling Master Plan (2008): The Regional Municipality of York Pedestrian and Cycling Master Plan (PCMP), is a blueprint to develop walking and cycling infrastructure. It also promotes alternate forms of travel, such as combining walking and cycling with public transit, to help reach the Region's sustainable transportation objectives.

The City of Victoria Pedestrian Master Plan is designed to make sidewalks, pathways, and crosswalks safer and more accessible as well as improve lighting. It will also prioritize construction of new sidewalks and make policy recommendations to ensure that pedestrians are given higher consideration in all new road construction and developments.

Opportunities to Reduce Transportation GHG Emissions

Consider the GHG emission impact of transportation-related infrastructure plans and investments (Concept; City): Determine if smaller investments can be made to have greater impact through active transportation, transit and carpooling (i.e. reduction of single vehicle occupancy). Determine the GHG impacts of the road plan (i.e. integrate GHG modeling scenarios into Transportation Master Plan decision making).

Transportation Portal (Concept; City): Improve communications of all transportation initiatives by making information related to transportation available in one place (transit, active transportation, bike and car parking, modal node locations, carpool and vehicle details (purchasing, driving and maintenance).

Continue to Encourage Infill, Densification and Mix-Use Through Land-use Planning (In-Progress; City and developers): Continue to develop and promote incentives to encourage business and homeowners to benefit from existing infrastructure and a reduced dependence on vehicles.

Alternate Transportation Fuel Availability (Concept; City and retail fuel stations): Consider how to incent the retail availability of alternate transportation fuels such as bio-diesel and compressed natural gas.

Improve Kingston Transit (In-Progress; City): The City has developed the Kingston Transit Redevelopment Plan to increase transit ridership. Continue to keep the cost of transit below the cost of parking and provide more direct routes.

Improve Kingston Transit (Concept; City): Consider extending the free bus pass to grades 11 and 12 as well as providing bus service east of Hwy 15 and make transit a better option for the suburbs.

Incent Densification (Concept; City): Incent densification through financial planning tools such as development charges and impost fees.

Walkable Community Schools (In-Progress; school boards): Maintain walkable community schools and promote the walking school bus.

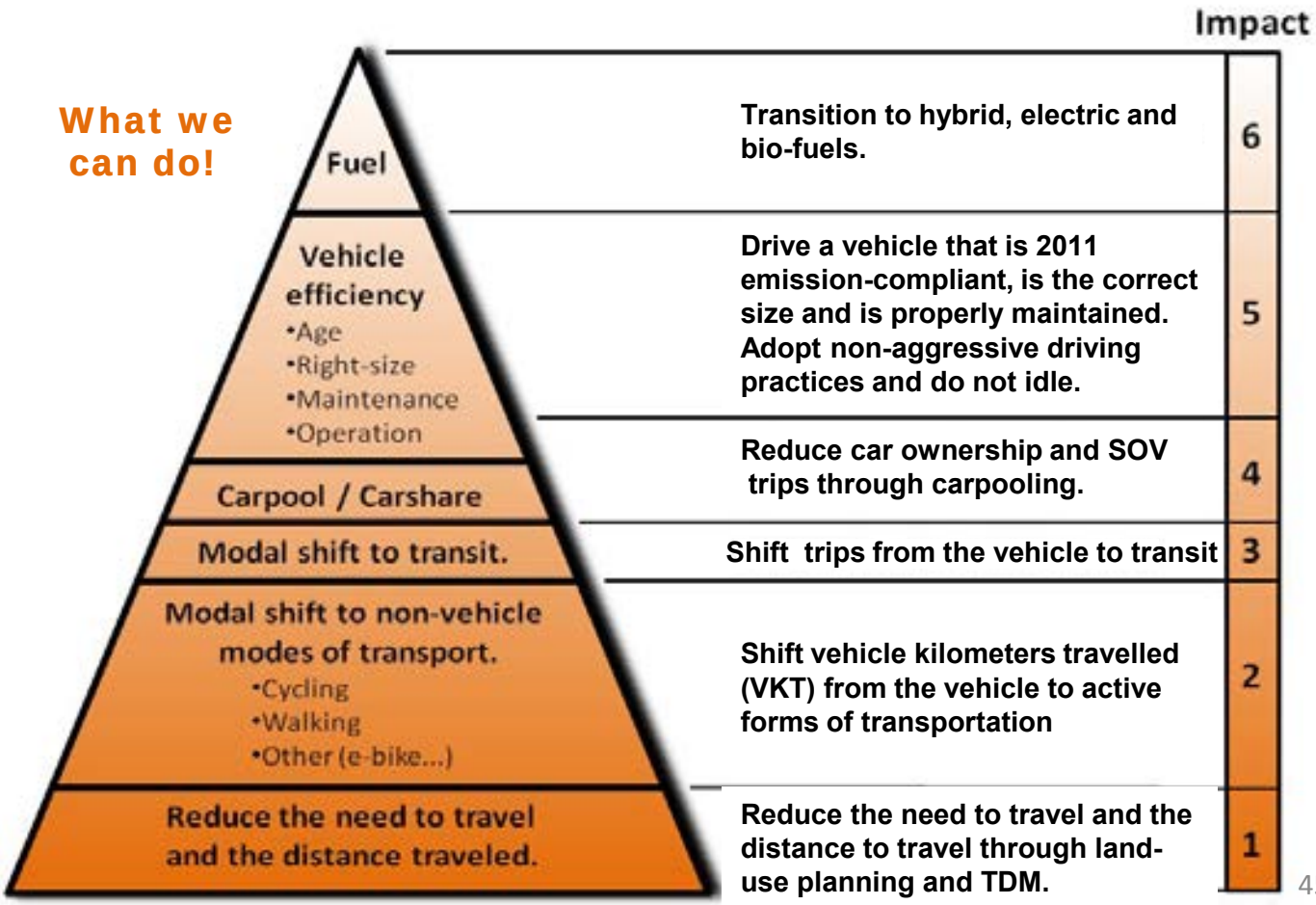
Increase Carpool Opportunities (Concept; City, employers and public): Given that 71% of Kingston commuters drive alone, enhance, develop and participate in carpool opportunities.

Participate in Car Share Programs (Concept; public): Every car share vehicle takes 9 to 13 cars off the road.[38] The approximate cost of owning a mid-sized car that travels 18,000 km/yr is $10,975/yr. This annual cost increases with larger and more fuel intensive vehicles.

Vehicle Efficiency - Age: (Concept; public): The Federal Passenger Automobile and Light Truck GHG Emission Regulation will ensure that vehicles, 2011 and newer, will have significantly better fuel efficiency than older vehicles (25% better than 2008). Based on the Canadian average, approximately 20% of our vehicles are over 10 years old. By accelerating the turn-over of older cars, annual fuel expenditures and GHG emissions can be reduced.

Vehicle Efficiency - Maintenance (Concept; public): By adopting proper vehicle maintenance (i.e. tire pressure), fuel efficiency can be improved significantly.

Transportation Action Impact Pyramid



Opportunities to Reduce Transportation GHG Emissions

Vehicle Efficiency - Anti-Idling

(In Progress; City, public): The City has an anti-idling bylaw in place. The key purpose of this bylaw is to educate the public about the impacts of idling. For an average vehicle, reducing idling by 10 minutes per day results in an annual savings of approximately $100 and a GHG emission reduction of 0.2 tonnes.[39]

Vehicle Efficiency - Operating Habits[40]

(Concept; public): Up to a 25% increase in fuel efficiency can be gained by:

1. Accelerating gently;
2. Maintaining a steady speed;
3. Anticipating traffic;
4. Coasting to decelerate, and
5. Avoiding high speeds.

Right Size Vehicle

(Concept; public): Our choice of vehicle has a significant impact on our transportation fuel expenditure and the GHG emissions that we emit. By selecting a vehicle that is the right size for our personal needs and the needs of our businesses we can save money and reduce our GHG impact. This table illustrates the average annual fuel consumption cost and GHG emissions released for a variety of vehicle sizes and types. By driving a mid-sized car rather than an SUV we could save $530 a year in fuel and decrease our annual GHG emissions by 1.1 tonnes CO_2e.[43]

Impact of Vehicle Size on Cost and GHG Emissions
(Based on 2013 vehicles and 18,000km/yr)[41]

Vehicle Type	Average Fuel Consumption (liters/km)	Annual Fuel Cost ($)	Annual GHG Emissions (tonnes CO_2e)
Mini - Car	5.89	$1,471	2.7
Crossover	7.32	$1,831	3.4
Compact	7.82	$1,906	3.5
Sub-Compact	7.93	$1,983	3.7
Mid-Size Car	8.34	$2,086	3.7
Full-Size Car	9.76	$2,441	4.3
Mini-Van	10.17	$2,544	4.4
SUV	10.46	$2,616	4.6
Executive	10.71	$2,677	5.1
Pick-Up Truck	12.66	$3,165	5.4

2013 Average Cost of Car Ownership (Mid-Size Car; 18,000 km/yr)[42]

Description of Car Expense	Annual Cost ($)
Fuel	$2,086
Insurance	$2,075
Licence & Registration	$89
Depreciation and Maintenance	$6,725
Total Annual Cost:	$10,975

Proposed Indicators and Impact of Potential Opportunities

Proposed Transportation Indicators			
Measure	**Indicator**	**Frequency**	**Source**
Transportation GHG Emissions	Tonnes CO_2e	2yrs	Update from Community GHG Inventory
Transportation GHG Emissions/Capita	Tonnes CO_2e	2yrs	Update from Community GHG Inventory
Transition from SOV to transit and active transportation	Modal Share	5yrs	Statistics Canada National Household Survey
Kingston Vehicle Travel Habits	Vehicle kilometers traveled	2 to 5 yrs	Consultant Commissioned
Cycling Infrastructure	Kilometers of bike lanes	annual	City - Engineering
Cycling Infrastructure Satisfaction	Bike Friendly Designation	As Requested	Share the Road Organization
Walking Infrastructure Satisfaction	Walk Friendly Designation	As Requested	Walk Friendly Ontario Organization

Transportation: Potential GHG Emission Reduction Actions	Estimated GHG Emission Reductions (t CO_2e) from 2011	
	2020	2030
Increased Transit Ridership	1,600	10,200
Increased Carpooling	3,400	11,400
Active Transportation	600	4,700
Federal Fuel Standards	6,800	145,600
Vehicle Efficiency: Anti-Idling	3,500	5,800
Vehicle Efficiency: Proper Maintenance	3,800	9,600
Vehicle Efficiency: Non-Aggressive Driving	7,700	15,400
Transition from Old Cars	300	48,400
Total Potential Transportation GHG Emission Reductions from 2011	**27,700**	**251,100**

3.4 Energy

The energy theme captures renewables and the energy used in homes and workplaces. GHG emissions,energy expenditures, existing and potential GHG emission reduction actions and proposed indicators to measure progress are presented. The conservation of water and wastewater is also included in the energy theme area.

Energy sources include: propane, natural gas, electricity, and heating oil. Workplaces include the following sectors: industrial, commercial and institutional. Kingston is a recognized leader in renewable energy with expertise in renewable education, research and business development.

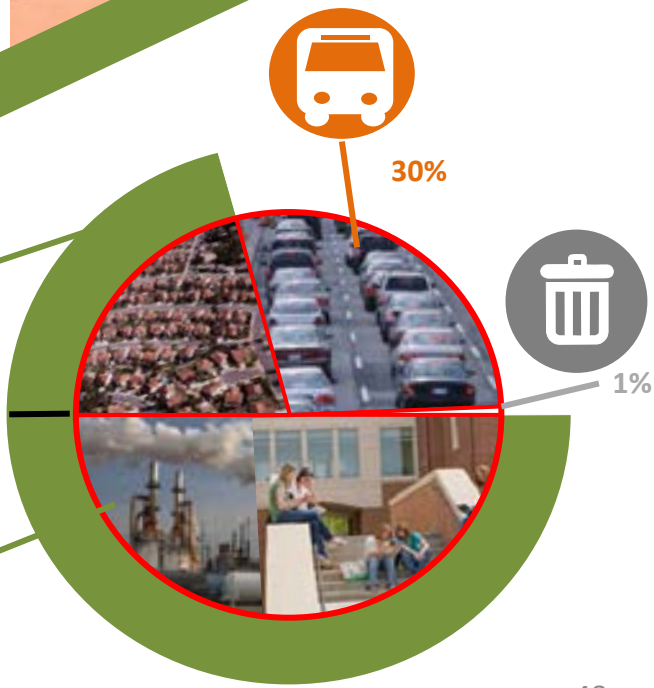
In 2011, to heat, cool and power homes and workplaces, Kingston residents spent $158 million and $216 million respectively.

Kingston homes generated 270,890 tonnes CO_2e and workplaces generated 761,064 tonnes CO_2e.

Homes

Workplaces

Renewables



Homes
18%
2011: 270,890 tonnes CO_2e

Workplaces
51%
2011: 761,064 tonnes CO_2e

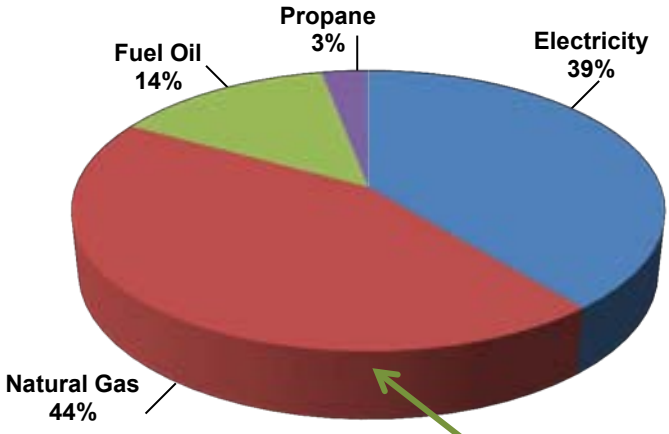
Homes and Workplaces: 2011 GHG Emission Overview

The energy sources to heat, cool and power homes and workplaces include: electricity, natural gas, fuel oil and propane. The charts below show the distribution of energy sources for both the home and workplace sectors for 2011. Natural gas is the dominant energy source representing 44% of the home GHG emissions and 82% of the workplace GHG emissions. Initiatives to address the consumption of natural gas, specifically within the ICI (industrial, commercial and institutional) sector is critical to Kingston's GHG emission reduction strategy.

Homes:

18% of total GHG Emissions

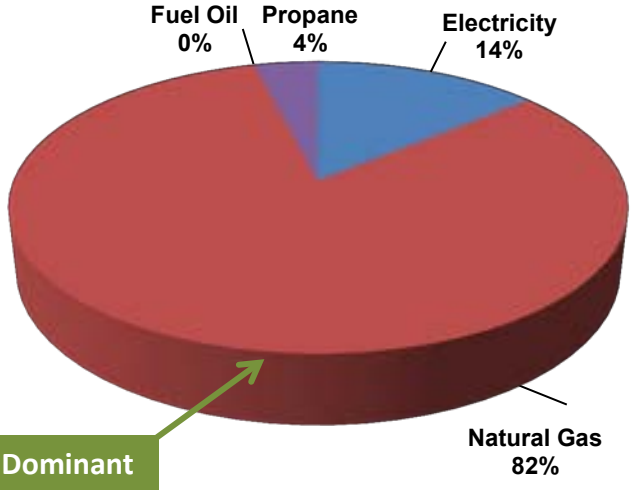
$158 Million



Workplaces:

51% of total GHG Emissions

$216 Million



Natural Gas is the Dominant Energy Source

GHG Emissions (2006 to 2011) decreased by 16,400 tonnes

6%

Energy Cost (2006 to 2011) Increased by $30 Million

23%

GHG Emissions (2006 to 2011) increased by 62,000 tonnes

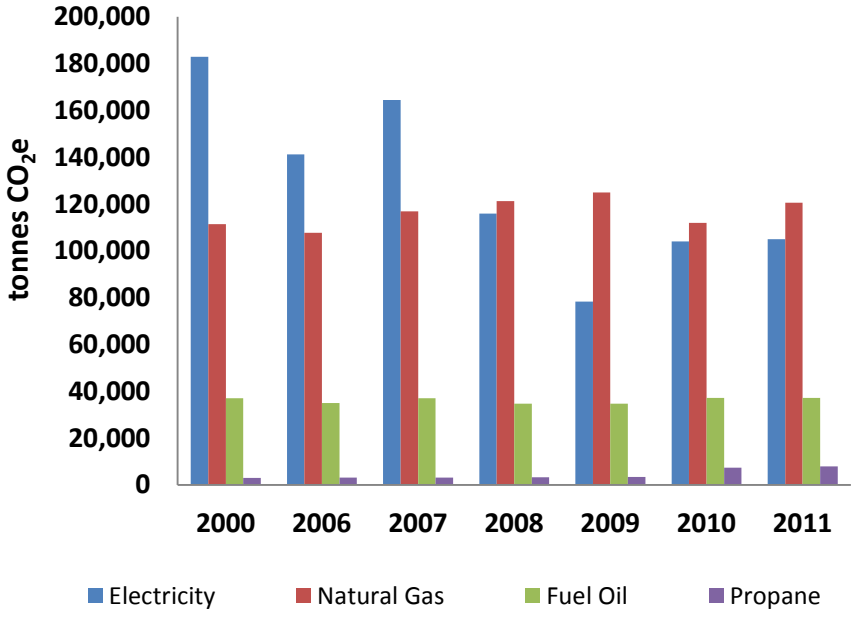
9%

Energy Cost (2006 to 2011) Increased by $24 Million

13%

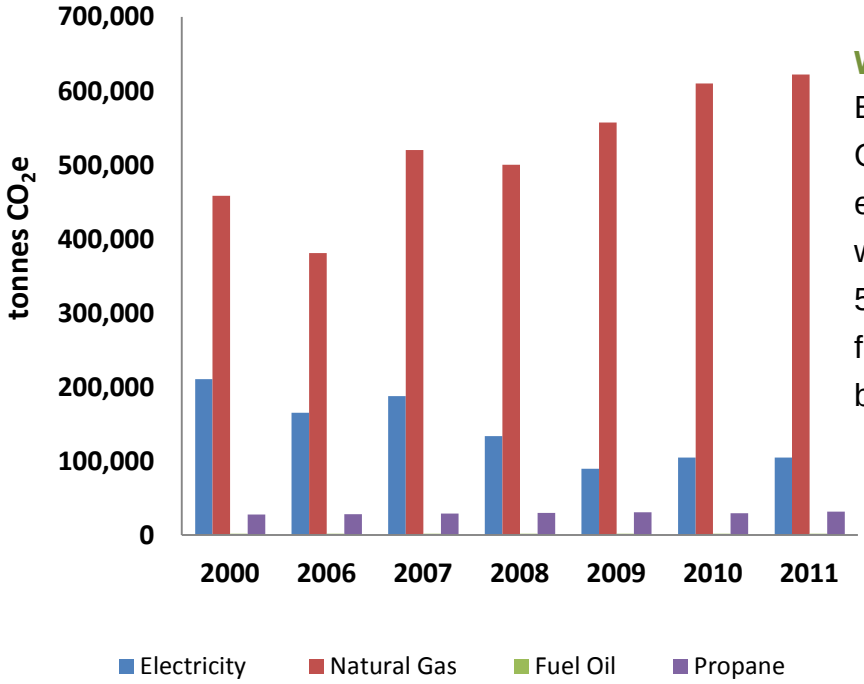
Homes and Workplaces: Historical Energy Source GHG Emissions (2000 and 2006 to 2011)

Between 2000 and 2011 the Ontario electricity GHG emission factor decreased by approximately 50%. This reduction was due to the phasing out of coal fired plants. Plans are in place by the Province of Ontario to phase out coal fired plants completely by the end of 2014.[43] The result is that electricity is becoming an increasingly cleaner form of energy. Natural gas is the dominant GHG emission source in both homes and workplaces.



Homes

Between 2000 and 2011, GHG emissions from the electricity used in Kingston homes decreased by 43% and GHG emissions from natural gas increased by 8%.



Workplaces

Between 2000 and 2011, GHG emissions from the electricity use in Kingston workplaces decreased by 50% and GHG emissions from natural gas increased by 36%.

Supporting Community Plans and Policies - Municipal

Official Plan (June 2013): The Official Plan (OP) states that Kingston is to be a leader in energy conservation, energy efficiency and sustainable energy production. There is to be a strong focus on the development of renewable energy systems that are appropriate for the type and scale of development and that minimize impacts on the natural environment and adjacent land uses. The OP also supports renewable energy technologies and a land use distribution that enables density, infill and mixed-use and district energy systems. Policies indicate that the City will promote energy audits to evaluate the energy efficiency of buildings.

Application Support in Principle for Roof Top and Small Ground Mount Projects By-law: The intent of the by-law is to enable participants in the Feed-In-Tariff (FIT) program to achieve priority points.

Installation of Solar Systems on Municipal Buildings: The City has installed eleven municipal roof top PV systems under the micro-FIT (<10 kW) and two systems under the FIT program.

Lawn Watering Bylaw

Municipal Green Building Policy: The policy requires that all large municipal building and retrofit projects undertake an assessment of Leadership in Energy and Environment Design (LEED) as a design goal for Council's consideration before the finalization of a project's design. The following 5 municipal facilities are LEED buildings: Kingston Police Headquarters, Ravensview administration building, INVISTA Centre, Rogers K-Rock Centre and Public Works Staff and Operations building.

Supporting Community Plans and Policies - Provincial

Green Energy Act (Reg.397/11): This Act requires municipalities, schools and hospitals to conduct and make public facility GHG emission inventories, to provide an Energy Plan (July, 2014) and to update this plan every 5 years.

Ontario Long Term Energy Plan (Dec., 2013): This plan provides aggressive strategies for conservation, energy efficiency and renewables.

Ontario Electricity Energy Mix - Phasing out of Coal Plants: The Ontario government has indicated that coal-fired plants will be eliminated by the end of 2014. This will have a significant impact on the Ontario electricity emission factor and will enable significant reductions in GHG emissions.

Ontario FIT and micro-FIT program: Provides a 20 year contract for solar installations.

Ontario Building Code (2012): The 2012 building code requires homes to be 15% more efficient and large buildings to be 13% more efficient that the previous code.

Goals and Objectives

Goal: **Reduce GHG emissions released from the heating, cooling and powering of our homes and workplaces and produce enough renewable energy to meet our needs.**

Objectives

E-OB1	• **Design and construct new buildings and renovate existing buildings (homes and workplaces) to minimize their energy consumption and release of GHG emissions.**
E-OB2	• **Be a leader in the development and use of sustainable building standards for design, construction and operation.**
E-OB3	• **Establish Kingston as a leader in green technology (wind, solar and bio-fuel) and build on the community's core strength and assets in this area.**
E-OB4	• **Reduce per capita treated water consumption for non-potable uses from all users**.

Community Actions Already Underway: Homes

OPA SaveOnEnergy Program (Homes)

This program is delivered by Hydro One and Kingston Hydro (2011 to 2014). A modified program is anticipated post-2014.

Home Energy Assistance Program (HAP): HAP is delivered by Hearthmakers to homeowners, tenants, landlords and social housing based on income eligibility. It provides energy assessments, installation of upgrades and energy efficient appliances (if eligible).

SaveOnEnergy Coupons: Coupons are available for energy efficient projects.

Fridge and Freezer Pick Up

Heating and Cooling Upgrade Incentives: The program offers $250 for a furnace upgrade and $400 for an A/C upgrade.

New Home Construction: Incentives are available to home renovators and builders that include energy efficiency measures (prescriptive, engineered and custom).

Solar Hot Water Rental

Utilities Kingston provides an affordable option for residences and businesses to reduce fuel use through solar technology.

Funding Opportunities

RBC Energy Saver Loan: Receive 1% off of the loan interest rate on a fixed rate installment loan over $5,000.

CMHC: Offers 10% refund on its mortgage loan insurance for homeowners who borrow money to build or buy an energy efficient home or renovate an existing one.

City: Planning

Energy Efficient Building Checklist:
Voluntary initiatives include: hot water systems, wood fueled appliances, electricity and water efficiency, sustainable building materials, HVAC systems and landscaping. At present, no financial incentives are available.

Natural Gas (Homes)

Utilities Kingston provides conservation tips, free audits and education to developers within their service area. They do not currently provide incentives for natural gas conservation. Union Gas has a conservation incentive in place (2011 to 2014) and it is expected to continue in a modified manner post-2014.

Current home incentives include:

1. **natural gas water heater savings kit**
2. **programmable thermostat rebate**
3. **affordable housing conservation program**
4. **helping homes conserve:** applies to the cost of insulation for low income customers

High Performance Homes

1. **Komelot Land Homes Ltd.** is in the process of building Kingston's first passive house. This house will achieve 80% to 90% energy efficiency above code.
2. **Caraco Corporation** designed and constructed Kingston's first LEED Home.
3. **Homestead and Caraco** is committed to building Energy Star homes.
4. **Habitat for Humanity** is committed to building homes with an energy efficiency of 35% above code.

Water Conservation and Quality Utilities Kingston

Water Conservation Demonstration Gardens: This garden is a public educational resource on sustainable gardening practices that demonstrates low-water use landscaping.

Rain Barrel Program: The sale of rain barrels enables residents to reduce storm water discharge and use the rain water for gardening purposes.

Multi-residential low flow toilet rebates

Community Actions Already Underway: Workplaces and Renewables

OPA SaveOnEnergy Program

This program is delivered through Hydro One and Kingston Hydro (2011 to 2014) and a modified program is anticipated post-2014. The current program includes: demand response incentives, a retrofit program, audit funding, incentives for building owners, incentive for exceeding code for high performance new construction, small business lighting program and new home construction incentives for home renovators and builders that include energy efficient measures. For the institutional sector, funding is provided for process and systems (i.e. incentives for capital, an embedded energy manager, engineering studies and monitoring).

Queen's University: CAP

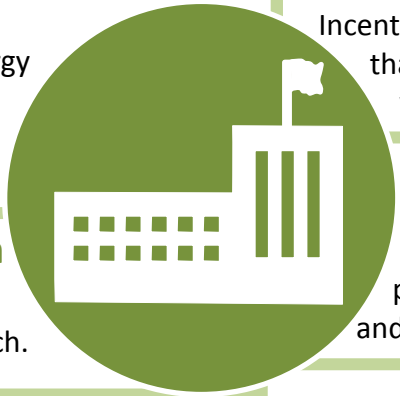
Queen's University's Climate Action Plan is targeting a 35% reduction in GHG emissions by 2020; a 70% GHG emission reduction by 2030 and carbon neutrality by 2040 (baseline year 2008).

St. Lawrence College

The College has implemented an energy retrofit program, is developing an energy plan and has installed 3 electric vehicle charging stations.

Low Carbon Energy Research

Lafarge and Queen's University are conducting low carbon energy research.



Our Hospitals

Kingston General Hospital and Hotel Dieu have both initiated 3 phase energy reduction programs. Providence Care is in the process of constructing a LEED Silver facility.

SWITCH

Founded in 2002, SWITCH is a membership based not for profit that provides a networking hub for alternative energy research, education and policy work in Southeastern Ontario.

Renewable Cooperatives

- Wintergreen Co-operative (wind and solar)
- Queen Street Solar Co-operative

Natural Gas

Utilities Kingston provides **conservation tips** on their website, **free customer audits** and through the development review process educates developers within their area on issues related to conservation.

Union Gas has a conservation incentive in place (2011 to 2014) for the ICI sector and a modified program is expected to continue post-2014. Incentives include: space heating, water heating equipment, cooking equipment and engineering projects to determine energy saving opportunities.

Water Conservation

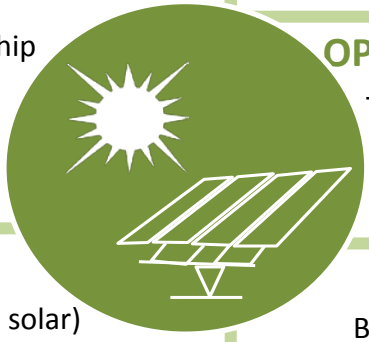
Utilities Kingston offers a Water Efficiency Retrofit Incentive Program (WERIP) to commercial and institutional clients. Incentive are available to projects that achieve a 5/m^3 combined water and sewage savings.

City of Kingston

The City has conducted facility retrofits, adopted a green building policy, constructed 5 LEED facilities, and has installed 11 solar projects.

Hearthmakers

Hearthmakers is the delivery agent for the SaveOnEnergy small business lighting and the Household Assistance Program. They also provide third party advice for energy improvements to homes, businesses and builders.



OPA FIT and microFIT Program

The OPA provides a 20 yr contract for solar PV systems. Currently, there is no compilation of the number and capacity of projects.

Solar Application By-law

Bylaw (in principal) to enable Kingston FIT applications.

Opportunities to Reduce GHG Emissions

A summary of selected potential actions are provided in this section. The status of the action and the identified lead organization is presented. Actions for the energy sector (including homes, workplaces and renewables) have been divided into four (4) categories:

1. Supportive Actions: Advocacy, Education and Capacity Building;
2. Supportive Actions: Use of Planning Tools to Incent Change;
3. Community Commitments, and
4. Financing Incentives for Renewables and Energy Efficiency.

1. Supportive Actions: Advocacy Education and Capacity Building

While advocacy, education and capacity building generally do not generate GHG emission reductions in the short term they set the stage for sustained and potentially significant impacts in the future.

Advocacy:

- Municipal leadership: advocate for higher than provincial building standards
- Lobby for more renewable energy within the Ontario energy mix
- Lobby for mandated home energy audits at the time of sale
- Lobby for increased municipal powers related to energy planning

Education:

- Renewable energy education
- Public carbon tax education
- EnerGuide and energy audit education
- Developer education: energy, renewables, incentives and sustainable design
- Overall GHG emission and energy education portal

Capacity Building:

- Renewable compilation: develop a compilation of local renewable projects
- Energy benchmarking working group: ICI sector volunteer working groups
- Green procurement policies voluntarily adopted by business and organizations
- Cogeneration and district energy support: feasibility study, developer engagement
- Municipal Energy Plan
- Energy Mapping
- Sub-metering apartments
- Develop a Sustainability Precinct: showcases an integration of sustainable land use, design and construction for a community neighbourhood.

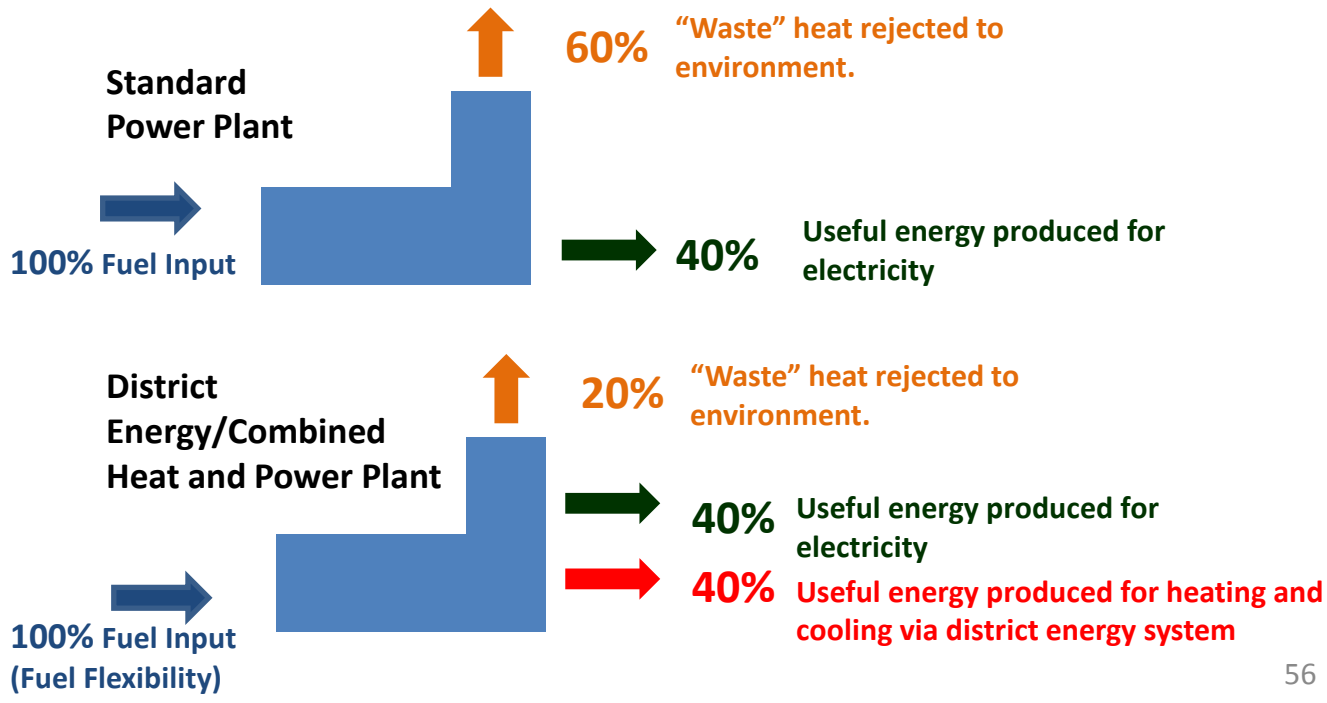
District Energy and Cogeneration

(Concept Action; City): As a first step conduct a feasibility study to determine the most promising areas in Kingston that could benefit from the efficiency, cost savings and fuel flexibility of a District Energy and Cogeneration System. Similar to Vaughan, this study could also include potential ownership and operational models as well as implementation plans. District energy systems provide space heating and cooling as well as water heating from a centralized plant through buried pipes to multiple users. This removes the need for each individual building to have a furnace, boiler or A/C unit. This offers the opportunity for fuel flexibility since a district energy system can transition from conventional fuels to renewable fuels. District energy systems allow for cogeneration or combined heat and power (CHP) where energy that would have been rejected can be used.

Examples: Town of Markham, City of London and City of Vaughan:

The City of London's district energy system serves 15% its downtown core buildings. City of Markham also has a district system within its downtown core. Generally, district energy is considered most practical in new developments. The Vaughan Holdings Inc. Board of Directors initiated a Vaughan District Energy Feasibility Study. This study examined the potential for district energy systems within the City. The study reviewed potential ownership and operating models and implementation plans. Funding was provided by the FCM Green Municipal Fund.

Energy-Efficiency Comparisons: Standard vs District Energy Combined Power [44]



Opportunities to Reduce GHG Emissions

2. Supportive Actions: Use of Planning Tools to Incent Change

While the municipality is unable to demand requirements greater than code, it is possible to try to incent change through planning tools.

Planning Priority Treatment (Concept; City): Give priority treatment to projects that offer significant energy efficiency, water efficiency and/or incorporate renewables.

Use Rezoning as a Leveraging Tool (Concept; City): Require higher energy efficiency than code for projects that are requesting rezoning.

Establish Green and Passive Development Guidelines (Concept; City): Use planning tools to require (where possible) and incent the adoption of energy efficiency and sustainable design measures. A sustainable building brochure and checklist is currently available, but there are no incentives currently offered.

Use of Rezoning as a Planning Tool to Require Higher Energy Efficiency than Code:
The **City of North Vancouver** updated its Sustainable Development Guidelines to include more rigorous standards for energy efficiency. Buildings are expected to meet the new energy efficiency guidelines when applying for rezoning. **The City of Vancouver** requires higher energy efficiency standards for large rezoning applications.

Passive Design Guidelines:
The **District of Saanich and City of Dawson** passive design guidelines optimize the impact of building orientation, form and exterior design elements. Shading features and landscaping can impact energy consumption.

3. Community Commitments

Queen's University Climate Action Plan (In-Progress; Queen's University)

Kingston Corporate Climate Action Plan (In-Progress; City)

Sustainability CoLab (Concept; Sustainability CoLab and the ICI sectors): The intent is to engage industrial, commercial and institutional organizations to develop Climate Action Plans.

Opportunities to Reduce GHG Emissions

4. Financial Incentives for Renewables and Energy Efficiency

Over 25% of Kingston homes are 25 years and older. There are several concept opportunities to incent audits and retrofits.

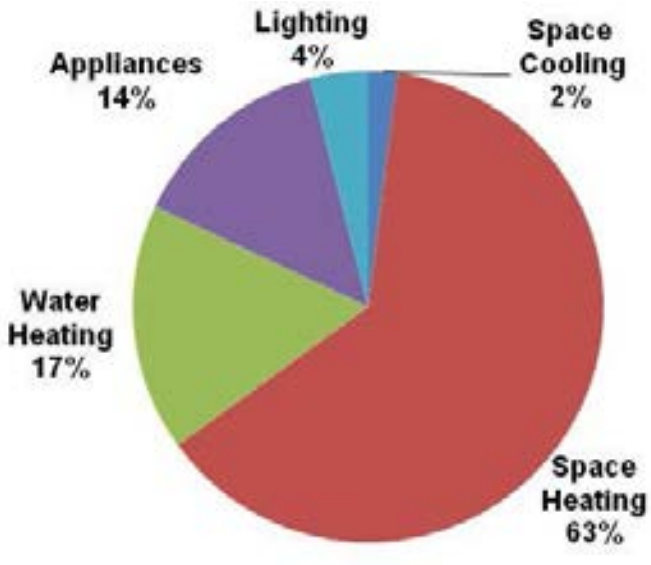
On-Bill Financing (Concept; LDCs): The Ontario Long Term Energy Plan (Dec., 2013) indicates that local distribution companies (LDCs) will be offering on-bill financing by 2015. On-bill financing offers homeowners the option of paying for their energy retrofit, water retrofit or renewable installation over time through their utility bill. The utility provides the financing to the homeowner. Potentially the debt could remain with the home.

Local Improvement Charges (Concept; City): Municipalities now have the power to enable homeowners to pay for energy and water retrofits as well as renewable installations through their tax bill. The advantage of an LIC is that the debt stays with the home.

Local Improvement Charges:

The **City of Toronto** initiated a residential pilot program to assist property owners to undertake energy and water efficiency retrofits and conservation measures. The City of Toronto will lend the up front costs from the City's working capital reserve and the property owner(s) will pay the City back via a special charge on their property tax bills. The debt remains with the property should the property be sold. This program addresses two key barriers: (i) the challenge of obtaining upfront financing and (ii) property owners who may want to sell their properties in the future are reluctant to make investments that they may not be able to recoup in the short-term.

The **City of Ann Arbor** developed a similar program for commercial property owners.



Canada

On average, 63% of household energy use is for space heating.[45]

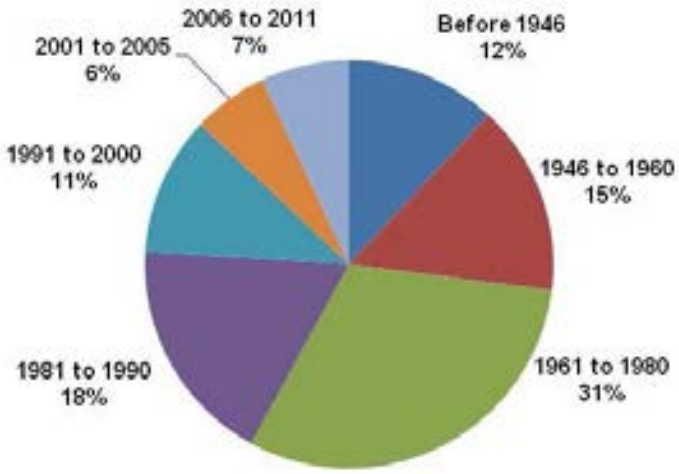
Provide incentives for Energy Audits through the Building Permit Process.

Encourage EnerGuide Audits at the Time of Sale: While this was identified in the Green Energy Act it has not yet become a regulation.

EnerGuide Rating:
The home's energy efficiency level is rated on a scale of 0 to 100. A rating of 0 represents a home with no insulation and high energy consumption and a rating of 100 is a home that does not require the purchase of energy.

Home Characteristics	Typical EnerGuide Rating
Older Home: Not Upgraded	0 to 50
Older Home: Upgraded	51 to 65
Older Home: Energy Efficient Upgrade	66 to 74
New Home Built to Code	65 to 72
New Home with some energy efficient Improvements	73 to 79
R2000 Home	80
Energy Star Home	86
High Performance Home: Energy Efficient new Home	91 to 99
Net Zero Energy Home	100

Kingston Homes Distribution of Age of Homes[46]



Summary of Potential GHG Emission Reduction Actions

Energy: Potential GHG Emission Reduction Actions (Home and Workplace)	Estimated GHG Emission Reductions (t CO_2e) from 2011	
	2020	2030
Incentives for Energy Retrofits: Local Improvement Charges (LIC), On-Bill Financing; Community Improvement Plan (CIP) Program for Energy Retrofits	6,000	18,000
SaveOnEnergy Incentive Program	21,100	32,600
Natural Gas Local Distributing Company Incentives	72,300	155,400
Energy Audits at Time of Sale	6,960	12,200
Incentive for Energy Audits through Permit Process	1,300	3,300
Ontario Electricity Mix: Retiring of Coal-Fired Plants (2014)	157,000	173,160
Reg.397/11: GHG Inventories and Energy Plans	40,800	45,100
Ontario Building Code Update	3,800	8,500
Queen's Climate Action Plan	11,500	31,700
Total Potential Energy GHG Emission Reductions from 2011	**320,800**	**481,800**

Summary of Proposed Energy Indicators

Proposed Energy Indicators			
Measure	**Indicator**	**Frequency**	**Source**
Total Home GHG Emissions and Energy Consumption	Homes: Tonnes CO_2e GJ Energy Consumed	2yrs	Update from Community GHG Inventory
Home GHG Emissions and Energy Consumed per Capita	Homes: Tonnes CO_2e/Capita GJ Energy/Capita	2yrs	Update from Community GHG Inventory
Total Workplace GHG Emissions and Energy Consumption	Workplaces: Tonnes CO_2e GJ Energy Consumed	2yrs	Update from Community GHG Inventory
Total Workplace GHG Emissions and Energy Consumed per Capita	Workplaces: Tonnes CO_2e/Capita GJ Energy/Capita	2yrs	Update from Community GHG Inventory
Kingston Renewable Projects and Capacity	Number of Projects/ Capacity	On Going	Concept: Based on potential compilation of projects
Housing Density: Urban Dwelling Unit Density	Number of units per area	5 yrs	Statistics Canada

3.5 Resources and Natural Systems

The Resources and Natural Systems theme area includes: trees, plants, waste and water. Trees and plants are important to the carbon cycle because they take in carbon dioxide (CO_2) and release oxygen (O_2). Trees also provide valuable shade.

The reduction of waste is critical to a sustainable community. From a GHG emission reduction perspective, the focus is on the diversion of organic waste from the landfill. Once organic waste (i.e. food waste, brush, lawn clippings, cardboard) is buried in a landfill in an oxygen depleted environment, the organic waste generates methane (CH_4). Methane is a 25 times more potent greenhouse gas than CO_2. Most landfills have either methane flaring or capture the methane to be used as energy.

By keeping our ecosystems healthy we are allowing the natural ability of our trees and plants to convert carbon dioxide into oxygen.

Goal and Objectives

Goal: Reduce GHG emissions through the preservation, protection and enhancement of our natural systems and responsible use of our resources.

Objectives

R-OB1	• Preserve the most environmentally-valuable natural areas.
R-OB2	• Increase the natural areas (natural corridors, shorelines and significant woodlots) and restore and remediate degraded natural areas where possible.
R-OB3	• Minimize the amount of waste going to landfill.
R-OB4	• Increase the number of trees in park areas and in the City.

Supporting Community Policies and Plans

Municipal Government:

- Guideline for Tree Preservation and Protection
- Kingston's Urban Forest Management Plan
- Kingston's Tree Bylaw
- Drinking Water Source Protection Plan
- Master Storm Water Management Plan
- Pollution Control Plan

Community Actions Already Underway

Waste

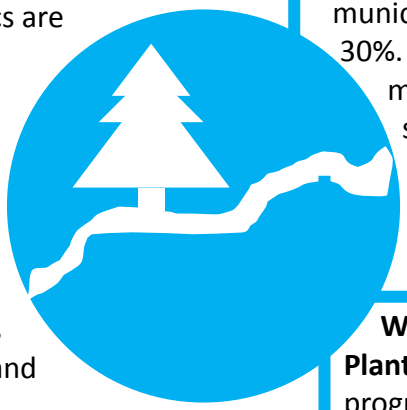
Residential Waste Diversion: The current goal is to achieve a 65% residential waste diversion from landfill (by weight) by 2012. At present the residential diversion rate is 52%. The Province's goal is a 60% diversion rate. In 2012, a 1 bag Kingston residential untagged limit was imposed.

Residential Recycleables: Residential Blue and Grey Box materials are collected on an alternating weekly basis.

Battery Recycling: Drop off locations are available throughout the city.

Pitch In Kingston: This is an annual community-wide spring waste clean up.

Clothesline Program: Reusable clothing, household goods and electronics are collected for redistribution.



Free-cycle Kingston:
This is a website that connects people who have items that they do not want with people who want the items. Items are free.

Loving Spoonful - Use of Excess Food: Excess food is collected and is distributed to those in need.

City and Queen's water bottle refill stations

Residential Source Separated Organics (SSO) Green Bin:
In 2008, a SSO program was initiated. SSO are collected weekly from homes and 20 unit multi-residential units as well as 21 to 50 unit buildings. The SSO is composted at the Norterra Organics Facility. The collection of SSO is to be expanded in 2014 to include 51 to 80 unit buildings and in 2015 to include buildings with greater than 80 units.

Transition Kingston: Offer skills sharing events to enable Kingston residents to become more sustainable.

Hearthmakers Energy Cooperative: Deliver the DEPAVE Paradise program to remove asphalt and recapture natural space.

Trees

City of Kingston Initiatives:
Action on Emerald Ash Borer: The City is educating residents about the treatment of the Emerald Ash Borer and has developed an impact and mitigation strategy for trees on municipal property.

Guidelines for Tree Preservation and Protection: This guideline identifies trees to be retained and protected during construction.

Tree Bylaw: Applies to endangered, threatened or at risk tree species.

Kingston's Urban Forest Management Plan: The intent of the plan is to guide the management of public trees. Kingston's municipal canopy is estimated to be 25% to 30%. The existing municipal urban forest is made up of 28,000 trees. The City is seeking opportunities with large land holders to either plant trees or allow trees planted on their land. The plan includes a list of adaptive tree species.

Western Landscape Services :
Plant a Tree Keep our City Cool: This program engages10 schools/yr. Students plant a tree in the school yard while learning about the importance of trees.

Cataraqui Region Conservation Authority:
Tree planting cost-share program are offered for rural landowners including the 50 Million Tree Program, which offers trees at a reduced cost and oversight by CRCA staff, as well as bulk seedling sales to landowners.

Lemoine Point Native Plant Nursery: A spring and fall stock program is offered to the public for trees, shrubs and flowers.

Lemoine Point Reforestation:
Research to determine which tree species survive in a changing climate.

Potential Actions

A selection of actions, identified lead organizations and their status is provided.

Develop a Community-based LEAF Program (Concept; public volunteer group) This is a not-for-profit organization that provides expertise, guidance and resources for tree and garden planting.

Protect Small Areas of Local Significance and Related Corridors (In-Progress; CRCA): In 2006, the CRCA prepared the Central Cataraqui Region Natural Heritage Study to look at the network of natural lands as well as the connections between them. When acquiring property, the CRCA targets lands with corridors and connections. When advising on development proposals, the CRCA consider connectivity and corridors.

Local Enhancement and Appreciation of Forests (LEAF) Program:
This is a Toronto not-for-profit organization, founded in 1996, that provides urban forest stewardship, backyard planting program, educational tools and resources, guidance and event volunteer coordination. They also sell products (i.e. edible garden kits) to encourage tree garden planting and have developed urban demonstration gardens and an adopt a tree program.

Enforcement for Replacing Trees on Private and Public Lands (In-Progress; City): For construction on private lands a Guideline for Tree Preservation and Protection has been developed. This guideline identifies where trees are to be retained and protected. A tree preservation and protection plan must be provided. The City Tree Bylaw applies to endangered, threatened or at risk tree species and distinctive trees in identified locations. Kingston's Urban Forest Management Plan guides the management of trees on municipal land.

Reforestation Initiative (Concept): Consider initiatives that takes lands unfit for agriculture back to forest with trees that are climate change resistant species.

Potential Actions

Increase Opportunities for Permeable Surfaces:

1. Consider opportunities for more permeable surfaces (Concept; City, developers, home and business).

2. Increase Opportunities for DePave Paradise (In-Progress; Hearthmakers, volunteers): A program where asphalt is removed to allow for natural space.

Permeable Pavement:
Region of Durham, Seattle, Chicago, City of Vancouver encourage the use of permeable pavement to reduce the amount of storm water flow, enable infiltration, reduce runoff of pollutants and increase beautification.

Waste Reduction:

1. Update the Waste Management Plan (Concept; City): It is anticipated that this update would revisit the residential waste diversion targets; consider eliminating free untagged garbage bags; consider the use of clear bags and evaluate garbage pick up once every two weeks rather than every week.

2. Consider Options to Increase Composting and Recycling within the ICI Sector (Partial-Progress; City, ICI sector and private sector service providers): At present, there is no City collection of recycling or organics for the industrial, commercial or institutional (ICI) sectors. ICI sectors retain organic and recycling haulers independently. The ICI sector needs to expand its uptake of recycling and organics management.

3. **Waste Reduction Plans** (In-Progress; ICI sector and service providers): Industrial/Commercial/Institutional organizations to incorporate organic, recycling and waste reduction strategies and plans into their operations.

4. **Commodity Exchange for Residential and ICI Sectors** (Concept).

5. **Low Carbon Energy Research** (In Progress; LaFarge and Queen's University)

6. **Food Reclamation** (In Progress; Loving Spoonful): Loving Spoonful collects food from a variety of sources (i.e. restaurants, events, farms, cafeterias) and distributes the food to those in need. Expansion is dependent on volunteers.

Kingston's Source Separated Organics (SSO):

Residential organics are collected weekly from all homes and multi-residential units of up to 20 units. The SSO is composted at the Norterra Organics facility. The collection of SSO was expanded in 2013 to include 21 to 50 unit buildings and in 2014 to include 51 to 80 unit buildings. In 2015, the SSO collection program will be expanded to include buildings with more than 80 units.

Kingston: A Top Canadian Composting City!

In July 2013 Statistics Canada reported that Kingston tied as the 3rd top composing city in Canada.

83% **of Kingston residents compost!**

GHG Emissions from Organic Waste (Historical and Projected)

The tonnage of organic material going to landfill has been decreasing due to the Green Bin program and increased education. It is estimated that due to increased diversion of organics from landfills that the GHG emissions associated with organic waste will be reduced by 25% by 2020 and by 50% by 2030 compared to 2011.

Year	Tonnes of Organic Material to Landfill	GHG Emissions (t CO_2e)	% of Total Emissions
2006	40,746	19,627	1.5%
2007	37,541	18,084	1.2%
2008	38,957	18,766	1.3%
2009	35,079	16,897	1.2%
2010	35,588	17,143	1.1%
2011	32,659	15,732	1.0%

Proposed Indicators

Proposed Indicators			
Measure	**Indicator**	**Frequency**	**Source**
Residential Diversion Rate	% of waste by weight diverted from landfill	2yrs	City of Kingston
Estimate of GHG Emissions from Organic Waste	Tonnes CO_2e	2yrs	Update from Community GHG Inventory
Tree Canopy	Tree canopy cover as a % of total city area	2yrs	City of Kingston
Parkland and Protected Areas	Total hectares of parkland and protected areas as a % of total municipal area	2 yrs	City of Kingston

3.6 Agriculture and Food Security

In 2010, it is estimated that the average Kingston Census Metropolitan Area (CMA) family of four spent approximately $166/week ($8,632/year) on a nutritious food basket. Most of this food is grown and processed outside of Kingston and region and is transported long distances to get to Kingston. By encouraging local food production we not only contribute directly to the economic growth of Kingston and the surrounding region but we also reduce the GHG emissions associated with the transportation of the food to Kingston and increase our food security. Local growing, production and distribution of food generates jobs, creates a sense of community and connects the rural and urban community. The actions outlined for this theme are qualitative in nature.

Goal:

Kingston's food system contributes to the reduction of GHG emissions and the increase in food security.

OBJECTIVES

A-OB1

- Raise awareness of the role of local food in reducing GHG emissions and providing food security.

A-OB2

- Develop local food production, processing, distribution and retailing businesses and facilities.

A-OB3

- Identify, designate or secure prime agricultural land.

A-OB4

- Maximize the amount of excess food that is made available to others and minimize the amount of organic waste that goes to landfill.

A-OB5

- Promote food skills including food production, selection, storage, preparation and nutrition through urban agriculture, community gardens, school gardens, community kitchens and cooking.

Community Actions Already Underway

New Farm Project (NFP)

Farmer Training: The National Farmer's Union program provides workshops, special events and micro-financing for off-season learning, livestock, seed and equipment.

Build Farm and Community:

- Local Harvest Newspaper
- Fall Gathering
- Research

Food Down the Road Website: This website includes a local food locator and an events calendar.

A Plan to Grow: Scaling Up Local Food in Kingston and Countryside (Jan., 2012): This report builds on current work and proposes new actions.

Local Public Health

Healthy Eating Working Group – Food Charter: The purpose of the food charter is to create a more accessible and sustainable food system within our region.

Food Policy Council: Formed in July 2013, its focus is to identify and propose innovative solutions to improve local food systems, spur local economic development and make food systems more environmentally sustainable and socially just. The Council will use the food charter as a guide to develop an action plan.

Community Food Advisors: These advisors are trained volunteers who provide hands-on guidance in the community to educate about healthy cooking and eating.

School Nutrition Policy Support Good Food Box: The good food box is a non-profit fruit and vegetable distribution system.

Community Gardens

Community Gardens Guidance document
Kingston Community Garden Network
12 Community Gardens in Kingston
5 School gardens

Kingston Downtown BIA

Local Foods Local Chefs: A partnership program that increases awareness of local food in Kingston by creating local food events, websites, promotional and educational materials/opportunities.

Fare in the Square: This is an annual harvest celebration at the Springer Market Square. This event showcases the quality and variety of local food available at the market and the talent of Kingston farmers and chefs.

Four Points Sheraton: Roof-top garden

Food Down the Road Magazine – Go Forth and Eat

Markets

Springer Market Square Market
Memorial Centre Market

Main Street Market: This service provides multiple locations for food pick-up and bicycle delivery in the downtown.

Bath Market, Community Harvest Market, Queen's Wendy's Mobile Market: This service provides food aggregation and distribution services.

Seeds

KASSI (Kingston Area Seed System Initiative): Locally grown and adapted seeds are available.

Sisters of Providence - Heirloom Seed Sanctuary

Loving Spoonful

Grow a Row: (National Program): Donate produce to those less fortunate
Excess Food Collection and Distribution
Community Kitchen Workshops
Garden Workshops
Preserve Reserve Program

Research and Support

Federation of Canadian Municipalities (FCM): ***Best Practices in Local Food – A Guide for Municipalities***
Frontenac County: Abattoir study
Urban Agriculture Kingston
Food Provider Network
Permaculture Kingston
Transition Kingston

Potential Action Opportunities

A selection of actions with the identified lead organization and status is provided.

Increase Urban Greenhouses (In-Progress; Loving Spoonful): Loving Spoonful is currently working with the Cataraqui Cemetery, which has offered three greenhouses on their property to be used by Loving Spoonful to grow food for local meal programs and shelters.

School Garden Guidelines with Health and Safety Considerations (In Progress; Limestone District School Board and Loving Spoonful)**:** To date there are 5 grow gardens and 2 more are planned for the spring of 2014. The School Garden Guideline will be in place in the spring of 2014.

Information guide to encourage residents own land for urban agriculture (Concept; Food Policy Council)

Community Food Centre (Concept): This concept is starting to take shape! Work is underway to select the optimum site for this centre. Many of the meal programs are engaging their guests to participate in food preparation.

Expand Food Waste Reduction Program (In Progress; Loving Spoonful): Loving Spoonful collects surplus food from restaurants, farmers, bakeries, wholesalers, market vendors and gardeners and take it to the meal providers and shelters. The organization is searching for additional organizations to participate.

Working Group for Locally Sourced Food (Concept)

Indoor Farmer's Market (Concept)

Develop Policy for Municipal Urban Fruit Trees (Concept)

Connect Landowners with workers to develop decentralized farms (Concept)

Expand the number of Community Gardens (Concept)

Comprehensive Local Food Guide (Concept; NFU)

3.7 Climate Resilience

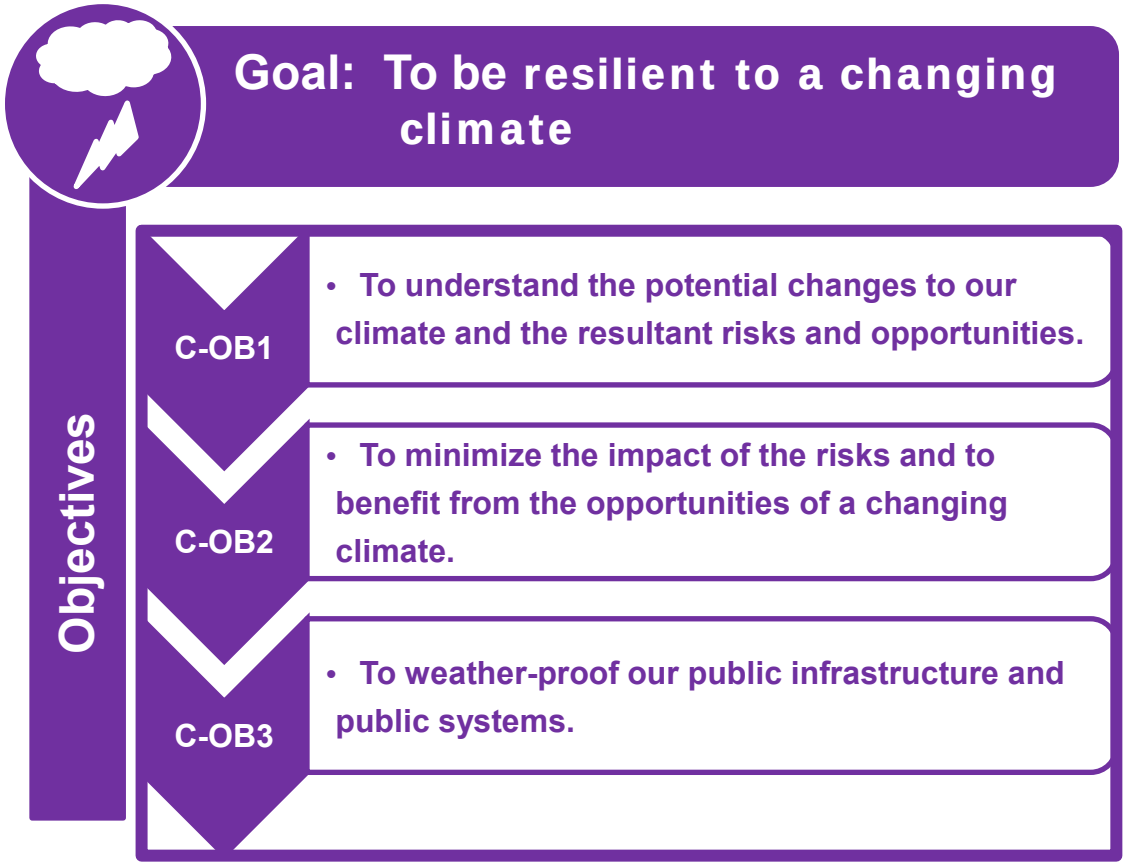
Climate resilience or climate change adaptation refers to measures or initiatives to reduce the vulnerability of natural and human systems against actual or expected climate change effects and to maximize potential benefits.[47] By understanding our health, infrastructure and ecosystem vulnerabilities, Kingston will be better able to proactively plan to weather the storm.

While the concept of adaptation is somewhat new, Kingston has been changing to reflect its new and emerging climate for some time and has many actions already underway. This section, along with the weather projections and risks outlined in Section 1, provides the foundation for a Kingston Adaptation Plan.

What is Climate Vulnerability?

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. It is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity. For example, a flooded river is not a disaster. However a disaster occurs when a flood interacts with a vulnerable system such as a community located on the flood plain.[48]

Goal and Objectives



Risks and Opportunities of a Changing Climate	
Risks	**Opportunities**
Emergency Management and Response	
Increase in frequency or intensity of severe weather events	Proactive infrastructure designs for future extremes
Increased potential of failure in essential services	Disaster risk reduction planning
Future uncertainty and potential for new extremes	
Potential for water shortages	
Public Health	
Heat stress, poorer air quality in high temperatures	Coordinated weather-health alert and response surveillance
Risk of increased water/food borne and other vector borne disease outbreaks	Less extreme cold and related health risks
Potential for increased health emergencies and casualties from severe weather events	

Actions the Community Already Has Underway

Local Public Health

Extreme Heat & Air Quality and Extreme Cold: Emergency Response Plans are in place for extreme heat and cold events and seasonal monitoring and alerting is provided to the general population and to community service providers.

Communicable Disease: Vector borne and zoonotic diseases (West Nile Virus, Lyme Disease); tick and mosquito surveillance and disease prevention.

UV Radiation: The Local Public Health is developing an application with the City that will allow shade audits to be conducted. This will have adaptation implications during periods of extreme heat, and with other indicators, can help identify vulnerable populations and areas.

Cataraqui Region Conservation Authority (CRCA)

Floodplain Mapping: CRCA helps to avoid harm to life and property that could be caused by flooding along Lake Ontario and the St. Lawrence River as well as inland lakes and streams. The CRCA prepares floodplain maps to show the areas that would likely be affected by the 1 per cent probability event. Staff offer technical advice and regulates development in and around flood prone areas (O.Reg. 148/06). Weather conditions and flood events are monitored and advisories are issued by the CRCA.

Drinking Water Source Protection: Funded through the Provincial Clean Water Act, the CRCA aids in the preparation of technical information and policies that help protect municipal drinking water sources. A Cataraqui Source Protection Plan is underway.

Ontario Low Water Response: The Water Response Team considers recent and predicted rainfall, snowfall, stream flow and other factors, and if needed will declare the Region to be in a low water condition.

Watershed Monitoring: The CRCA operates and monitors the health of watersheds across the region and issues watershed reports.

City of Kingston

Get Ready Kingston: Personal Emergency Preparedness Guide: This guide includes information about**:** Kingston's risks and hazards, where to get emergency information, how to develop a household disaster plan, what to put in a go bag and an emergency supply.

City of Kingston Emergency Plan

Shelters and Drop in Centres: Shelters have extended hours in times of extreme heat and cold and there are identified drop-in centres.

Action on Emerald Ash Borer: The City is educating residents about the treatment of the Emerald Ash Borer and has developed an impact and mitigation strategy for trees on municipal property.

Adaptive Species are Included in Urban Forest Management Plan.

Utilities Kingston

Utilities Kingston Water Buggy: Provide mobile, safe drinking water to the public.

Ravensview Pollution Control Plant Secondary Treatment Upgrade

Combined Sewer Overflow Prevention Includes: storage tanks, pumping station upgrades and on-going work to separate storm and water pipes.

Water Conservation Initiatives:

- **Rain Barrel Program**
- **Water-wise Garden Education**
- **Incentives for Reduction**

Hearthmakers

Well Aware Program: Groundwater Protection Initiative: Deliver a provincially funded rural well program to educate homeowners.

Potential Actions

Climate and Health Surveillance (In-Progress; Local Public Health): The Local Public Health conducts monitoring, detection and response (health, water, climate, energy). Local surveillance is conducted for emerging trends in infectious disease via emergency department syndrome surveillance system. This includes surveillance of the health impacts of climate change such as heat/cold weather injuries, vector-borne disease and emerging infectious diseases. Passive surveillance is conducted on all reportable diseases as identified within the Health Protection & Promotion Act. Active tick surveillance was conducted in 2011, 2012 and is planned for 2014. The Local Public Health also conducts water surveillance at beaches during the summer months.

Lobby for Kingston Relevant Climate Surveillance - Monitoring, detection and response to Climate (i.e. Weather Stations) (Concept; City)

Climate Related Chronic Disease Education (In-Progress; Local Public Health): The Local Public Health connect health risks and chronic disease to the need for climate change action. The Communicable Disease Team operational plan for 2014 identifies climate change as the driver for vector borne disease (i.e. West Nile, Lyme).

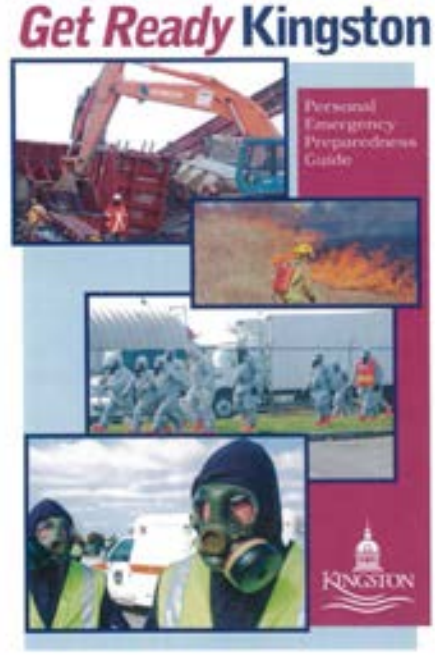
Develop a Kingston Community Adaptation Plan (Concept; City, Local Public Health, public): Using the Kingston Climate Action Plan as a foundation develop a Kingston Community Adaptation Plan. As part of an adaptation plan include vulnerability assessments to "storm-proof" assets for resilience.

Incorporate Extreme Weather Impact Functionality into City's Emergency Operations (In-Progress; City): The City is building impact assessment, modeling and analytical functionality into the City's emergency operations.

Educate the Public on Resilience (Concept; City)**:** Provide education and communication on need and roles of public and others for resilience in community (i.e. storm-proofing of communities, support for action, safety).

Drought Responses and Risk Reduction - Fire and water conservation specifically for rural areas (In-Progress; City Fire and CRCA): Fire officials establish fire warning levels. Water Response Team coordinated by CRCA monitors local watersheds and declares low water conditions.

Emergency Food Planning (In-Progress; City): The City considers food interruptions within emergency planning and education. With grocery stores having an in-store food supply of only three days food shortages are a risk in most communities. The City will continue to encourage residents, as part of the *Get Ready Kingston* program, to ensue that they have a sufficient supply of non-perishable foods as part of their personal and far..



Preparing for an Emergency Before it Happens!

Get Ready Kingston is a guide for Kingston residents to prepare for an emergency. This guide helps Kingston residents to:

- Understand Kingston's known risks and hazards;
- Make a household disaster plan;
- Put a go bag together;
- Assemble an emergency supply kit, and
- Know where to get emergency information.

Potential Actions

Expand Heat-Alert Responses:

1. **Checking on vulnerable persons** (Concept; United Way): Consider the possibility of providing a community information line (211) to check on vulnerable persons.
2. **Heat Alerting Criteria** (In-Progress; Local Public Health): The Local Public Health is participating in a Heat Health Project in collaboration with the Clean Air Partnership, Health Canada, Public Health Agency of Canada, Environment Canada and other local public health agencies. This three year project is to be completed in 2016. The objective is to develop an efficient, coordinated, evidence-based system comprised of robust, standardized criteria for calling heat alerts.
3. **Long-Term Care and Retirement Homes** (In-Progress; Local Public Health): The Local Public Health will be conducting an inventory of local long-term care homes and retirement homes within the region to determine if they have air conditioning and emergency generators. The intent is to understand the extent of infrastructure vulnerabilities and identify adaptation strategies though best practice.

Update floodplain mapping to include new weather data, determine flooding risks, and the impact on development and infrastructure planning (In-progress; City and CRCA): The CRCA is delegated responsibility by the Province to lead planning for natural hazards including flood risk. Floodplain maps are updated at regular intervals for watercourses as well as for the Lake Ontario and St. Lawrence River shorelines. Flood plain maps are based on the 1 per cent probability event, which is the regulatory standard. Due to recent changes in the climate, CRCA conducts sensitivity analyses to determine the impact of increased flows. Climate change may cause smaller flooding events to occur on a more regular basis. Intense rainstorms may continue to aggravate flooding problems away from streams and shorelines – exceeding the capacity of storm drains and roads to drain away the water and flooding urban roads, parking lots and basements.

Measures to reduce rate of loss of natural systems and increase parkland areas (biomass, wetlands as measures to protect community from flooding) (In-Progress; City Official Plan): Total hectares of parkland and protected area as a percentage of the total municipal area is captured as a measure within the *Sustainable Kingston Plan Indicators Report*.

“It is time for all of us to stand and cheer for the doer, the achiever -- the one who recognizes the challenges and does something about it.”

Vince Lombardi[49]

4.0 Implementation Strategy

The Kingston community is enthusiastic and engaged about taking action to reduce GHG emissions and to set a path to enable our community to be resilient to our changing climate. Through a variety of engagement forums (roundtable, on-line survey and open houses) the Kingston community had informed the development of this plan.

We all play a role in the realization of this plan. It will take all of us working together to implement this plan. The collective understanding from the community outreach is that a serious response to climate change is imperative to safeguard the quality of life of our children and the generations to come.

This section provides an overview of collective action, plan governance and the implementation framework.

4.1 Collective Action

The Kingston Climate Action Plan has been developed through extensive community consultation and outreach. Input, from key stakeholders (individuals and organizations), local subject matter experts and interested residents has been incorporated into this plan.

This plan outlines existing and potential new actions to reduce GHG emissions as well as actions needed to move towards climate resilience. While municipal government will lead the governance of this plan, it will take all of us (the residential, institutional, industrial and commercial sectors) focused on sustained and significant action to realize the change that is needed.

The successful implementation of this plan will depend on our ability as individuals and organizations to form partnerships and to take leadership roles in the development of proposed concept actions. The plan identifies concept actions as those action ideas where the proposed lead organization may not, at present, have the strategic direction, resources (human and financial) to implement the concept action. In many cases, the realization of an action will require cooperation, shared resources and the identification of co-benefits between organizations.

The collective understanding is that a serious response to climate change is imperative to safeguard the quality of life of our children and the generations to come.

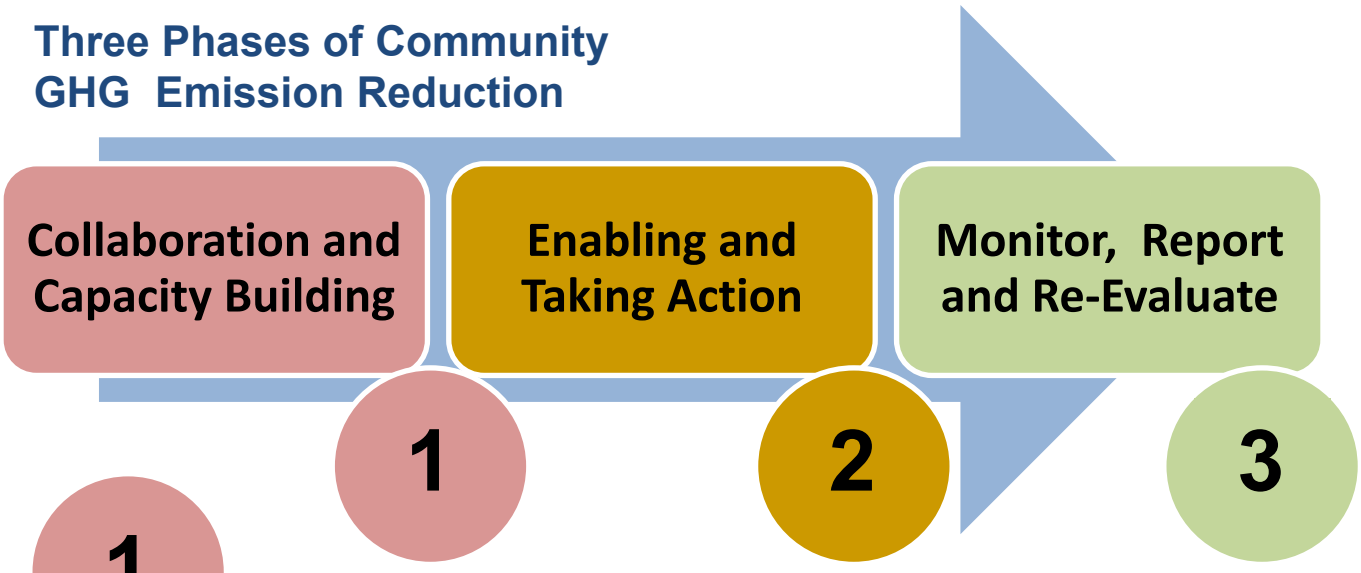
4.2 Governance

The City of Kingston will retain ownership and governance of the Kingston Climate Action Plan and will take responsibility for developing a broader implementation in 2015. **While the City of Kingston will work to deliver actions within its direct control and influence, the expectation is that community organizations will accept the call to action in the areas that they represent.** Provided below is a summary of how municipal government can influence the reduction of GHG emissions.[50] Within the direct control of the City of Kingston is how they manage their own operations including: municipal infrastructure, operations, buildings, fleet (including transit) and purchasing decisions. The City of Kingston will develop a Corporate Climate Action Plan to address GHG emission reductions within its direct control. The City of Kingston will use its ability to directly influence GHG emissions from the transportation network, land use patterns and the management of residential solid waste through policy and programs.

How Municipalities Influence GHG Emissions[51]

The City of Kingston, with Sustainable Kingston as the lead organization, has become a part of Sustainability CoLab, a provincial network of communities engaging local businesses in the solution to climate change. Sustainability CoLab is a national not-for-profit whose mission is to enable, mobilize and build community-driven and action-oriented approaches to business sustainability. CoLab helps communities create a local sustainability network that supports organizations to set and achieve carbon reduction goals. Working with a list of community partners, Sustainable Kingston will help each organization to create an action plan to reduce their greenhouse gas emissions. Through that plan, each organization will establish a baseline, monitor the changes in GHG emissions and have their progress publicly celebrated.

4.3 Implementation Framework



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Collaboration and Capacity Building

To realize the level of GHG emission reductions needed, it will take action at the community, provincial and national level. Locally, we will need to leverage our collective knowledge, partnerships, networks, resources and leadership. The development of this plan is the first step. As a community, we need to continue the conversation and increase stakeholder involvement and participation in existing and new actions.

Outreach, Education and Awareness:

- On-Line Tool kit: An on-line tool-kit will be developed. This will provide an information source for the community to take action at both an individual and workplace level.
- Speaker Series: The Kingston Climate Action Plan speaker series delivered by Sustainable Kingston, will enable the community to come together to share and learn.
- Sustainability CoLab: Through Sustainability CoLab, Sustainable Kingston will engage with local organizations to understand their GHG emissions and establish a plan for reduction.

Volunteer Development:

Kingston has a rich culture of volunteerism. The implementation of many of the actions within the plan will draw on the existing and growing number of volunteers within the community. Organizations working together in partnerships will create opportunities for volunteers to develop new skills and foster new relationships.

Champion and Partnership Cultivation:

To be successful each action will need a champion to lead its development and implementation. Action champions will be encouraged to step forward, to realize the benefits of action and work together to seek funding opportunities and shared synergies.

2 Enabling and Taking Action

Leadership Team:

A leadership team will be developed to address concept actions and foster increased support and leverage for existing actions.

Strategic Initiatives:

The City will develop strategic initiatives within its direct control and influence to reduce GHG emissions. A network of NGOs such as Sustainable Kingston, Sustainability CoLab, Hearthmakers, SWITCH, Utilities Kingston and renewable energy cooperatives will be fostered to develop events and initiatives to advance the goals, objectives and actions identified in this plan.

Lead by Example:

Queen's University has established its Climate Action Plan and the City of Kingston will develop a Corporate Climate Action Plan. Other community organizations will be encouraged to do the same to reduce their energy expenditures and GHG emissions.

Communications Strategy:

The City will implement a communications plan to promote a speakers series as well as marketing initiatives and actions.

3 Monitor, Report and Re-Evaluate

In order to determine if progress is being made to reach the reduction targets, it is important to continue to monitor community GHG emissions, access the status of the indicators identified within this plan and monitor the progress of existing and new actions. By sharing status information and ensuring an open dialogue with the community identified actions will be re-evaluated and possible new actions will be identified. This process will keep the Kingston Climate Action Plan a vibrant and relevant guiding document.

Community GHG Emission, Indicator and Plan Review:

The City will provide updates of the corporate and the community GHG emission inventories and will monitor the indicators presented within this plan. With input from the community organizations, the City will provide status updates of the progress that the community has had in addressing the goals, objectives and targets of the Kingston Climate Action Plan.

Celebrate Success and Plan for Continued Action:

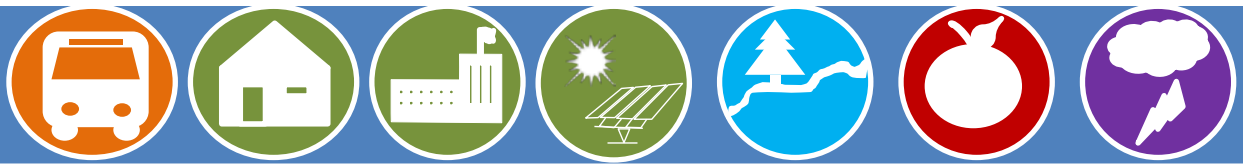
Through partnerships, we will access our progress, celebrate our successes and seek new opportunities to advance the goals of this plan.

4.4 Taking Climate Action

Reduce your Carbon Footprint and Increase your Climate Resilience

This section provides tips for individuals (4.4.1) and organizations (4.4.2) to reduce their GHG emissions and advance the goals and objectives of each of the five theme areas. For more resources please visit the Kingston Climate Action Plan Toolkit at:

CityofKingston.ca/ClimateAction



The tips provided are categorized (where possible) into three levels based on the anticipated impact, capital cost, pay-back and behavioural change needed.

Getting Started

- Low or no capital cost
- Minor behavioural change
- Immediate payback

Making Progress

- Consider GHG emissions when making a replacement purchase
- Moderate capital costs incurred
- Intermediate behavioural change
- Medium-term payback

Low Carbon Lifestyle/Culture

- GHG emission is a major factor in decision making
- Significant costs incurred
- Major behavioural change
- Longer-term payback

Towards A Low Carbon Lifestyle/Culture

4.4.1 Individual Tips

Section 4.4.1 focuses on efforts that an individual can take to reduce GHG emissions and become more resilient to a changing climate. Tips for transportation, energy and climate resilience are subdivided into the three categories: getting started, making progress and low carbon lifestyle. General individual tips are provided for resources and natural systems as well as agriculture and food security.

Tips for individuals to reduce their GHG emissions from transportation are provided below.

Transportation: Tips for Individuals

Getting Started	• Choose active transportation whenever possible (cycle or walk). • Choose transit or carpool over car use whenever possible. • Do not idle and avoid drive-thrus. • Plan your trips to ensure that you drive as little as possible. • Ensure that your vehicle is well maintained (i.e. tire pressure, and check air filter monthly). • Do not drive aggressively. Up to a 25% increase in fuel efficiency can be gained by: accelerating gently, maintaining a steady speed, anticipating traffic, coasting to decelerate and avoiding high speeds. • Use air conditioning sparingly.
Making Progress	• When buying a new car, ensure that it is right-size for your needs, is the best in its fuel class and is at least 2011 emission compliant.
Low Carbon Lifestyle	• For people looking to buy a home, look for a location within a 30 minute walk to work and major amenities, thereby reducing your daily transportation needs. • Choose to live without a car on a daily basis. Seek car share options for those times when you do need a car. • If you must own a car, transition to hybrid, electric and bio-fuels.

More resources available at the Kingston Climate Action Plan Toolkit
CityofKingston.ca/ClimateAction

Tips for individuals to reduce GHG emissions associated with the energy consumed in their homes are provided below.

Energy (Homes and Renewables) Tips

Getting Started

- Review your bills and track your energy consumption and energy costs from all sources.
- Use appliances between 7pm and 7am when the demand for electricity is low and off-peak pricing is in place.
- Change furnace air filter once every 2 to 3 months and regularly service your heating, ventilation and air conditioning systems to ensure maximum efficiency.
- Caulk and weather-strip doors and windows.
- Use programmable thermostats and turn down thermostats to reduce heating and cooling requirements when no one is home. Wear a sweater in the winter and lower the heating temperature.
- Use a fan in the summer and use air conditioning sparingly.
- Close exterior doors during hot and cold days.
- Turn down the setting on your water heater and insulate the hot water tank and pipes.
- Use rain barrels and plant drought resistant plants.
- Take shorter showers and use a low-flow shower head.
- Ensure that the dishwasher and the laundry machines are full when you run a load.
- Wash clothes in cold water and use a clothesline to dry your clothes.
- Set the fridge to 3 °C and the freezer to -18 °C.
- Switch to compact fluorescent light bulbs.
- Turn off lights when not in use.
- Try to not use power equipment when landscaping.
- Use the SaveOnEnergy old fridge and freezer pick up program.

Making Progress

- When buying new appliances buy Energy Star appliances.
- Take advantage of incentives (i.e. Union Gas, SaveOnEnergy).
- Take advantage of Utilities Kingston multi-residential low flow toilet rebates.
- Join a local renewable energy cooperative (Wintergreen, Queen St.).
- Have an energy audit conducted on your home and implement the
- recommendations.
- If buying a home, require an EnerGuide rating for the home so that
- energy efficiency and energy costs are factors in the buying decision.

Low Carbon Lifestyle

- Install renewable energy in your home (i.e. solar, geothermal).
- If building a new home, design and build an Energy Star home (EnerGuide Rating: 86), LEED home or a passive design home.

Tips for individuals to reduce GHG emissions through their management of resources and natural systems as well as their approach to agriculture and food security are provided below. These tips provided are general and have not been categorized.

Resources and Natural Systems Tips for the Individual

- Use your green bin or backyard composter to compost organic material (food waste, leaf and lawn waste) rather than putting it in the garbage.
- Recycle materials (paper, metals, plastic, glass, cardboard, electronics, batteries, printer cartridges, and electronic equipment).
- Discard of hazardous wastes at the household hazardous waste centre.
- Participate in give away days rather than placing items you no longer want in the garbage.
- Participate in the Pitch-In Kingston community clean up day.
- Donate unused items rather than putting them in the garbage.
- Consider buying a gently used item rather than buying new.
- Plant drought resistant plants.
- Plant climate resistant trees to provide shade.
- Maximize the amount of permeable surfaces on your property.

Agriculture and Food Security Tips for the Individual

- Support local food markets and buy local food as much as possible.
- Start your own garden on your property or participate in a community garden.
- Support Loving Spoonful's *Grow a Row* program to help meal programs and shelters.
- Support restaurants and grocers that provide local foods.
- Participate in community events celebrating local foods (i.e. Fare in the Square).



More resources available at the Kingston Climate Action Plan Toolkit
CityofKingston.ca/ClimateAction

Tips for individuals to be resilient to a changing climate are provided below. These are general tips and are not categorized.

Climate Resilience Tips for the Individual

- Review the *Get Ready Kingston* Personal Emergency Preparedness Guide and make a household disaster plan, assemble an emergency supply kit (including adequate water supply and non-perishable foods) and put together a go bag.
- Make a list of emergency numbers.
- During a Power Failure (from *Get Ready Kingston*):
  - During a prolonged power failure, drain pipes to prevent them from freezing and bursting.
  - Turn off appliances that would turn on automatically when the power is restored.
  - Keep refrigerator and freezer doors closed to maintain cold.
  - Do not use a barbeque, a camp stove or a generator indoors since they generate dangerous levels of carbon monoxide.
- During a gas leak (from *Get Ready Kingston*):
  - Evacuate area and call 9-1-1.
  - Do not introduce a spark (i.e. no lighters or matches).
  - If the odour is strong, do not use your phone, operate light switches or electrical devises. Any spark could cause a fire.
- During periods of extreme heat:
  - Educate yourself and your family about how to prevent heat-related illness and the signs of heat-related illness including: dehydration, heat cramps, heat exhaustion and heat stroke.
  - If you have elderly neighbours, check on them when a heat alert has been issued.
  - Inform yourself about the location of the closest cooling centre to your home.
  - Be aware of the increased risk of respiratory illnesses during periods of extreme heat.
- During periods of extreme cold:
  - Be aware of cold related illness and how to prevent, recognize and treat them (i.e. frost bite and hypothermia).
  - Inform yourself about the location of the closet warming centre in case your home heating system is not working (i.e. electric heating during a power failure) during a period of extreme cold.
  - Check on any elderly neighbours.
  - Only use heating devices designed for indoor purposes.
- Be aware of changing road conditions.

Climate Resilience
Tips for the Individual

- Be aware of basement flood prevention during extreme rain or melt (select tips from Utilities Kingston *Flood Facts and Tips)*:
    - If connected to the City sewer, have a plumber inspect your sewer lateral every 5 to 10 years.
    - Understand how your drainage and plumbing works.
    - Ensure that your sump pump is working and that rain water drains only onto your lawn or the storm sewer. Rain water should not drain into the sanitary sewer.
    - Reduce water use on rainy days.
    - Maintain the foundation of your home.
    - Install a backwater sanitary valve.
    - Make sure your downspouts and eaves troughs are free from debris.
    - Manage your property's runoff. Lot grading can move water away from your house.
    - Inspect your property when it rains.
- During periods of drought, follow the water-use restrictions imposed by the local Water Response Team for homes with wells and by Utilities Kingston for homes connected to City water.
- Lyme Disease Prevention, Recognition and Treatment:
    - Educate yourself and your family about the cause, treatment and prevention of Lyme disease (Local Public Health website).
    - Make it a habit to check yourself, your family and your pets after being in areas where ticks could be present.

More resources available at the Kingston Climate Action Plan Toolkit
CityofKingston.ca/ClimateAction

4.4.2 Tips for Organizations

Section 4.4.2 focuses on efforts that an organization can take to reduce GHG emissions and become more resilient to a changing climate. Tips for transportation and energy as well as resources and natural systems are subdivided into the thee categories: getting started, making progress and low carbon lifestyle. General tips for organizations are provided for agriculture and food security as well as climate resilience.

Tips for organizations to reduce GHG emissions from transportation are provided below.

Transportation: Tips for Organizations

Getting Started	• Engage staff to seek opportunities to reduce fuel consumption from workplace travel as well as alternatives to the single occupancy vehicle for employee commuting. • Understand your employees' commuting habits and barriers to active transportation, use of transit or carpooling. • Enrol in the Kingston Transit Transpass program which offers employees a discounted monthly pass, paid for through payroll deductions and a public transit tax credit. • Develop a carpool program at your workplace. • Ensure that work vehicles are well maintained (i.e. tire pressure). • Educate staff about the impact of idling, aggressive driving habits on fuel efficiency and GHG emissions. • Track the mileage, cost and GHG emissions from work vehicles. • Consider alternatives to workplace travel (i.e. Skype, webinars).
Making Progress	• When replacing a work vehicle, ensure that it is right-sized, has the highest fuel efficiency of its class and is at least 2011 emission compliant. • Provide shower facilities, lockers and bike parking to promote cycling to and from work. • Seek opportunities to gain further commitment from employees through engagement, education, campaigns, recognition and celebrations.
Low Carbon Lifestyle	• Join the E3 Fleet rating program to move your fleet towards greater efficiency, reduced GHG emissions and lower fuel costs. • Put in place a work-from-home program to reduce employee travel. • Transition to hybrid, electric vehicles and bio-fuels.

Tips to enable reduced GHG emissions from organizations (or workplaces) are provided below.

Energy (Workplace) Tips

Getting Started

- Track the energy use and costs to heat, cool and power the workplace.
- Engage and educate employees about climate change and the impact of energy consumption on cost and GHG emissions.
- Develop a program to engage employees to identify opportunities to reduce energy consumption.
- Educate staff and establish maximum winter and minimum summer indoor temperatures.
- Ensure that the heating, ventilation and air conditioning (HVAC) system is regularly serviced to maintain efficiency.
- Keep exterior doors closed during cold and hot days.
- Turn off computer monitors when not in use and activate the energy saving feature on all monitors.
- Turn-off photo copiers and other office equipment during off-hours and when not in use.
- Turn off lights when not in use and make use of natural light.
- Switch to LED light bulbs.
- Match lighting level to the task need.
- Use drought resistant and climate resilient plants in landscaping.

Making Progress

- Have an energy audit conducted and implement the low-medium cost recommendations.
- Seek electricity consumption and cost saving opportunities from the SaveOnEnergy program delivered through the LDCs.
- Seek applicable natural gas consumption and cost savings incentives from Union Gas (available to Union Gas customers).
- Seek opportunities to reduce water consumption through incentives from Utilities Kingston.
- Install low-flow toilets and faucets as well as waterless urinals.
- When upgrading HVAC systems choose the most energy efficient option available.

Low Carbon Lifestyle

- Develop a workplace climate action plan, with a vision, reduction targets, reduction actions, implementation plan as well as indicators for measuring progress.
- Install renewable energy (i.e. solar, geothermal, biomass).
- Buy renewable power (i.e. Bullfrog Power).
- Integrate energy efficiency and low carbon decision making into policies, standard operating procedures and the corporate culture.

Tips for organizations to reduce GHG emissions through the management of resources and natural systems are provided below.

Resources and Natural Systems Tips for Organizations

Getting Started

- Engage staff to identify opportunities for waste reduction.
- Have your organic materials (food waste and brush and leaf waste) collected for composting or treatment.
- Donate unused food to meal programs and shelters.
- Recycle materials (paper, metals, plastic, glass, cardboard, electronics, batteries, printer cartridges and electronic equipment).
- Reduce your use of paper as much as possible.
- Use only Forest Stewardship Council (FSC) paper.
- Seek out customers or alternate uses for any by-products of your operation that currently go to landfill.
- Avoid buying products with excess packaging.

Making Progress

- Encourage staff to participate in the spring Pitch in Day to clean up our community.
- Landscape with climate resistant plants and trees.
- Incorporate recycled content, recycleable content and FSC certified paper products and wood into your purchasing decisions.
- Conduct a waste audit.
- If your property has the space, either plant climate resistant trees yourself or allow others to plant climate resistant trees on your property.

Low Carbon Lifestyle

- Develop a waste management plan. Engage staff to develop targets for waste reduction, develop strategies and an action plan to reach the targets and establish indicators to measure progress towards meeting the targets.
- Communicate the progress towards reaching targets and celebrate successes.
- Integrate waste management and waste reduction strategies into the workplace culture.

More resources available at the Kingston Climate Action Plan Toolkit
CityofKingston.ca/ClimateAction

Tips for organizations to reduce GHG emissions through their approach to agriculture and food security as well as climate resilience are provided below. These tips provided are general and have not been categorized.

Agriculture and Food Security Tips for Organizations

- Engage caterers that provide local foods for organization events.
- If your organization provides food on a daily basis, highlight local food options and try to source as much as possible from local producers.
- Support restaurants that feature local products for business lunches and dinners.
- Work with Loving Spoonful to provide excess food to shelters and meal programs.
- If possible, make land available for community gardens on your property.

Climate Resilience Tips for Organizations

Conduct a climate vulnerability assessment to determine the risks exposure to your employees, clients and your operation to the impacts of climate change including extreme weather and increased presence of vector borne disease. Extreme weather includes: extreme wind, ice storms, extreme heat and cold, extreme rain, drought, snow storms and thunder storms. Based on the outcome of the vulnerability assessment develop strategies and actions to mitigate the risks as well as indicators to measure progress.

5.0 Glossary and Acronyms

CDD: Cooling Degree Days

CDD is a measure of the energy needed to cool a building. The number of degrees that a day's average temperature is above 18 degrees Celsius is the number of CDD. For example if the day's average temperature is 26 degrees Celsius, then the number of CDD for that day would be 8 degrees Celsius.

CIP: Community Improvement Plan [52]

A community improvement plan is a tool that allows a municipality to direct funds and implement policy initiatives toward a specifically defined project area.

CO_2: Carbon Dioxide

Carbon dioxide is a by-product of the combustion of fossil fuels and is a key greenhouse gas.

CO_2e: Carbon Dioxide Equivalent

Carbon Dioxide Equivalent is a way of describing different greenhouse gases in a common unit. For a quantity and particular greenhouse gas, carbon dioxide equivalent is the amount of carbon dioxide which would have the equivalent global warming potential (GWP). CO_2e is very important because it allows different greenhouse gases to aggregated and expressed as a single unit.

CRCA: Cataraqui Regional Conservation Authority[53]

The CRCA is made up of 11 watersheds (including the Cataraqui River, Millhaven Creek and Little Cataraqui Creek) and jurisdiction over 3,500 sq. km of land. The services and facilities provided by the CRCA include:

- watershed strategies and management;
- mapping and development of a natural resources database for the watershed;
- technical assistance to landowners;
- conservation education programs for schools;
- outdoor recreation facilities such as conservation areas, trails and boat ramps;
- environmental land use planning;
- habitat protection and reforestation;
- flooding and erosion protection;
- sensitive wetlands, floodplains, shorelines and valley land protection, and
- water quality and quantity monitoring.

EnerGuide Home Rating:
EnerGuide for Home rating system is a program developed by Natural Resources Canada in 2006. The EnerGuide for Houses scale goes from 0-100 with 0 being the least efficient and 100 being the most energy efficient. An ENERGY STAR home has an EnerGuide rating of approximately 86 and an R-2000 home has an EnerGuide rating of approximately 80.

ENERGY STAR Home:
In 2005, Natural Resources Canada expanded the ENERGY STAR initiative to include homes as well as appliances. ENERGY STAR qualified new homes have increased energy efficiency than those built to code. ENERGY STAR homes typically have an EnerGuide rating of approximately 86.

FCM: Federation of Canadian Municipalities
The FCM is a membership based not-for-profit organization that represents the interests of municipalities on policy and program matters that fall within federal jurisdiction. The FCM provides networking, education and funding opportunities to Canadian municipalities.

GWP: Global Warming Potential
The global warming potential of a green house gas indicates the amount of warming a gas causes over 100 years. The GWP is an index where CO_2 is given a value of 1 and the GWP of other GHG gases is the number of times more warming they cause compared to CO_2. For example, methane (CH_4) causes 25 times more warming than CO_2 over 100 years.

HDD: Heating Degree Days
HDD is a measure of the energy needed to heat a building. The number of degrees that a day's average temperature is below 18 degrees Celsius is the number of HDD for that day. For example, if the average temperature for a day was 10 degrees Celsius then the HDD for that day would be 8 degrees Celsius.

IPCC: Intergovernmental Panel on Climate Change

kWh: kilowatt – hour:
A kilowatt-hour is a unit of energy equivalent to 1000 Watts of electricity used for 1 hour. For example, a 100 watt light bulb for 1 hour uses : 100watts x (1 kW/1000 watts) x 1 hour = 0.1 kWh.

LDCs: Local Distributing Companies
This term refers to the companies that distribute electricity and natural gas to our community. For electricity this includes Hydro One and Kingston Hydro. For natural gas this includes Union Gas and Utilities Kingston.

LEED: Leadership in Energy and Environment Design[54]
Leadership in Energy and Environmental Design (LEED) is a sustainable building rating system that is administered in Canada by the Canada Green Building Council (CaGBC). Over the past 11 years, the CaGBC has certified over 1000 LEED buildings in Canada.

ppm: parts per million
Parts per million is a measure of concentration.

R-2000 Home:
An R-2000 home is a voluntary energy efficiency standard that is certified by the federal government. Typical features include: high insulation in the walls, ceiling and basements, high-efficiency windows and doors, high-efficiency heating and cooling systems, whole-house ventilation and testing to ensure minimal air leakage. This standard is regularly updated.

TDM: Transportation Demand Management

SOV: Single Occupancy Vehicle

VKT: Vehicle kilometers travelled

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Page 9: Disaster Frequency in Canada: Public Safety Canada, 2013. Graphic provided by Risk Sciences International.
Page 10: Images of Floods: Calgary Flood, July 2013: http://en.wikipedia.org/wiki/File:East_Village_Calgary_Flood_2013.jpg
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Page 13: Volunteers with DePAVE Paradise: Hearthmakers Energy Cooperative
Page 25: Sunset at "Time" statue on Kingston waterfront: Julie Scott
Page 41: House blueprints: Lizzography
Page 50: Home construction: Lizzography
Page 52: Man working on furnace: Lizzography
Page 59: DePave Paradise volunteers: Hearthmakers
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Page 63: Patchwork Organics at Springer Market: Wayne Hiebert
Page 64: Woman with Tomatoes at Springer Market: Wayne Hiebert; Two chefs at Sizzles restaurant: Four Points Sheraton
Page 69: Father, Daughter and water: Lesley Kimble
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Page 78: Image of How Municipalities Influence GHG Emissions: http://ghgtoolkit.mccac.ca/wp-content/uploads/2012/01/Municipal-GHG-Influence-V4.jpg
Page 84: Image of peppers: Four Points Sheraton
Page 86: Waves at Portsmouth Olympic Harbour: Bob Hales
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TriEdge

For more information on the Kingston Climate Action Plan visit: cityofkingston.ca/climateactionplan

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Our Vision:
Kingston - Canada's Most Sustainable City
One Action at a Time!

Final Plan (August 2014)

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