City of Hamilton
BOARD OF HEALTH

Meeting #: 19-006
Date: June 17, 2019
Time: 1:30 p.m.
Location: Council Chambers, Hamilton City Hall
71 Main Street West

Loren Kolar, Legislative Coordinator (905) 546-2424 ext. 2604

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1. CEREMONIAL ACTIVITIES

2. APPROVAL OF AGENDA

(Added Items, if applicable, will be noted with *)

3. DECLARATIONS OF INTEREST

4. APPROVAL OF MINUTES OF PREVIOUS MEETING

4.1 May 13, 2019

5. COMMUNICATIONS

5.1 Correspondence from Kingston, Frontenac and Lennox & Addington Public Health respecting Health Promotion as a Core Function of Public Health

Recommendation: Be endorsed.

5.2 Correspondence from the Renfrew County and District Health Unit respecting a Review of Provincial Budget and Proposed Changes to Public Health

Recommendation: Be received.

5.3 Correspondence from the Association of Local Public Health Agencies respecting an Update to Board of Health Members

Recommendation: Be received.

5.4 Correspondence from the Brant County Health Unit respecting Concerns with the 2019 Provincial Budget

Recommendation: Be received.

5.5 Correspondence from Public Health Sudbury & Districts respecting the North East Public Health Regional Boundaries - Modernization of the Ontario Public Health System

Recommendation: Be received.

5.6 Correspondence from Kingston, Frontenac and Lennox & Addington Public Health respecting the Provincial Government's Decision to Reverse Retroactive Funding Changes to Municipalities

Recommendation: Be received.

6. DELEGATION REQUESTS

7. CONSENT ITEMS

8. PUBLIC HEARINGS / DELEGATIONS

9. STAFF PRESENTATIONS

9.1 Corporate Climate Change Task Force Response to the Climate Change Emergency Declaration (BOH19022) (City Wide)

10. DISCUSSION ITEMS

10.1 Arrell Youth Centre Secondment (BOH17008(a)) (City Wide)

10.2 By-law No. 11-080 To Prohibit Smoking Cannabis and Vaping Within City Parks and Recreation Properties (BOH07034(n))

11. MOTIONS

11.1 Establishment of Departmental Climate Change Workplans within the City of Hamilton

12. NOTICES OF MOTION

13. GENERAL INFORMATION / OTHER BUSINESS

14. PRIVATE AND CONFIDENTIAL

15. ADJOURNMENT

BOARD OF HEALTH
MINUTES 19-005

1:30 p.m.
Monday, May 13, 2019
Council Chambers
Hamilton City Hall

Present: Mayor F. Eisenberger (Chair)
Councillors M. Wilson, J. Farr, N. Nann, C. Collins, T. Jackson, E. Pauls, J.P. Danko, B. Clark, M. Pearson, B. Johnson, L. Ferguson, A. VanderBeek, T. Whitehead and J. Partridge

Absent with Regrets: Councillor S. Merulla – City Business

THE FOLLOWING ITEMS WERE REFERRED TO COUNCIL FOR CONSIDERATION:

1. Appointment of a Vice-Chair of the Board of Health for the 2018-2022 Term (Item 1)

(Eisenberger/Danko)
That Councillor M. Wilson be appointed as the Vice-Chair of the Board of Health for the 2018-2022 term.

Result: **Motion carried by a vote of 13 to 0, as follows:**

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
NOT PRESENT - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
YES - Councillor Terry Whitehead
YES - Councillor Arlene VanderBeek
NOT PRESENT - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

2. Correspondence from Sudbury & Districts Public Health, respecting Support for Bill S-228, the Child Health Protection Act (Item 5.14)

(Clark/Pearson)
That the Correspondence from Sudbury & Districts Public Health, respecting Support for Bill S-228, the Child Health Protection Act, be endorsed by the Board of Health.

Result: Motion CARRIED by a vote of 14 to 0, as follows:

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
NOT PRESENT - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
YES - Councillor Terry Whitehead
YES - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

3. Correspondence from the Simcoe Muskoka District Health Unit, respecting Urgent Provincial Action to Address the Potential Health and Social Harms from the Ongoing Modernization of Alcohol Retail Sales in Ontario (Item 5.15)

(Whitehead/Ferguson)
That the Correspondence from the Simcoe Muskoka District Health Unit, respecting Urgent Provincial Action to Address the Potential Health and Social Harms from the Ongoing Modernization of Alcohol Retail Sales in Ontario, be endorsed by the Board of Health.

Result: Motion CARRIED by a vote of 14 to 0, as follows:

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
NOT PRESENT - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
YES - Councillor Terry Whitehead
YES - Councillor Arlene VanderBeek

YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

4. Menstrual Products (BOH19019) (City Wide) (Item 7.1)

(Collins/Jackson)
That Report BOH19019, respecting Menstrual Products, be received.

CARRIED

5. Stock Epinephrine Auto Injector Expansion in Restaurants (BOH13040(f)) (City Wide) (Item 7.2)

(Ferguson/Johnson)
That Report BOH13040(f), respecting Stock Epinephrine Auto Injector Expansion in Restaurants, be received.

CARRIED

6. Amendments to By-Law No. 11-080 To Prohibit Smoking Cannabis and Vaping Within City Parks and Recreation Properties (BOH07034(m)) (City Wide) (Item 10.1)

(Pearson/Johnson)
That City of Hamilton Legal Services, in consultation with Public Health Services, prepare a by-law for the Board of Health's consideration, to amend City of Hamilton By-Law No. 11-080 Prohibiting Smoking Within City Parks and Recreation Property in order to include additional prohibitions on the smoking of cannabis and vaping within City-owned parks and recreation properties.

Result: Motion CARRIED by a vote of 12 to 0, as follows:

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
NOT PRESENT - Councillor Chad Collins
YES - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
NOT PRESENT - Councillor Terry Whitehead
NOT PRESENT - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

7. Clean Air Hamilton 2019 Funding (BOH19021) (City Wide) (Item 10.2)

(Johnson/Pearson)
That the following vendors, identified by Clean Air Hamilton, for the delivery of 2019 air quality programs to be funded through the 2019 Public Health Services operating budget, be approved:

(a) Green Venture and Corr Research Inc. for the delivery of Fresh Air for Kids ($10,580);

(b) Cycle Hamilton Coalition Inc. for the delivery of Friendly Streets ($12,000); and,

(c) Environment Hamilton Inc. for the delivery of Trees Please ($12,420).

Result: Motion CARRIED by a vote of 12 to 0, as follows:

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
NOT PRESENT - Councillor Chad Collins
YES - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
NOT PRESENT - Councillor Terry Whitehead
NOT PRESENT - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

9. Mandatory Rabies Immunization (BOH19018) (City Wide) (Item 10.3)

(Johnson/Ferguson)
(a) That Hamilton Animal Services assume the enforcement of mandatory rabies immunization pursuant to Regulation 567 under the *Health Protection and Promotion Act*; and

(b) Revenue generated via charges be directed towards improvement and enhancements within Hamilton Animal Services' overall rabies response program through responsible pet ownership.

Result: Motion CARRIED by a vote of 12 to 0, as follows:

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann

NOT PRESENT - Councillor Sam Merulla
NOT PRESENT - Councillor Chad Collins
YES - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
NOT PRESENT - Councillor Terry Whitehead
NOT PRESENT - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

10. Update on Provincial Funding Issues for Public Health Services (Item 10.4)

(Pauls/Ferguson)
That the Update on Provincial Funding Issues for Public Health Services, be received.

CARRIED

FOR INFORMATION:

(a) APPOINTMENT OF A VICE-CHAIR FOR THE 2018-2022 TERM (Item 1)

Mayor Eisenberger relinquished the Chair to nominate Councillor M. Wilson as Vice-Chair of the Board of Health for the 2018-2022 Term.

(Whitehead/Danko)
That the resignation of Councillor Whitehead from the Association of Local Public Health Agencies Board, be received, to allow for the new Vice-Chair of the Board of Health to participate.

CARRIED

For further disposition, refer to Item 1

(b) CHANGES TO THE AGENDA (Item 2)

The Clerk advised the Board of the following change to the agenda:

12. NOTICE OF MOTION (Item 12)

12.1 Free Menstrual Products

(Clark/Pearson)
That the agenda for the May 13, 2019 Board of Health be approved, as amended.

Result: **Motion CARRIED by a vote of 14 to 0, as follows:**

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
NOT PRESENT - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
YES - Councillor Terry Whitehead
YES - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

(c) DECLARATIONS OF INTEREST (Item 3)

There were no declarations of interest.

(d) APPROVAL OF MINUTES OF PREVIOUS MEETING (Item 4)

(i) April 15, 2019 (Item 4.1)

(Collins/Danko)
That the Minutes of the April 15, 2019 meeting of the Board of Health be approved, as presented.

Result: **Motion CARRIED by a vote of 14 to 0, as follows:**

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
YES - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
YES - Councillor Terry Whitehead
NOT PRESENT - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson

YES - Councillor Maria Pearson
YES - Councillor Brad Clark

(e) COMMUNICATIONS (Item 5)

(Pearson/Clark)
That the following Correspondence Items, be received:

(i) Correspondence from Peterborough Public Health respecting Funding for the Healthy Babies, Healthy Children Program (Item 5.1)

(ii) Correspondence from Board of Health for Southwestern Public Health respecting a Vision Screening Funding Request (Item 5.2)

(iii) Correspondence from the Association of Local Public Health Agencies respecting a Post 2018 Municipal Election Flyer (Item 5.3)

(iv) Correspondence from the Association of Local Public Health Agencies respecting the 2019 Ontario Budget (Item 5.4)

(v) Correspondence from the Association of Local Public Health Agencies respecting the 2019 Ontario Budget Highlight's from the Association of Municipalities Ontario (Item 5.5)

(vi) Correspondence from the Association of Local Public Health Agencies respecting the 2019 Ontario Budget and Reducing Investments in Public Health (Item 5.6)

(vii) Correspondence from Kingston, Frontenac and Lennox & Addington Public Health respecting Ontario's Public Health Restructuring (Item 5.7)

(viii) Correspondence from the Thunder Bay District Health Unit respecting their Resolution regarding the Restructuring of Public Health in Ontario (Item 5.8)

(ix) Correspondence from the Perth District Health Unit respecting the 2019 Ontario Budget and the Impact on Public Health (Item 5.9)

(x) Correspondence from the Leeds, Grenville & Lanark District Health Unit respecting the 2019 Ontario Budget (Item 5.10)

(xi) Correspondence from Kingston, Frontenac and Lennox & Addington Public Health respecting their Endorsement of the Children Count Task Force Recommendations (Item 5.11)

(xii) Correspondence from Kingston, Frontenac and Lennox & Addington Public Health, respecting the Announced Expansion of the Sale of Alcohol in Ontario (Item 5.12)

(xiii) Correspondence from Hasting Prince Edward Board of Health, and Hasting Prince Edward Public Health respecting the 2019 Ontario Budget (Item 5.13)

CARRIED

(f) MOTION (Item 11)

(i) Free Menstrual Products (Added Item 11.1)

(Wilson/Nann)
WHEREAS, people who menstruate need adequate and appropriate access to menstrual products so that they can experience their full health potential, maintain dignity and participate fully in community;

WHEREAS, no internal programs to the City of Hamilton reported that they consistently budgeted for menstrual products;

WHEREAS, according to Plan Canada International study, one-third of Canadian women under the age of 25 struggled to afford menstrual products;

WHEREAS, the estimated annual cost of purchasing menstrual products ranges from $76 to $153;

WHEREAS, the inability to afford menstrual products is a health equity issue,

WHEREAS,the majority of individuals who menstruate have started their period unexpectedly in public without having the supplies they need, resulting in feelings of anxiety and embarrassment;

WHEREAS, all community agencies interviewed agreed there is a need for low or no cost menstrual products;

WHEREAS, menstruating is a natural bodily function, and access to menstrual products is as necessary as access to toilet paper;

WHEREAS, universal access to menstrual products contributes to the normalization of menstruation and enhanced access in a dignified way;

WHEREAS, other Canadian cities, including London and Sarnia are already piloting and/or assessing the feasibility of menstrual product access programs;

WHEREAS, recreation centres and libraries service a large population, diverse in age and socioeconomic status;

WHEREAS, public-facing City of Hamilton facilities can be accessed by all members of the community at no cost; and

THEREFORE, BE IT RESOLVED:

(a) That the City of Hamilton work towards providing free menstrual products (pads and tampons) in all public-facing municipally-run facilities in the following ways:

(i) That staff report back to the Board of Health outlining options and costs for a pilot project that would offer menstrual products in select recreation centres and library locations;

(ii) That the evaluation of the pilot project also includes qualitative data from people using the products;

(iii) That the pilot results inform the feasibility of expanding the provision of free menstrual products in all public-facing municipal buildings;

(iv) That the Board of Health refer this report to Hamilton-Wentworth Catholic District School Board Liaison Committee and the Hamilton-Wentworth District School Board Liaison Committee to determine the feasibility of a targeted or universal approach to enhance access to no cost menstrual products within the school system;

(v) That the Board of Health correspond with the Premier of Ontario and relevant Ministries to request an increase in social assistance rates to a level that reflects the true costs of basic needs, taking into consideration the added costs for people that menstruate; and,

(vi) That May 28th of each year be recognized as Menstrual Health Day.

(Wilson/Nann)
That the motion respecting Free Menstrual Products, be deferred to a future Board of Health meeting.

Result: **Deferral Motion DEFEATED by a tied vote of 7 to 7, as follows:**

YES - Councillor Maureen Wilson
NOT PRESENT - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
YES - Councillor Tom Jackson
NO - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
NO - Councillor Judi Partridge
NO - Councillor Terry Whitehead
NO - Councillor Arlene VanderBeek

NO - Councillor Lloyd Ferguson
NO - Councillor Brenda Johnson
NO - Councillor Maria Pearson
YES - Councillor Brad Clark

(Jackson/Clark)
That sub-section (a) to the motion respecting Free Menstrual Products be amended by deleting the phrase "work towards", and replacing it with the phrase "explore the feasibility of", to read as follows:

(a) That the City of Hamilton ~~works towards~~ ***explore the feasibility of*** providing free menstrual products (pads and tampons) in all public-facing municipally-run facilities in the following ways:

Result: ***Amendment*** **CARRIED by a vote of 9 to 6, as follows:**

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
YES - Councillor Tom Jackson
NO - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
NO - Councillor Judi Partridge
YES - Councillor Terry Whitehead
NO - Councillor Arlene VanderBeek
NO - Councillor Lloyd Ferguson
NO - Councillor Brenda Johnson
NO - Councillor Maria Pearson
YES - Councillor Brad Clark

(Nann/Farr)
That the motion respecting Free Menstrual Products, be further amended by removing sub-sections (iii) and (vi), and renumbering the remaining sections, to read as follows:

(a) That the City of Hamilton ***explore the feasibility of*** providing free menstrual products (pads and tampons) in all public-facing municipally-run facilities in the following ways:

(i) That staff report back to the Board of Health outlining options and costs for a pilot project that would offer menstrual products in select recreation centres and library locations;

(ii) That the evaluation of the pilot project also includes qualitative data from people using the products;

~~(iii) That the pilot results inform the feasibility of expanding the provision of free menstrual products in all public-facing municipal buildings;~~

(iii) That the Board of Health refer this report to Hamilton-Wentworth Catholic District School Board Liaison Committee and the Hamilton-Wentworth District School Board Liaison Committee to determine the feasibility of a targeted or universal approach to enhance access to no cost menstrual products within the school system;

(iv) That the Board of Health correspond with the Premier of Ontario and relevant Ministries to request an increase in social assistance rates to a level that reflects the true costs of basic needs, taking into consideration the added costs for people that menstruate; and,

~~(v) That May 28th of each year be recognized as Menstrual Health Day.~~

Result: **Amendment CARRIED by a vote of 14 to 1, as follows:**

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
YES - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
NO - Councillor Judi Partridge
YES - Councillor Terry Whitehead
YES - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

Main Motion, ***as amended***, reads as follows:

(a) That the City of Hamilton ***explore the feasibility of*** providing free menstrual products (pads and tampons) in all public-facing municipally-run facilities in the following ways:

(i) That staff report back to the Board of Health outlining options and costs for a pilot project that would offer menstrual products in select recreation centres and library locations;

(ii) That the evaluation of the pilot project also includes qualitative data from people using the products;

(iii) That the Board of Health refer this report to Hamilton-Wentworth Catholic District School Board Liaison Committee and the Hamilton-Wentworth District School Board Liaison Committee to determine the feasibility of a targeted or universal approach to enhance access to no cost menstrual products within the school system; and,

(iv) That the Board of Health correspond with the Premier of Ontario and relevant Ministries to request an increase in social assistance rates to a level that reflects the true costs of basic needs, taking into consideration the added costs for people that menstruate.

Result: **Main Motion, *as amended,* DEFEATED by a vote of 8 to 7, as follows:**

YES - Councillor Maureen Wilson
YES - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
YES - Councillor Tom Jackson
NO - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
NO - Councillor Judi Partridge
NO - Councillor Terry Whitehead
NO - Councillor Arlene VanderBeek
NO - Councillor Lloyd Ferguson
NO - Councillor Brenda Johnson
NO - Councillor Maria Pearson
NO - Councillor Brad Clark

(g) NOTICE OF MOTION (Item 12)

(i) Free Menstrual Products (Added Item 12.1)

(Wilson/Nann)
That the Rules of Order be waived in order to allow for the introduction of a Motion respecting Free Menstrual Products

Result: **Motion CARRIED by a 2/3 Majority vote of 14 to 0, as follows:**

YES - Councillor Maureen Wilson
NOT PRESENT - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
YES - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
YES - Councillor Terry Whitehead
YES - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
YES - Councillor Brenda Johnson
YES - Councillor Maria Pearson
YES - Councillor Brad Clark

For further disposition, refer to Item (f)(i)

(h) GENERAL INFORMATION/OTHER BUSINESS (Item 13)

(i) Amendments to the Outstanding Business List (Item 13.1)

(Pearson/Ferguson)
That the following Due Dates be revised:

1. Item 2015-A
   Review of the City of Hamilton's Pest Control By-law (November 16, 2015, Item 9.1)
   Due Date: May 2019 Revised
   Due Date: TBD

2. Item 2016-B
   Food Strategy Priority Actions 2 & 3 (August 11, 2016, Item 7.1)
   Due Date: March 2019 Revised
   Due Date: TBD

3. 2016-C
   Contaminated Sites Management Plan (December 5, 2016, Item 5.1)
   Due Date: Q4 2018
   Revised Due Date: TBD

That the following items be removed from the Outstanding Business List:

1. 2018-C
   Board of Health Self-Evaluation Results (BOH18011(a)) (City Wide) (September 17, 2018, 18-007, Item 5.5)
   Addressed in Item 1 of this agenda

2. 2018-D
   Stock Epinephrine Auto Injector Expansion in Restaurants (BOH13040(c))
   Original date: June 19, 2017, 17-005, Item 7.1
   Placed back on OBL: December 10, 2018, 18-009, Item 13.1
   Addressed in Item 7.2 of this agenda

3. 2018-F
   Free Menstrual Hygiene Products
   December 10, 2018, 18-009, Item 8.1
   Addressed in Item 7.1 of this agenda

4. 2019-A
   Feasibility of Amending City of Hamilton By-law 11-080 Prohibiting Smoking Within City Parks and Recreation Property to Incorporate a Prohibition on Recreational and Medicinal Cannabis Smoking and Vaping Within City-owned Parks and Recreation Properties
   January 14, 2019, 19-001, (Added Item 11.1)
   Addressed in Item 10.1 of this agenda

Result: Motion CARRIED by a vote of 11 to 0, as follows:

YES - Councillor Maureen Wilson
NOT PRESENT - Councillor Jason Farr
YES - Councillor Nrinder Nann
NOT PRESENT - Councillor Sam Merulla
YES - Councillor Chad Collins
YES - Councillor Tom Jackson
YES - Councillor Esther Pauls
YES - Councillor John-Paul Danko
YES - Chair Fred Eisenberger
YES - Councillor Judi Partridge
YES - Councillor Terry Whitehead
NOT PRESENT - Councillor Arlene VanderBeek
YES - Councillor Lloyd Ferguson
NOT PRESENT - Councillor Brenda Johnson
YES - Councillor Maria Pearson
NOT PRESENT - Councillor Brad Clark

(i) ADJOURNMENT (Item 15)

(Ferguson/Danko)
That, there being no further business, the Board of Health be adjourned at 3:43 p.m.

CARRIED

Respectfully submitted,

Mayor F. Eisenberger
Chair, Board of Health

Loren Kolar
Legislative Coordinator
Office of the City Clerk

KFL&A Public Health

May 23, 2019

Received May 23 2019
MOH Office

VIA: Electronic Mail (christine.elliott@pc.ola.org)

Honourable Christine Elliott
Minister of Health and Long-Term Care and Deputy Premier of Ontario
Hepburn Block
10th Floor
80 Grosvenor Street
Toronto, ON M7A 1E9

Dear Minister Elliott:

RE: Health Promotion as a Core Function of Public Health

The Kingston, Frontenac and Lennox & Addington (KFL&A) Board of Health passed the following motion at its May 22, 2019 meeting:

THAT the KFL&A Board of Health strongly urge the Government of Ontario to maintain the current health promotion mandate of local public health units; and

THAT the KFL&A Board of Health ask the Government of Ontario to consult with Medical Officers of Health across Ontario should they consider any changes to the health promotion mandate and/or functions of local public health units or future public health entities.

There has been a recent flurry of media attention on public health in Ontario in response to announced changes to the public health system including decreased funding, a change in how public health units are funded, and the transition of 35 public health units to ten regional public health entities. In this media maelstrom, there has been recognition of the importance of public health and the programs and services it provides; however, the current media rhetoric regarding the benefits of public health is almost exclusively focused on the health protection and disease prevention mandates of public health agencies (e.g., preventing and mitigating infectious diseases such as measles and SARS). While these are critical aspects of the work public health provides to our communities, the Provincial Government has been silent on the importance of health promotion as a core function of public health. Furthermore, when health promotion work is mentioned, the Government of Ontario has noted that the Ministry of Health and Long-Term Care will assume centralized lifestyle messages or has noted that the work (e.g., a study of energy drinks or bike lanes) is not where public health should invest its resources. This is worrisome.

. . . / 2

KFL&A Public Health

Honourable Christine Elliott
Minister of Health and Long-Term Care and Deputy Premier of Ontario
Letter Continued. . . *Page 2*

Health promotion is more than just crafting messages and making posters. It is the methodical and scientific application of a comprehensive approach to address health issues. Components of health promotion include strengthening community action, developing personal skills, creating supportive environments, building healthy public policy, and re-orienting the health care system. Health promotion, when used with fidelity, has demonstrated great success. Tobacco is a great example of a health promotion success story. While most people would agree that the policy and taxation levers used by the federal and provincial governments are responsible for the dramatic and sustained drop in smoking rates, it is the work of health promotion that enabled those tools to be created and enacted. It was through successful knowledge translation activities informing the general public of the evidence that smoking causes lung cancer, the evaluation of prevention and cessation programs, and community action and advocacy from non-smokers—all the result of health promotion—that put tobacco on the public's agenda. Once tobacco was on the public's agenda, and recognized as a health hazard, policies were implemented, and continue to be implemented to this day, to protect the public from the harms of tobacco use. Clearly, health promotion is an effective tool to improve the health of the population.

Furthermore, effective health promotion is needed now more than ever as communities across Ontario grapple with the epidemic of chronic diseases. In Ontario, chronic diseases are the leading cause of disability and death and account for nearly 80% of all deaths. With a rapidly aging population, the prevalence of chronic diseases is expected to rise along with a significant associated financial toll on the provincial health care budget. Health care costs in Ontario are projected to account for 70 percent of the provincial budget by 2022 and 80 percent by 2030, making the prevention of chronic diseases a health and financial priority.

Medical Officers of Health -- highly trained and trusted professionals with the expertise to address health threats in their communities -- are well-positioned to determine effective strategies to address common risk factors for chronic disease (i.e., tobacco use, alcohol use, unhealthy eating and physical inactivity) and other factors that impact health such as early childhood development, mental health and the social determinants of health. Medical Officers of Health must be afforded the full slate of public health tools to protect and promote the health of their communities.

. . . / 3

KFL&A Public Health

Honourable Christine Elliott
Minister of Health and Long-Term Care and Deputy Premier of Ontario
Letter Continued. . . *Page 3*

Health protection, disease prevention and health promotion are equally important and core functions of public health. Having a well-resourced public health system with the tools required to address both acute and chronic health threats is the best chance that Ontario has to make our health care system sustainable, to end hallway medicine, and to protect what matters most – health.

Yours truly,

Denis Doyle, Chair
KFL&A Board of Health

Copy to: The Honourable Doug Ford, Premier
Ian Arthur, MPP Kingston and the Islands
Randy Hillier, MPP Lanark-Frontenac-Kingston
Daryl Kramp, MPP Hastings-Lennox and Addington
Loretta Ryan, Association of Local Public Health Agencies
Dr. David Williams, Chief Medical Officer of Canada
Dr. Chris Mackie, Chair, Council of Medical Officers of Health
Susan Stewart, Chair, Ontario Chronic Disease Prevention Managers in Public Health
Monika Turner, Director of Policy, Association of Municipalities of Ontario
Ontario Boards of Health

Renfrew County and District Health Unit

"Optimal Health for All in Renfrew County and District"

Received May 03 2019
MOH Office

April 29, 2019

The Honourable Doug Ford
Premier of Ontario
Legislative Building, Queens Park
Toronto, ON M7A 1A1
Sent via email: doug.ford@pc.ola.org

The Honourable Christine Elliott
Deputy Premier and Minister of Health and Long-Term Care
Hepburn Block 10th Floor
80 Grosvenor Street
Toronto, ON M7A 1E9
Sent via email: christine.elliott@pc.ola.org

Dear Premier Ford and Minister Elliott,

During a special board meeting on April 24, 2019, the Board of Health for the Renfrew County and District Health Unit reviewed the budget tabled by the government of Ontario on April 11, 2019, with regard to the proposed changes to local public health. We are writing to express the views of the board members regarding the implications to the public health system.

Transformation of the system is planned for the immediate future, including the consolidation of public health units from 35 down to 10. The board asks the province to stop the planned reduction from 35 Health Units to 10.

As well, the funding arrangement between the Province and the municipalities is under review. We ask that the Province maintain the current 75 percent provincial, 25 percent municipal funding for Renfrew County and District Health Unit. The recently announced provincial funding reduction will have a devastating effect on the health of the residents of Renfrew County and District.

The board understands these changes have been announced in response to achieving efficiencies while increasing responsiveness to local public health needs.

The board asks the provincial government reconsider the funding reduction, as this will challenge our ability to continue to provide these essential services within our community.

The Province will soon begin consultations with individual boards of health and health units regarding the transition details from 35 health units to 10. The board, however, requests the Province of Ontario maintain the health protection and health promotion mandate of Renfrew County and District Health Unit.

The Board asks the Province of Ontario to recognize the vast distance and lack of homogeneity in Ontario. The Province must ensure that distances are manageable and that public health units are not overwhelmed because they are providing service to areas that are too large and vast.

The board in respect to public health restructuring affirms support of the Province of Ontario in implementing a common governance model for existing public health units. We request that consultations on this model begin immediately and do appreciate the opportunity to participate in this process.

Additionally, the board asks the Province to ensure this change in public health governance and organization is as effective and efficient as possible, while maintaining the strong public health presence and impact in our community.

The board considers these specific issues of significant importance during a potential restructuring process:

- Guarantee that service levels to our community will be maintained, with no service losses nor reduction to quality.

- Ensure meaningful involvement by the community throughout the change process.

- Improve the effectiveness of collaboration by grouping similar health unit populations together.

- Provide equitable access to lost administrative "back office" positions within the new Regional Public Health Entity for all current employees, through a fair competition process.

- Establish "back office" support services that are of equal quality or superior standards to those systems currently in place.

- Maintain appropriate municipal role in governance by obligated municipalities within the new structure.

The board commends the commitment by the Province to enhance the oral health efforts of public health with the $90 million funding for low-income seniors.

As we continue to deliver essential front line health protection and promotion services, we look forward to working with the Ministry so we may, together, achieve the efficiency goals while meeting local public health needs.

Sincerely,

Janice Visneskie Moore

Janice Visneskie Moore
Chair, Board of Health

cc: Renfrew County and District Board of Health
Dr. David Williams, Chief Medical Officer of Health
The Honourable John Yakabuski, MPP—Renfrew-Nipissing-Pembroke
Loretta Ryan, Association of Local Public Health Agencies—alPHa
Ontario Medical Association—OMA
Northern Ontario Municipal Association—NOMA
Federation of Northern Ontario Municipalities—FONOM
Monica Turner, Association of Municipalities—AMO
Rural Ontario Municipal Association—ROMA
Ontario Boards of Health
Renfrew County and District Municipalities and Townships

Fernandes, Krislyn

From: Susan Lee <susan@alphaweb.org>
Sent: May 10, 2019 10:04 AM
To: All Health Units
Subject: Update from alPHa BOH Section Executive - May 2019
Attachments: 2019 05 BOH Update to Members.pdf

Categories: Email - Completed, Councillor Correspondence/meetings

PLEASE ROUTE TO:

All Board of Health Members
****

Please find attached an update to all board of health members from the alPHa Boards of Health Section Executive Committee.

This quarterly update is provided to help members keep abreast of the BOH Section's and alPHa's activities as well as important sectoral news.

Regards,

Susan

Susan Lee
Manager, Administrative & Association Services
Association of Local Public Health Agencies (alPHa)
2 Carlton Street, Suite 1306
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Tel. (416) 595-0006 ext. 25
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Please visit us at http://www.alphaweb.org

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Providing leadership in public health management

Update to Board of Health Members
May 10, 2019

2019 Ontario Budget: Public Health System Restructuring

On April 11, as part of the 2019 Ontario Budget reading, the provincial government announced plans to change the public health system as follows:

- reduce the number of public health units from the current 35 to 10 and move to a regional structure by 2020-21 (these 10 new regional public health entities will be governed by 10 regional boards of health, the size and composition of which are presently unknown);
- save $200 million annually from across the local public health system by 2021-22;
- streamline Public Health Ontario; and
- regionalize the public health laboratory system.

Since then, the Ministry of Health and Long-Term Care has informed health units that it will reduce the current provincial-municipal cost-sharing arrangement over the next three years beginning April 1, 2019 as follows:

Year	Provincial-Municipal Share for Toronto	Provincial-Municipal Share for All Other Health Units
2019-20	60/40	70/30
2020-21	60/40	70/30
2021-22	50/50	60/40 for 6 regions with population greater than 1 million; 70/30 for 3 regions with a population less than 1 million

alPHa Responses and Action

Soon after the budget announcements, alPHa and the membership worked to make Ontarians aware of public health's concerns over the potential negative impacts of these changes on community health and well-being. On April 24, a position statement was issued and a news release was sent out on April 12.

alPHa's Executive Committee, COMOH members, and Board of Health Chairs also held several emergency meetings over the past several weeks to discuss the proposals and strategize on next steps. The alPHa Board of Directors met at the end of April and sent a letter on May 3rd to the Minister of Health and Long-Term Care seeking clarification on aspects of the proposed changes. alPHa has set up a dedicated page on its website that houses all communications to date by the association, as well as those by members, on the proposed changes. These are being shared with health units and boards of health in the hopes they may be adapted for local context and use.

Quick Links to alPHa's Online Resources Regarding Public Health Restructuring:

- Speaking Notes – Toronto Board of Health Meeting May 6th
- Letter to the Minister
- alPHa Position Statement

- Speaking Notes – Toronto Board of Health Meeting April 15th
- alPHa News Release - Budget 2019 & PH Restructure
- alPHa Memo to Members - Budget 2019
- alPHa Post-Election Flyer
- alPHa Pre-Budget Submission 2019
- Resource Paper
- Local Public Health Responses
- alPHa Submission - Expert Panel on Public Health
- Public health promotional material including a brochure and video
- Media Coverage on Twitter: @PHAgencies

Next Steps

As we wait to hear further details from the Ministry in the coming weeks, alPHa encourages the membership to attend the upcoming annual conference in Kingston, Ontario. Retitled **Moving Forward with Public Health**, the program has been redrafted to reflect the recent announcements on sectoral changes. Canada's Chief Public Health Officer will kick off the event with a keynote address on building partnerships and there will be two panel discussions related to public health restructuring. The first panel will look at the cyclical nature of support for public health in this province and the second panel will examine the critical elements of Ontario's public health system as it evolves. This conference will provide many opportunities for board of health members to share their thoughts and ideas on restructuring as public health moves forward.

Upcoming Events and Meetings for All Board of Health Members

June 9-11, 2019: Moving Forward with Public Health, alPHa 2019 Annual General Meeting & Conference, Four Points by Sheraton Hotel & Suites, 285 King St. E., Kingston, Ontario.

June 11, 2019 (during alPHa Annual Conference): alPHa Boards of Health Section Meeting
All board of health members in Ontario are welcome to attend this meeting, which will be held during the alPHa Annual Conference in Kingston (pre-registration required).

This update was brought to you by the Boards of Health Section Executive Committee of the alPHa Board of Directors. alPHa provides a forum for member boards of health and public health units in Ontario to work together to improve the health of all Ontarians. Any individual who sits on a board of health that is a member organization of alPHa is entitled to attend alPHa events and sit on the Association's various committees. Learn more about us at www.alphaweb.org

BRANT COUNTY
HEALTH UNIT

194 Terrace Hill Street
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5.4

www.bchu.org

May 27, 2019

Received May 28 2019
MOH Office

The Honourable Doug Ford
Premier of Ontario
Legislative Building, Queen's Park
Toronto, ON M7A 1A1
(sent via email to: premier@ontario.ca)

The Honourable Christine Elliott
Deputy Premier and Minister of Health and Long-Term Care
Hepburn Block, 10th Floor
80 Grosvenor Street
Toronto, ON M7A 1E9
(sent via email to: Christine.elliott@ola.org)

Dear Premier Ford and Minister Elliott,

On behalf of the Brant County Health Unit (BCHU) Board of Health, we are writing to express our concerns regarding the implications of the 2019 budget. Ontario's local public health system is an essential part of keeping communities safe and healthy. Public health delivers an excellent return on investment and works on the front line to protect communities from illness, and promote health and wellbeing. The services provided by public health, outlined in the Ontario Public Health Standards, ensure that the population stays out of the health care system and remains healthy.

While we recognize the need for a sustainable public health system in Ontario, it is difficult to comprehend how a $200 million provincial reduction in preventative services will contribute to lowering future overall health care costs. The Public Health budget represents approximately 2% of the Province's total health care expenditures and every dollar spent on public health services saves an average of $14 in the acute care system. For every $1 invested in:

- immunizing children with the measles-mumps-rubella vaccine $16 are saved in health care costs;
- early childhood development and health care saves up to $9 in future spending on health, social and justice services;
- car and booster seat education and use saves $40 in avoided medical costs;
- fluoridated drinking water results in $38 saved in dental care;
- tobacco prevention programs saves up to $20 in future health care costs; and
- mental health and addictions saves $7 in health costs and $30 in lost productivity and social costs.

The proposed provincial reduction in funding for public health services represents a significant strain on the ability of local public health units, like the Brant County Health Unit, to continue to deliver on its mandate. A reduction in funding that represents 26% of the budget cannot occur without cutting services. These cuts will

impact on our ability to deliver the front-line public health services that keep people out of hospitals and primary care offices and will ultimately mean greater costs to the health care system.

Before the new directions for public health units are fully implemented, the BCHU Board of Health recommends that any changes to the funding ratio be done in consultation with municipalities rather than unilaterally by the Province and deferred to the municipal 2020 funding year. The 2019 municipal levy has already been established and municipalities are already almost 50% through their budget year.

Additionally, the BCHU Board of Health recommends that the following be considered when the development of the new regional public health entities and regional governance structure occurs to maintain a strong public health presence and impact in our community:

1. No loss of service to our community – All current programs and services under the Foundational and Program Standards continue to be funded by the Regional Public Health Entity to provide services in Brant.
2. Meaningful input into program planning – The needs of Brantford and Brant County are considered in the planning of programs and services for our community.
3. Integrity of the Health Unit – The Health Unit continues to function as a unit and services continue to be provided locally.
4. Appropriate municipal role in governance – The public expects that their municipal tax dollars are overseen by municipal politicians. For the municipal investment, representatives of the obligated municipalities will continue in this oversight role.
5. Effective administrative support – All administrative services provided by the Regional Public Health Entity will be at the same level or better than currently exists in the Health Unit.

Ontario local public health units play a crucial role in ensuring the safety, health and well-being of Ontario communities and their populations. This crucial role is played out daily as Public Health Units work diligently and professionally to protect their communities from illnesses and promote health and well-being. These services outlined in the Ontario Public Health Standards and Related Programs ensure that our population remains healthy and does not end up requiring costly care and treatment in hospital emergency rooms and wards. The Board of Health for the Brant County Health Unit implores your government to leave the current public health structure as it is, delivering excellent and local preventative care to our community.

Sincerely,

Greg Anderson,
Chair, Brant County Board of Health

JAT/lmj
Copied: Dr. David Williams, Chief Medical Officer of Health
The Honourable Willem Bouma, MPP—Brantford-Brant
Association of Local Public Health Agencies
Monika Turner, Association of Municipalities of Ontario
Ontario Boards of Health
City of Brantford
County of Brant
The Expositor

5.5

Received May 29 2019
MOH Office

Public Health
Santé publique
SUDBURY & DISTRICTS

May 28, 2019

VIA ELECTRONIC MAIL

The Honourable Doug Ford
Premier of Ontario
Legislative Building
Queen's Park
Toronto, ON M7A 1A1

Dear Premier:

Re: North East Public Health Regional Boundaries – Modernization of the Ontario Public Health System

At its meeting on May 16, 2019, the Board of Health for Public Health Sudbury & Districts carried the following resolution #17-19:

WHEREAS the Health Protection and Promotion Act amendment effective April 1, 2005, enabled the merger of the Muskoka-Parry Sound Health Unit with the Simcoe County District Health Unit and with the North Bay & District Health Unit; and

WHEREAS North Bay Parry Sound District Health Unit and Simcoe Muskoka District Health Unit (SMDHU) have invested greatly since that time to successfully transition to their respective new agencies; and

WHEREAS the new public health entity for northeastern Ontario is proposed to include the existing public health units in the region (Algoma Public Health, Public Health Sudbury & Districts, Porcupine Health Unit, North Bay Parry Sound District Health Unit, Timiskaming Health Unit) along with Muskoka District and a part of Renfrew; and

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f: 705.522.5182

Rainbow Centre
10 rue Elm Street
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t: 705.522.9200
f: 705.677.9611

Sudbury East / Sudbury-Est
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phsd.ca

WHEREAS the northeast public health entity is the only one of ten proposed regional entities that would not respect existing health unit boundaries and would require the costly dissolution of existing health units; and

WHEREAS the demographics, socioeconomic status, health status, and important health care referral patterns of the Muskoka District are all distinct from those of the northeast; and

WHEREAS the proposed northeast public health entity is a massive area (402,489 km^2) with significant administrative and geographic complexities, for which the incorporation of an additional distinct area would tax the region's ability to respond appropriately to diverse public health needs; and

WHEREAS the Board of Health for SMDHU having expressed similar observations, is requesting the support of northeast boards of health for their position that SMDHU remain intact as they transition to a new regional entity;

THEREFORE be it resolved that the Board of Health for Public Health Sudbury & Districts endorse the position of the Board of Health for SMDHU that the organization of their public health services remains intact as they transition to the new regional public health entity.

Thank you very much for your attention to this important matter. The Board of Health is working hard with regional counterparts to be able to engage constructively with the anticipated Ministry of Health and Long-Term Care consultation process over the next number of months.

Sincerely,

René Lapierre
Chair, Board of Health

cc: Honorable C. Elliott, Deputy Premier and Minister of Health and Long-Term Care
Dr. D. Williams, Chief Medical Officer of Health, Ministry of Health and Long-Term Care
L. Ryan, Executive Director, Association of Local Public Health Agencies
J. McGarvey, President, Association of Municipalities Ontario
F. Gélinas, MPP Nickel Belt
M. Mantha, MPP Algoma-Manitoulin
J. West, MPP Sudbury
J. Vanthof, MPP Timiskaming, Cochrane
Ontario Boards of Health

KFL&A Public Health

June 4, 2019

VIA: Electronic Mail (doug.ford@pc.ola.org)

Received June 5 2019
MOH Office

Honourable Doug Ford
Premier of Ontario
Premier's Office
Room 281
Legislative Building, Queen's Park
Toronto, ON M7A 1A1

Dear Premier Ford:

RE: Announcement re: Reversing Retroactive Funding Cuts to Municipal Funding

The Kingston, Frontenac and Lennox & Addington (KFL&A) Board of Health is extremely pleased with the provincial government's decision to reverse retroactive funding changes to municipalities, and commitment to working with municipalities and Boards of Health to find ways to reduce spending.

The Board is cognizant that there is a deficit at the provincial level and a need to work collaboratively and creatively with the provincial government to find efficiencies in multiple areas, including public health. In so doing, KFL&A Public Health commits to continued work with the government in this regard.

KFL&A Public Health looks forward to the opportunity to work collaboratively with the Province of Ontario, ensuring the core public health functions will be preserved and leveraged to help reorient the health system, creating efficiencies in health care through protection from disease and promotion of health, to reduce hallway medicine and keep the people of Ontario healthy.

Yours truly,

Denis Doyle, Chair
KFL&A Board of Health

Copy to: The Honourable Christine Elliott, Minister of Health and Long-Term Care, Deputy Premier
The Honourable Steve Clark, Minister of Municipal Affairs and Housing
Ian Arthur, MPP Kingston and the Islands
Randy Hillier, MPP Lanark-Frontenac-Kingston
Daryl Kramp, MPP Hastings-Lennox and Addington
Todd Smith, MPP Bay of Quinte
Loretta Ryan, Association of Local Public Health Agencies
Ontario Boards of Health

INFORMATION REPORT

TO:	Mayor and Members Board of Health
COMMITTEE DATE:	June 17, 2019
SUBJECT/REPORT NO:	Corporate Climate Change Task Force Response to the Climate Change Emergency Declaration (BOH19022) (City Wide) **(Outstanding Business List Item)**
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Trevor Imhoff (905) 546-2424 Ext. 1308
SUBMITTED BY and SIGNATURE:	Jennifer Vickers-Manizn on behalf of Kevin McDonald Director, Healthy Environments Division Public Health Services

COUNCIL DIRECTION

The Board of Health at its meeting on March 18, 2019, and subsequently approved and amended by Council at its meeting of March 27, 2019, approved Item 3 of the Board of Health Report 19-003 which directed items:

"(a) That the City of Hamilton declare a climate emergency that threatens our city, region, province, nation, civilization, humanity and the natural world;"

"(b) That a multi-departmental Corporate Climate Change Task Force of City of Hamilton staff be created under the leadership of the City Manager;"

"(c) That the Corporate Climate Change Task Force be directed to investigate and identify:
(i) Additional actions to be taken to incorporate into existing plans and policies to achieve net zero carbon emissions before 2050;
(ii) Best processes to centralize reporting on Climate Change for the Corporation of the City of Hamilton;
(iii) Green initiative investments and returns to the community, including, but not limited to, the following:

(1) The city of Hamilton has reduced its carbon footprint since 2005. In addition to efforts surrounding mitigating personal property flooding the City has initiative a number of energy conservation initiatives;
(2) Energy intensity at City facilities (e.g. Recreation, Lodges, Entertainment, Police, etc.), has been reduce by 28% when comparing 2017 versus 2005;
(3) The City of Hamilton was a leader in the development of local district energy. The City of Hamilton established Hamilton Renewal Power Inc. (HRPI), which operates cogeneration at the wastewater treatment plant and landfill. HRPI generates 28,000,000 kWh of renewable energy annually with a reduction of 100,000 tonnes of carbon dioxide;
(4) Cumulative greenhouse gas (GHG) reductions from energy conservation initiatives over the period 2011-2017 is 52,325 tonnes;
(5) When comparing greenhouse gas (GHG) emissions for the periods 2016 versus 2005, 2005 emissions were in excess of 120,000 tonnes, decreasing to in excess of 80,000 tonnes by 2016; and,
(6) At the Bay Area Climate Change Summit some clear directions were discussed that would allow Hamilton to meetings it climate change targets:
    (aa) All new building be built net zero by 2030 and all new buildings retrofitted by 2050 including fuel switching
    (bb) All diesel vehicles be decommissioned by 2030 and all vehicles electrified by 2050;
    (cc) Low carbon technology for our steel manufacturing and other district energy technologies; and,
    (dd) These initiatives would need to be taken by all partners and the City could show leadership by committing to these actions for construction and renovations of City facilities, requiring net zero construction where the City funds organizations for buildings (i.e. affordable housing) and the City could continue to “green” its own fleet of vehicles towards the goals listed above;

(iv) Gaps in current programs and projects and strategies to address those gaps; and,
(v) The establishment of a critical path and Terms of Reference to initiate an awareness strategy campaign to encompass the

history of global warming, climate change and the United Nation's Declaration on a Climate Emergency, which is to include the impacts of not taking such action, and the investment vs. the expense of taking such action."

"(d) That the Corporate Climate Change Task Force report back to the Board of Health within 120 days;" and,

"(e) That Council supports the City of Hamilton staff participation in the Bay Area Climate Change Implementation Teams as subject matter experts to accelerate climate action across the Bay Area."

INFORMATION

Executive Summary

The objective of this information report is to provide the Board of Health (BOH) an update on the reporting structure and framework for the creation of a multi-departmental Corporate Climate Change Task Force. The work of the task force will be to report annually to General Issues Committee (GIC) on specific strategies of how to address climate mitigation and adaptation. The task force will be coordinated by staff within Public Health Services. All City departments will centralize reporting through the task force. This information will be reported to and led by the City Manager and the General Managers of each respective department on a quarterly and ad hoc basis. This will ensure information is provided in a timely manner and essential information on climate change is considered in every department, as necessary.

Another objective of this report is to provide BOH members with a summary of previous and ongoing climate change actions taken by departments in the City of Hamilton. Several of the actions and directions identified can be leveraged through existing and ongoing work. By doing this, the City will save money and staff time by coordinating this work and identifying existing strategies and plans to reprioritize key climate change objectives.

The gap analysis identified actions to be further investigated and is in Appendix "B" to Report BOH19022. These actions have been strategically selected based on scientific reports completed for the Regional Bay Area Climate Change Office. The report completed by Sustainability Solutions Group (SSG) titled "Hamilton and Burlington Low-Carbon Scenario and Technical Report 2016 to 2050", is attached as Appendix "C" to Report BOH19022. This report completed a Greenhouse Gas (GHG) emissions inventory and identified low-carbon actions for Hamilton and Burlington to meet their GHG reductions targets. These actions include:

- Climate Adaptation;
- Planning;
- Buildings;
- Transportation;
- Procurement;
- Industry;
- Financing;
- Education and Awareness; and,
- Reporting Structures.

Locally, Hamilton is already experiencing the impacts of climate change through shoreline and escarpment erosion, millions of dollars of infrastructure damages caused by extreme storm events and freeze/thaw cycles, increases in extreme heat events leading to drought, and increased precipitation leading to flooding. Projected future costs of climate change are difficult to predict, however a well-regarded Canadian economic impact study concluded that climate change costs to the Canadian economy would be within the range of 1-5% of the Canadian GDP annually by the 2050's.

By working to achieve the City of Hamilton's climate actions goals we will also be working to achieve several other corporate and community strategic priorities. For example:

- By reducing emissions and prioritizing green infrastructure we will be improving air quality and citizens access to naturalized areas;
- Programs to accelerate net-zero energy buildings, with a focus on social housing and government incentives, will help reduce expensive utility costs and improve standard of living; and,
- Building retrofit programs can create thousands of good paying, local skilled trade jobs improving employment rates and reducing poverty.

It is important that all strategies and actions include both equitable health and social considerations in order to achieve all of Hamilton's priorities.

Background

In March 2019, Hamilton City Council approved a motion declaring climate change as an emergency and that urgent action is needed. At the time this report was written, approximately 549 Councils globally, including the Government of the United Kingdom, have declared a climate emergency according to climateemergencydeclaration.org. In Canada, the website states 386 Municipalities declared a climate emergency including, more recently, Vancouver, Halifax, Kingston, Hamilton, Burlington, and Ottawa, respectively.

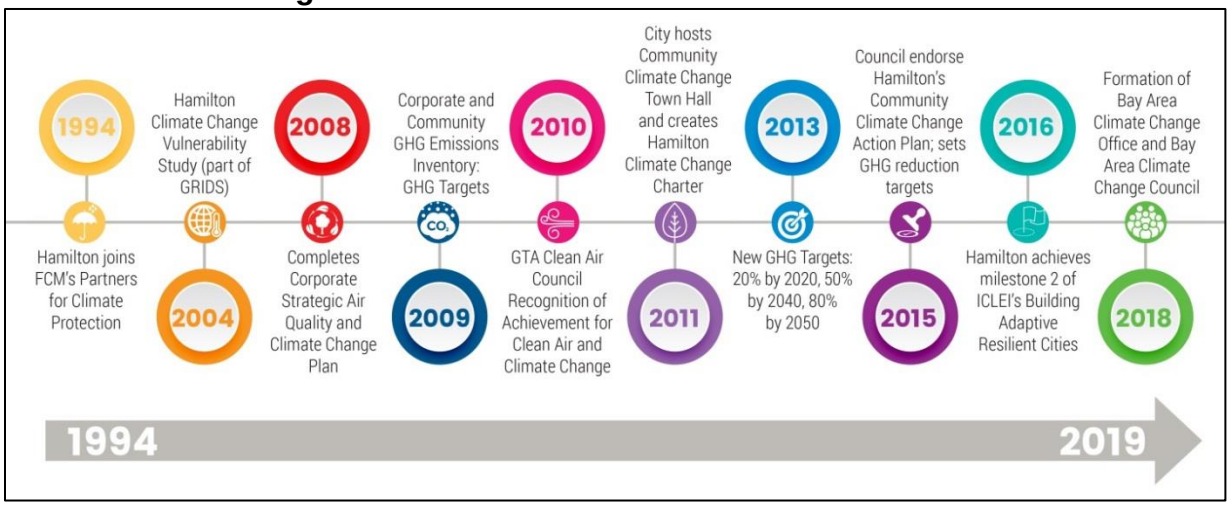
Hamilton's Climate Actions to Date

Climate change action in the City of Hamilton formally began in 1994 when the City signed on to the Partners for Climate Protection (PCP) program through the Federation of Canadian Municipalities (FCM) — a milestone oriented framework for climate action. In 2012, Hamilton completed all five of PCP's milestones by (1) Creating a Green House Gas (GHG) Inventory and Forecast; (2) Setting Emission Reduction Targets; (3) Developing a Local Action Plan; (4) Implement the Local Action Plan; and, (5) Monitoring Progress and Reporting Results.

Hamilton utilizes innovative technology to both climate change mitigation and adaptation. Combine generation (co-gen) plants were installed at the City's landfill and the Woodward Water Wastewater Treatment Plant (WWTP), which captures methane to create renewable electricity. This co-gen plant avoids 100,000 tonnes carbon dioxide equivalent (tCO_2e) per year from entering the atmosphere. Renewable natural gas is also created at the WWTP by capturing methane and using a biogas purification unit to yield utility grade renewable natural gas that is injected into the Union Gas distribution system. This results in a reduction of 15 tCO_2e.

The City has also undergone climate adaptation actions preparing for, and mitigating against flooding events caused by increased precipitation. An example of this is the City of Hamilton's backwater valve replacement program where the City invested in providing a grant rebate program for homeowners to install a backwater valve in order to prevent basement flooding. Figure 1 below shows a graphical representation of Hamilton's climate actions since 1994.

Figure 1: Hamilton's Climate Actions 1994 – 2019



A comprehensive list of Hamilton's completed, ongoing and proposed climate change actions are included in Appendix "A" to Report BOH19022. These existing and ongoing actions will help can be leveraged in order for Hamilton to achieve the new proposed

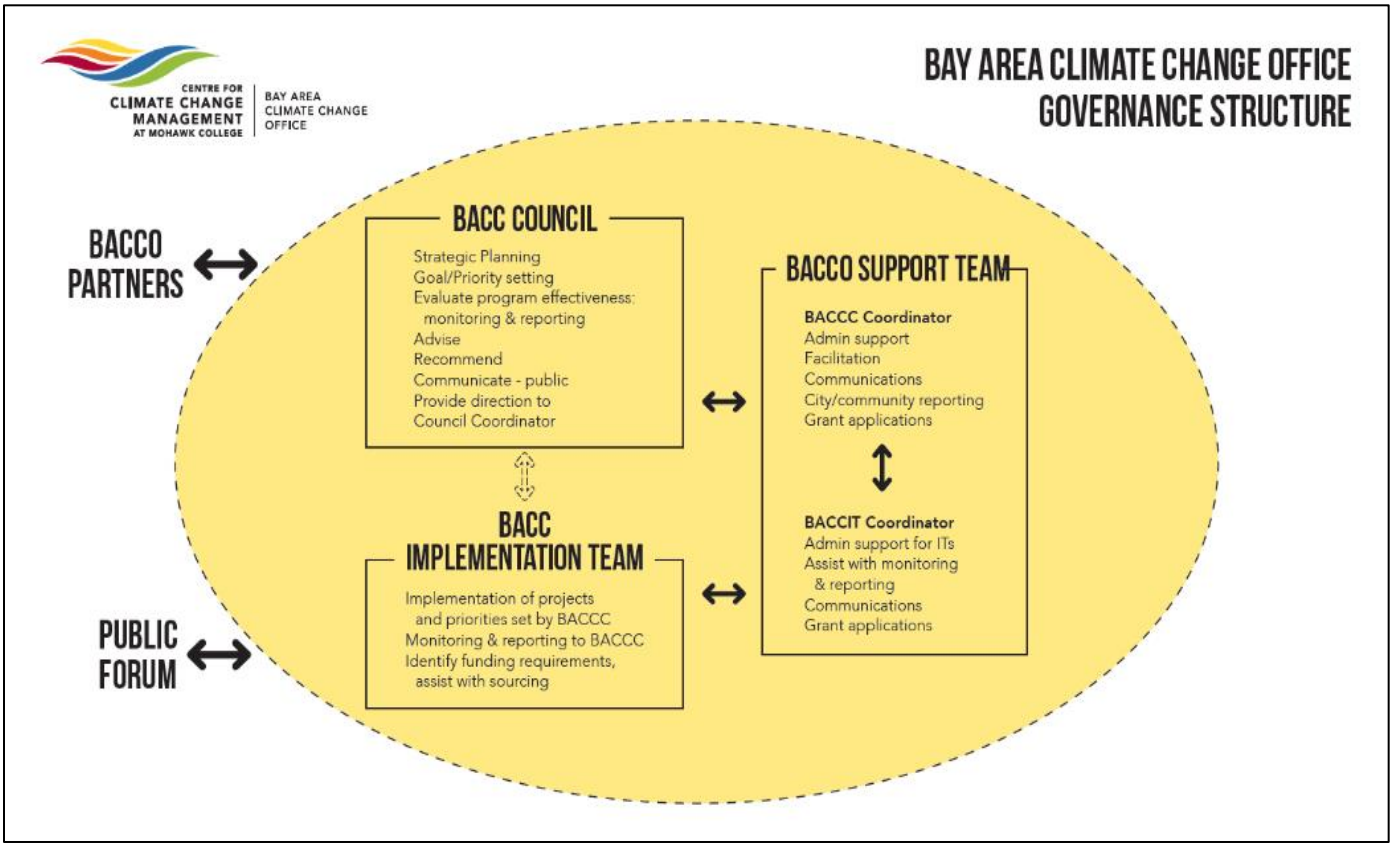
actions in Appendix "B" to Report BOH19022. By prioritizing these objectives within existing plans and policies it will save staff time and resources. Although care was taken to ensure that this list is as accurate as possible, there may be additional actions that were not included within this list.

Bay Area Climate Change Office

Over the past two years, City staff have focused effort on developing a governance structure for climate change work. This effort has been done in partnership with Mohawk College's Centre for Climate Change Management (CCCM) and the City of Burlington to create a Regional, collaborative governance model that seeks to replicate the successes of the Bay Area Restoration Council (BARC). This Regional model is meant to prioritize and accelerate climate actions as described in Hamilton's Community Climate Action Plan, Burlington's Community Energy Plan and the new Hamilton and Burlington Low-Carbon Scenario and Technical Report 2016 to 2050.

The Bay Area Climate Change Governance Model is an effort to accelerate climate change action through coordination and support of many already ongoing actions, in order to bring a collective voice to climate action to all levels of government. Figure 2 below shows a graphical representation of the governance model. For more information on the Bay Area Climate Change Office Engagement Report, please see Appendix "D" to Report BOH19022.

Figure 2: Bay Area Climate Change Governance Model



The Carbon Disclosure Project (CDP) is another example of Hamilton's Climate Change reporting structure that can be used to better centralize climate change reporting across the Corporation to Council and the Community.

Hamilton's Mayor and Council signed Hamilton onto the Global Covenant of Mayors (formerly Compact of Mayors) — an international alliance of cities and local governments with a shared long-term vision of promoting and supporting voluntary action to combat climate change and move to a low emissions, resilient society.

In 2018 CDP, in partnership with the Global Covenant of Mayors, created a standardized scoring methodology for city submissions. Cities around the world were scored based on their actions and level of detail within their submissions and given a letter rating score. The City overall scored a "B" and is considered "Management Level" as per CDP methodology. The North American and Global Average for cities, in comparison, received a score of "D" (see Figure 3 below).

Figure 3: City of Hamilton Carbon Disclosure Project Scoring

Scoring Band Explanation						
A city in the Management has understood the main risks and impacts of climate change and is taking action to adapt to and reduce these effects. These cities have worked collaboratively with key stateholders to understand their risks and impacts and now have plans in place to mitigate and adapt.						
	Adaptation	City-wide emissions	City-wide emissions reductions	Climate & social risk	Opportunities	Water supply
City of Hamilton	D	B	D	C	B	B
North America Average	D	D	D	C	C	D
Global Average	D	D	D	D	D	D

Although climate change is a challenging problem to solve and further action is needed, the actions described above demonstrate that the City of Hamilton is well-positioned to achieve the proposed framework and to meet our GHG emission reduction goals.

Corporate Climate Change Task Force Framework

Climate change mitigation and adaptation planning is complex, and requires coordinated attention and action among City departments across the corporation, companies and organizations across Hamilton, and individual citizens. Recent direction from Council calls for the creation of a multi-departmental Corporate Climate Change Task Force under the leadership of the City Manager.

This Task Force is directed to undertake an extensive investigation to determine:

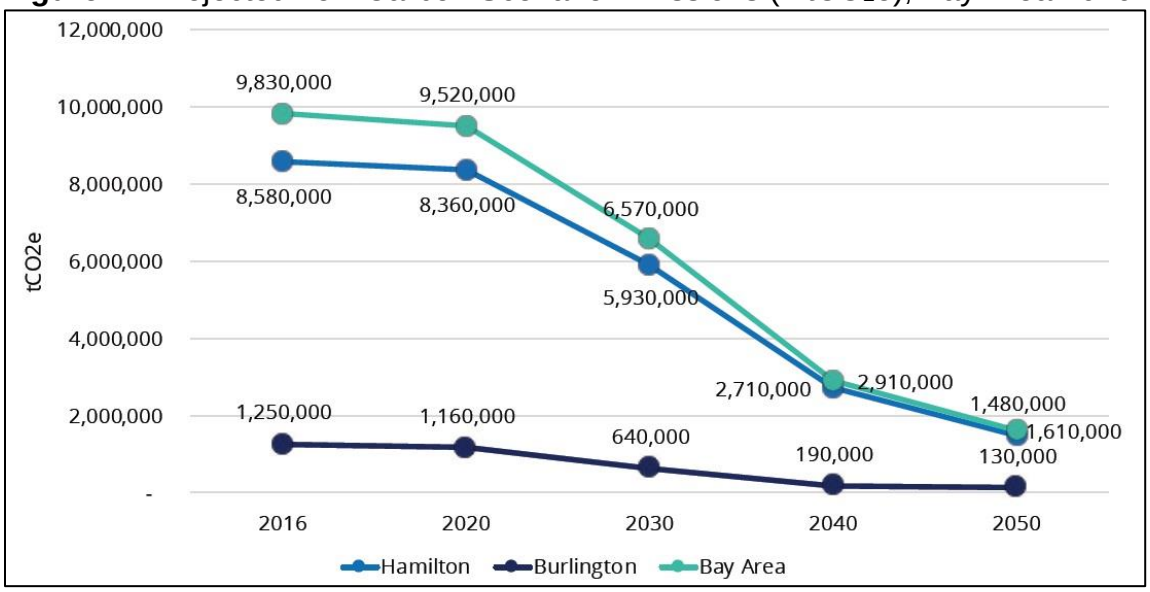
1. Additional actions to be taken to incorporate into existing plans and policies to achieve net zero carbon emissions before 2050;
2. Best processes to centralize reporting on Climate Change for the Corporation of the City of Hamilton;
3. Investigation into past green initiative investments and returns to the community;
4. Gaps in current programs and projects and strategies to address those gaps; and,
5. Establishment of a critical path and Terms of Reference to initiate an awareness strategy campaign.

The multi-departmental Climate Change Task Force will begin to develop specific strategies on the exact implementation of the actions areas proposed in Appendix “B” to Report BOH19022 and will report back to GIC.

The new action areas identified in Appendix “B” to Report BOH19022 are based on previous scientific reports including the Hamilton and Burlington Low-Carbon Scenario

and Technical Report 2016 to 2050. The forecasting model utilizes Sustainability Solutions Group's (SSG) energy, emissions, land-use and financial model CityInSight. This model developed a baseline for 2016, then created a Business-as-Usual (BAU) and Low-Carbon (LC) scenarios forecast, which identifies actions that could be taken in order for Hamilton to lower its emissions from approximately 8.6 megatonnes of carbon dioxide equivalent ($MtCO_2e$) in 2016 to 1.5 $MtCO_2e$ — a decrease of 83%. The low carbon emissions pathway is identified in Figure 4.0 below:

Figure 4: Projected Low Carbon Scenario Emissions ($MtCO_2e$), Bay Area 2016-2050



SSG's report and CityInSight model shows that it is technically feasible to lower Hamilton's emissions by 83%. The modelled predictions for costs of these actions were out of the scope of this project and would need to be further investigated prior to making any strategies and recommendations to GIC.

Relevant Consultations

Staff colleagues, including Senior Leadership Teams from departments across the corporation including Public Works, Planning and Economic Development, Healthy and Safe Communities, and the City Manager's Office were all consulted with respect to this report. External stakeholders include leading environmental organizations including Environment Hamilton, Hamilton 350 and the Bay Area Climate Change Council.

With respect to the formation of the Bay Area Climate Change Office and the Bay Area Climate Change Council, Lura Consulting undertook extensive community consultation across Hamilton and Burlington. For details on those consultations please see Appendix "D" to Report BOH19022.

Conclusion

The purpose of this report is a response to Hamilton City Council's declaration recognizing that climate change is an emergency and the single largest threat to municipalities across the world and that urgent climate action is needed.

The objective of this information report is to provide the Board of Health (BOH) an update on the reporting structure and framework for the creation of a multi-departmental Corporate Climate Change Task Force. The work of the task force will be to report annually to General Issues Committee (GIC) on specific strategies of how to address climate mitigation and adaptation. The task force will be coordinated by staff within Public Health Services, Healthy and Safe Communities Department. All City departments will centralize reporting through the task force. This information will be reported to and led by the City Manager and the General Managers of each respective department on a quarterly and ad hoc basis. This will ensure information is provided in a timely manner and essential information on climate change is considered in every department, as necessary.

Regional collaboration with the Bay Area Climate Council will ensure alignment with regional priorities and synergies are identified between the City of Hamilton and Burlington and the members of the Bay Area Climate Change Council.

It will take an unprecedented shift of resources and attention to achieve carbon neutrality by 2050. Through constant and ongoing collaboration with internal and external stakeholders, climate adaptation, prioritization of zero emission buildings and transportation, strategic procurement, clear and constant education and awareness, and consistent reporting, Hamilton will be able to achieve our climate change goals that contribute to environmental, social and economic prosperity for Hamilton.

APPENDICES AND SCHEDULES ATTACHED

Appendix "A" to Report BOH19022:	List of Hamilton's Climate Change Actions
Appendix "B" to Report BOH19022:	Hamilton's Corporate Climate Change Actions Framework
Appendix "C" to Report BOH19022:	Hamilton and Burlington Low-Carbon Scenario and Technical Report 2016 to 2050
Appendix "D" to Report BOH19022:	BACCO Engagement Summary Report

Hamilton's Climate Change Actions

Department	Initiative	Result/Outcome
City-Wide	In 2004 Hamilton joins the Partners for Climate Protection (PCP), a milestone framework for climate change action and preparedness	Achieved all 5 milestones in 2012 completing: (1) Baseline Emissions Inventory and Forecast (2) Setting emissions reduction targets (3)Develop local action plan (4) Implementing local action plan (5) monitor progress and report results
City-Wide	In 2008 City of Hamilton creates first Corporate Strategic Air Quality and Climate Change Plan	Sets GHG reduction targets and actions to address climate change
City-Wide	In 2009 City of Hamilton releases Corporate and Community GHG emissions inventory	Sets GHG reduction targets of 10% by 2012, 20% by 2020 for
City-Wide	City partnered and supported Green Venture and Environment Hamilton in a 1 year pilot program	Created climate change champion campaign enlisting 24 organizations across Hamilton
City-Wide	City of Hamilton becomes first municipality in Ontario to create a community climate change charter.	Achieved 55 organizational signatories and 440 individuals signed to a voluntary charter to take local action
City-Wide	In 2011 City of Hamilton meets 2012 and 2020 emission reduction targets	World Wildlife Fund (WWF) recognizing Hamilton as one of top ten cities in Canada taking action climate change
City-Wide	In 2013 City of Hamilton joins the Carbon Disclosure Project (CDP) global reporting platform for GHG emission inventories	City of Hamilton sets new GHG reduction targets of 20% by 2020, 50% by 2040, and 80% by 2050
City-Wide	City of Hamilton in 2015 joined the Global Covenant of Mayors, at the time the world's largest cooperative effort among Mayors and City Officials.	As a member Hamilton pledges to reduce GHG emissions and track progress and prepare for the impact of climate change
Public Works	2017 Fleet emissions reduction of 4% over base year of 2005	1,445 tonnes CO2e lower than 2005
Public Works	Green Fleet Plan was established over 10 years ago. The City has 60 hybrid vehicles in operation currently.	Hybrid vehicles used combination of battery power and gasoline making them more efficient saving money on fuel and GHG emissions.
Public Works	Transit Fleet is replacing diesel buses with Compressed Natural Gas Buses with lower GHG emissions.	Cost savings of $0.38 per km while lowering emissions. Emissions reductions to be calculated.

Department	Initiative	Result/Outcome
Public Works	2018 approx. 30 million kWh of renewable electricity production at the Glanbrook Landfill and Woodward Wastewater Treatment Plant	100,000 tonnes CO2e avoided annually
Public Works	2018 approx. 40,000 giga joules of Renewable Natural Gas produced at the Woodward Wastewater Treatment Plant	15 tonnes CO2e reduced annually
Public Works	Starting in 2005 completing various retrofits (LED lighting, chillers and boilers etc.) of the Street Lighting system and Arena's, Fire Stations, Police, Recreation Centres and other Corporate buildings and operations	52,325 tonnes CO2e total reduced (2005-2017)
Public Works	Corporate Energy Intensity (energy use per square foot) is down 28% from base year of 2017 vs 2005.	$68 million in cumulative savings
Public Works	All but one of the 5 year ponds at Glanbrook Landfill have been expanded handle a 25 year storm. More raw chuck damns and ditches have been installed as preventative measures for future weather impacts.	Climate adaptation expanding stormwater ponds helps to prevent and mitigate future flooding events
Public Works	City of Hamilton's grant funding for backwater-valve replacement program.	Installation of backwater-valves to residences in order to prevent basement flooding.
Public Works	Successfully obtained funding from Federal Government Disaster Mitigation and Adaptation Fund	Funding will be used to restore and enhance our shoreline and escarpment barriers to prevent against future storm damages
Public Works	In 2018 installed anti-stagnation valves across Hamilton water distribution.	Resulted in savings over 2.1 million kWh.
Public Works	Installed inline check valve at storm/sewer outfalls.	Prevents back flow of water caused by high water levels, as well as reduced maintenance costs by approximately 90%

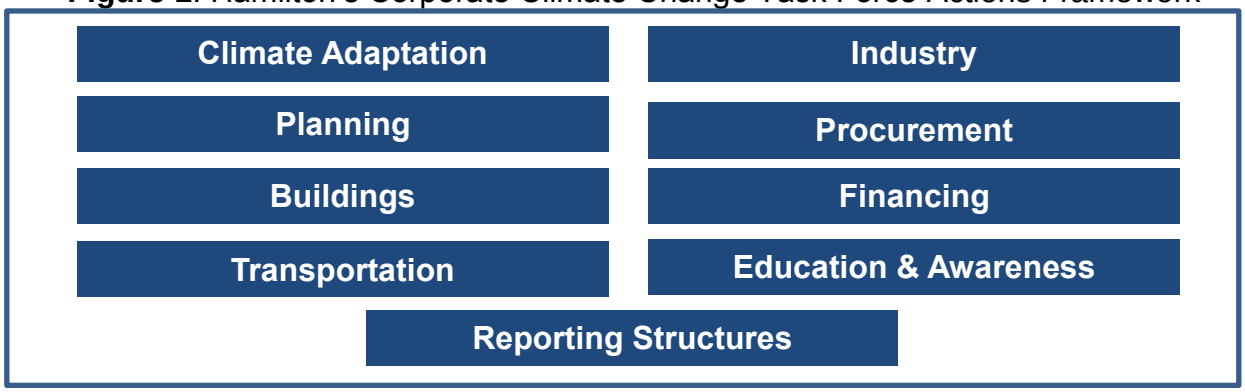
Department	Initiative	Result/Outcome
Healthy and Safe Communities Department	Staff, beginning in Planning and Economic Development have been tracking Corporate and Community GHG emissions since 2006	Since 2006 city-wide emissions have been reduced by approximately 21% according to 2016 inventory.
Healthy and Safe Communities Department	In 2014 Public Health Staff undertake 14 month "Let's Talk About the Weather" campaign to develop a Community Climate Change Action Plan	Pop-ups reached over 200 people, Workshops has over 150 attendees, notices and newsletters sent to 358 individuals and 91 Neighbourhood Associations, created 8 Task Forces comprised of over 65 individuals
Healthy and Safe Communities Department	The Medical Officer of Health issues Extreme Heat and Extreme Cold alerts to the broader community including key organizations and stakeholders to provide additional services including but not limited to: shelters, extended service hours	Increases climate resiliency by providing awareness and additional services to help protect our most vulnerable populations
Healthy and Safe Communities Department	Public Health Staff led between 2014-2016 a Corporate Climate Change Adaptation Working Group undertaking corporate climate risk statement	Identified and scored climate risk statements to begin prioritizing climate adaptation actions. Achieves ICLEI's Building Adaptive Resilient Cities (BARC) Milestone 2 of 5
Healthy and Safe Communities Department	Public Health Staff partnering with Environment Hamilton, Faith and the Common Good and Community Resiliency to Extreme Weather (CREW) to complete neighbourhood level climate adaptation planning and extreme weather preparedness	Hosted several workshops completing asset mapping and emergency preparedness training
Healthy and Safe Communities Department	Pool and Splash Pad hours are extended and are free during extended heat events.	Increases climate resiliency by providing awareness and additional services to help protect our most vulnerable populations
Healthy and Safe Communities Department	Lead in partnership with Mohawk College and the City of Burlington to create regional collaborative climate change governance structure	Bay Area Climate Change Office and Bay Area Climate Change Council formed to accelerate climate change action and bring a regional approach to climate action
Planning and Economic Development	In 2004 hires third party engineering firm to undertake GRIDS Background Study: Hamilton's Vulnerability to Climate Change	Identified opportunities to proactively manage its vulnerability to climate change by looking at land use and infrastructure during the GRIDS process

Department	Initiative	Result/Outcome
Planning and Economic Development	Planning Staff are leading the creation of Hamilton's Community Energy Plan (CEP); expected completion Q4/2020.	The CEP is an integrated, comprehensive, long-term plan to meet local energy needs while improving energy and water efficiency.
Planning and Economic Development	Planning Staff completed and Council endorsed in 2018 a comprehensive Transportation Master Plan (TMP)	Sections of TMP addresses several factors towards reducing GHG emissions and improving health through: *Complete-Liveable-Better (CLB) Streets, The Role of Health in the Built Environment, Future Travel Demand Modelling, Sustainability Mobility Program, and Cycle Master Plan Review*
Planning and Economic Development	Planning Staff leading a multi-departmental Urban Forest Strategy to protect and enhance Hamilton's urban forest.	Protecting and growing urban forests contribute to GHG and air pollutant reduction, stormwater capture from precipitation events and provides cooling during extreme heat events.
CityHousing Hamilton	Between 2017-2018 completed various energy retrofits including building automation systems, domestic hot water heating etc.	Over 674 tonnes CO2e reduction annual, reduction of water usage by over 160,000 m3/year.
CityHousing Hamilton	Throughout 2019 completing various energy retrofits at 13 high-rise apartment buildings including building envelope, mechanical equipment etc.	Estimate GHG reduction of 476 tonnes CO2e annually with approximate utility savings expected of $100,000 annually.

Hamilton's Corporate Climate Change Actions Framework

Climate change is an extremely complex problem that requires a holistic multi-disciplinary approach to address. It will require actions from all levels of government, including local municipalities, key anchor institutions, not-for-profit organizations, and individual citizen action. The below corporate climate change framework puts forward future actions that the City of Hamilton can take in order to help in the overall global effort to mitigate and adapt to climate change.

Figure 1: Hamilton's Corporate Climate Change Task Force Actions Framework



Several of the actions identified are taken from the low-carbon scenarios of Sustainability Solutions Group's (SSG) report completed for the Bay Area Climate Change Office titled "Hamilton and Burlington Low-Carbon Scenario and Technical Report 2016 to 2050, and is attached as Appendix "C" to Report BOH19022. The framework also builds off of Hamilton's historical and ongoing actions in order to leverage, as much as possible, existing staff resources and time.

Assessment for Climate Adaptation Actions

Within any climate change framework, climate adaptation is a critical component in order to prevent and mitigate climate change impacts. This can improve health outcomes of the population and save money through avoided costs of infrastructure damages and insurance claims. The insurance industry has consistently stated the importance of municipalities to conduct climate adaptation planning and more recently the investment industry has communicated the importance of climate action as well.

Due to the slow speed of the global carbon cycle, carbon previously emitted will last thousands of years within the world's atmosphere and, further contributing to global warming. This is why immediate decarbonisation of our civilization is required and why the impacts of climate change are inevitable and why climate adaptation is critical.

The Intergovernmental Panel on Climate Change (IPCC) defines adaptive capacity as "the ability of a system to adjust to climate change (including climate vulnerability and

extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences." Between 2013-2016, City staff underwent climate adaptation planning through International Council for Local Environmental Initiatives (ICLEI) Local Governments for Sustainability Canada's Building Adaptive & Resilient Cities (BARC) framework. Staff across the corporation worked with ICLEI Canada who developed The Science of Climate Change: Climate Data for the City of Hamilton. Using this report that projected future climate scenarios, staff developed approximately 52 climate change risk statements. Examples of risk statements include "Increase freeze-thaw cycles during the winter months leading to increased damage and mortality on the natural environment" and "Changes in precipitation resulting in decreased functionality of sewers, combined sewers and storm water ponds causing surcharge."

Utilizing these existing climate risk statements and projected climate scenarios, staff have begun researching historical meteorological data using Environment and Climate Change Canada's weather stations in Hamilton. In order to properly assess historical financial, social and environmental impacts of climate change, accurate meteorological data will need to be analyzed to begin identifying dates, or range of dates to assess what impacts occurred to the corporation and the community during that weather event. Meetings with internal and external subject matter experts across the corporation and community will take place to create standardized metrics and identification of databases in order to holistically determine the impacts of climate change.

The objective of this work is to conduct a comprehensive investigation into historical climate change impacts in order to properly recommend future climate adaptation actions. Staff are working across departments and looking to collaborate with other initiatives including the Smart City Initiative and the Enterprise Data Management project. Future budget recommendations will include costs, impact analysis including avoided costs and co-benefits in order for GIC to make an informed decision.

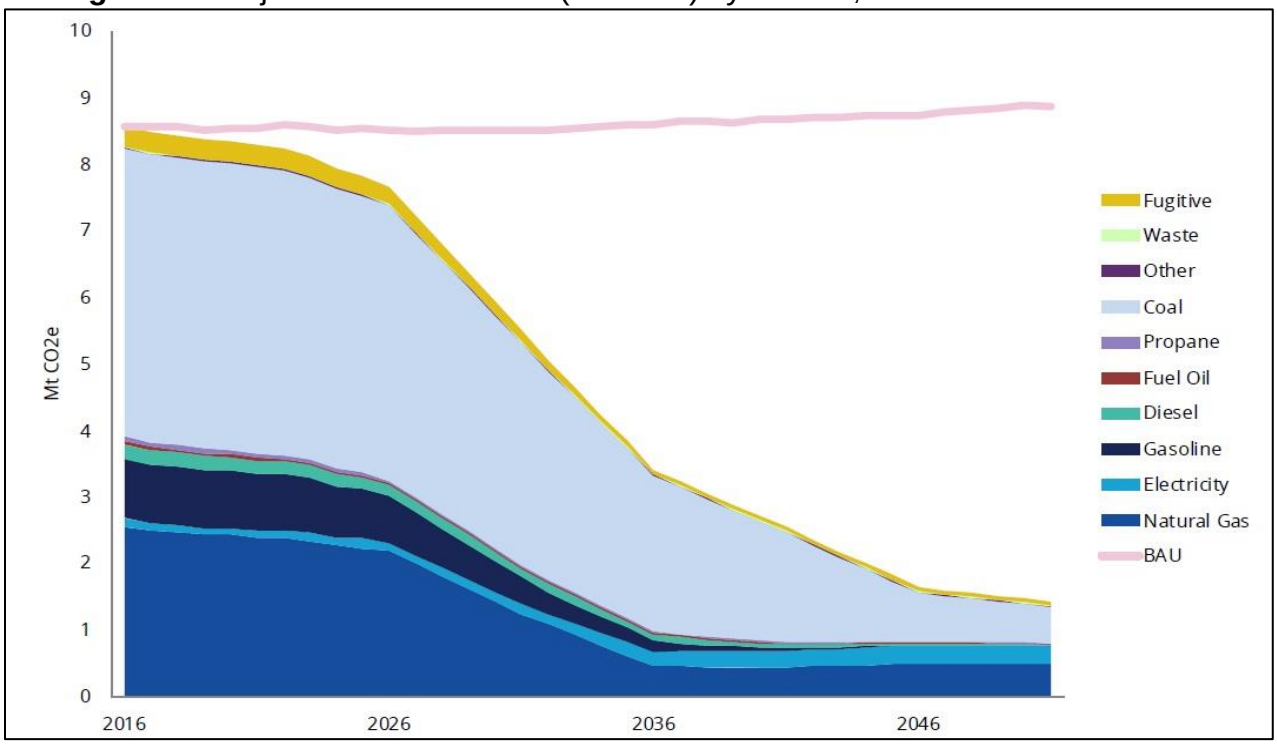
The outcome of this work will help the City achieve a Healthy and Safe Community, Economic Prosperity & Growth, and Built Environment & Infrastructure by helping our infrastructure and community prepare for and adapt to a changing climate.

Assessment for Climate Mitigation Actions

The majority of the actions outlined below for mitigation are described within the Hamilton and Burlington Low-Carbon Scenario and Technical Report 2016-2050, completed by Sustainability Solutions Group (SSG). SSG has worked on climate change planning and emissions inventories for municipalities across Canada including Toronto, Markham, Burlington, Guelph, Ottawa, Region of Peel, and most recently the Cities of Hamilton and Burlington through the Bay Area Climate Change Office. SSG's CityInSight model ensures low carbon (LC) scenarios are physically coherent and are a highly detailed representation of each scenario that is calibrated against local conditions.

In 2016, Hamilton's GHG emissions inventory was calculated at approximately 8.6 MtCO2e. This represents 87% of total emissions across the Bay Area (Hamilton and Burlington). Figure 2 below shows the LC pathway compared to the business-as-usual (BAU) by fuel type for the City of Hamilton to achieve an 83% reduction by 2050.

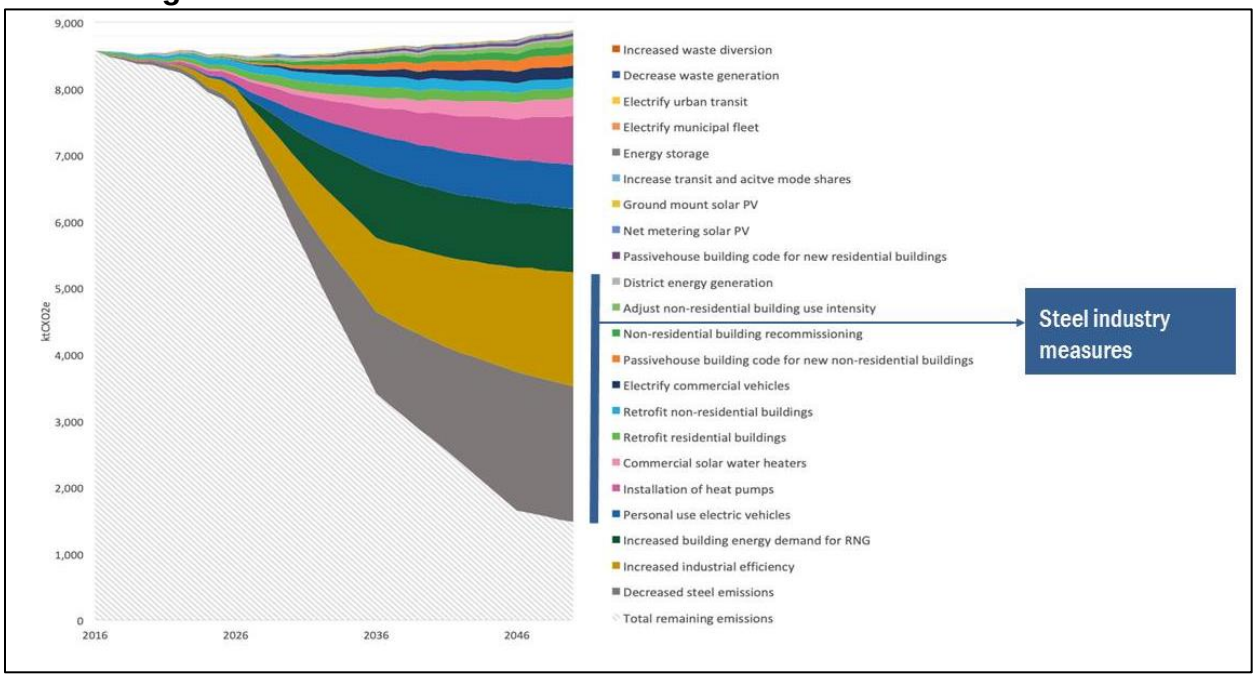
Figure 2: Projected LC Emissions (MtCO2e) by Source, in Hamilton 2016-2050



Note that a scenario is an internally consistent view of what the future might turn out to be — not a forecast, but one possible future outcome. It assumes that several policies, actions or strategies to address energy and emissions are implemented between 2017 and 2050.

Figure 3 below shows a widget table used to graphically represent the LC scenario and actions and the corresponding emission reductions for Hamilton. Although these actions are technologically feasible, they may or may not be economically feasible as the cost of the actions were out of the scope of this study.

Figure 3: Hamilton's LC Scenario Actions and Emissions Reductions



The above widget table shows that the majority of emissions reduction potential comes from the steel industry in Hamilton. Although this is an important source of emission reductions potential, industrial emissions are regulated by the Provincial and Federal governments. However, if you remove steel industry from consideration, Hamilton is similar to other municipalities where the majority of GHG emissions come from buildings and transportation. The sections below outline an overarching framework that details potential actions and policies that are within the direct control of Municipal Council and can greatly reduce corporate and community GHG emissions across Hamilton.

Planning

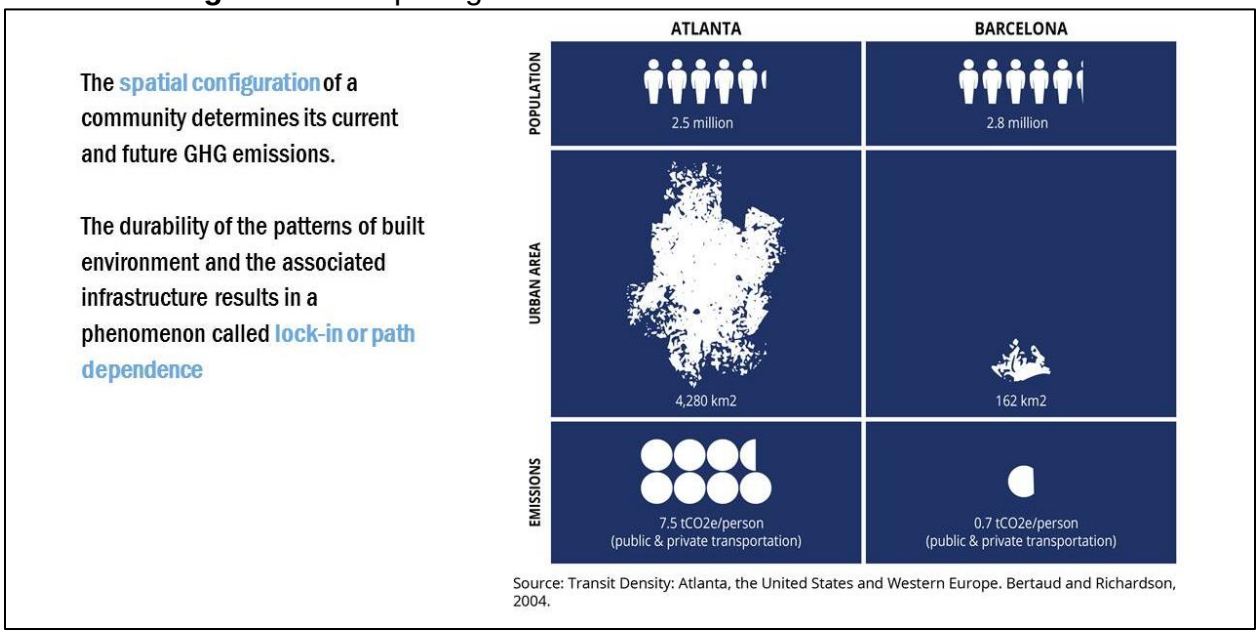
Land use planning affects almost every aspect of life in Ontario. How a city grows and how land is used has a direct impact on the GHG emissions the City produces and how resilient the community can be to extreme weather events caused by climate change.

An Official Plan (OP) is prepared by City Planners, with input from the community and helps to ensure that future planning and development will meet the specific needs of the community. Supportive language for climate change mitigation and adaptation should be incorporated into planning policies such as an OP and other primary decision-making processes such as GRIDS, Master Plans for Transportation, Water and Wastewater, and Stormwater.

The City of Hamilton is currently updating its Growth Management Strategy, known as GRIDS 2. The City will also be completing a Municipal Comprehensive Review (MCR) concurrently with GRIDS 2. These plans and decision-making processes will guide

growth over the next 10 years; however, it is vitally important that climate change be considered throughout the entire process. Figure 4 below is an example of two different global cities and how complete and connected communities and intensification can greatly influence the tonnes of carbon dioxide equivalent (tCO2e) per person.

Figure 4: Comparing Atlanta and Barcelona tCO2e Per Person



Climate change and air quality is mentioned throughout the existing Urban Hamilton Official Plan (UHOP) and Rural Hamilton Official Plan (RHOP); however, it is important to incorporate stronger language on climate change mitigation and adaptation to facilitate the transition to a zero carbon community.

Planning staff will participate on the Multi-Departmental Climate Change Task Force and will collaborate with other Planning Staff and the community to ensure a zero carbon community direction is properly communicated within GRIDS 2, the MCR and the UHOP and RHOP.

Buildings

In a report released by The Atmospheric Fund (TAF) in 2018 that calculated GHG emissions across the Greater Toronto Hamilton Area (GTHA), it was stated that the building sector contributed to 47% of GHG emissions. It also stated that 87% of those emissions come from natural gas use for water and space heating.

In Hamilton, SSG's report stated the top three emissions sources from building energy type is: coal at 61.0%, natural gas at 35.0% and electricity at 1.9% respectively. The emissions factor or emission intensity (i.e., how much carbon dioxide is emitted per unit of energy used) of any fuel source is very important. For example, coal has a much

higher emissions intensity compared to natural gas and therefore for every unit of coal burned to produce energy results in far more carbon dioxide released into the atmosphere compared to using natural gas. Furthermore because of Ontario's relatively clean electricity grid, electricity has far lower emission intensity than natural gas. These are important considerations when deciding on supply of fuel for the building sector.

There are potential municipal policy tools to encourage and facilitate lowering GHG emissions from the building sector. For example, municipalities across Ontario including Vaughan, Halton Hills, Clarington Township, Richmond Hill, Toronto, Mississauga, Brampton, and Whitby have either developed or have begun to develop what are being referred to as "Green Development Standards." These are either mandatory or voluntary design requirements with a focus on improved energy efficiency with all new private and city-owned developments. Municipal Green Development Standards will help facilitate local transition towards more energy efficient buildings.

However, a policy to address the existing building stock in Hamilton and across Ontario is required to reduce GHG emissions from existing buildings. Many of the buildings in Hamilton are very old, not energy efficient and require substantial maintenance. Policy initiatives that support the retrofit of existing buildings are growing in popularity across Canada. Similar programs such as Toronto's Home Energy Loan Program (HELP), City of London's Local Energy Efficiency Partnership (LEEP), or Nova Scotia's Property Assessed Clean Energy (PACE) are all examples of Municipal and Provincial programs aimed at retrofitting existing buildings to improve energy efficiency.

These two policies and additional policies to reduce energy and GHG emissions in buildings will be further researched and investigated through the development of the Community Energy Plan (CEP). Hamilton's Planning Committee approved the Terms of Reference for the development of the CEP in 2018, and submissions to the Request for Proposals have been received. Through the CEP, strategies will be developed for the implementation of the above-described policies and will be submitted to Planning Committee for approval.

Regional synergies may also exist for the development of a building retrofit program. One of the key strategic priorities of the Bay Area Climate Change Council is the implementation of a home energy retrofit program. Staff from both Hamilton and Burlington will be asked to participate on the implementation teams that will investigate the potential of bringing a regional approach to this type of policy program. There are also GTHA working groups through the Clean Air Partnership (CAP) also developing strategies for the creation of a building retrofit program. Ensuring that all Hamilton strategies for policy implementation align and complement regional objectives, rather than duplicate, will be an important consideration as the CEP is developed.

Although several energy conservation and fuel switching projects have reduced the City's GHG emissions, the reduction of Ontario's electricity emission factor has had

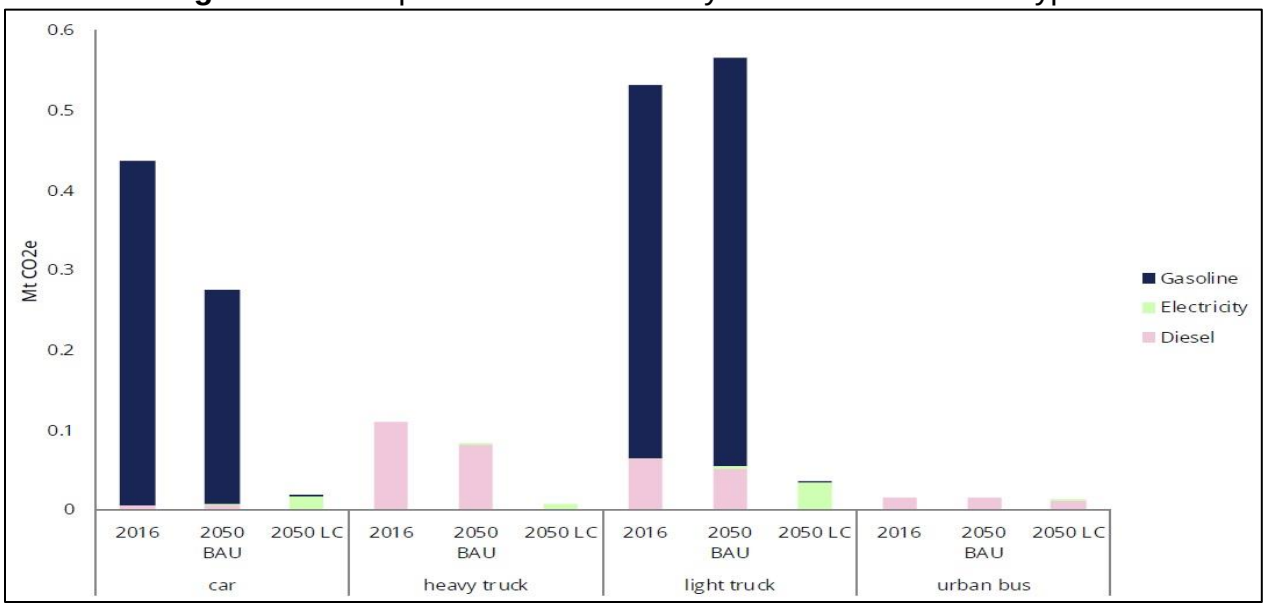
significant impact on reducing corporate GHG emissions. Staff across Public Works, including the Office of Energy Initiatives, have been participating in the CEP development and will participate in the Corporate Climate Change Task Force.

Energy efficient retrofits and high performance net zero energy buildings has the potential to create good paying, skilled trade jobs. The Canadian Green Building Council statistics show that in 2014, over 297,000 direct full-time workers were employed in the green building sector. This represents more Canadians employed than in the forestry, oil and gas, and mining industries combined.

Transportation

The transportation sector is the second largest source of GHG emissions with 1,096,430 tCO2e in Hamilton. This is consistent with many other municipalities across Ontario and Canada. TAF's research of GHG emission sources across the GTHA makes it clear that transportation sector emissions are a key area to target for emissions reduction strategies. Figure 5 below shows a representation of the emission sources in the transportation sector by vehicle type for Hamilton's 2016 emissions inventory completed by SSG.

Figure 5: Transportation Emissions by Source and Vehicle Type



The above bar graph shows that light trucks (e.g., Sport Utility Vehicles and Pick-Up Trucks), followed by cars are the two highest emission sources from transportation in Hamilton. This data shows the importance of supplying and increasing the availability of sustainable mobility networks across the City of Hamilton.

The City of Hamilton addresses several factors of transportation through the Transportation Master Plan (TMP). Several important aspects of reducing GHG emissions and improving health are detailed through sections of the TMP including:

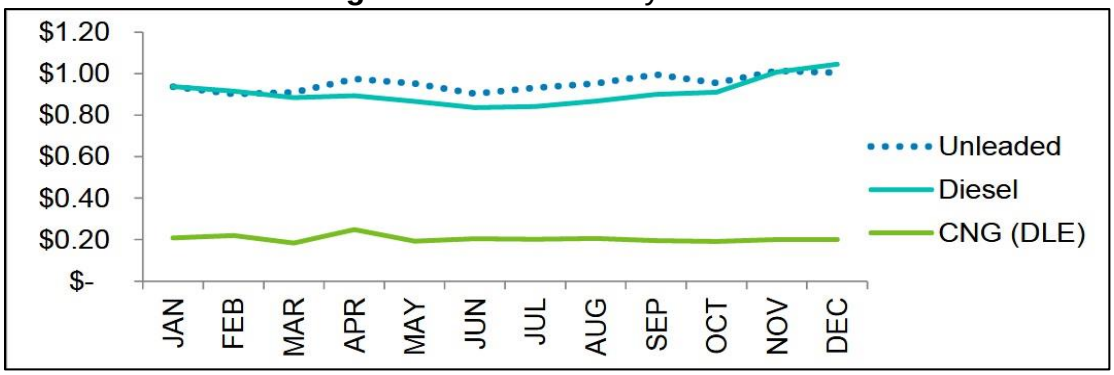
- Complete-Liveable-Better (CLB) Streets;
- The Role of Health in the Built Environment;
- Future Travel Demand Modelling;
- Sustainable Mobility Program Review; and,
- Cycling Master Plan Review and Update.

For example, an important part of achieving net carbon neutrality by 2050 will be the electrification and/or decarbonisation of our entire transportation sector. Within the TMP, actions include the requirement to provide electric vehicle (EV) charging stations as part of future zoning by-law amendments and the expansion of existing EV charging parking stations to create a network within all municipally-owned facilities, including public parking lots.

Efforts to accelerate and enhance these actions are needed to include requirements for EV charging stations at all new and renovated infrastructure projects including, but not limited to, buildings, parking lots, and service stations to prioritize the installation of EV charging stations.

The City of Hamilton's vehicle fleet represents the largest source of corporate emissions, according to the City of Hamilton's 2017 Annual Energy Report, at 38,040 tCO2e respectively. It is also the only sector of corporate emissions that have increased since the 2005 baseline year. Emission from the City's fleet is mainly attributed to the use of diesel fuel. The City has begun decommissioning diesel buses and transitioning to Compressed Natural Gas (CNG) buses. CNG has a much lower emission intensity (lower CO2e emission rate) compared to diesel. It also is far more cost effective with an average fuel cost per litre of $0.22 compared to diesel at $0.91. Figure 6 below shows the monthly fuel price of diesel, unleaded gasoline and CNG's diesel litre equivalent (DLE).

Figure 6: 2017 Monthly Fuel Prices in DLE



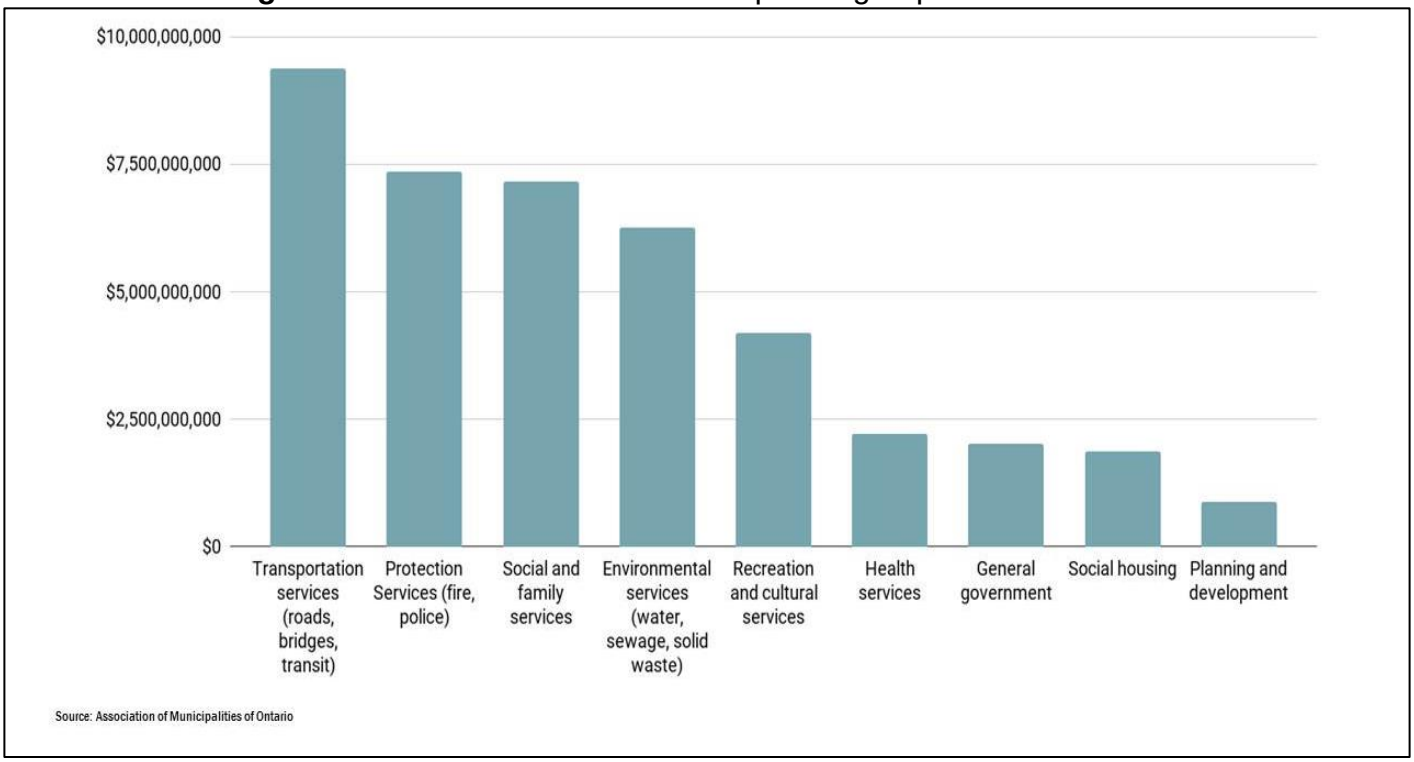
Vehicle fleet emissions in 2016 amounted to approximately 3.47% of total transportation emissions in Hamilton. However, fleet emissions have been growing since 2005 as our fleet gets larger. To remain a community leader in climate action, continued and enhanced efforts of decommissioning our diesel combustion engines through the transition to CNG vehicles should be prioritized.

Several co-benefits result in reducing GHG emissions in every sector, but the transition of people getting out of their personal vehicles, taking active and sustainable transportation and purchasing zero emission vehicles offers several health benefits. Diesel and gasoline combustion from vehicles results in the release of several harmful contaminants including fine Particulate Matter (PM2.5), Nitrogen Dioxide (NO2) and Benzene and Benzo(a)pyrene. By reducing GHG emissions from the transportation sector you are also reducing the exposure of Hamilton's population to these harmful contaminants. Furthermore, by providing citizens with the easy option of taking active and sustainable transportation, the City is promoting a healthy lifestyle that can reduce rates of obesity and other chronic illnesses.

Procurement

Municipal Governments across Ontario have the ability to impact sectors and markets by their large purchasing power. Figure 7 below shows statistics from Association of Municipalities of Ontario (AMO).

Figure 7: 2015 Local Government Operating Expenditures: $41.4B



Further information from AMO showed that in 2015 Ontario Gross Provincial Product (GPP) was $763 B, whereas local government accounted for $46.7 B (~6%). Local governments can use their purchasing power to help achieve the strategic priorities of the City and the Community through environmental and social strategic procurement.

The concept of environmental and social strategic procurement is that local governments can use the procurement process as a strategic function designed to align and support key social and environmental public policy goals. Social procurement has been used extensively across the world. In 2017, the European Commission adopted a public procurement strategy that includes the wider uptake of innovative, green and social procurement. In 2015, the Ontario provincial government passed the Community Benefit Clauses to infrastructure contracts awarded in Ontario.

Industry

Hamilton's industrial sector contributes the largest amount of GHG emission in the City at approximately 5,747,685 tCO2e, or 67% of total emissions. Hamilton has a very large industrial sector in the north end, supplying thousands of jobs and contributing millions of dollars to the local, provincial and federal tax base. Hamilton Chamber of Commerce CEO wrote in the Hamilton Spectator on August 31, 2018, that steel directly employs 10,000 people in dozens of companies in Hamilton's community and, through $2 B in local procurement, supports up to 40,000 additional jobs.

Sustainability Solutions Group's report does provide potential scenarios for the decarbonisation of the industrial sector in Hamilton. However it should be noted that these are one of several potential pathways towards decarbonisation. The SSG report details actions including increasing process motors and electrical efficiency, phasing out blast furnaces and switching to electric arc furnaces, and using more scrap metal and fuel shift away from coal, coke and oil to natural gas and electricity.

These actions may not be indicative of the direction of our local industrial partners. This is why continuing to grow our partnerships and collaborative efforts to investigating innovative low carbon solutions that maintains local companies' global competitiveness, is very important.

Examples of innovative technologies to lower industrial GHG emissions include Stelco's collaborative partnership in 2018 with Walker Environmental, who began using bio-carbon produced by Walker Environmental from recovered resources to replace a portion of coal in the coking process and, in turn, will provide 64,000 tCO2e reduction in GHG emissions. Another collaborative project, led by Hamilton Chamber of Commerce in partnership with local manufacturers, is McMaster University and the City of Hamilton will investigate the feasibility of utilizing waste heat and determining the potential efficient uses for it. This study hopes to enhance the competitive advantage of Hamilton's Bayfront Industrial Area while further reducing harmful emissions.

Ongoing partnership development and collective advocacy to higher levels of government for additional funding resources to investigate innovative low carbon technologies that allow industry to be globally competitive will be extremely important as Hamilton transitions to a prosperous net carbon neutral economy.

Finance

The transition to a zero carbon community will require an unprecedented initial amount of investment. It will require the re-prioritization of funding and alternative forms of financing mechanisms that have not been previously considered by local governments. The increased initial capital costs will be dramatic, however according to SSG's report, there could be a potential of $20 B in savings from energy costs alone.

Fortunately, the global financial sector is realizing the extreme importance and associated risks from climate change on investments. On April 16, 2019, The Guardian U.K. published an article quoting the governors of the Bank of England and France's central bank stating "As financial policymakers and prudential supervisors we cannot ignore the obvious physical risks before our eyes. Climate change is a global problem, which requires global solutions, in which the whole financial sector has a central role to play."

More and more investors are looking to invest in organizations and within cities that are leaders in climate change mitigation and adaptation. Investors realize the importance of climate change resiliency to improve business continuity when extreme weather events occur and that sustainability and energy efficiencies can save money and improve businesses triple bottom line.

A potential municipal financing mechanism growing in popularity across North America is a Green Bond. City of Toronto Manager of Capital Markets at the Bay Area Climate Change Summit defined Green Bonds as "debt securities where the proceeds are utilized to fund projects with specific environmental benefits." According to Sustainalytics, a local Hamilton investment research and ratings provider, the Green Bond market has grown 26% over the last year between 2018-2019. Approximately $8.3 B was issued last year through Green Bonds in Canada.

Currently Ottawa and Toronto are the only two municipalities in Ontario that have issued a Green Bond. Ottawa plans to use the $102 M raised to finance the light rail transit capital work requirements.

Although Green Bonds are still considered debt, there are several benefits of issuing a Green Bond including:

- An Environmental Social Governance (ESG) certified Green Bond will ensure funding is spent based on a Council approved framework which directs funding towards projects with a specific environmental benefit; and,

- Now due to demand, financing costs on average approximately one basis point cheaper than traditional debt ($100 M raised would equal approximately $100,000 in annual savings).

The issuance of a Green Bond may require costly administrative burdens that negate any annual savings realized. Finance staff will participate on the Corporate Climate Change Task Force in order to investigate and report back to the City Manager and Council on the cost benefit analysis of issuing a Green Bond.

Education and Awareness

City staff have engaged the community on climate change mitigation and adaptation priorities through several projects over the last five years, including:

- Let's Talk About The Weather, which consulted with hundreds of Hamilton residents in 2014, leading to the creation of Hamilton's first Community Climate Change Action Plan;
- Community Climate Change Adaptation workshops and meetings, which engaged with 20 prominent organizations on climate impacts of concern and gaps in coping with them;
- The Bay Area Climate Change Office engagement process in 2018, consulting with 32 organizations and 895 individuals on climate change priorities and the structure of the newly-formed Bay Area Climate Change Council; and,
- The first and second Bay Area Climate Change Summit, in 2018 and 2019 respectively, with over 400 attendees.

This has provided City staff with a good base of understanding of climate change mitigation and adaptation priorities in our community. In general, people want politicians at all levels to do more on climate change both in terms of reducing emissions and adapting our communities to expected impacts; however, it's worth noting that Hamilton residents haven't been specifically consulted on climate mitigation since the "Let's Talk About the Weather" campaign in 2014. Consultation efforts since that time have focused on regional initiatives with the City of Burlington as part of the Bay Area Climate Change Office, and on climate adaptation. Despite consulting with key environmental organizations such as Environment Hamilton, Hamilton 350, and members of the Bay Area Climate Change Council, no wide-spread community consultations on the concept of a Climate Emergency, or potential actions and policies resulting on the declaration, has taken place.

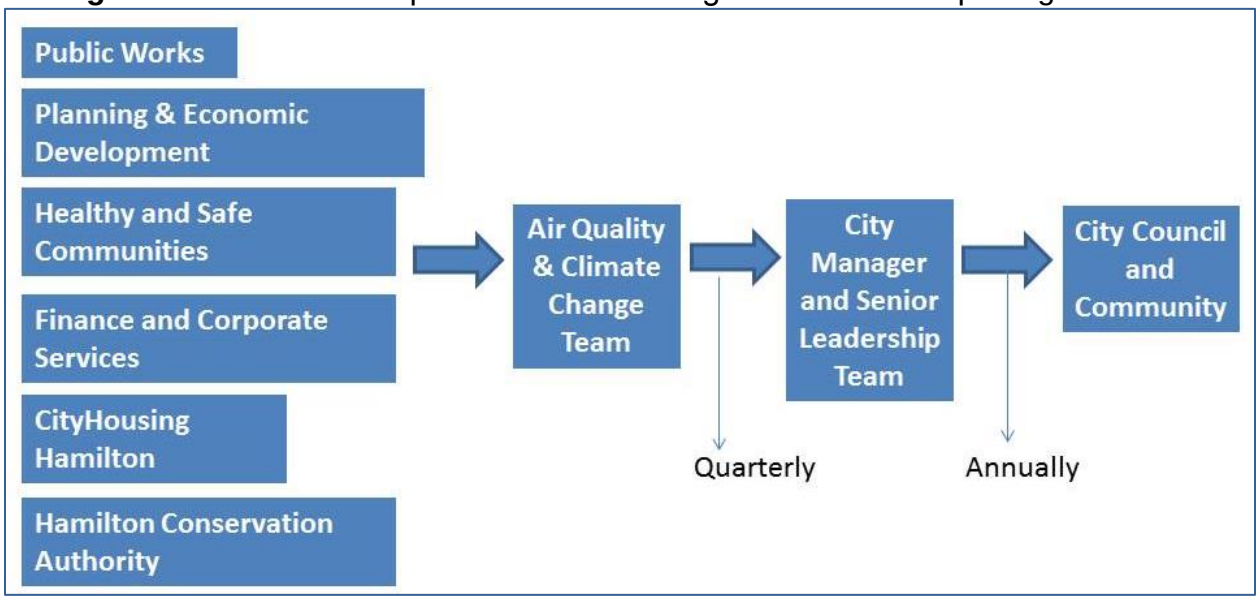
Through the Bay Area Climate Change Office, City of Hamilton staff will be partnering with Mohawk College, McMaster University and Mohawk College to continue their community awareness campaign that was funded by the federal government through the Climate Action Fund. The education and awareness campaign will be delivering a variety of community seminars, pop-up events and targeted educated strategies on a

variety of climate topics. Further to this, Hamilton and Burlington are also partnering with Youth Challenge International establishing cohorts of youth groups across Ontario to work on climate change action. It will be worthwhile to include further education and awareness on the climate change emergency within this ongoing planned engagement work.

Reporting

Climate change presents a great scientific, political, social and economic complexity that will require unprecedented GHG emission reductions that will impact the entire Corporation of the City of Hamilton and the community; therefore, a multi-disciplinary collaboration between all departments through the Corporate Climate Change Task Force will be created.

Figure 8: Hamilton's Corporate Climate Change Task Force Reporting Structure



This Task Force will report quarterly to all of the General Managers of each department through the Senior Leadership Team in order to ensure information and updates are shared in a timely manner. The Task Force will report directly the City Manager so oversight is from the highest level within the City of Hamilton. The information provided by the Corporate Climate Task Force will be used to prioritize annual capital and operating budgets in order to work towards meeting our new GHG reduction targets, while also becoming more resilient to the impact of climate change.

The Air Quality and Climate Change (AQ&CC) Team within the Healthy and Safe Communities Department will continue to act as the coordinating office for the Corporate Climate Change Task Force. The AQ&CC team will centralize climate change work and reporting of the Corporate Climate Change Task Force across the

corporation in order for the City Manager to update Municipal Council on the progress of climate change work on an annual basis.

City staff across the corporation will also be requested to participate on the regional Bay Area Climate Change Implementation Teams, to ensure alignment with regional priorities. Synergies will be identified and created that accelerate uptake of climate action across the cities of Hamilton and Burlington. These Implementation Teams will report back to the Bay Area Climate Change Council which in turn will report back annually to the community through public forums on the progress of regional climate action and each respective municipality to identify strengths and weaknesses.

It will be important to communicate clearly and often on what the priorities are, the actions to be taken, emerging scientific knowledge, and progress on achieving our goals. Every policy, plan and action will need to be dynamic in order to keep up with evolving technology and information. By working towards developing the above reporting frameworks, both Municipal council and the community will be able to stay up to date on the progress of climate change action across the cities of Hamilton and Burlington.

Hamilton and Burlington Low-Carbon Scenario and Technical Report 2016 to 2050

COMPLETED AS PART OF THE BAY AREA CLIMATE CHANGE OFFICE, CENTRE FOR CLIMATE CHANGE MANAGEMENT AT MOHAWK COLLEGE
GREENHOUSE GAS INVENTORY AND FORECAST

SSG SUSTAINABILITY SOLUTIONSGROUP

whatIf?

TERMS AND ACRONYMS

ACRONYM	DESCRIPTION
BAU	Business as usual
BF	Blast furnace
CDD	Cooling degree day
DMA	Data, methods and assumptions
GHG	Greenhouse gas
GJ	Gigajoule
HDD	Heating degree day
HELP	Home Energy Loan Program
ICI	Institutional, commercial and industrial
LC	Low-carbon
LIC	Local improvement charge
MWh	Megawatt hour
OBC	Ontario Building Code
PACE	Property assessed clean energy
PJ	Petajoule
PV	Photovoltaics
RNG	Renewable natural gas
TGS	Toronto Green Standard

CONTENTS

EXECUTIVE SUMMARY

This report provides an analysis of energy, GHG emissions and energy costs from 2016 to 2050 for the cities of Burlington and Hamilton, which collectively are described as the Bay Area.

The GHG emissions baseline was developed using SSG's energy, emissions, land-use, and financial model, CityInSight. This model was used to develop a baseline for 2016, and Business-as-Usual (BAU) and Low-Carbon (LC) scenarios. CityInSight ensures a physically coherent and highly detailed representation of each scenario that is calibrated against local conditions; in other words, the scenarios are realistic and possible futures for the Bay Area.

The BAU scenario represents a continuation of current trends and policies. The LC scenario includes detailed actions that improve the efficiency of dwellings and buildings, fuel switches to electricity for heating and vehicles, increases local renewable energy including district energy, additional transit and active transportation and reduced waste generation.

Figure 1 illustrates the total GHG emissions for the Bay Area (Burlington and Hamilton combined), which are 9.8 MtCO2e in 2016 and are relatively flat until 2050. Fuel efficiency standards and a decreased requirement for heating as a result of climate change offset a population increase. The low-carbon scenario results in a decline to 1.6 MtCO2e by 2050, a reduction of 84% over 2016.

Figure 2 shows the split between the two cities. Hamilton's GHG emissions are 87% of the total, with 8.6 MtCO2e versus 1.3 MtCO2e from Burlington. Nearly 70% of Hamilton's GHG emissions are associated with the steel industry.

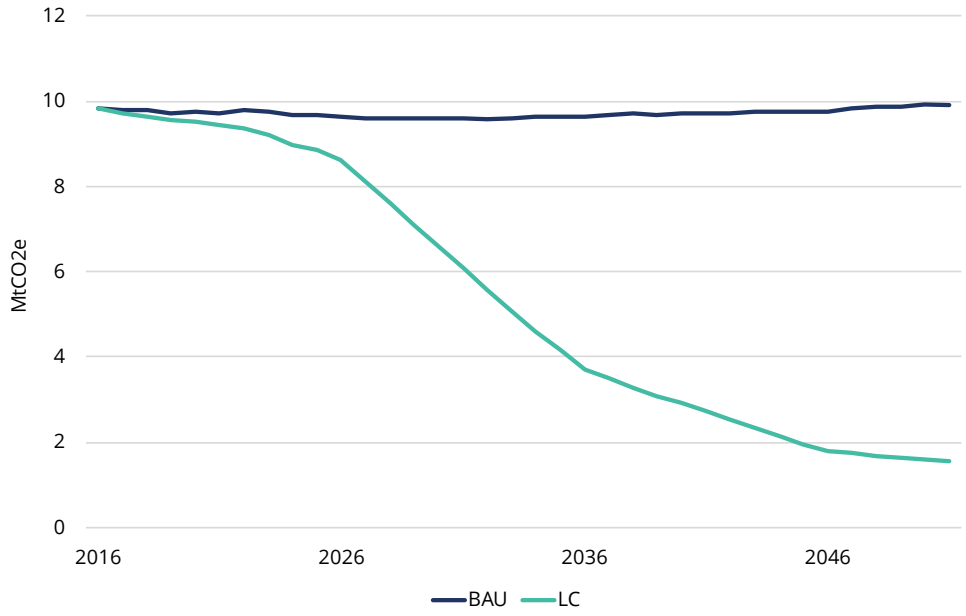


Figure 1. Total GHG emissions (MtCO2e) for the Bay Area (Burlington and Hamilton).

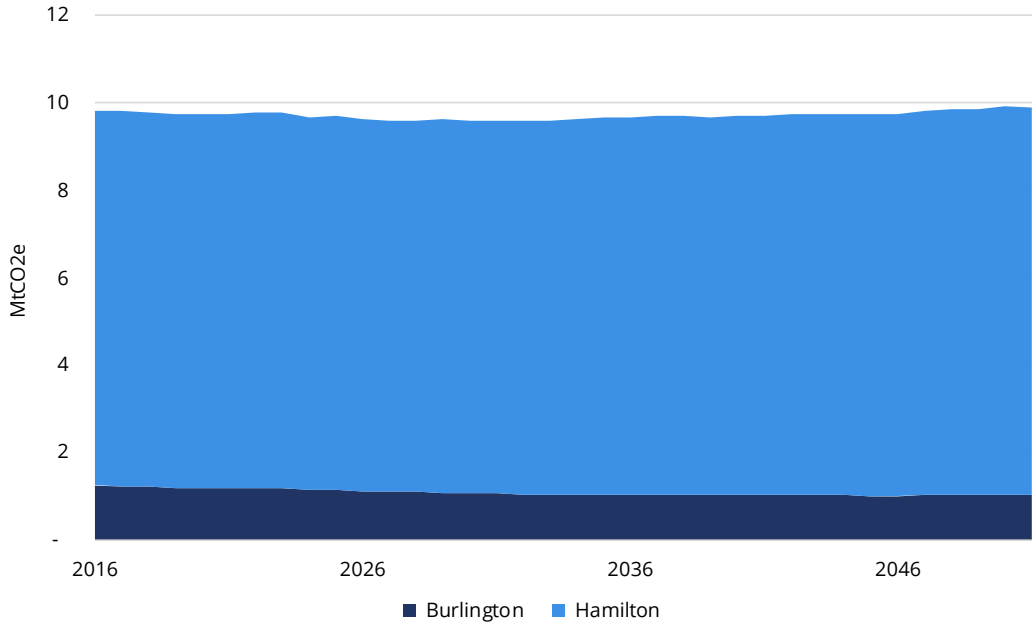


Figure 2. Total GHG emissions (MtCO2e) for Burlington and Hamilton, BAU scenario.

Figure 3 shows energy consumption for both municipalities on a per capita basis with the steel sector removed for the City of Hamilton. As a result the difference between the two municipalities on an energy basis is relatively small, a 100-120 GJ/capita. This difference narrows further in the low-carbon scenario, declining to 40 GJ/capita by 2050.

The GHG impacts of the low-carbon scenario are illustrated in Figure 4. GHG emissions from Burlington decline to 130 ktCO2e, whereas GHG emissions in Hamilton fall to 1.5 MtCO2e, with much of the remaining GHG emissions being associated with the steel industry.

In terms of deep emissions reductions, the key opportunities are efficiency gains wherever possible followed by fuel switching away from natural gas to electricity and from gasoline to electricity and further decarbonisation of electricity.

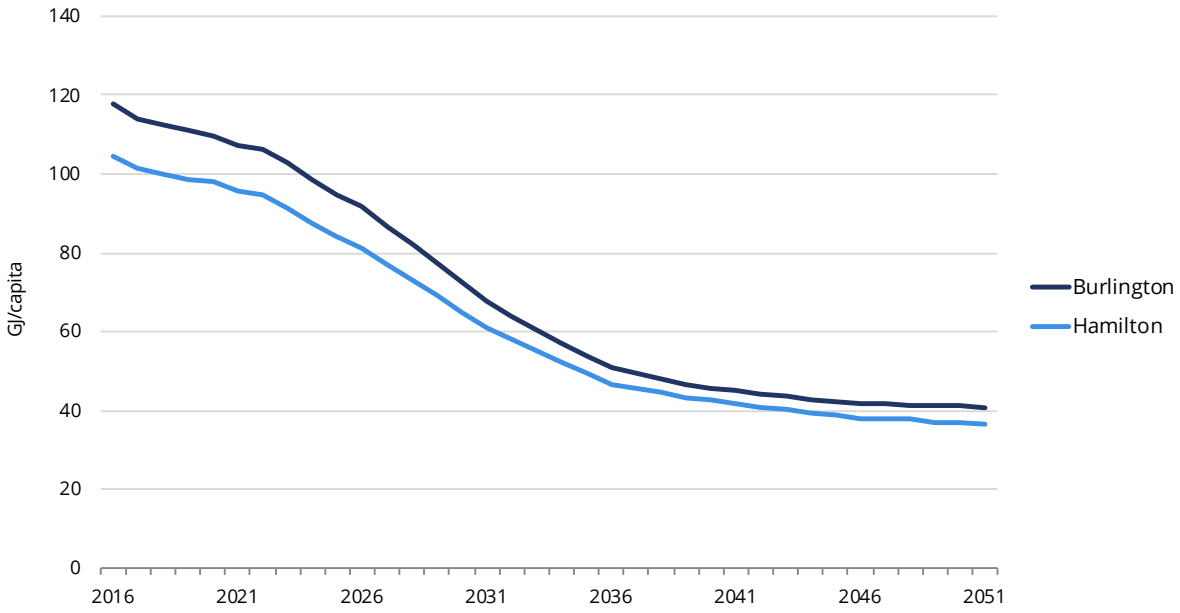


Figure 3. Per capita energy consumption by city, excluding industrial energy for the LC scenario.

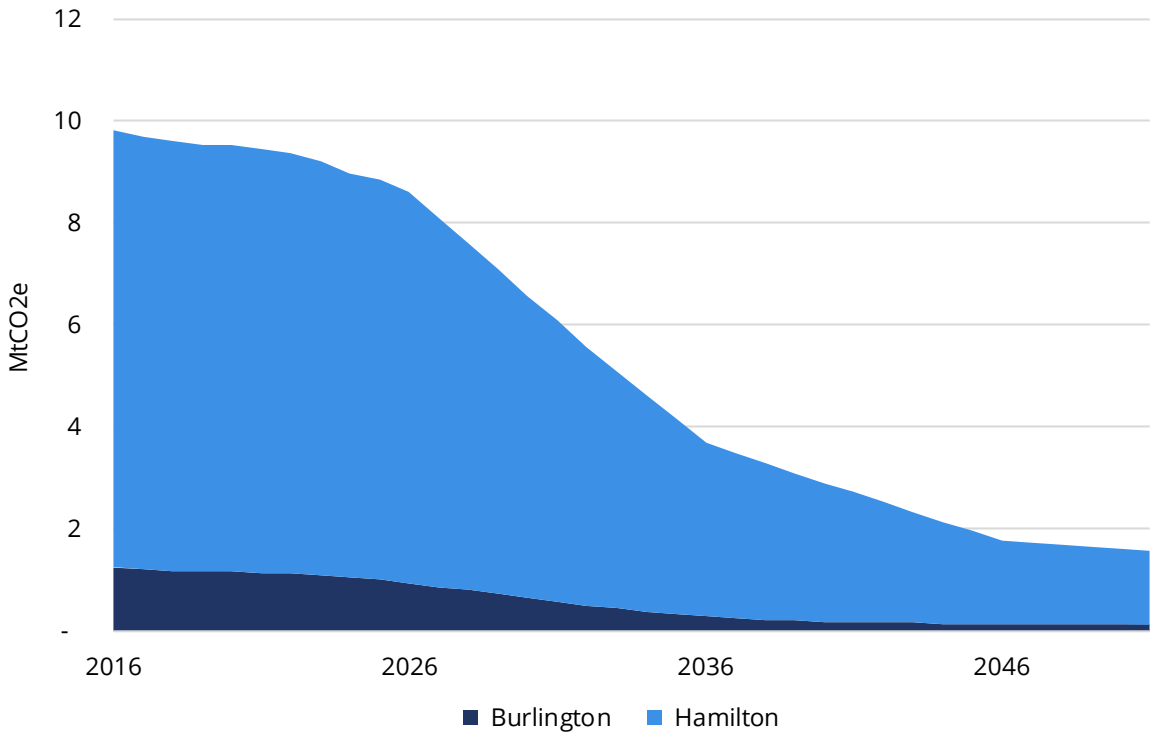


Figure 4. Total GHG emissions (MtCO2e) for Burlington and Hamilton, LC scenario.

Total energy expenditures for the Bay Area in 2016 were $2.2 billion; in the BAU scenario, this climbs to $2.8 billion by 2050 versus $1.8 billion in the low-carbon scenario (Figure 5). The annual financial savings can be used to finance the transition. Over the period, the avoided energy expenditures resulting from the low-carbon scenario totals $20 billion. An additional $9 billion is saved from reduced expenditures on the carbon tax in the LC scenario relative to the BAU scenario between 2019 and 2050, because the reduced GHG emissions result in lower carbon taxes.

The implementation of the LC scenario requires a scaling up of action and ambition; this analysis indicates that this pathway is physically possible and will result in considerable energy savings. Regional coordination over the Bay Area can result in avoided duplication of programs that will deliver these savings. For example, requirements for enhanced building energy performance for new construction reduce the need for future retrofits and can be jointly developed between the two cities. A similar story applies to a local improvement charge (LIC) program to support energy retrofits. A vehicle to stimulate local generation of renewable energy, a cooperative can also be jointly coordinated, as a can a program which purchases and supports the deployment of electric vehicles.

Targets for GHG emissions have been identified by decade out until 2050 for each of the cities and the Bay Area as a whole. GHG emissions targets by sectors can also be specified in order to align with the low-carbon scenario. In addition to the decadal targets, a carbon budget is also specified; a carbon budget represents the cumulative GHG emissions associated with the low-carbon pathway over the period from 2018 to 2050. The carbon budget, like a financial budget, is an envelope of GHG emissions from which the city subtracts its annual GHG emissions to identify whether or not the overall trajectory is on track. Additionally, a carbon budget allows the City or Bay Area to align with the global carbon budget, which seeks to limit warming to either 1.5° or 2°.

The 2050 GHG target for the Bay Area is 1.6 MtCO2e, a significant drop over the 2016 total of 9.8 MtCO2e. The cumulative total, or carbon budget, between 2018 and 2050 is 176 MtCO2e.

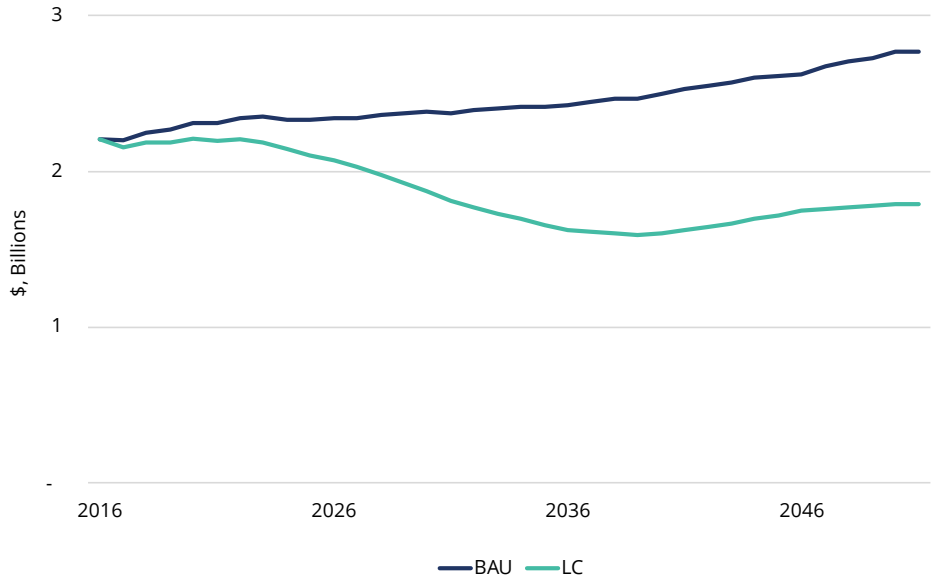


Figure 5. Total energy expenditures, Bay Area

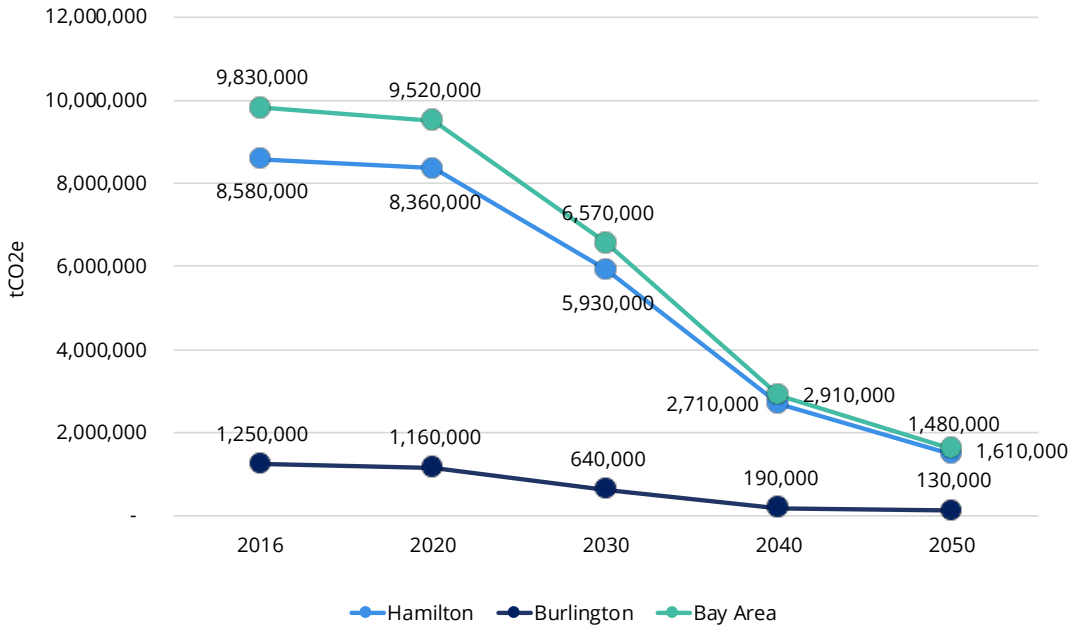


Figure 6. GHG emissions targets, Bay Area and municipalities

INTRODUCTION

Mohawk College, located in Hamilton, Ontario, has partnered with the City of Hamilton and the City of Burlington to host a Centre for Climate Change Management (CCCM). The CCCM is a regional response to climate change that supports sustainability and the implementation of Burlington's Community Energy Plan and Hamilton's Climate Change Action Plan.

To facilitate understanding of the energy and GHG profiles of the two cities, each has been analyzed separately in order to assess the differences in their industry, policies and populations.

The GHG emissions baseline was developed using a systems dynamics model called CityInSight, which evaluates energy, and GHG emissions. This model was used to develop a baseline and Business-as-Usual and Low-Carbon scenarios for each municipality.

The emissions baseline applies the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories accounting framework (GPC Protocol). The GPC uses the municipal boundary as the inventory boundary. Appendices 1 & 2 provide summaries on the scope of reporting on GHG emissions according to the requirements of the GPC.

The Business-as-Usual (BAU) scenario illustrates the impact of continuing current practices on energy consumption and GHG emissions out until 2050. The Low-Carbon (LC) scenario shows the impacts on energy use and GHG emissions from low-carbon actions in buildings, transportation and waste sectors for each municipality.

In this comparison, the demographic projections are held constant in the LC and the BAU scenarios. Because these projections of population growth, and the resulting changes to employment and households are consistent, the influence of the low-carbon actions is highlighted.

The two municipalities have distinct objectives related to energy and GHG emissions. The goal for the City of Hamilton is for GHG emissions to be 80% below 1990 levels by 2050. The City of Burlington's Community Energy Plan has five stated goals:

1. 5% annual community energy reduction from 2014 by 2031.
2. An overall annual reduction of per capita community energy use of 4% or 5.3 GJ/person per annum.
3. Sustainable local generation (including both renewable and district energy): 12.5 MW by 2031.

4. Reduce annual energy consumption by 2.4 GJ/person in new housing construction, resulting in a 34% reduction (per person) when compared to Burlington's existing residential building stock.

5. Achieve a 20% modal split by 2031 for transportation, and reduce annual fuel use by 20.9 GJ/person by 2031.

CITY OF BURLINGTON DEMOGRAPHICS

POPULATION

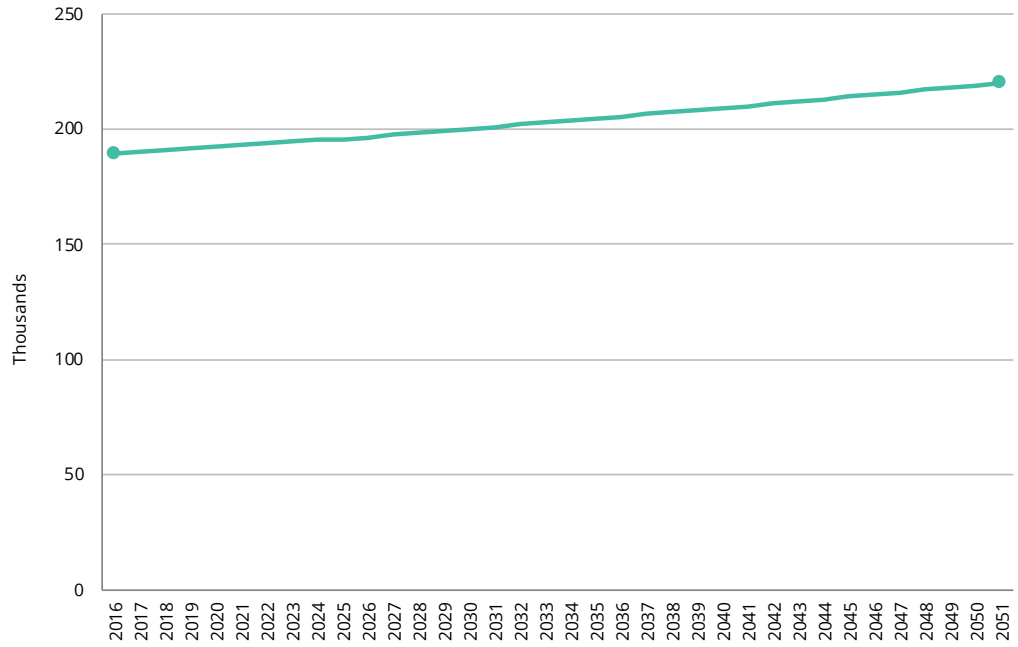


Figure 7. Projected population, Burlington, 2016-2050.

EMPLOYMENT

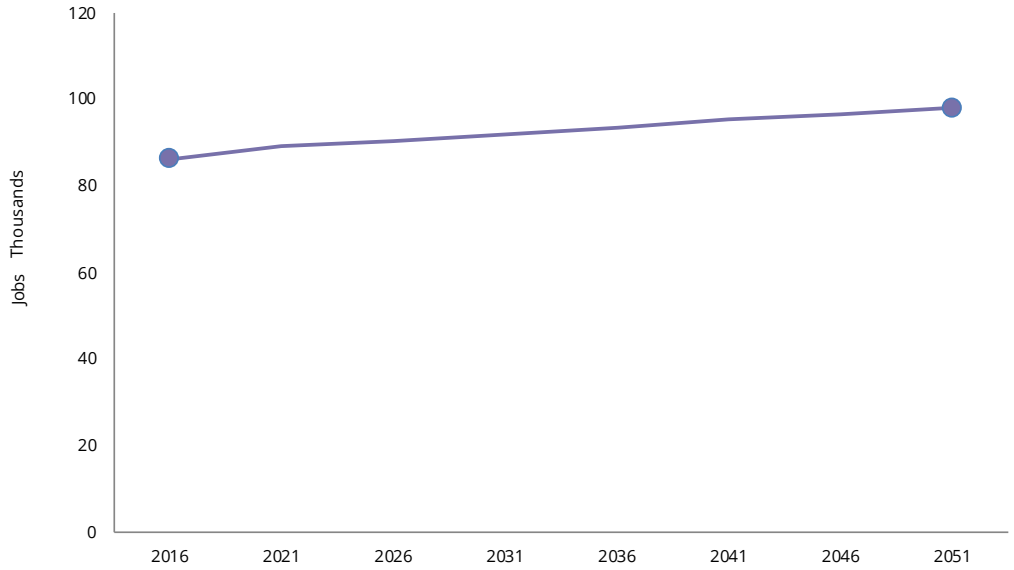


Figure 8. Projected employment, Burlington, 2016-2050.

Demographic information helps to contextualise the baseline of energy use and GHG emissions within a community. Three key pieces of information are the population, rate of employment, and number of households. Data sources, and the assumptions made to project demographic data to 2050 are described in detail on page 38, in the Data, Methods and Assumptions (DMA) manual.

The 2016 census data[1] for population and employment were adjusted for the estimated undercount by age. Growth rates provided by the Regional Municipality of Halton for the City of Burlington[2] were used from 2016 to 2031. The Ontario Growth Plan for the Greater Golden Horseshoe 2017[3] growth rates for the Region of Halton were used between 2031 and 2041, and after 2041, growth rates were held constant until 2050.

The population in 2016 was 189,000 people; this is projected to increase to 219,000 by 2050, an increase of 16%. The total number of jobs in 2016 was 86,000 and by 2050, this is projected to increase to 98,000.

1 Statistics Canada. 2017. Burlington, CY [Census subdivision], Ontario and Halton, RM [Census division], Ontario (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017

2 Regional Municipality of Halton Best Planning Estimates of Population, Occupied Dwelling Units and Employment, 2011-2031, 2011.

3 Ontario Ministry of Municipal Affairs, 2017. Growth Plan for the Greater Golden Horseshoe (2017).

CITY OF HAMILTON DEMOGRAPHICS

POPULATION

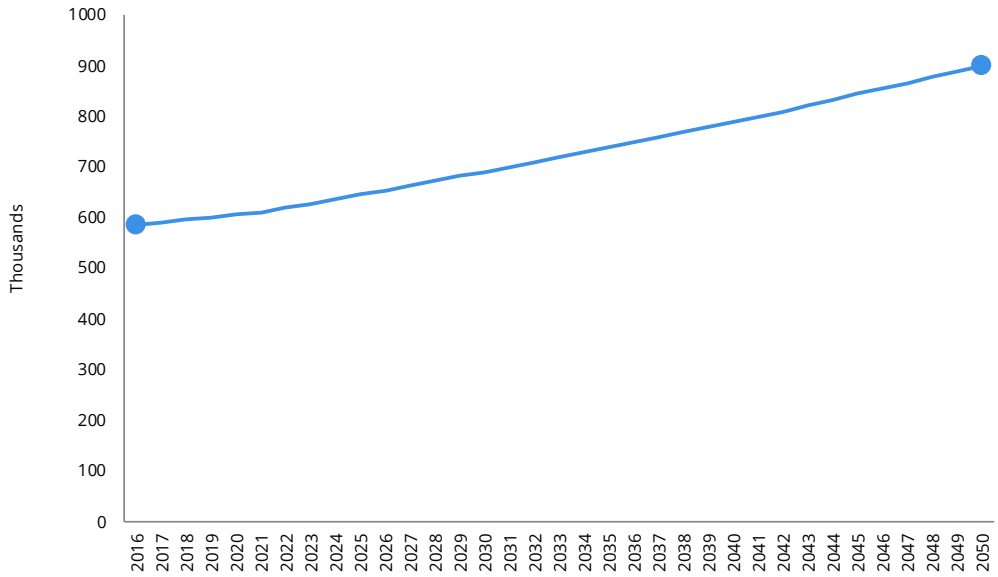


Figure 9. Projected population, Hamilton, 2016-2050.

EMPLOYMENT

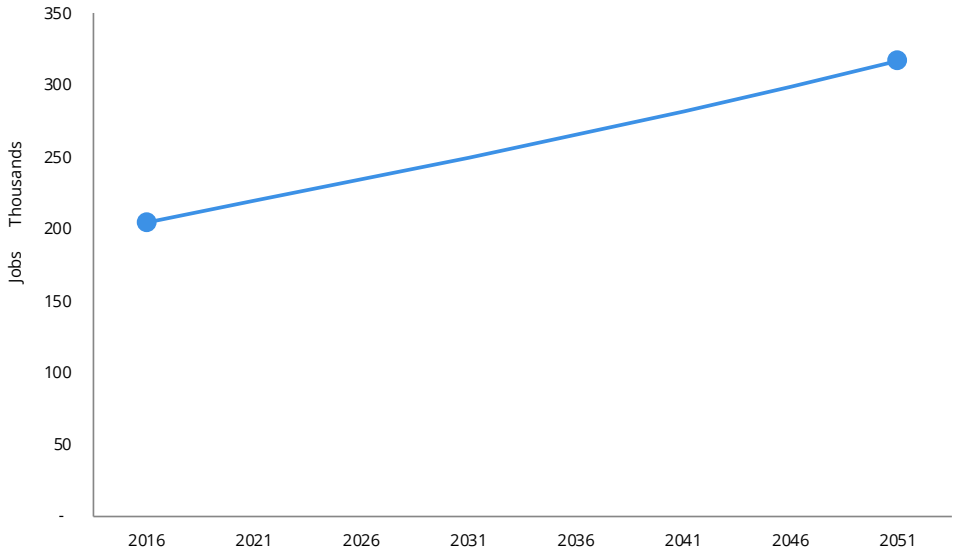


Figure 10. Projected employment, Hamilton, 2016-2050.

A similar approach was used for the City of Hamilton. The 2016 census data[4] for population and employment were adjusted for the estimated undercount, and to reflect the place of work of employees. Population growth rate projections from 2016 to 2041 came from the GRIDS2 report[5], and the 2041 growth rate was held constant from 2041 to 2050.

The population in 2016 was 585,617 people, which is projected to increase to 898,800 by 2050, an increase of 53%.

The total number of jobs in 2016 was 204,360, which is projected to grow to 316,750 by 2050.

4 Statistics Canada. 2017. Hamilton, C [Census subdivision], Ontario and Hamilton, CDR [Census division], Ontario (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017.

5 City of Hamilton, 2006. GRIDS2 Growth Summary 2006-2016.

PART 1: BUILDING A LOW-CARBON SCENARIO

The low-carbon (LC) scenario is a projection over the time period from 2017 to 2050. It is designed to illustrate the anticipated energy use and greenhouse gas emissions for the Cities of Hamilton and Burlington if the Cities implement the actions to address energy and emissions described in Tables 1 and 2 between 2017-2050.

Note that a scenario, as it is applied in this context, is an internally consistent view of what the future might turn out to be—not a forecast, but one possible future outcome. Similar to the BAU scenario, the LC scenario projection is one of many possible views of the future; in this case, one that assumes that several policies, actions or strategies to address energy and emissions are implemented between 2017-2050.

Low-carbon scenarios were developed for both municipalities using a common approach. A scenario is not a forecast, but rather is one possible future outcome. Scenarios are coherent in describing the relationships between different variables and reflecting an evolution of current physical stocks such as buildings and vehicles. In other words, scenarios as developed in this analysis, cannot reflect a physically impossible trajectory.

LOW-CARBON ACTIONS

A low-carbon future for both Hamilton and Burlington requires changes across all aspects of the community, including new and existing buildings, transportation, industry, and waste management. In order to model these changes, a catalogue of actions was developed, based on research of best practices of municipal actions.

This catalogue was reviewed with city staff and additional refinement and analysis was undertaken to develop a list of actions relevant for each of the cities. This process was informed by the results of the BAU analysis, which provided insight on the major drivers of GHG emissions in both cities, and therefore helped to identify areas with potential for GHG emissions reductions.

In total, 21 actions were identified for Burlington, and 23 were identified for Hamilton. These are described in Tables 1 and 2, respectively. Modelling assumptions and

parameters were developed for each action. These assumptions were derived from a detailed review of academic literature, and the application or modelling of the action in other similar cities. The assumptions underlying the actions are explained in more detail in Tables 1 and 2, which also show the assumptions in the BAU scenario for the two cities for comparison.

Each action was modeled using CityInSight in two steps: assumptions for each of the actions were modelled to quantify the emissions reduction impact against the BAU scenario; and then an integrated scenario was developed, whereby all the actions are modelled together to capture feedback between and among the actions.

The feedback between the actions can significantly influence the emissions reductions associated with an action. For example, when modelled against the BAU scenario, a shift to increased walking mode share represents reduced gasoline if a vehicle trip is avoided. However, In the integrated scenario, the introduction of electric vehicles means that the elimination of a vehicle trip results in reduced electricity consumption, which represents significantly less GHG emissions reductions.

Because of the feedback between the actions, the sequence in which the actions are implemented in the model influences the outcome associated with a particular action. In general, actions that reduce consumption and maximise efficiency are prioritized and deployed prior to actions related to fuel switching and local energy generation. Examples include prioritising mode share shifts to walking and cycling prior to electrification of the vehicle fleet, or prioritizing retrofits and improved building codes to buildings before switching to renewables. Figure 11 illustrates a schematic of the sequencing of actions, grouped into two general categories, as they were implemented in the model.

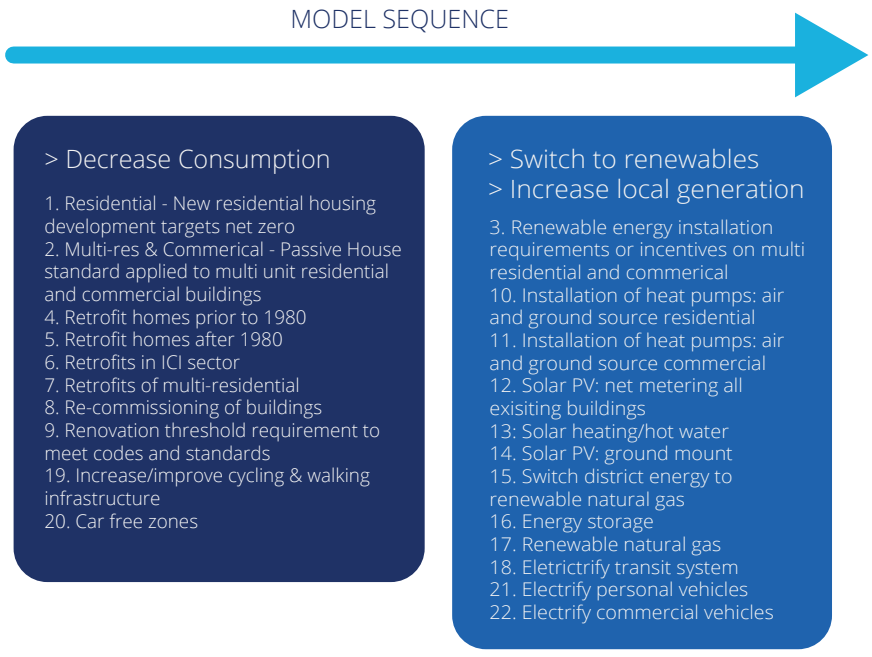


Figure 11. Sequencing schematic of actions in modelling.

Several underlying assumptions were unchanged (from the BAU) in the low-carbon scenario; these include the population and employment projections, building growth projections, climate projections (heating and cooling degree days), the provincial grid emissions factors, and vehicle fuel efficiency standards.

These assumptions are held constant in the LC scenario for one of two reasons:

1. They are underlying drivers that are not associated with the implementation of a low-carbon action are required to be held constant in order to provide a consistent comparison between the LC scenario and the BAU;

2. They are drivers of energy and emissions that the Cities have very little influence over, and as such, do not have the ability to implement action to address these areas.

Table 1. BAU and Low-Carbon actions and assumptions for the City of Burlington.

CITY OF BURLINGTON	BAU ASSUMPTION	LOW-CARBON ASSUMPTION
BUILDINGS		
New buildings growth		
Floor space	Floor space per employee held constant.	Floor space per employee decreased by 25% by 2050 in offices.
New buildings energy performance		
Residential	Apply 2017 Ontario Building Code (OBC) levels of performance.	Incrementally increase the number of buildings that achieve Passive House levels of performance to 100% by 2030.
Industrial, commercial and institutional (ICI)	Apply 2017 OBC levels of performance.	Incrementally increase the number of buildings that achieve Passive House levels of performance to 100% by 2030.
Existing buildings energy performance		
Retrofit homes built prior to 2017	No retrofits.	98% of pre-2017 dwellings retrofit by 2050, with retrofits achieving thermal and electrical savings of 50%. Savings are greater for older buildings than newer buildings.
Retrofits of commercial and industrial	No retrofits.	98% of pre-2017 dwellings retrofit by 2050, with retrofits achieving average thermal and electrical savings of 50%. Savings are greater for older buildings than newer buildings.
Recommissioning of commercial and institutional buildings	No retrofits.	Every building is recommissioned on a ten-year cycle, achieving energy savings of 15% on pre-2017 building stock.
End use		
Space heating	Baseline shares of heating systems are maintained	Air source heat pumps are added to 40% of residential buildings and 30% of commercial buildings by 2050. Ground source heat pumps are added to 20% of residential and 25% of commercial buildings by 2050.
Water heating	Scale up to 10% of residential buildings by 2050, and 10% of commercial buildings by 2050. Achieves 50% of solar hot water load.	Scale up to 80% of residential buildings by 2050, and 50% of commercial buildings by 2050. Achieves 50% of solar hot water load.
ENERGY GENERATION		
Solar PV	Scale up so that 10% of all buildings by 2050 have solar PV systems which provide on average 30% of consumption for building electrical load for less than 5 storeys; 10% for multi-unit and commercial buildings.	80% of all buildings by 2050 have solar PV systems which provide on average 30% of consumption for building electrical load for less than 5 storeys; 10% for multi-unit buildings greater than 5 storeys and commercial buildings

CITY OF BURLINGTON	BAU ASSUMPTION	LOW-CARBON ASSUMPTION
Solar PV - ground mount	0.5 MW per year between 2018 and 2050; ~20 hectares (ha)	5 MW per year between 2018 and 2050; ~120 ha.
District Energy	N/A	2 MW of district energy capacity added to the commercial and institutional buildings in the downtown core.
Energy storage	No storage deployed.	250 MWh by 2050.
Renewable natural gas	No additional production.	Local production is maximised and additional renewable natural gas is imported to displace natural gas consumption in buildings.
TRANSPORTATION		
Expanded transit	Transit mode share remains constant.	Transit mode share increases to 5% of internal trips.
Active modes	Walking and cycling mode share remains constant.	Active mode share increases to 10% of internal trips.
Electrify transit system	No additional electrification.	100% transit system is electric by 2030.
Electrify municipal fleet	No additional electrification.	100% of the fleet is electric by 2030.
Electrify personal vehicles	~5% of personal use vehicles are electric by 2035; 10% by 2050.	100% of new personal use vehicles are electric beginning in 2030.
Electrify commercial vehicles	25% of the vehicle fleet is electric by 2050.	All commercial vehicles are electric by 2050.
WASTE		
Waste generation	Waste generation is held constant.	Waste generation is reduced by 50% per capita by 2050.
Waste diversion	Waste diversion rates are held constant.	Diversion rates are increased by 50% per capita by 2050.

Table 2. BAU and Low-Carbon actions and assumptions for the City of Hamilton.

CITY OF HAMILTON	BAU ASSUMPTION	LOW-CARBON ASSUMPTION
BUILDINGS		
New buildings growth		
Floor space	Floor space per employee held constant.	Floor space per employee decreased by 25% by 2050 in offices.
New buildings energy performance		
Residential	Apply 2017 OBC levels of performance.	Incrementally increase the number of buildings that achieve Passive House levels of performance to 100% by 2030.
ICI	Apply 2017 OBC levels of performance.	Incrementally increase the number of buildings that achieve Passive House levels of performance to 100% by 2030.
Existing buildings energy performance		
Retrofit homes built prior to 2017	No retrofits.	98% of pre-2017 dwellings retrofit by 2050, with retrofits achieving thermal and electrical savings of 50%. Savings are greater for older buildings than newer buildings.
Retrofits of commercial and industrial	No retrofits.	98% of pre-2017 dwellings retrofit by 2050, with retrofits achieving average thermal and electrical savings of 50%. Savings are greater for older buildings than newer buildings.
Recommissioning of commercial and institutional buildings	No retrofits.	Every building is recommissioned on a ten-year cycle, achieving energy savings of 15% on pre-2017 building stock.
End use		
Space heating	Baseline shares of heating systems are maintained.	Air source heat pumps are added to 40% of residential buildings and 30% of commercial buildings by 2050. Ground source heat pumps are added to 20% of residential and 25% of commercial buildings by 2050.
Solar water heating	Scale up to 10% of residential buildings by 2050, and 10% of commercial buildings by 2050. Achieves 50% of solar hot water load.	Scale up to 80% of residential buildings by 2050, and 50% of commercial buildings by 2050. Achieves 50% of solar hot water load.
ENERGY GENERATION		
Solar PV	Scale up so that 10% of all buildings by 2050 have solar PV systems which provide on average 30% of consumption for building electrical load for less than 5 storeys and 10% for multi-unit and commercial buildings.	80% of all buildings by 2050 have solar PV systems that provide on average 30% of consumption for building electrical load for less than 5 storeys and 10% for multi-unit buildings greater than 5 storeys and commercial buildings.

CITY OF HAMILTON	BAU ASSUMPTION	LOW-CARBON ASSUMPTION
Solar PV - ground mount	0.5 MW per year between 2018 and 2050: ~20 ha.	5 MW per year between 2018 and 2050: ~120 ha.
District Energy	N/A	16.3 MW of district energy capacity added to the commercial and institutional buildings in the downtown core.
Energy storage	No storage deployed.	250 MWh by 2050.
Renewable natural gas	No additional production.	Local production is maximised and additional renewable natural gas is imported to displace natural gas consumption in buildings.
TRANSPORTATION		
Expanded transit	Transit mode share remains constant.	Transit mode share increases to 5% of internal trips.
Active modes	Walking and cycling mode share remains constant.	Active mode share increases to 10% of internal trips.
Electrify transit system	No additional electrification.	100% of the transit system is electric by 2030.
Electrify municipal fleet	No additional electrification.	100% of the fleet is electric by 2030.
Electrify personal vehicles	~5% of personal use vehicles are electric by 2035; 10% by 2050.	100% of new personal use vehicles are electric beginning in 2030.
Electrify commercial vehicles	25% of the vehicle fleet is electric by 2050.	All commercial vehicles are electric by 2050.
WASTE		
Waste generation	Waste generation is held constant.	Waste generation is reduced by 50% per capita by 2050
Waste diversion	Waste diversion rates are held constant.	Diversion rates are increased by 50% per capita by 2050
INDUSTRY		
Industrial efficiencies	Baseline efficiencies are held fixed.	Increase process motors and electrical efficiency by 50% by 2050
Steel industry production and inputs	Production and inputs are held fixed	Production of steel is maintained at current levels (almost 4 million tons crude steel per year), but two out of three blast furnaces are shut down (one in 2030 and one in 2040) and production is moved from blast furnaces to electric arc furnaces. One blast furnace is still operating in 2051, and the electric arc furnaces are charged with 70% scrap/30% hot metal. Fuels in this case shift away from coal, coke, oil, to more natural gas and electricity.

LOW-CARBON SCENARIO RESULTS

Each action, when modeled sequentially, is responsible for a reduction in GHG emissions, as compared to the BAU scenario.

Figures 12 and 13 illustrate the impacts of the low-carbon actions, relative to the BAU scenarios for Burlington and Hamilton, respectively. The light grey area represents the remaining GHG emissions following the introduction of the actions, and the reduction from each action is represented by a different colour.

GHG emissions in Burlington in 2050 are 87% below the BAU 2050 levels, and 90% below 2016 baseline levels. In the low-carbon scenario, GHG emissions in Hamilton are 83% below 2050 levels in the BAU scenario, and 83% below 2016 baseline levels.

The source of the GHG reductions is described in more detail in subsequent sections of the report.

TOTAL EMISSIONS REDUCTIONS- BURLINGTON

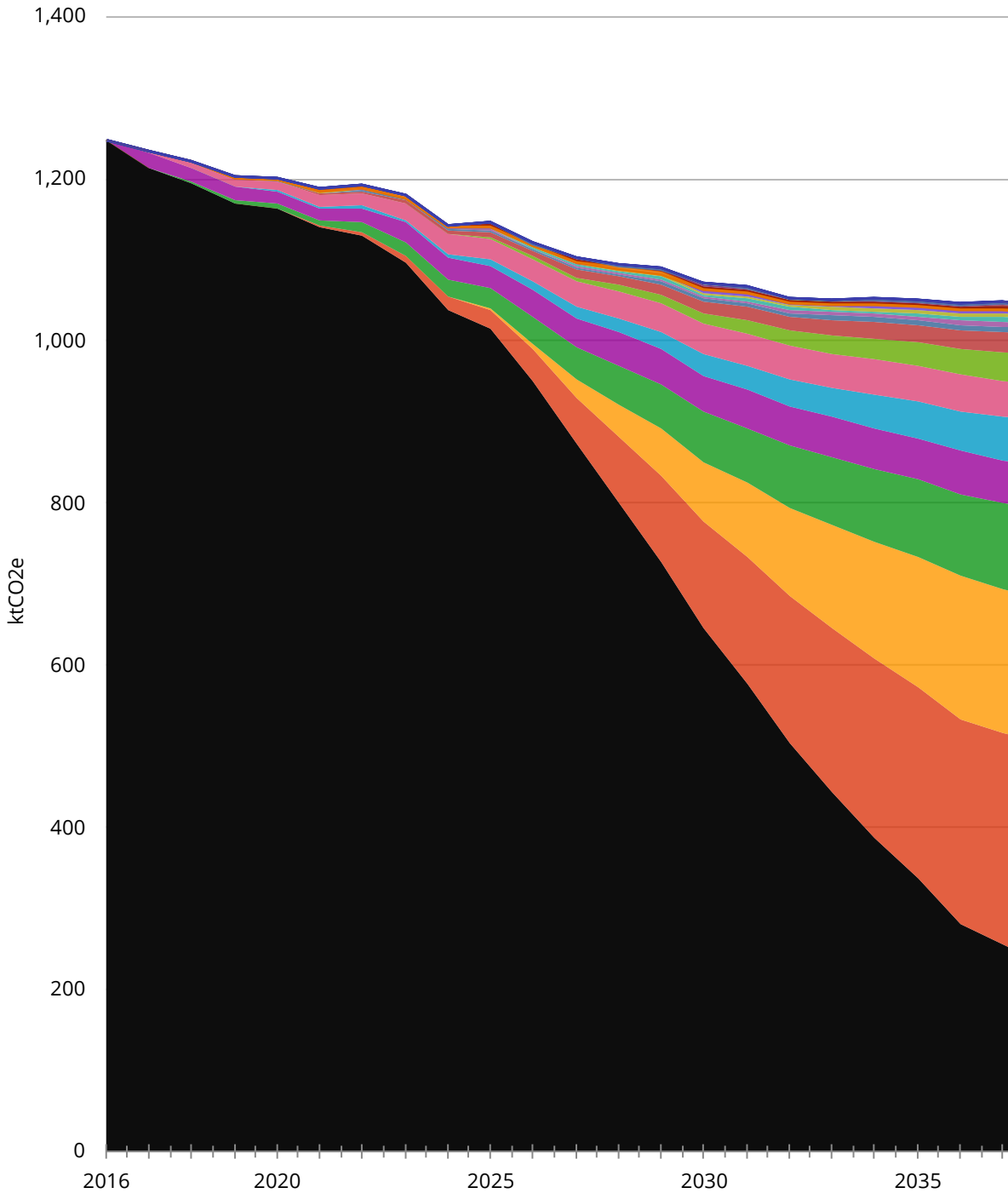
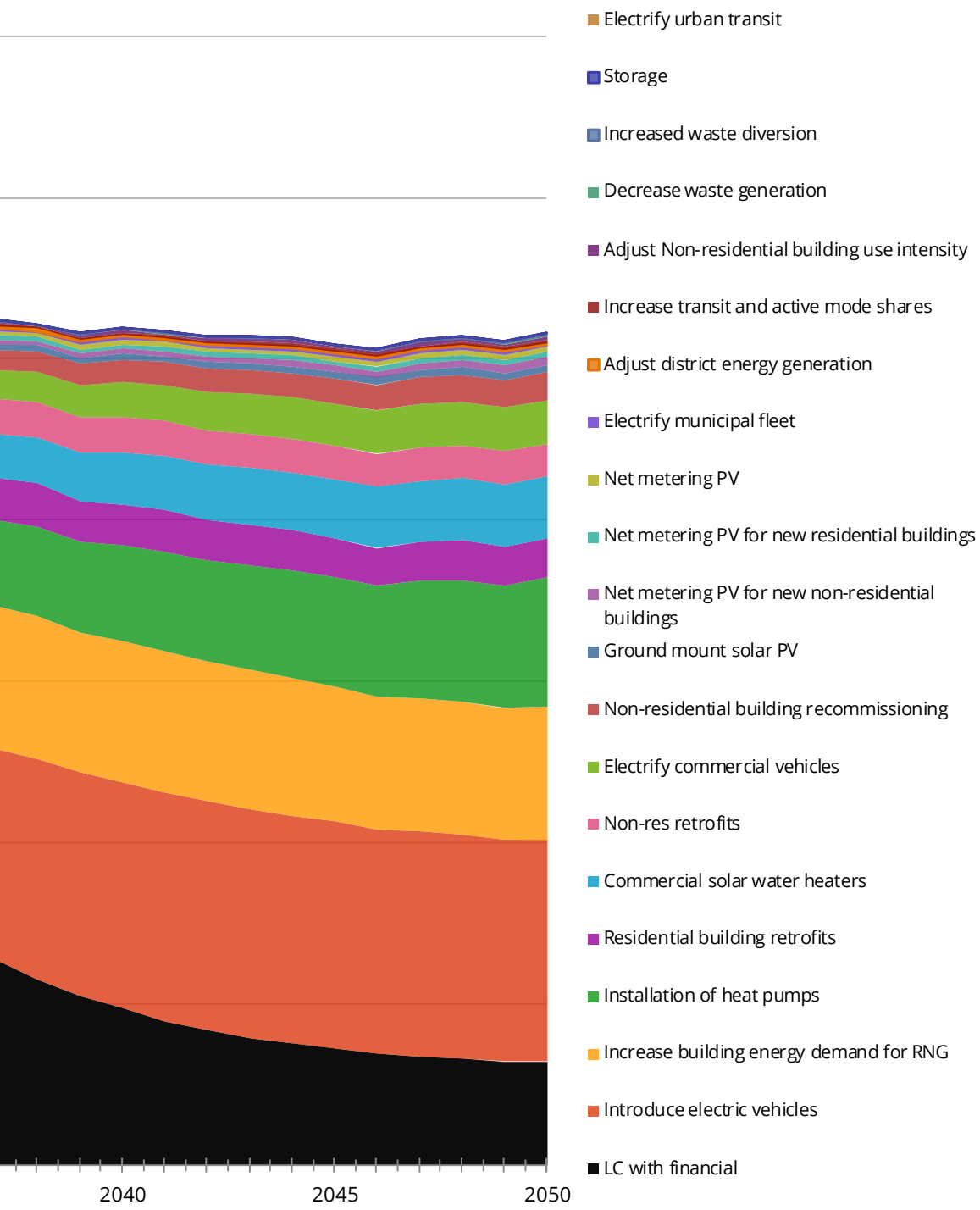


Figure 12. Emission reductions by action from 2016 baseline—City of Burlington


Electrify urban transit
Storage
Increased waste diversion
Decrease waste generation
Adjust Non-residential building use intensity
Increase transit and active mode shares
Adjust district energy generation
Electrify municipal fleet
Net metering PV
Net metering PV for new residential buildings
Net metering PV for new non-residential buildings
Ground mount solar PV
Non-residential building recommissioning
Electrify commercial vehicles
Non-res retrofits
Commercial solar water heaters
Residential building retrofits
Installation of heat pumps
Increase building energy demand for RNG
Introduce electric vehicles
LC with financial
2040
2045
2050

TOTAL EMISSIONS REDUCTIONS- HAMILTON

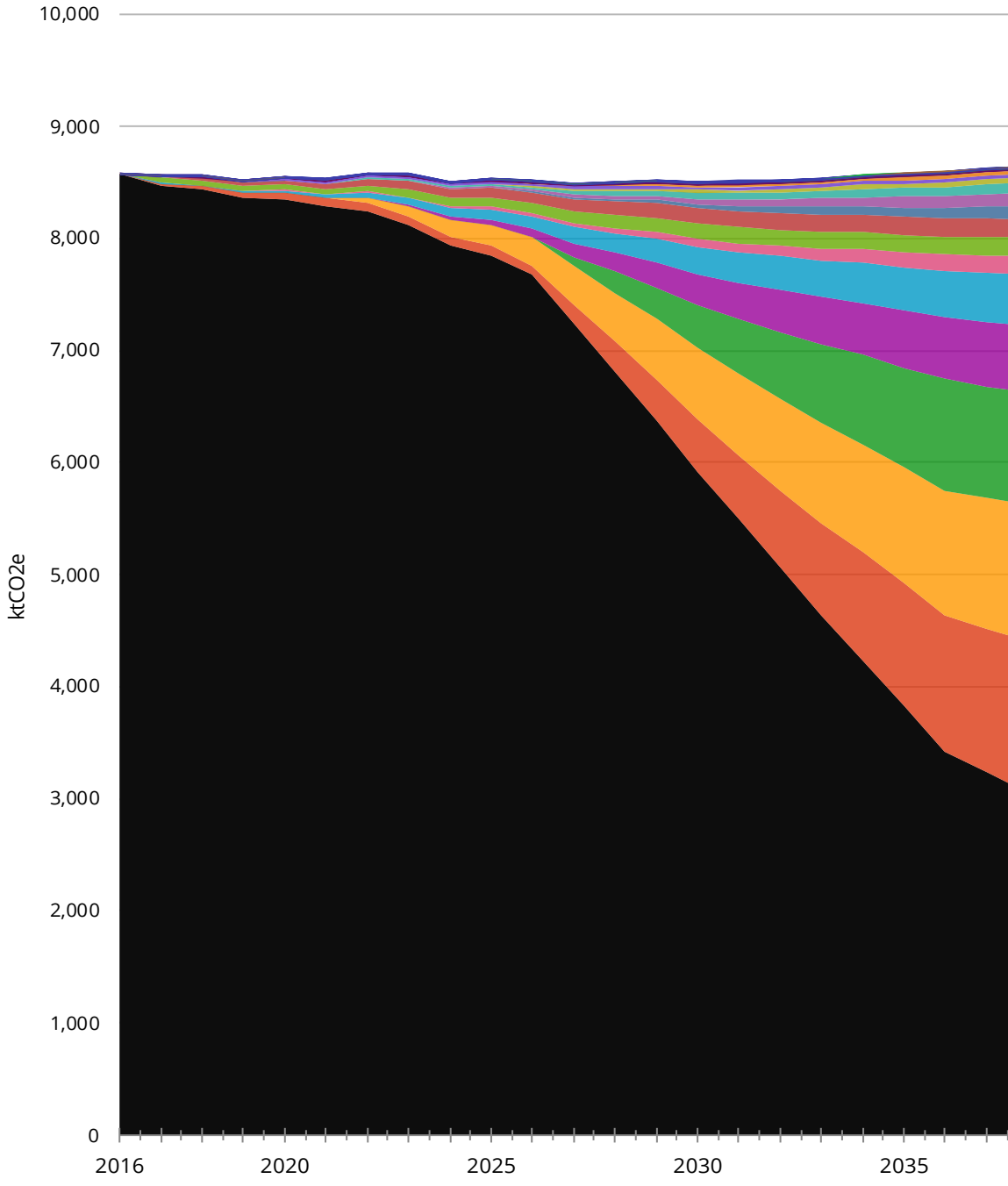
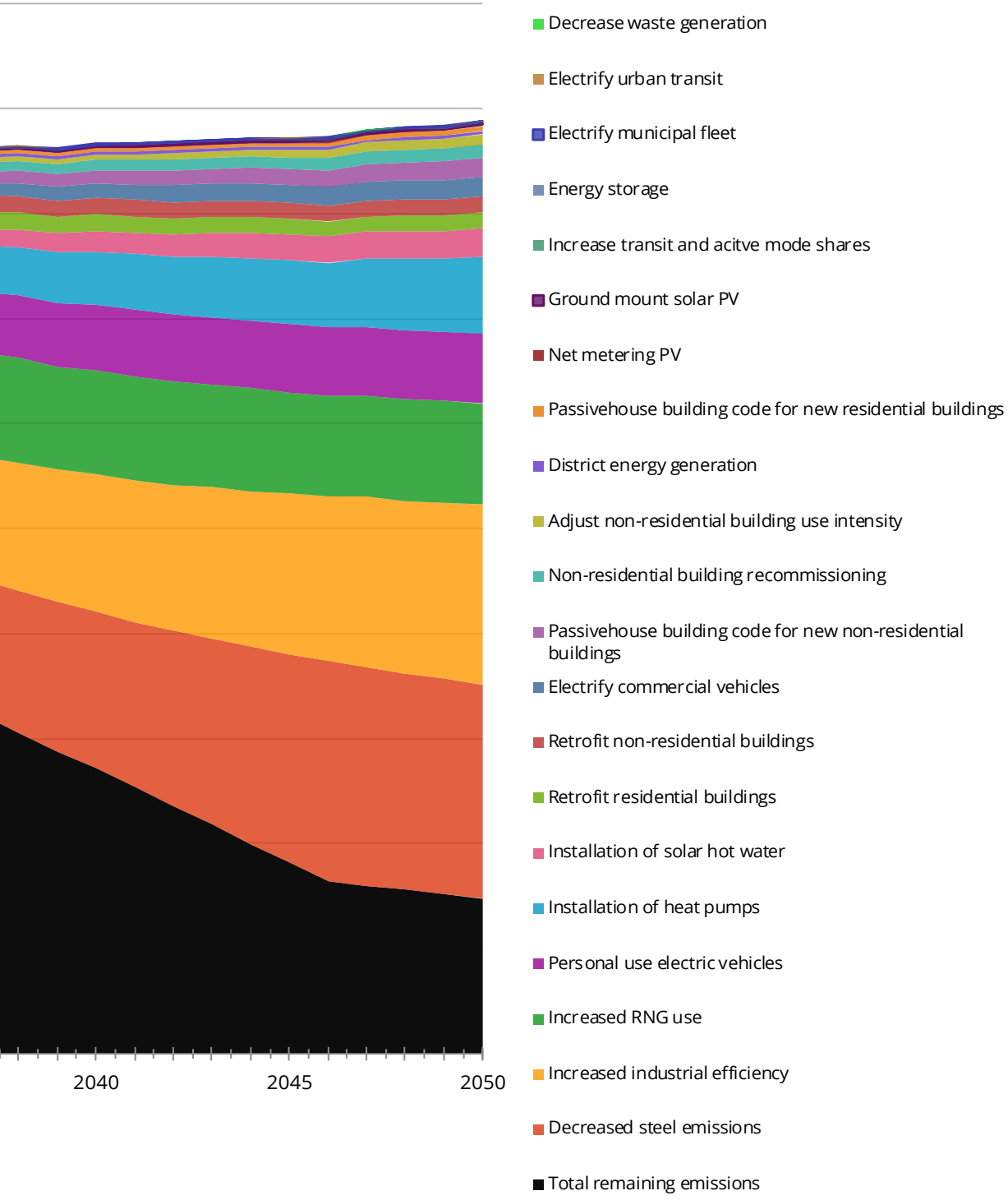


Figure 13. Emission reductions by action from 2016 baseline—Hamilton.


2040
2045
2050
Increased waste diversion
Decrease waste generation
Electrify urban transit
Electrify municipal fleet
Energy storage
Increase transit and acitve mode shares
Ground mount solar PV
Net metering PV
Passivehouse building code for new residential buildings
District energy generation
Adjust non-residential building use intensity
Non-residential building recommissioning
Passivehouse building code for new non-residential buildings
Electrify commercial vehicles
Retrofit non-residential buildings
Retrofit residential buildings
Installation of solar hot water
Installation of heat pumps
Personal use electric vehicles
Increased RNG use
Increased industrial efficiency
Decreased steel emissions
Total remaining emissions

PART 2: CITY OF BURLINGTON LOW-CARBON RESULTS

COMMUNITY ENERGY

ENERGY BY SECTOR

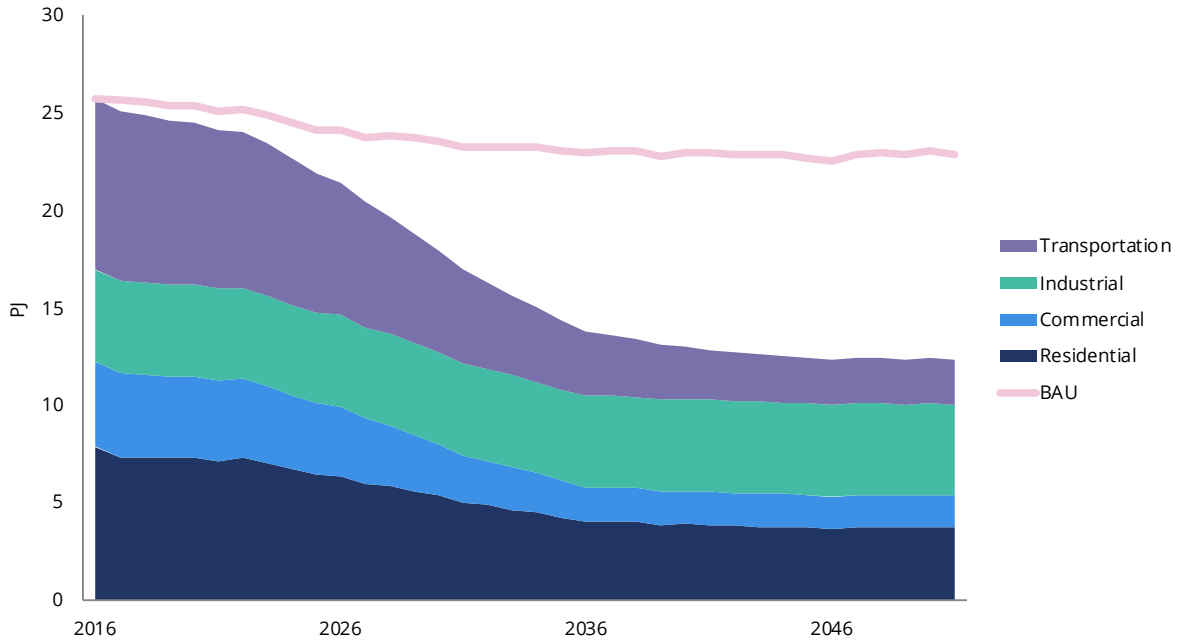


Figure 14. Projected LC energy consumption (PJ) by sector, Burlington, 2016-2050.

ENERGY BY FUEL

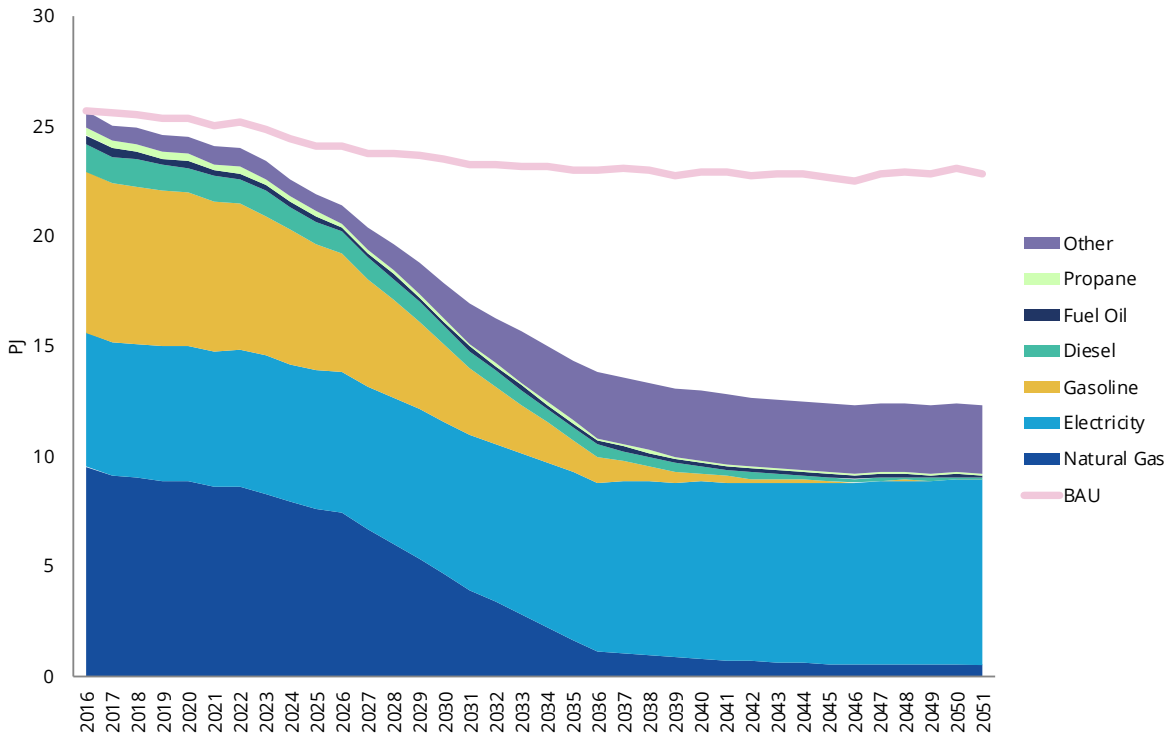


Figure 15. Projected LC energy consumption (PJ) by fuel, 2016-2050.

The largest reduction in energy use comes from the transportation sector (62% decrease over the BAU in 2050), followed by the residential sector (52% decrease over the BAU in 2050).

Improvements to vehicle efficiency standards drive some of the decrease in transportation energy use, as was seen in the BAU, but the majority of the energy savings are from the electrification of the personal and commercial vehicles and a reduction in vehicle use (transit and active transportation use increasing).

Building retrofits, improvements in the efficiency of new buildings, increased use of heat pumps and solar hot water, and electrification all contribute to the reduction in residential energy use.

Energy use in 2016 is 37% natural gas, 29% gasoline, and 24% electricity. In the LC scenario, gasoline is almost entirely removed as a fuel source, and electricity and renewable natural gas (the “other” category) account for 68% and 25%, respectively, of the energy consumption. Natural gas consumption decreases by 94% in the LC scenario.

PER CAPITA ENERGY

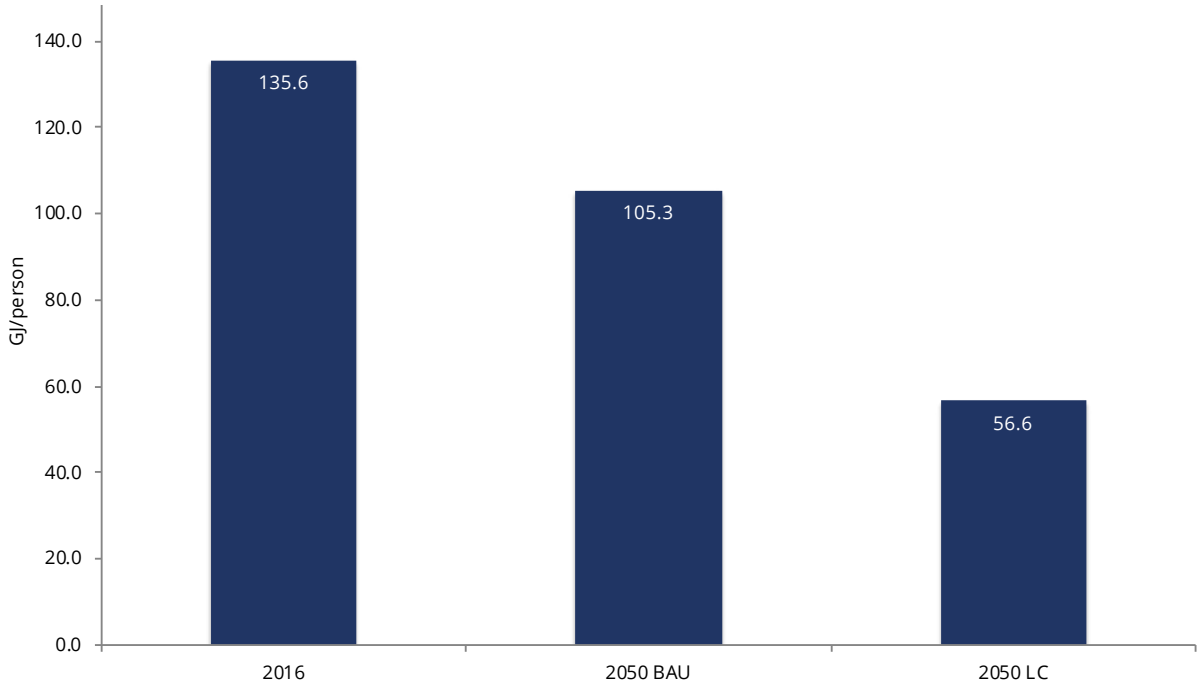


Figure 16. Projected energy per capita energy use (GJ/person), 2016, 2050 BAU and 2050 LC, Burlington.

Overall, the LC scenario results in a total energy use decrease from 26 PJ in 2016, to 12 PJ in 2050. This is a 52% reduction from the 2016 baseline, and a 46% reduction over the BAU in 2050.

Per capita energy use decreases by 58% from the baseline, and 46% over the BAU in 2050. Table 3 shows full details of the reduction in energy use by sector and by fuel type.

Table 3. Energy consumption- Burlington.

ENERGY BY SECTOR (GJ)	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050 LC
Transportation	8,774,475	34.1%	6,012,086	26.1%	2,285,335	18.4%	-74.0%	-62.0%
Residential	7,841,338	30.5%	7,837,371	34.0%	3,761,312	30.3%	-52.0%	-52.0%
Industrial	4,703,504	18.3%	4,703,504	20.4%	4,703,503	37.9%	0.0%	0.0%
Commercial	4,376,880	17.0%	4,514,377	19.6%	1,655,005	13.3%	-62.2%	-63.3%
Total	**5,696,197**		**23,067,338**		**12,405,155**		**-51.7%**	**-46.2%**
ENERGY BY FUEL (GJ)	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050 LC**
Natural Gas	9,512,172	37.0%	9,096,332	39.4%	531,290	4.3%	-94.4%	-94.2%
Gasoline	7,314,276	28.5%	4,839,761	21.0%	2,389	0.0%	-100.0%	-100.0%
Electricity	6,128,322	23.8%	7,033,714	30.5%	8,430,508	68.0%	37.6%	19.9%
Diesel	1,229,201	4.8%	816,054	3.5%	112,705	0.9%	-90.8%	-86.2%
Other	763,034	3.0%	802,163	3.5%	3,119,826	25.1%	308.9%	288.9%
Fuel Oil	376,836	1.5%	248,236	1.1%	138,664	1.1%	-63.2%	-44.1%
Propane	372,356	1.4%	231,078	1.0%	69,774	0.6%	-81.3%	-69.8%
Total	**25,696,197**		**23,067,338**		**12,405,155**		**-51.7%**	**-46.2%**
ENERGY PER CAPITA (GJ/CAP)	**135.6**		**105.3**		**56.6**		**-58.3 %**	**-46.2%**

ENERGY FLOW AND CONVERSIONS

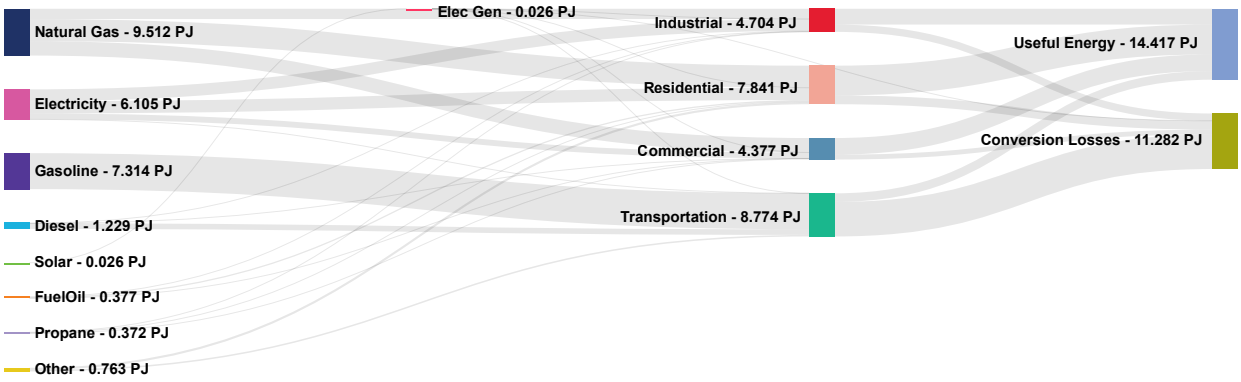


Figure 17. 2016 Energy Flow—Burlington.

The Sankey diagrams for 2016 (Figure 17) and the 2050 LC scenario (Figure 18) show the energy flow by fuel and sector for the City of Burlington. The ratio of useful energy to conversion losses in 2016 is 1.3:1, and in 2050 this climbs to 4.0:1.

Local generation of electricity increases from 0.03 PJ to 2.3 PJ in 2050, and a district energy network is added (thermal network).

The Sankey also shows a significant decline in natural gas between 2016 and 2050 in the low-carbon scenario, while electricity consumption is flat, despite the increase in population and employment.

In terms of sectors, transportation shows the biggest drop from 9 PJ to just over 2 PJ, with smaller declines in commercial and residential buildings.

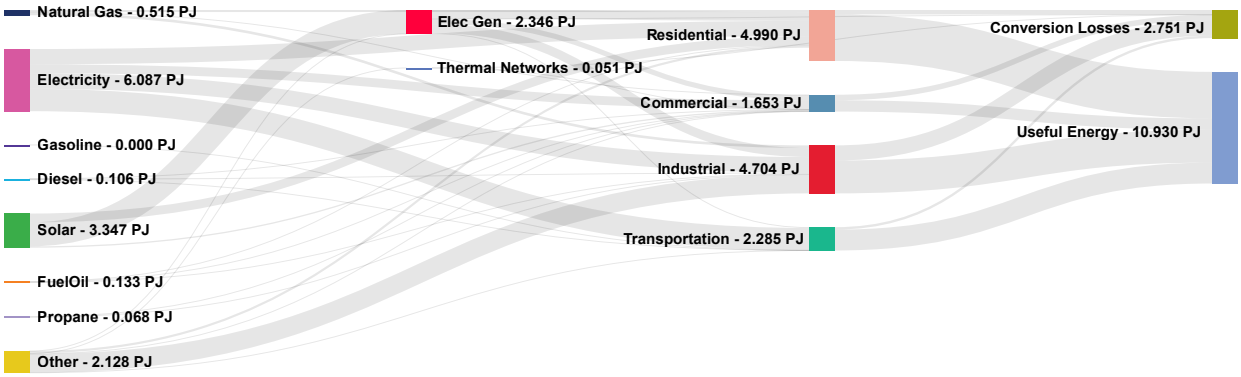


Figure 18. Energy flow, 2050 (LC)— Burlington.

COMMUNITY EMISSIONS

EMISSIONS BY SECTOR

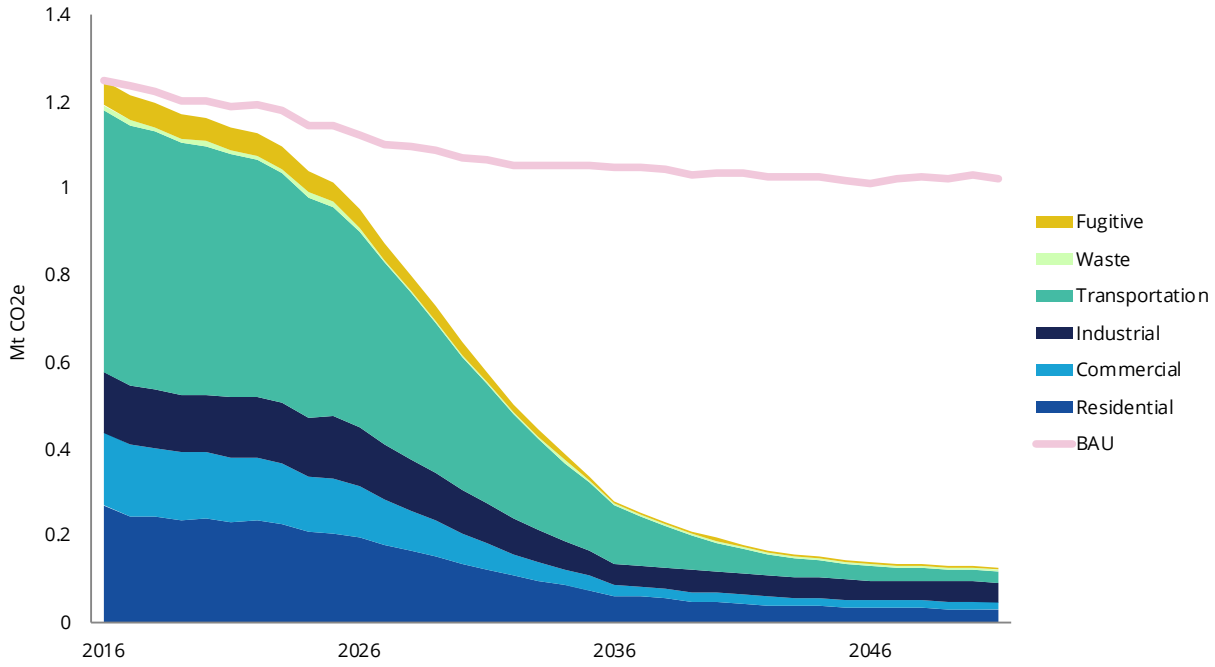


Figure 19. Projected LC emissions (MtCO2e) by sector in Burlington, 2016-2050.

EMISSIONS BY SOURCE

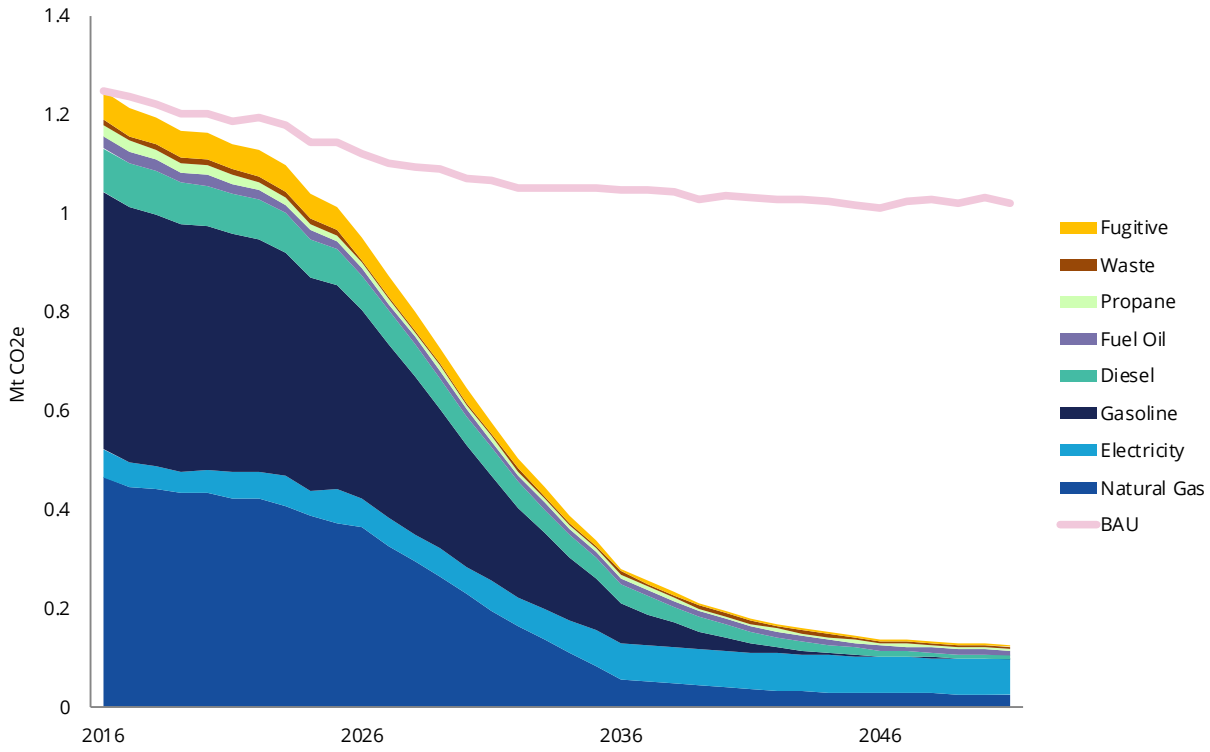


Figure 20. Projected LC emissions (MtCO2e) by source in Burlington, 2016-2050.

Total GHG emissions decline from 1.25 MtCO2e in 2016 to 0.13 MtCO2e in the 2050 LC scenario, representing a decrease of 90%.

All sectors show a reduction in GHG emissions ranging from 55% in waste, to 96% in transportation. Energy efficiency measures combined with the shift to electricity as a fuel source are the primary sources of reductions in GHG emissions.

The LC scenario illustrates a shift from carbon-intensive fuel sources, specifically gasoline (42% of 2016 emissions) and natural gas (37% of 2016 emissions), to low or zero emissions sources. As a result of the shift to electricity, GHG emissions from electricity increase by 31% from 2016 to 2050 in the low-carbon scenario.

PER CAPITA EMISSIONS

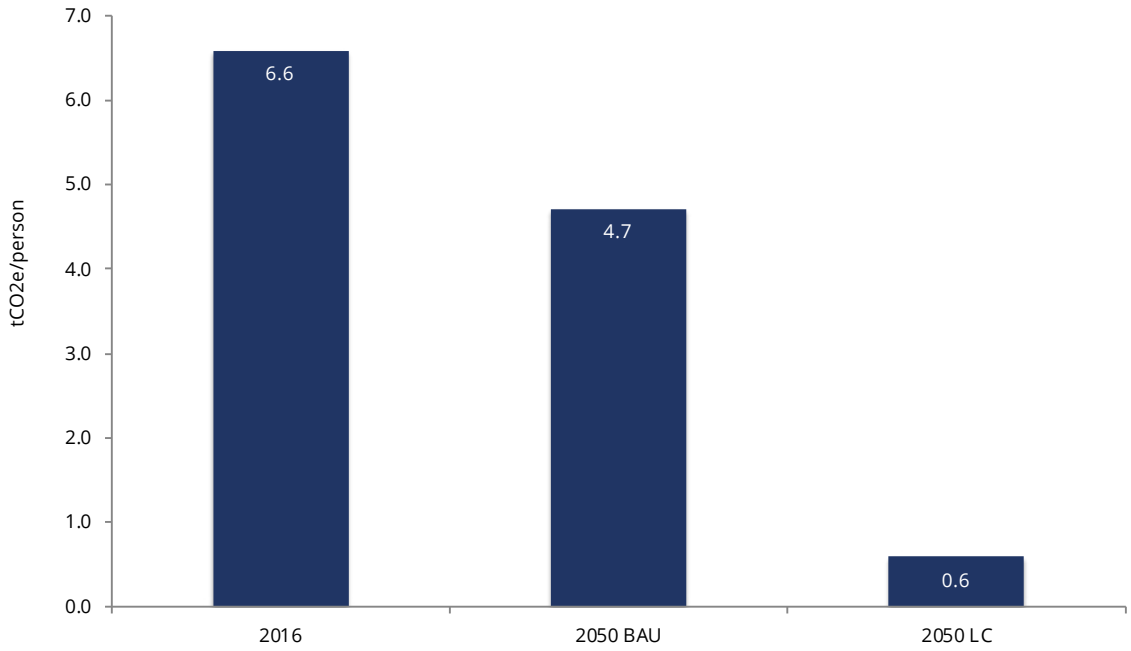


Figure 21. Projected emissions per capita (tCO2e/person), Burlington.

GHG emissions decline from 6.6 tCO2e per person in 2016, to 0.6 tCO2e in 2050 in the LC scenario. This is a 90% decrease from 2016 to the 2050 LC scenario, and an 88% decrease between the BAU and LC scenarios in 2050.

Table 4 provides a comparison of the total GHG emissions for Burlington in 2016, and the two scenarios in 2050.

Table 4. Community GHG emissions - Burlington.

EMISSIONS BY SECTOR (tCO2e)	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050 LC
Transportation	602,533	48.3%	399,743	38.8%	27,399	21.3%	-95.5%	-93.1%
Residential	269,052	21.6%	245,945	23.8%	32,135	25.0%	-88.1%	-86.9%
Commercial	169,334	13.6%	171,097	16.6%	15,956	12.4%	-90.6%	-90.7%
Industrial	138,659	11.1%	144,344	14.0%	45,311	35.2%	-67.3%	-68.6%
Fugitive	57,835	4.6%	55,307	5.4%	3,230	2.5%	-94.4%	-94.2%
Waste	10,706	0.9%	15,077	1.5%	4,760	3.7%	-55.5%	-68.4%
Total	**1,248,119**		**1,031,513**		**128,791**		**-89.7%**	**-87.5%**
EMISSIONS BY SOURCE (tCO2e)	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050 LC**
Gasoline	521,222	41.8%	345,203	33.5%	149	0.1%	-100.0%	-100.0%
Natural Gas	466,414	37.4%	446,023	43.2%	26,049	20.2%	-94.4%	-94.2%
Diesel	87,877	7.0%	58,402	5.7%	8,224	6.4%	-90.6%	-85.9%
Fugitive	57,835	4.6%	55,307	5.4%	3,230	2.5%	-94.4%	-94.2%
Electricity	55,348	4.4%	80,173	7.8%	72,439	56.2%	30.9%	-9.6%
Fuel Oil	25,942	2.1%	17,195	1.7%	9,673	7.5%	-62.7%	-43.7%
Propane	22,774	1.8%	14,133	1.4%	4,267	3.3%	-81.3%	-69.8%
Waste	10,706	0.9%	15,077	1.5%	4,760	3.7%	-55.5%	-68.4%
Total	**1,248,119**		**1,031,513**		**128,791**		**-89.7%**	**-87.5%**
EMISSIONS PER CAPITA (tCO2e/ PERSON)	**6.6**		**4.7**		**0.6**		**-91.1 %**	**-87.5 %**

BUILDING SECTOR: ENERGY

BUILDING ENERGY USE BY FUEL

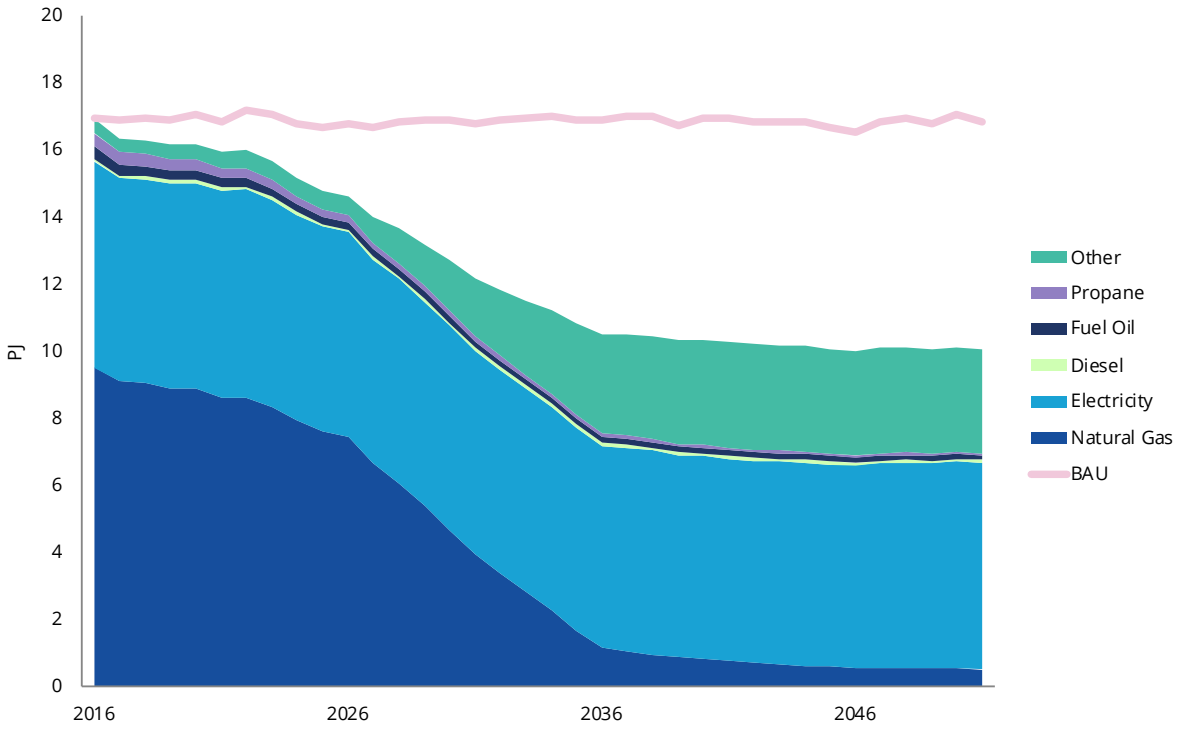


Figure 22. Projected LC building energy use (PJ) by fuel, Burlington, 2016-2050.

BUILDING ENERGY BY END USE

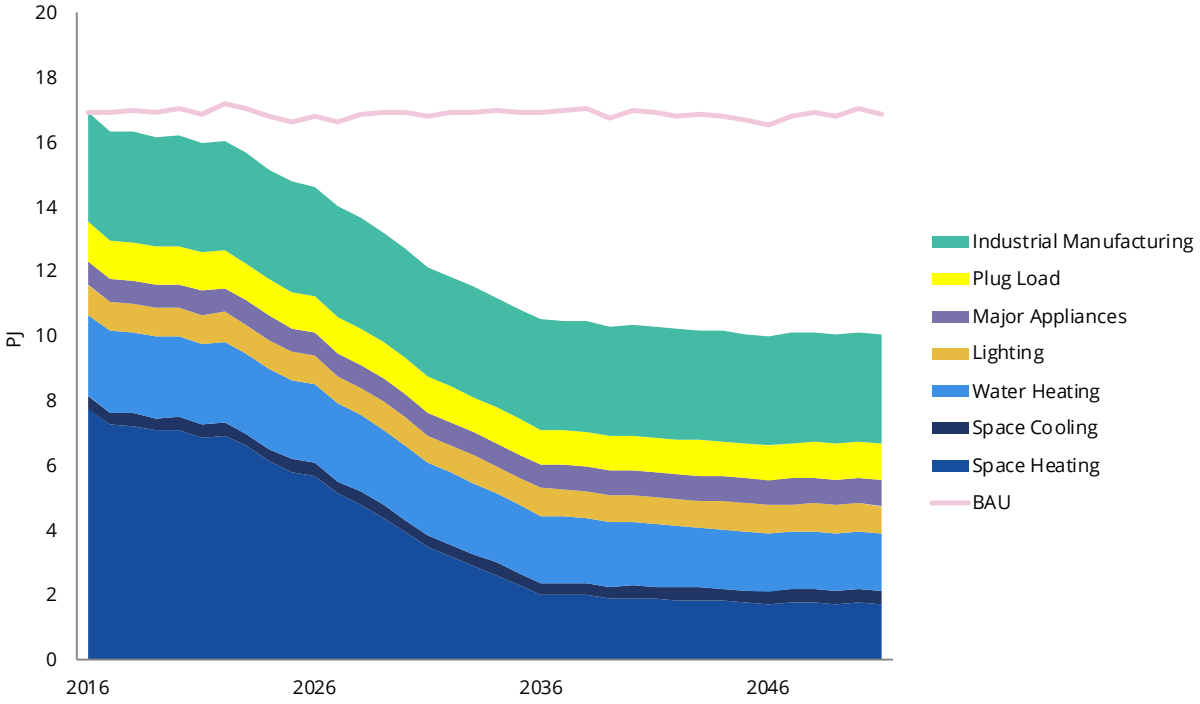


Figure 23. Projected LC building energy use (PJ) by end use, Burlington, 2016-2050.

The buildings sector sees an overall reduction of energy use from 17 PJ in 2016 to 10 PJ in 2050 under the LC scenario. Electricity consumption remains constant over this period despite an increase in population and buildings while natural gas, propane and fuel oil decrease. The “other” category, which includes local energy sources including solar, biogas, and district energy, grows to account for 31% of the energy used by the building sector by 2050. This local generation represents a significant local investment, resulting in employment opportunities.

The overall decrease of 40% in building energy use is a result of retrofits to existing buildings, and improvements to the energy efficiency of new residential buildings. The reduction in energy consumption for space heating accounts for 77% of the energy savings. Fuel switching for space heating results in a shift from natural gas boilers to air source and ground source heat pumps in residential and commercial buildings.

The reduction in heating degree-days is the primary reason energy use isn’t projected to increase in the BAU scenario as the population grows. The same reduction in heating degree-days is applied to the LC scenario, but in this case is combined with fuel switching and retrofits.

BUILDING ENERGY USE BY BUILDING TYPE AND FUEL

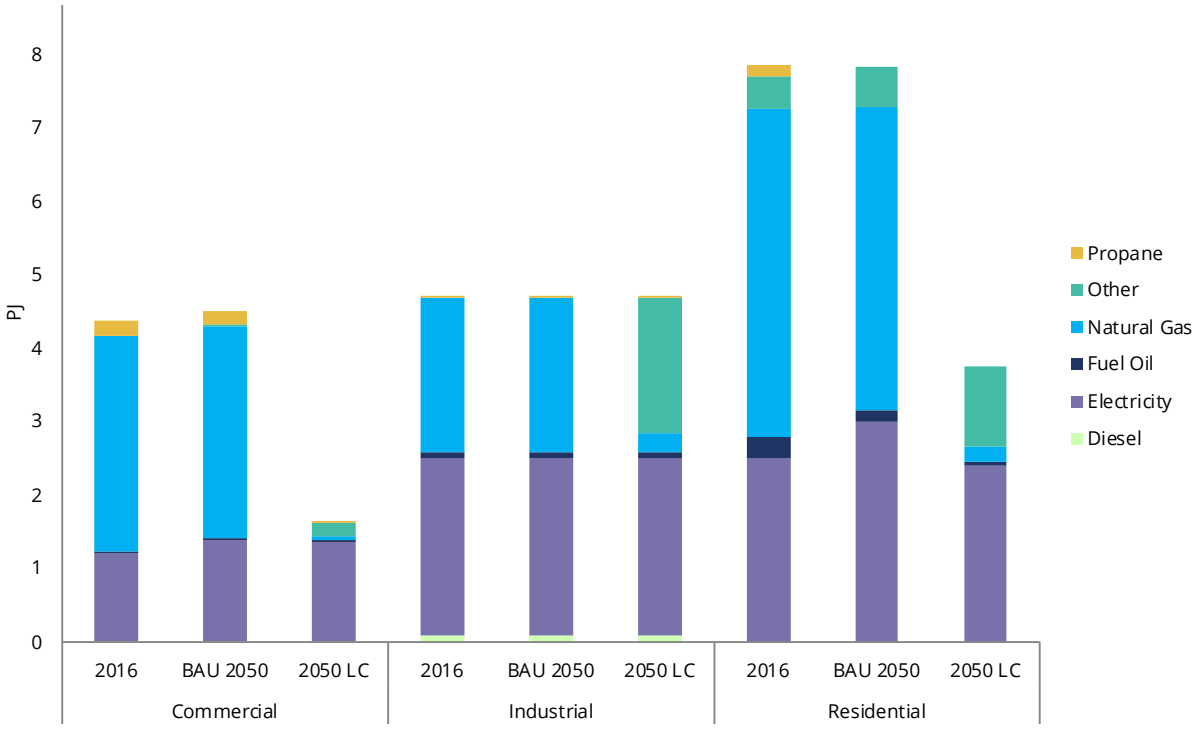


Figure 24. Projected building energy use (PJ) by building type and fuel, Burlington.

BUILDING ENERGY USE BY BUILDING TYPE AND END USE

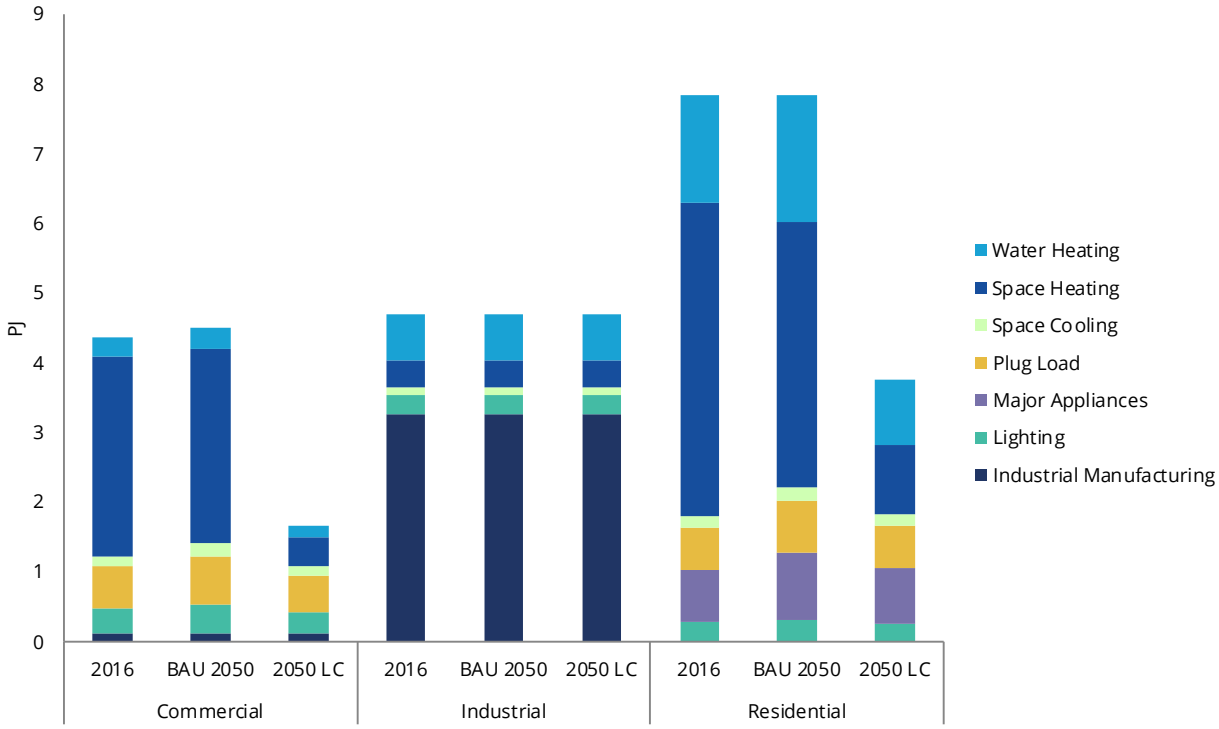


Figure 25. Projected building energy use (PJ) by building type and end use, Burlington.

The increased use of electricity as the primary fuel source applies to all sectors of buildings. The residential and industrial sectors show a shift to “other” fuel sources, which include renewable natural gas and locally-generated electricity.

By 2030, 100% of new buildings are projected to achieve Passive House levels of performance, and existing buildings will be retrofitted to achieve 50% reduction in electrical consumption.

For commercial buildings, the LC scenario projects a reduction in floor space per employee of 25% by 2050, as well as building efficiencies for both new and existing buildings.

Residential buildings account for the majority of building energy use, and are the primary focus for reductions in energy consumption within the buildings sector.

PER HOUSEHOLD ENERGY

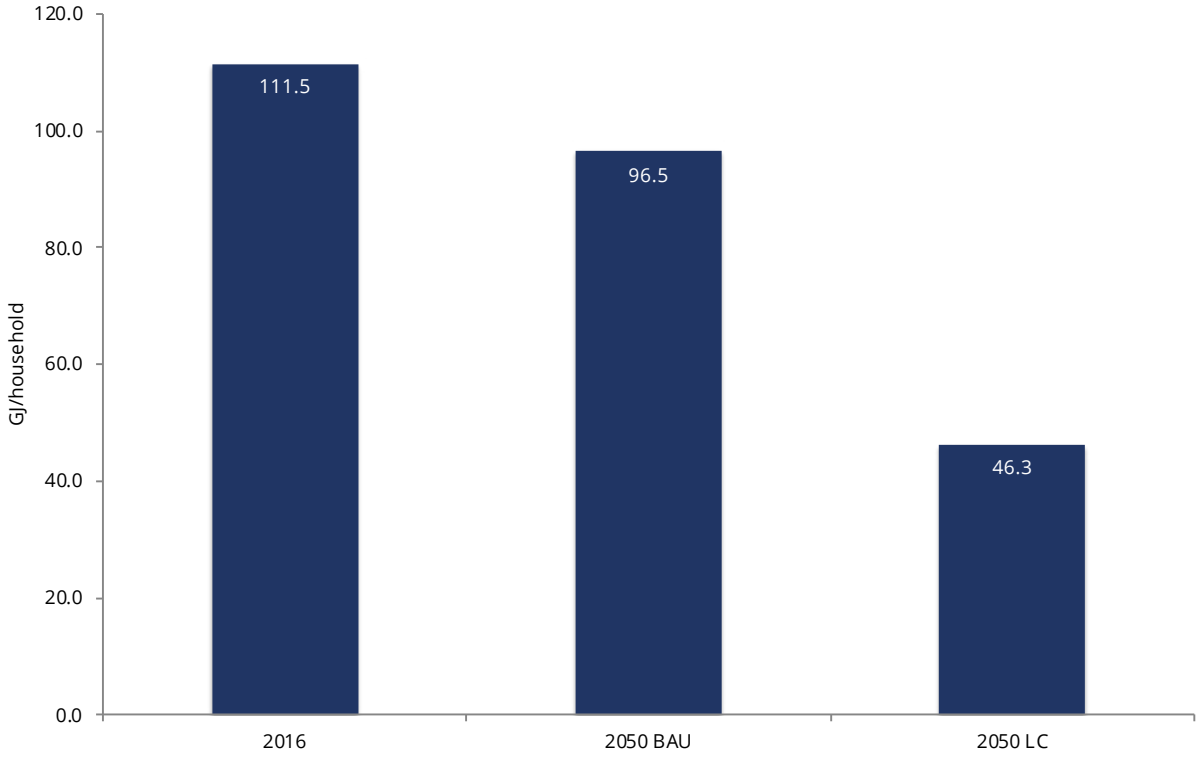


Figure 26. Projected residential energy per household (GJ/household), Burlington.

Residential energy use per household declines from 112 GJ to 46 GJ between 2016 and 2050 in the LC scenario, a reduction of 58%. This reduction exceeds Burlington's goal of a reduction of 34% in new housing constructions when compared with the existing housing stock.

Table 5. Buildings sector energy - Burlington.

BUILDINGS ENERGY (GJ) BY BUILDING TYPE	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050LC
Residential	7,841,338	46.3%	7,837,371	46.0%	3,761,312	37.2%	-52.0%	-52.0%
Commercial	4,376,880	25.9%	4,514,376	26.5%	1,655,005	16.4%	-62.2%	-63.3%
Industrial	4,703,503	27.8%	4,703,503	27.6%	4,703,503	46.5%	0.0%	0.0%
Total	16,921,722		17,055,251		10,119,820		-40.2%	-40.7%
BUILDINGS ENERGY (GJ) BY FUEL	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Natural Gas	9,512,172	56.2%	9,096,331	53.3%	531,290	5.2%	-94.4%	-94.2%
Electricity	6,128,167	36.2%	6,799,310	39.9%	6,171,513	61.0%	0.7%	-9.2%
Other	442,802	2.6%	590,908	3.5%	3,119,190	30.8%	604.4%	427.9%
Fuel Oil	376,836	2.2%	248,236	1.5%	138,664	1.4%	-63.2%	-44.1%
Propane	372,356	2.2%	231,078	1.4%	69,774	0.7%	-81.3%	-69.8%
Diesel	89,389	0.5%	89,389	0.5%	89,389	0.9%	0.0%	0.0%
Total	**16,921,722**		**17,055,251**		**10,119,820**		**-40.2%**	**-40.7%**
BUILDINGS ENERGY (GJ) BY END USE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Space Heating	7,757,125	45.8%	6,992,890	41.0%	1,791,735	17.7%	-76.9%	-74.4%
Industrial Manufacturing	3,382,228	20.0%	3,384,590	19.8%	3,384,525	33.4%	0.1%	0.0%
Water Heating	2,494,457	14.7%	2,806,254	16.5%	1,781,365	17.6%	-28.6%	-36.5%
Plug Load	1,232,075	7.3%	1,426,571	8.4%	1,110,337	11.0%	-9.9%	-22.2%
Lighting	928,918	5.5%	1,004,614	5.9%	850,989	8.4%	-8.4%	-15.3%
Major Appliances	737,439	4.4%	953,042	5.6%	806,313	8.0%	9.3%	-15.4%
Space Cooling	389,479	2.3%	487,290	2.9%	394,557	3.9%	1.3%	-19.0%
Total	**16,921,722**		**17,055,251**		**10,119,820**		**-40.2%**	**-40.7%**

BUILDING SECTOR: EMISSIONS

BUILDING EMISSIONS BY FUEL SOURCE

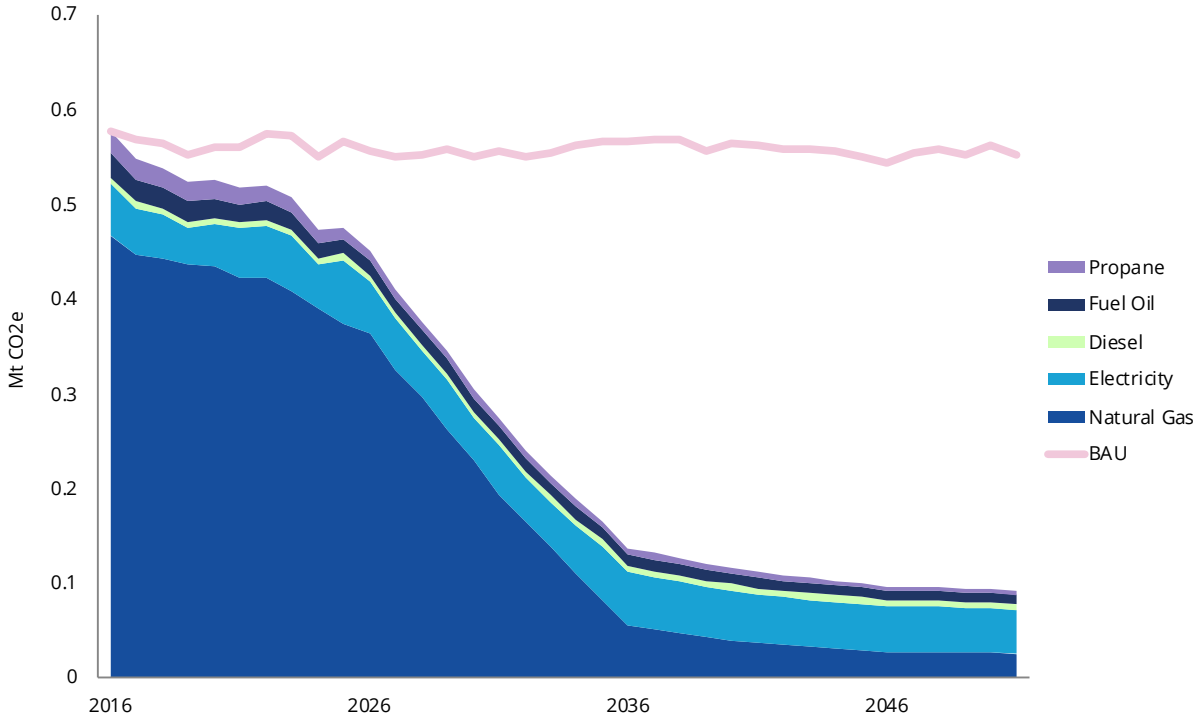


Figure 27. Projected LC building emissions (MtCO2e) by source, Burlington, 2016-2050.

BUILDING EMISSIONS BY END USE

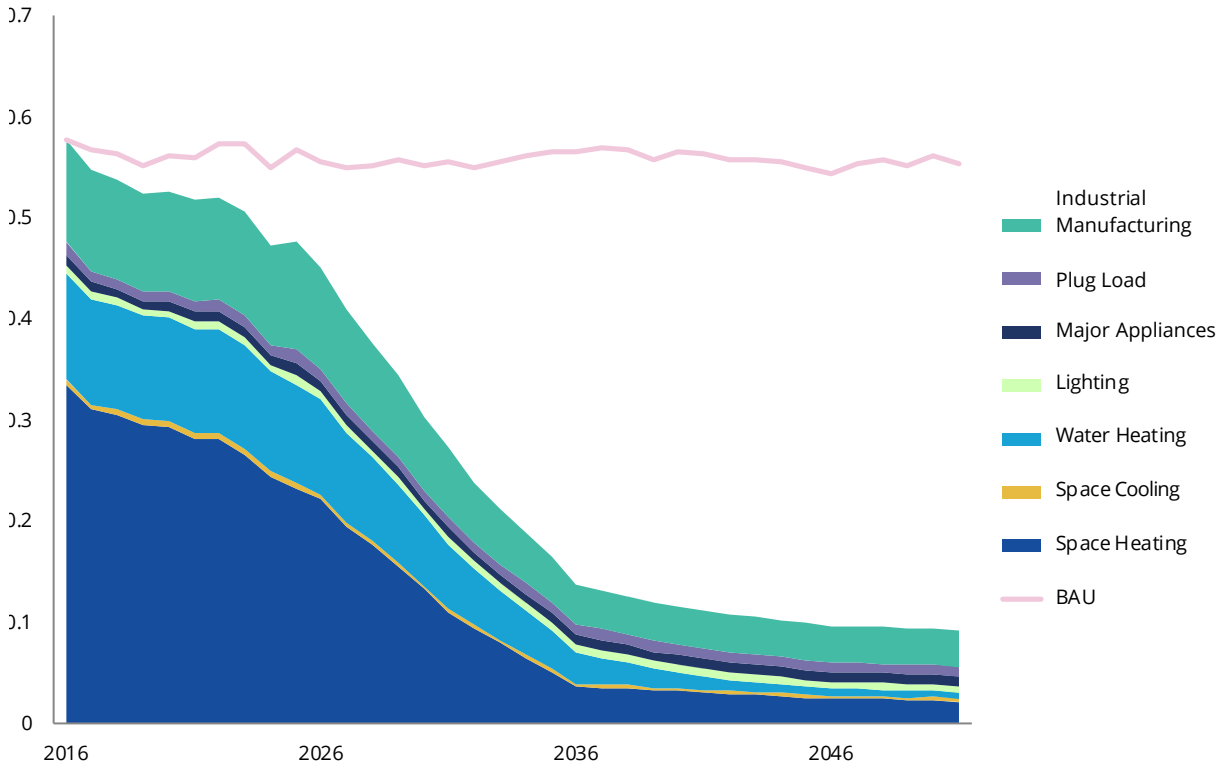


Figure 28. Projected LC building emissions (MtCO2e) by end use, Burlington, 2016-2050.

The shift away from carbon-intensive fuel sources, particularly natural gas, results in an emissions reduction of 84% by 2050 against the 2016 baseline. Reduction in overall consumption of energy through retrofits and Passive House standards for new residential and commercial buildings drive the reduction in GHG emissions, followed by the switch to low- and zero-emission fuel sources.

The switch to heat pumps for space heating, and solar for water heating are the primary drivers of GHG emissions reductions in the City. These are augmented by the decreased demand for energy from more efficient buildings.

BUILDING EMISSIONS BY BUILDING TYPE AND FUEL

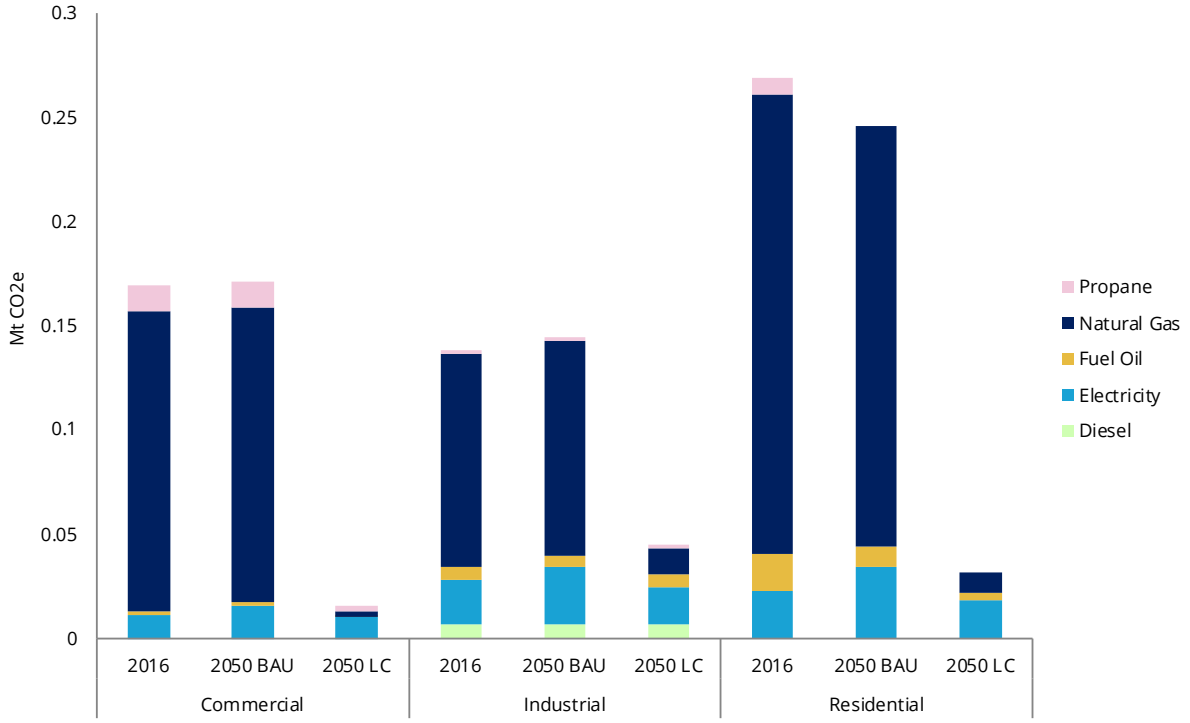


Figure 29. Projected building emissions (MtCO2e) by building type and source, Burlington.

BUILDING EMISSIONS BY BUILDING TYPE AND END USE

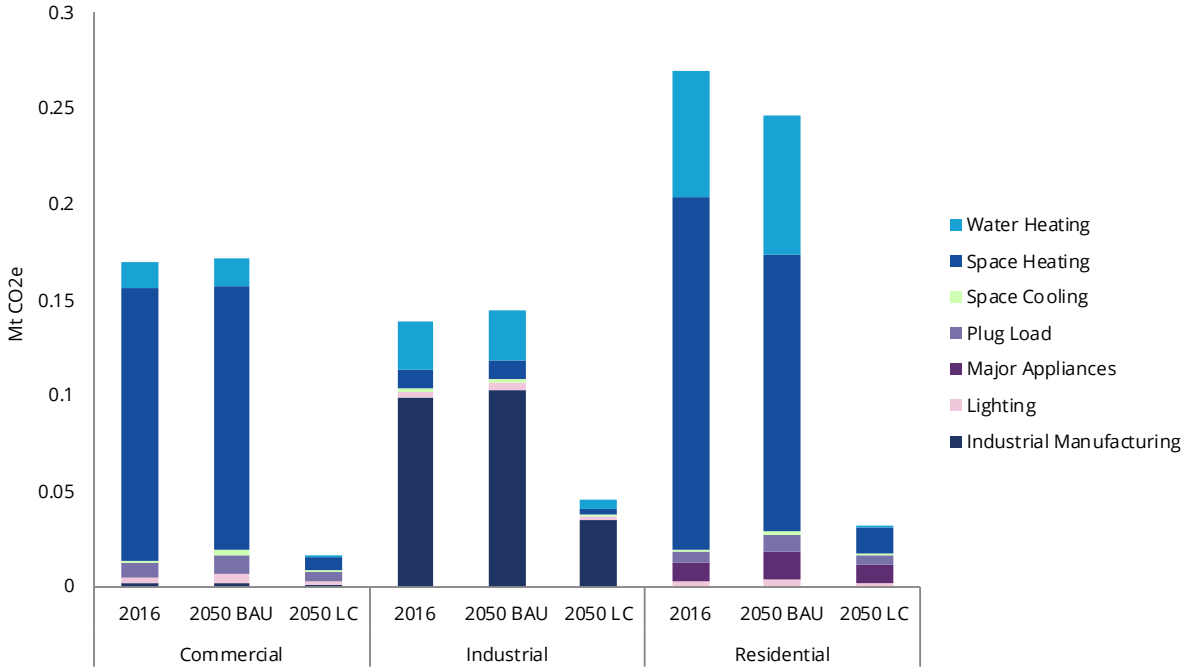


Figure 30. Projected building emissions (MtCO2e) by building type and end use, Burlington.

In 2016, natural gas is the dominant fuel source across all sectors. By switching to electricity for space and water heating, and reducing overall consumption, GHG emissions are reduced across all sectors, but most markedly in the residential sector.

Total emissions are reduced by 84% between the 2016 baseline, and 2050 in the LC scenario.

Space heating and water heating are the primary sources of GHG emissions in 2016, followed by industrial manufacturing. Switching technologies to heat pumps and solar hot water, and fuels, from natural gas to electricity, GHG emissions are decreased overall.

PER HOUSEHOLD EMISSIONS

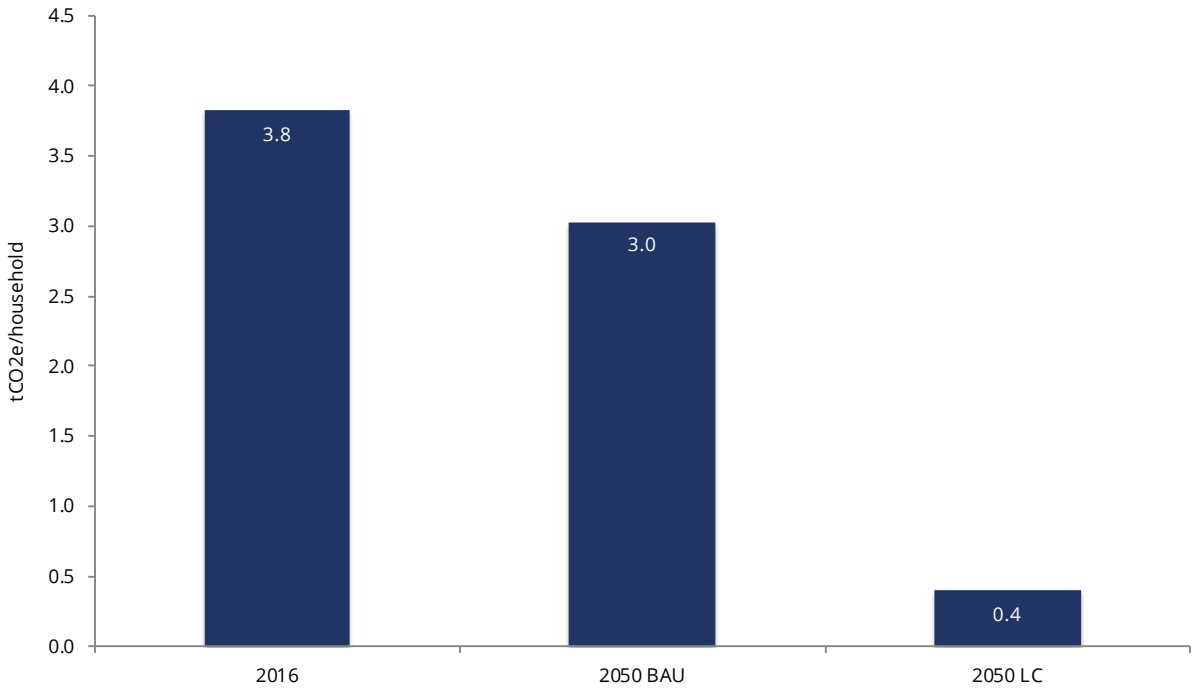


Figure 31. Projected emissions per household (tCO2e/household), Burlington.

Residential GHG emissions decrease by 88% by 2050 in the LC scenario. These emissions savings are a result of retrofits to existing buildings to maximize energy efficiency, Passive House standards for new houses, use of energy efficient heating sources, and overall shift away from fossil fuels. Details of the buildings emissions results are shown in Table 6.

Table 6. Buildings sector GHG emissions, Burlington.

BUILDINGS EMISSIONS (tCO2e) BY BUILDING TYPE	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050LC
Residential	269,052	46.6%	245,945	43.8%	32,134	34.4%	-88.1%	-86.9%
Commercial	169,334	29.3%	171,097	30.5%	15,956	17.1%	-90.6%	-90.7%
Industrial	138,659	24.0%	144,344	25.7%	45,311	48.5%	-67.3%	-68.6%
Total	577,045		561,386		93,401		-83.8%	-83.4%
BUILDINGS EMISSIONS (tCO2e) BY FUEL	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Natural Gas	466,415	80.8%	446,023	79.5%	26,049	27.9%	-94.4%	-94.2%
Electricity	55,347	9.6%	77,468	13.8%	46,846	50.2%	-15.4%	-39.5%
Fuel Oil	25,942	4.5%	17,195	3.1%	9,673	10.4%	-62.7%	-43.7%
Propane	22,774	3.9%	14,133	2.5%	4,267	4.6%	-81.3%	-69.8%
Diesel	6,567	1.1%	6,567	1.2%	6,567	7.0%	0.0%	0.0%
Total	**577,045**		**561,386**		**93,401**		**-83.8%**	**-83.4%**
BUILDINGS EMISSIONS (tCO2e) BY END USE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Space Heating	334,595	58.0%	291,534	51.9%	23,028	24.7%	-93.1%	-92.1%
Water Heating	104,930	18.2%	112,949	20.1%	6,035	6.5%	-94.2%	-94.7%
Industrial Manufacturing	101,114	17.5%	105,213	18.7%	35,837	38.4%	-64.6%	-65.9%
Plug Load	12,962	2.2%	18,223	3.2%	9,380	10.0%	-27.6%	-48.5%
Major Appliances	9,852	1.7%	14,740	2.6%	9,736	10.4%	-1.2%	-33.9%
Lighting	8,390	1.5%	11,446	2.0%	6,460	6.9%	-23.0%	-43.6%
Space Cooling	5,203	0.9%	7,282	1.3%	2,927	3.1%	-43.8%	-59.8%
Total	**577,045**		**561,386**		**93,401**		**-83.8%**	**-83.4%**

TRANSPORTATION SECTOR ENERGY

TRANSPORTATION ENERGY BY FUEL

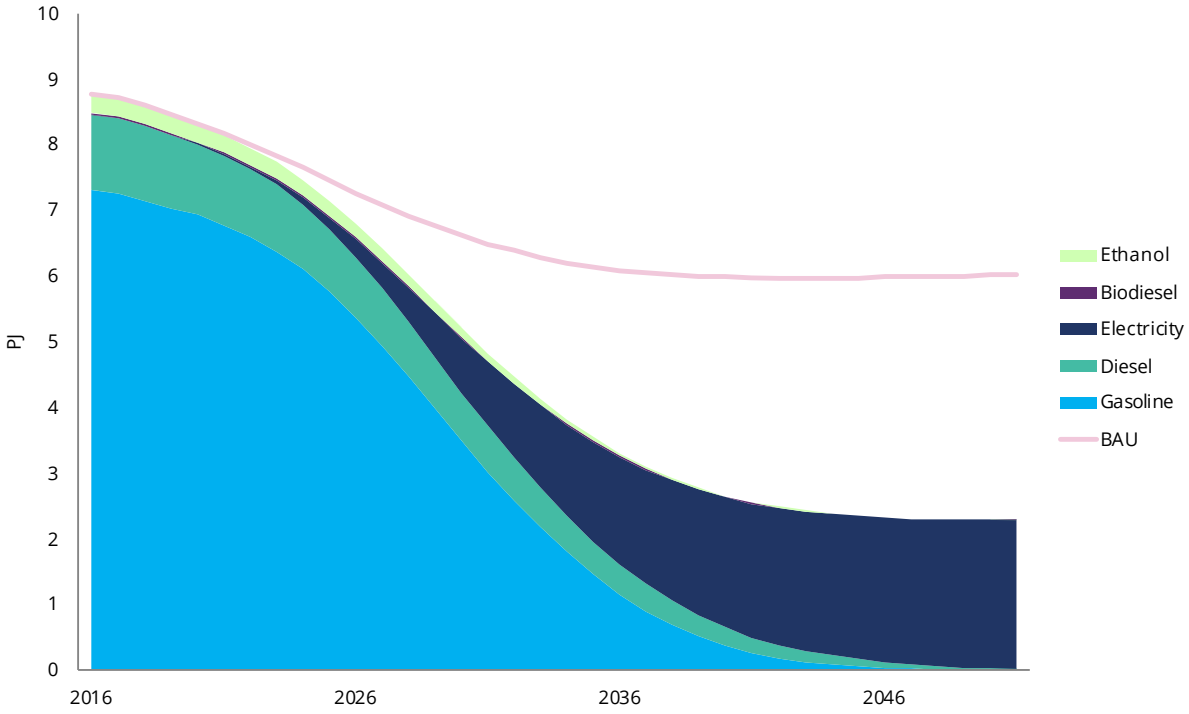


Figure 32. Projected LC transportation energy use (PJ) by fuel, Burlington, 2016-2050.

TRANSPORTATION ENERGY BY VEHICLE TYPE

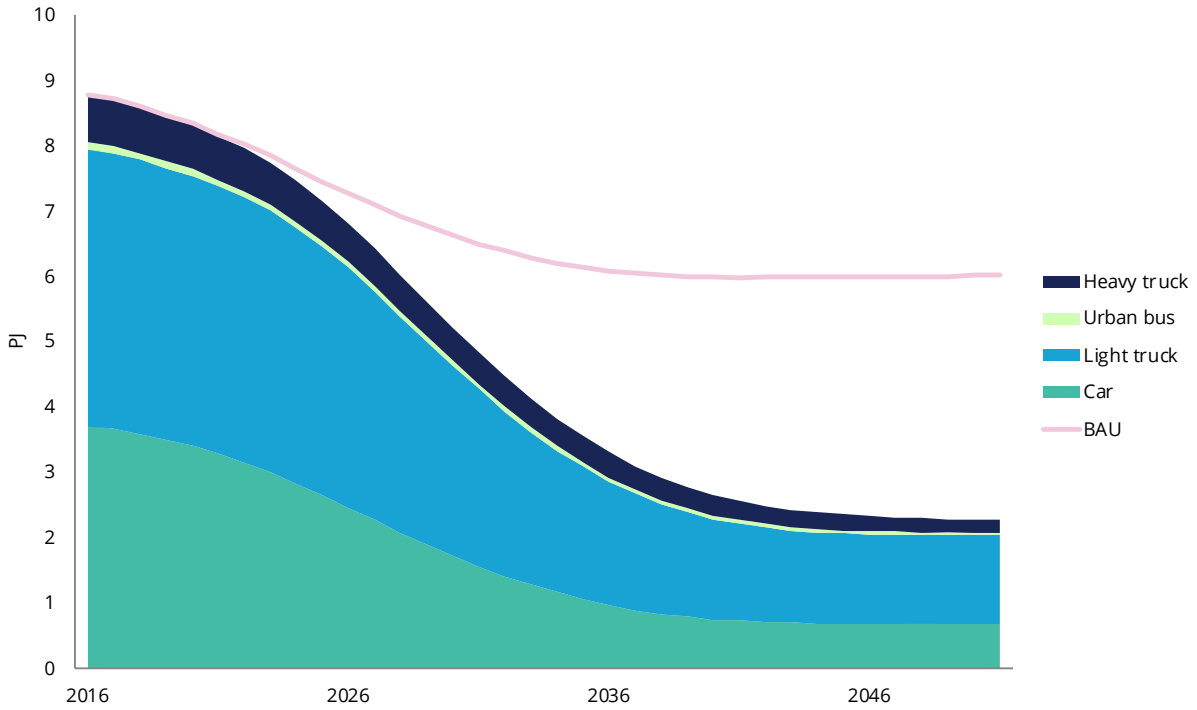


Figure 33. Projected LC transportation energy use (PJ) by vehicle type, Burlington, 2016-2050.

Transportation energy consumption declines by 74% in 2050 in the LC scenario against the 2016 baseline, and by 62% in comparison with the 2050 BAU. Fossil fuels are entirely, or almost entirely, eliminated as a fuel source, and are replaced by electricity.

In addition to fuel switching, energy consumption is reduced by behavioural changes such as increasing the use of transit and active transportation, which displace vehicular trips.

Light trucks and cars represent the majority of the vehicle market in 2016, and market trends predict that light trucks will become dominant, representing 59% of the energy demand in 2050.

All vehicle classes become more efficient, which accounts for the decline in energy consumption in the BAU scenario, in spite of the growing population. This trend is enhanced in the in the LC scenario, as a result of increased electrification of the vehicle fleet and the greater efficiency of electric vehicles relative to the internal combustion engine.

TRANSPORTATION ENERGY BY VEHICLE TYPE & FUEL

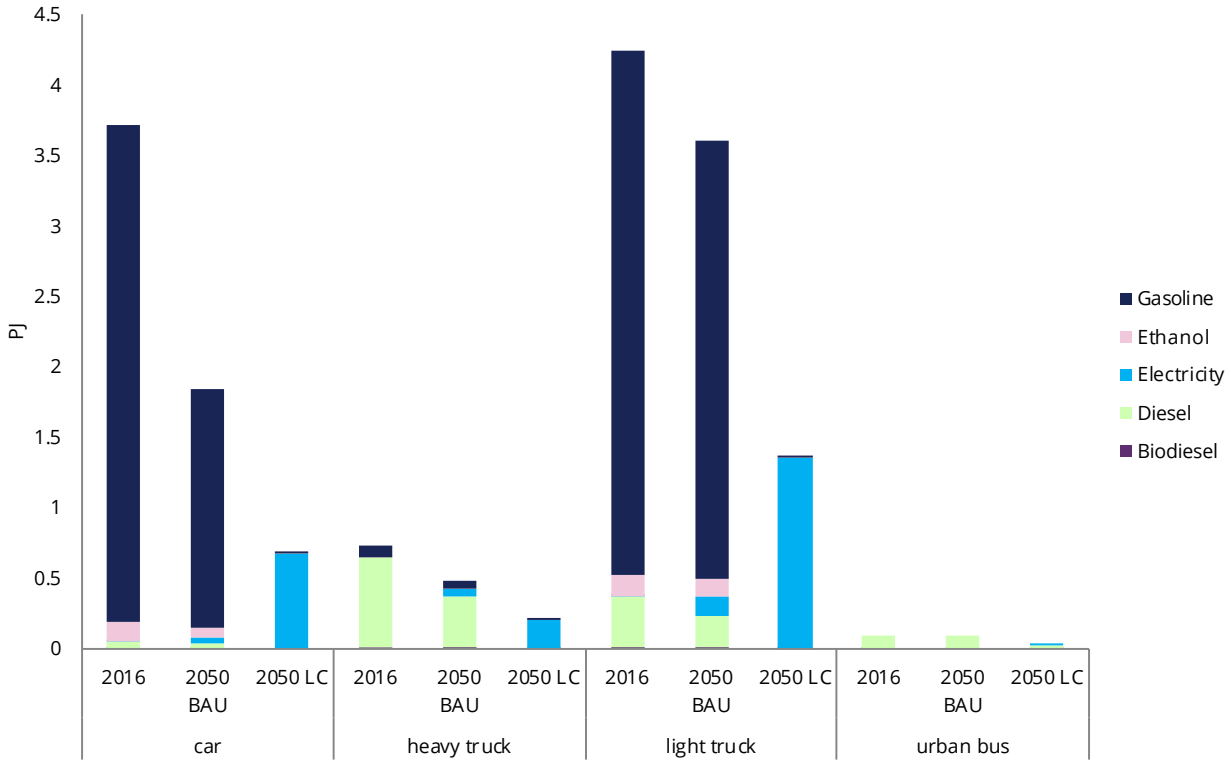


Figure 34. Projected transportation energy use (PJ) by vehicle type and fuel, Burlington.

Cars and light trucks consume 91% of the transportation energy demand in 2016, and 90% of the energy demand in the 2050 LC scenario. The impact of the efficiency of electric vehicles is apparent when the BAU is compared against the LC scenario in 2050 for both cars and light trucks, with energy savings exceeding 50%.

Table 7. Transportation sector energy, Burlington.

TRANSPORTATION ENERGY (GJ) BY FUEL	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050LC
Gasoline	7,314,276	83.4%	4,839,761	80.5%	2,389	0.1%	-100.0%	-100.0%
Diesel	1,139,812	13.0%	726,665	12.1%	23,316	1.0%	-98.0%	-96.8%
Ethanol	293,820	3.3%	194,417	3.2%	96	0.0%	-100.0%	-100.0%
Biodiesel	26,412	0.3%	16,839	0.3%	540	0.0%	-98.0%	-96.8%
Electricity	155	0.0%	234,404	3.9%	2,258,994	98.8%	1457806.9%	863.7%
Total	**8,774,476**		**6,012,086**		**2,285,335**		**-74.0%**	**-62.0%**
TRANSPORTATION ENERGY (GJ) BY VEHICLE TYPE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/ 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Light truck	4,238,706	48.3%	3,599,872	59.9%	1,363,445	59.7%	-67.8%	-62.1%
Car	3,710,492	42.3%	1,837,579	30.6%	679,352	29.7%	-81.7%	-63.0%
Heavy truck	727,887	8.3%	477,244	7.9%	203,202	8.9%	-72.1%	-57.4%
Urban bus	97,390	1.1%	97,390	1.6%	39,336	1.7%	-59.6%	-59.6%
Total	**8,774,476**		**6,012,086**		**2,285,335**		**-74.0%**	**-62.0%**

TRANSPORTATION SECTOR EMISSIONS

TRANSPORTATION EMISSIONS BY SOURCE

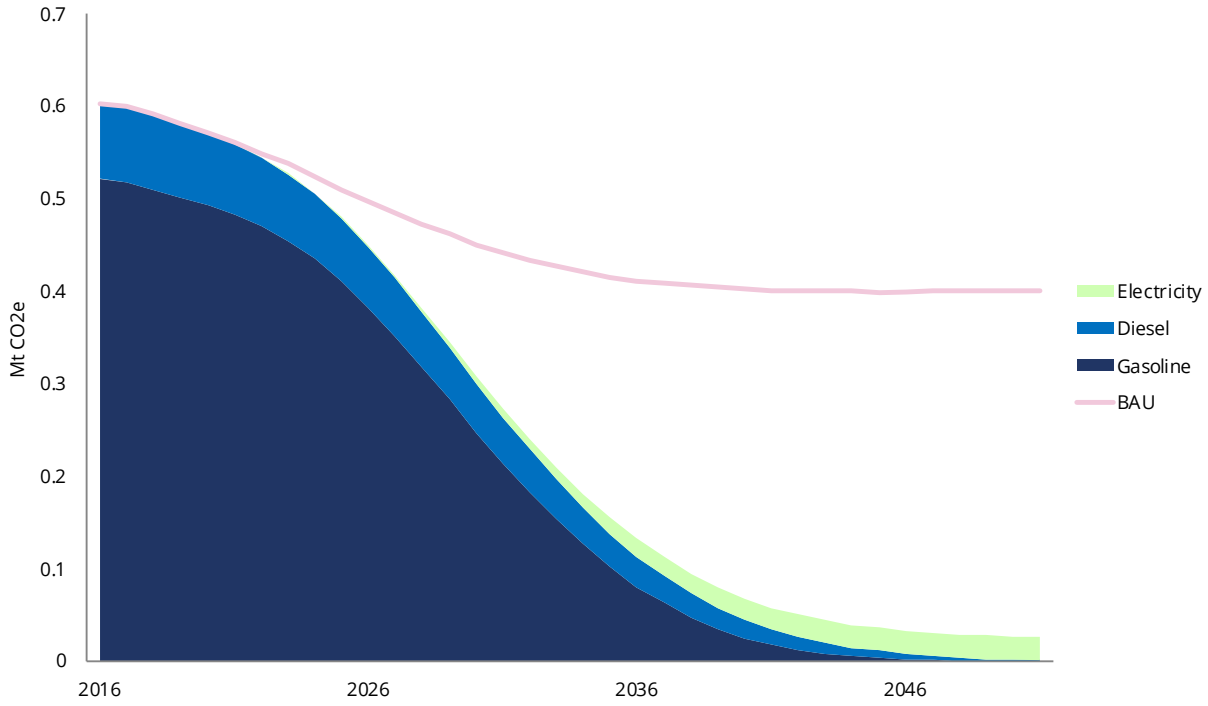


Figure 35. Projected LC transportation GHG emissions (MtCO2e) by source, Burlington, 2016-2050.

TRANSPORTATION EMISSIONS BY VEHICLE TYPE

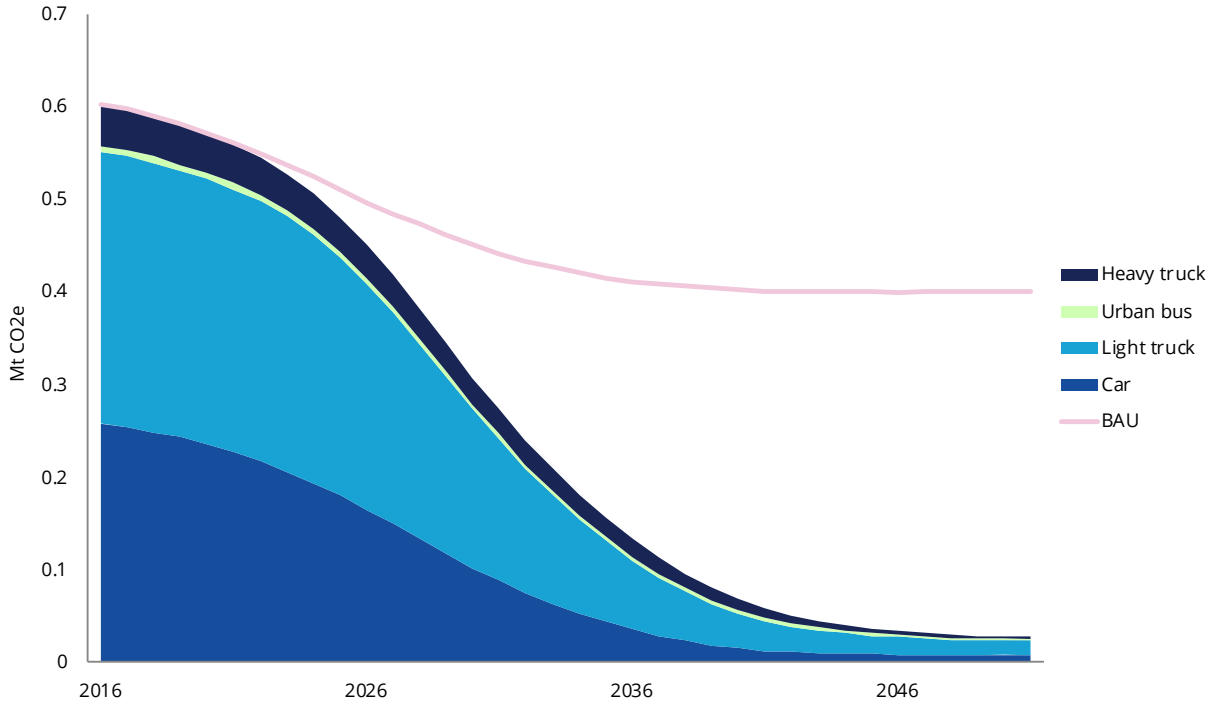


Figure 36. Projected LC transportation GHG emissions (MtCO2e) by vehicle type, Burlington, 2016-2050.

GHG emissions from transportation in 2016 are dominated by gasoline (87%), with lesser contributions from diesel (14%). By switching to electric vehicles for all classes, GHG emissions are reduced by 96% in the LC scenario. While actions that reduce vehicle use and increase the mode share of transit and active transportation contribute to the reduction in GHG emissions, the elimination of carbon-intensive fuel sources is critical to achieving these levels of emissions reductions.

The market share of light trucks is projected to increase, and they represent 57% of the GHG emissions in 2050 in the LC scenario. GHG emissions fall from 43% in 2016 to 28% in 2050 in the LC scenario, because of improved efficiency standards, and switching to electric vehicles by 2030.

Total GHG emissions from vehicles decrease by 96% between 2016 and 2050 in the LC scenario, a decrease of 93% over 2050 in the BAU scenario.

TRANSPORTATION EMISSIONS BY SOURCE AND VEHICLE TYPE

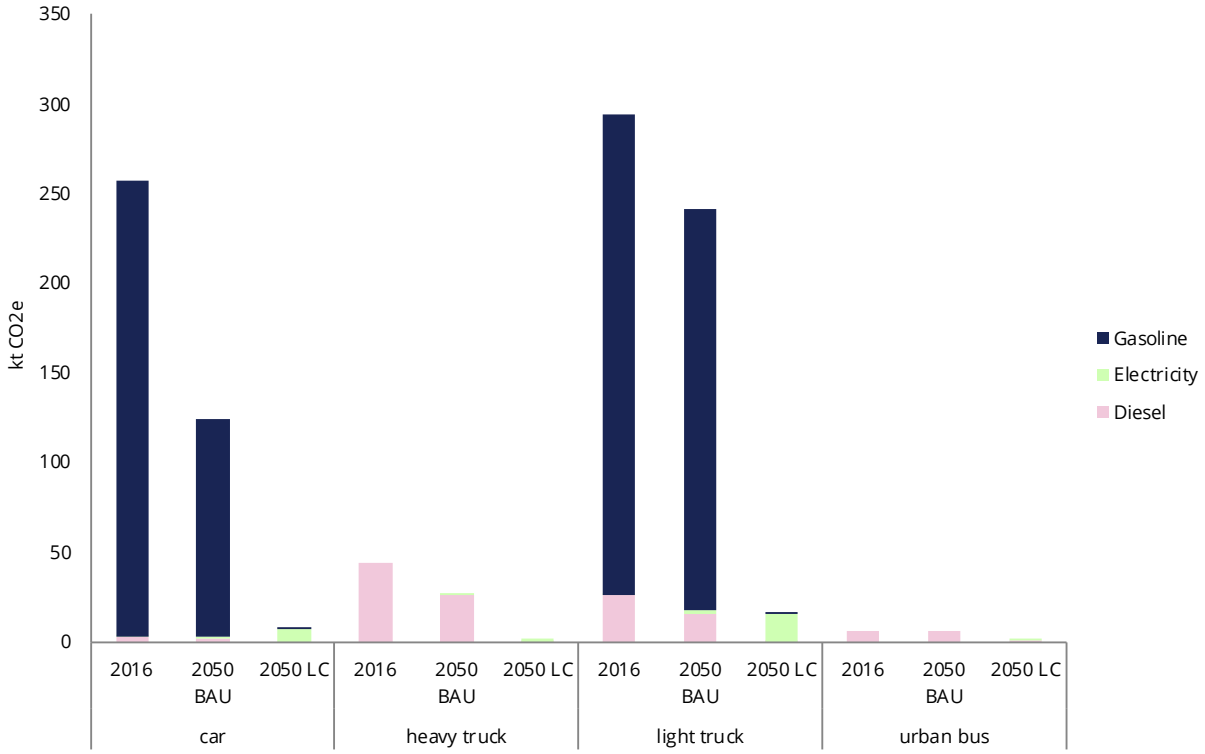


Figure 37. Projected transportation GHG emissions (ktCO2e) by source and vehicle type, Burlington.

In 2016, cars and light trucks are the primary source of GHG emissions (92%), producing a combined 551 ktCO2e. While they are still the dominant source of GHG emissions (85%) by 2050 in the LC scenario, total emissions from cars and light trucks drops to 23 ktCO2e.

Table 8. Transportation sector GHG emissions- Burlington.

TRANSPORTATION EMISSIONS (tCO2e) BY FUEL	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050LC
Gasoline	521,222	86.5%	345,203	86.4%	149	0.5%	-100.0%	-100.0%
Diesel	81,310	13.5%	51,835	13.0%	1,657	6.0%	-98.0%	-96.8%
Electricity	1	0.0%	2,705	0.7%	25,593	93.4%	1828755.6%	846.3%
Total	**602,533**		**399,743**		**27,399**		**-95.5%**	**-93.1%**
TRANSPORTATION EMISSIONS (tCO2e) BY VEHICLE TYPE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Light truck	293,783	48.8%	241,573	60.4%	15,656	57.1%	-94.7%	-93.5%
Car	257,244	42.7%	124,597	31.2%	7,697	28.1%	-97.0%	-93.8%
Heavy truck	44,749	7.4%	26,814	6.7%	2,440	8.9%	-94.5%	-90.9%
Urban bus	6,758	1.1%	6,758	1.7%	1,606	5.9%	-76.2%	-76.2%
Total	**602,533**		**399,743**		**27,399**		**-95.5%**	**-93.1%**

WASTE SECTOR EMISSIONS

WASTE EMISSIONS BY TYPE

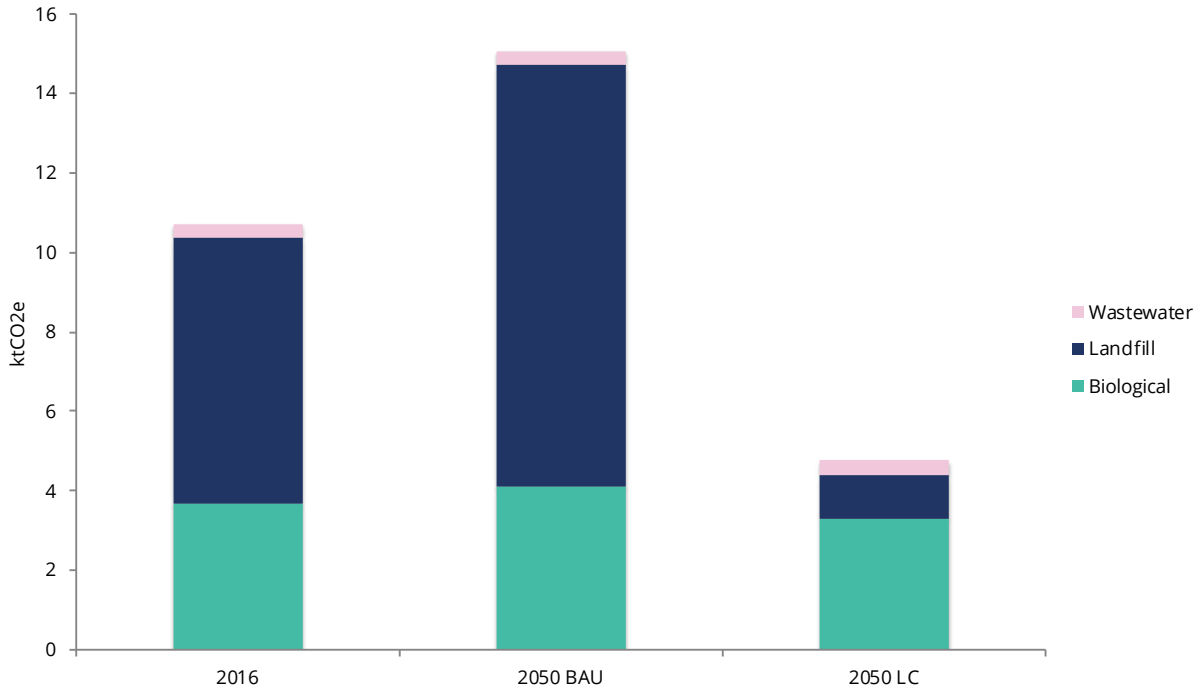


Figure 38. Projected waste GHG emissions (tCO2e), Burlington.

The LC scenario assumes that waste generation will decrease by 50% per capita by 2050, and that diversion rates will increase by 50% per capita in the same time period. Wastewater GHG emissions are consistent between the BAU and the LC scenarios, as the production rates of this waste do not change. The reduction in GHG emissions in landfills is the result of increased capture of biogas, as well as the reduction in per capita waste production. Biological sources include compost, yard waste, and other organic matter.

ENERGY EXPENDITURES

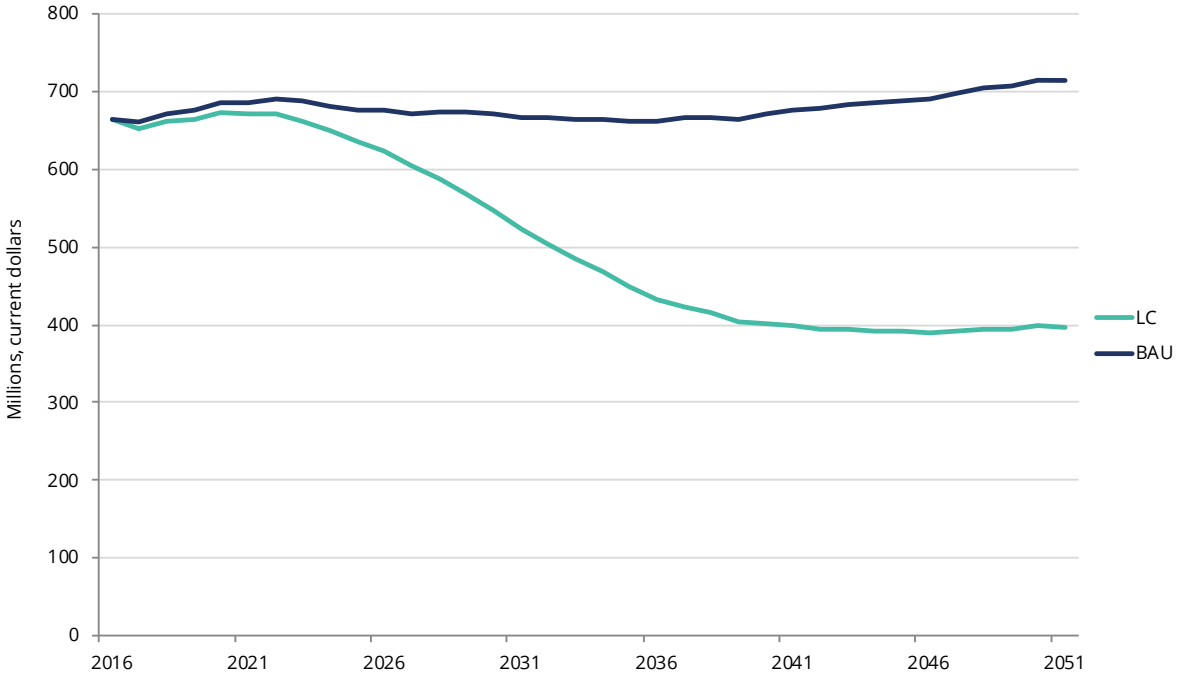


Figure 39. Total energy expenditures for BAU and LC, 2016-2050, Burlington.

Total energy expenditures in Burlington were $660 million in 2016, climbing to $714 million in 2050 in the BAU scenario. The LC scenario results in annual energy expenditure savings of $317 million by 2050. Cumulative savings between 2018 and 2050 on energy expenditures are $5.7 billion. Figure 33 shows that the energy expenditures in Burlington are roughly split between electricity and natural gas and as natural gas is phased out due to electrification of heating and transportation, the share of electricity grows to nearly 100% by 2050.

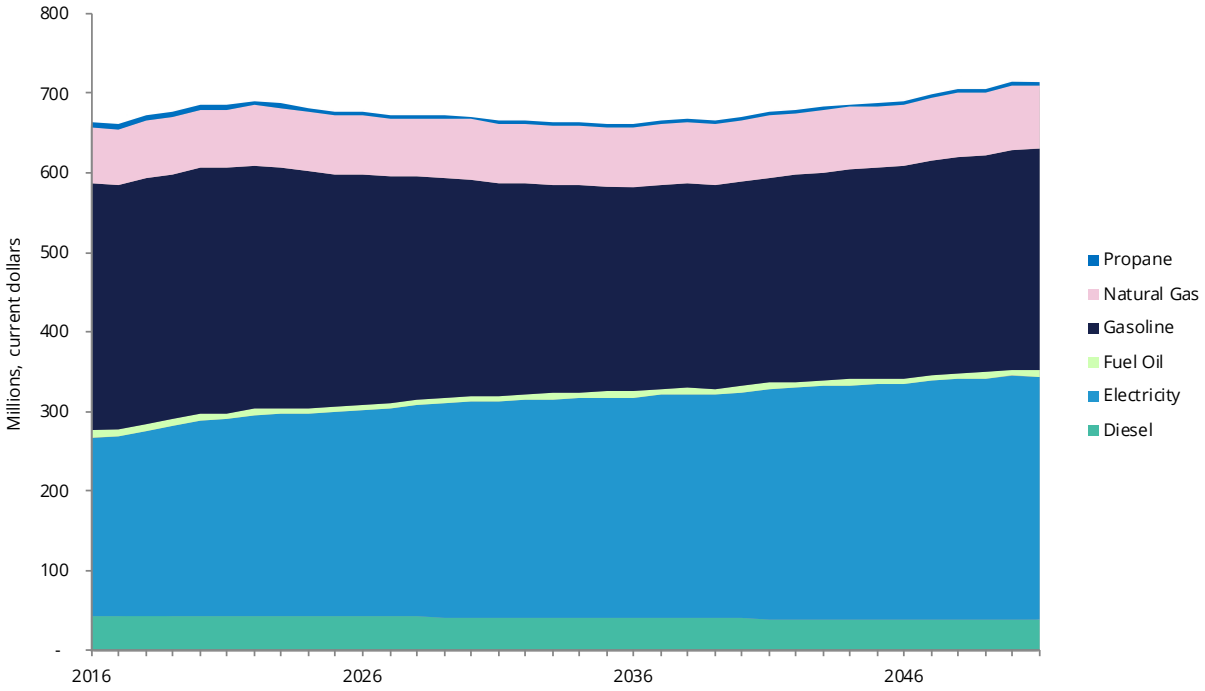


Figure 40. BAU energy costs by fuel type, Burlington.

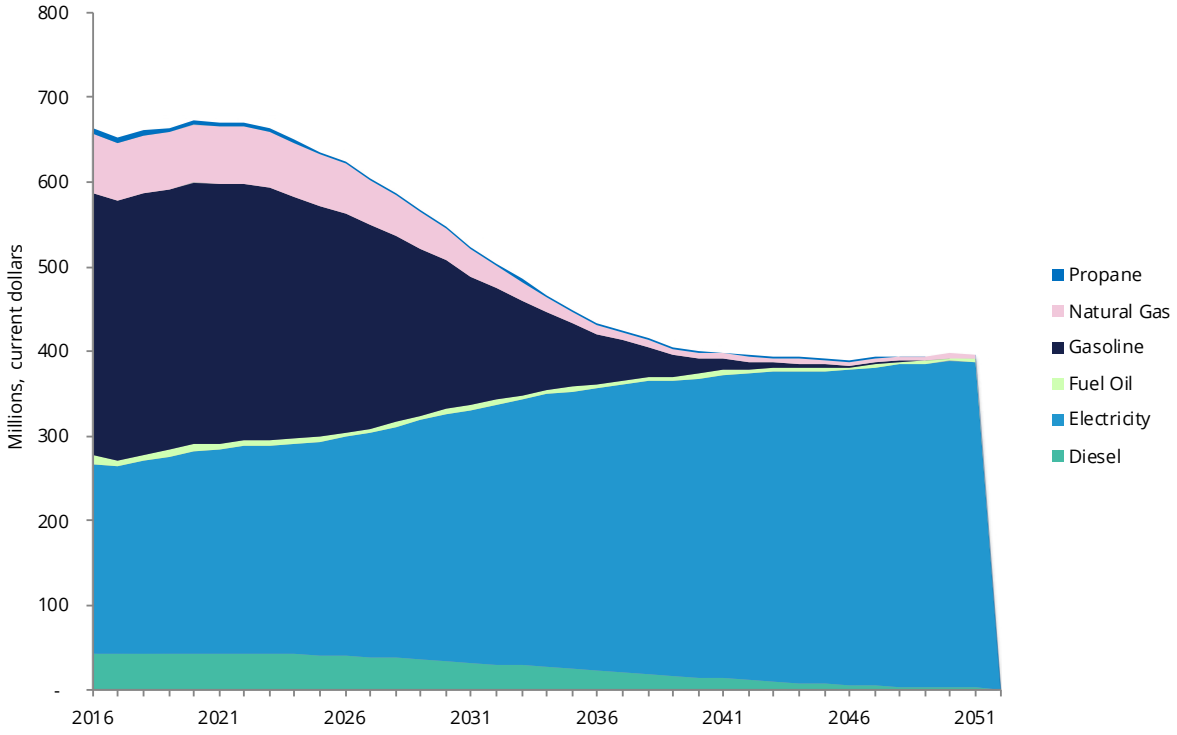


Figure 41. LC energy costs by fuel type, Burlington.

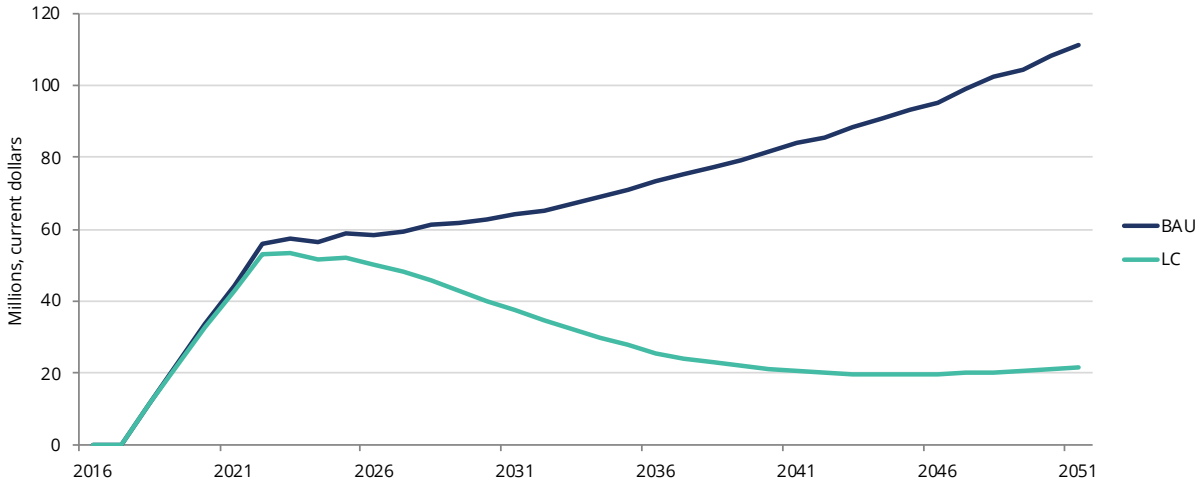


Figure 42. Total cost of carbon emissions, BAU vs LC, Burlington.

The costs associated with the Federal carbon tax were also evaluated. In 2019, carbon tax expenditures total $23 million per year, climbing to $110 million per year by 2050 in the BAU. In the low-carbon scenario, carbon tax expenditures fall to $25 million in 2050, a savings of $90 million. Cumulative savings between 2019 and 2050 are $1.3 billion between 2019 and 2050. Figures 43 and 44 illustrate the impact of the carbon tax on various sectors. In the BAU scenario, transportation expenditures increase because of the reliance on fossil fuels, while the opposite is evident in the low-carbon scenario, when carbon tax expenditures fall to zero in the transportation sector.

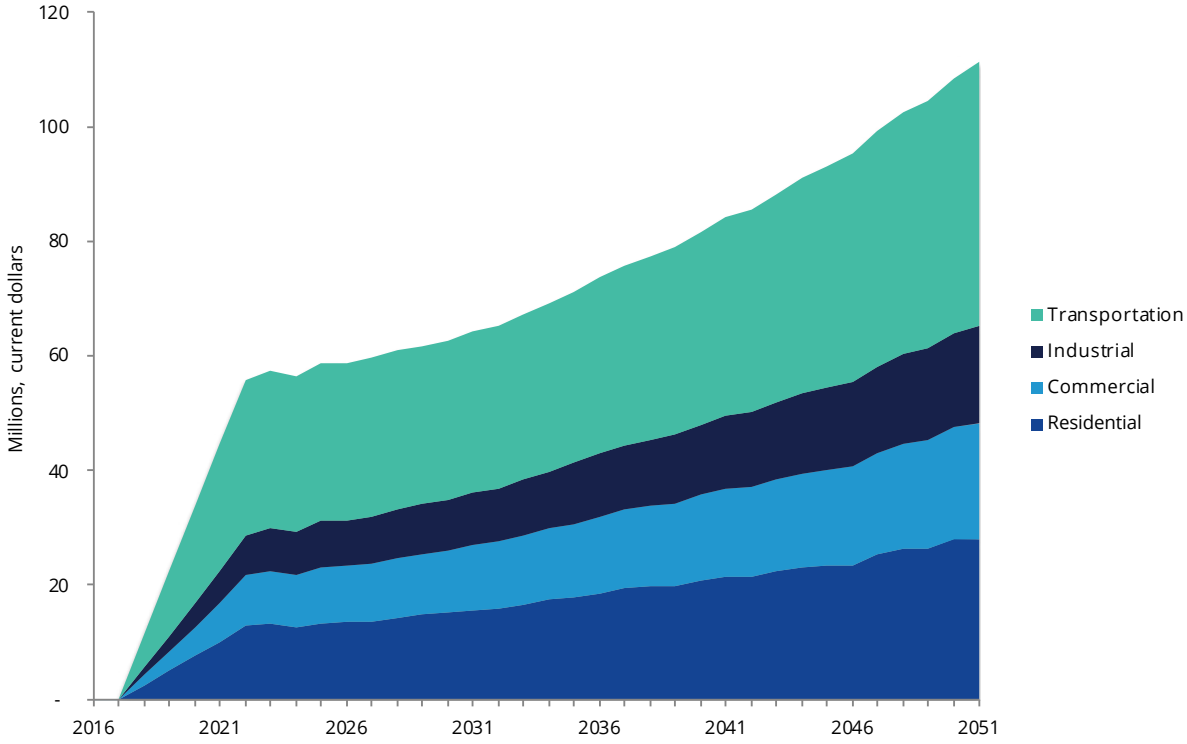


Figure 43. BAU emission costs by fuel type, Burlington.

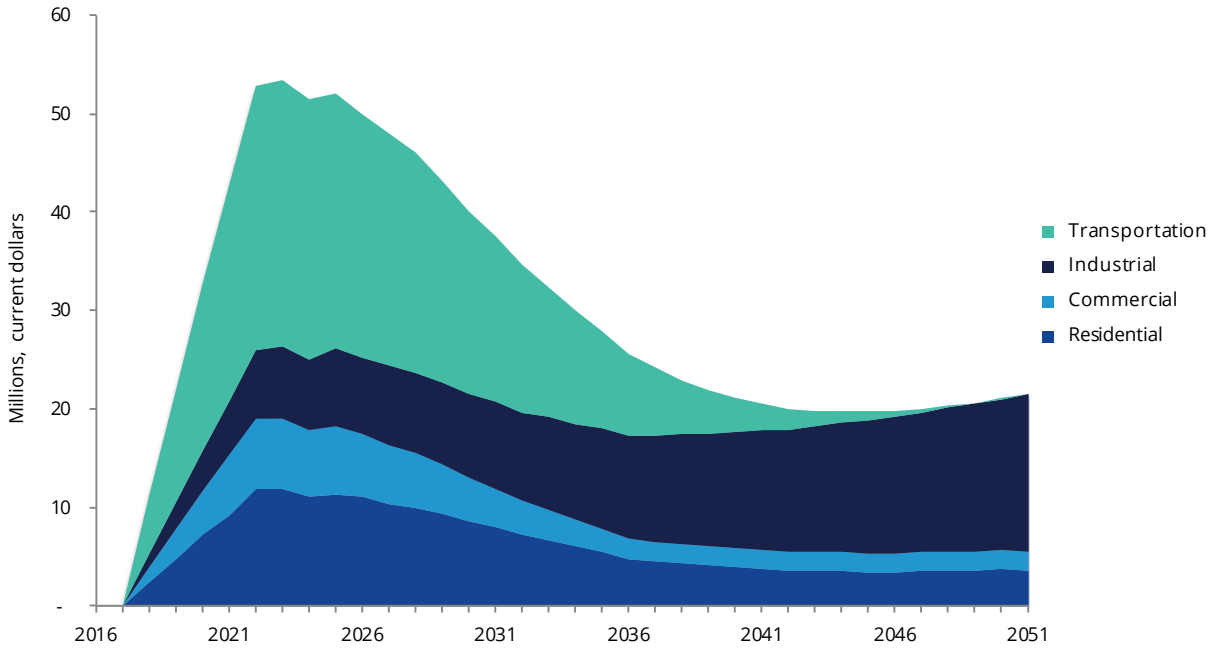


Figure 44. LC emission costs by fuel type, Burlington.

PART 3: CITY OF HAMILTON LOW-CARBON RESULTS

COMMUNITY ENERGY AND EMISSIONS

ENERGY BY SECTOR

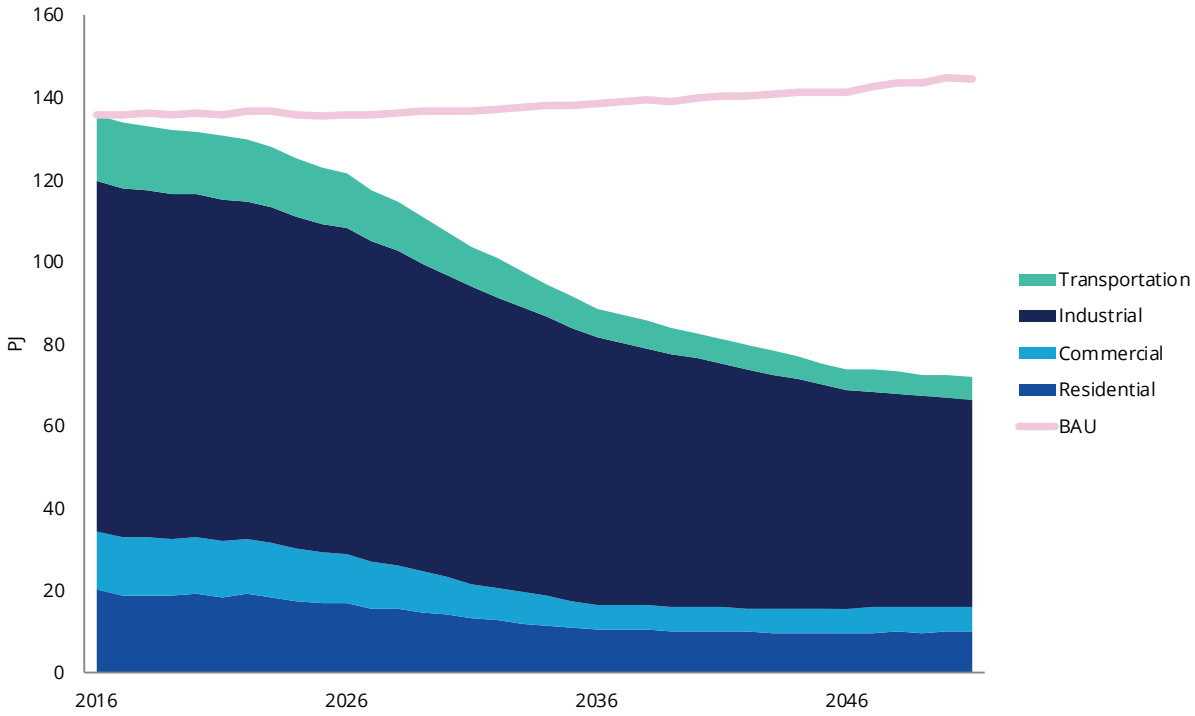


Figure 45. Projected LC energy consumption (PJ) by sector, Hamilton, 2016-2050.

ENERGY BY FUEL

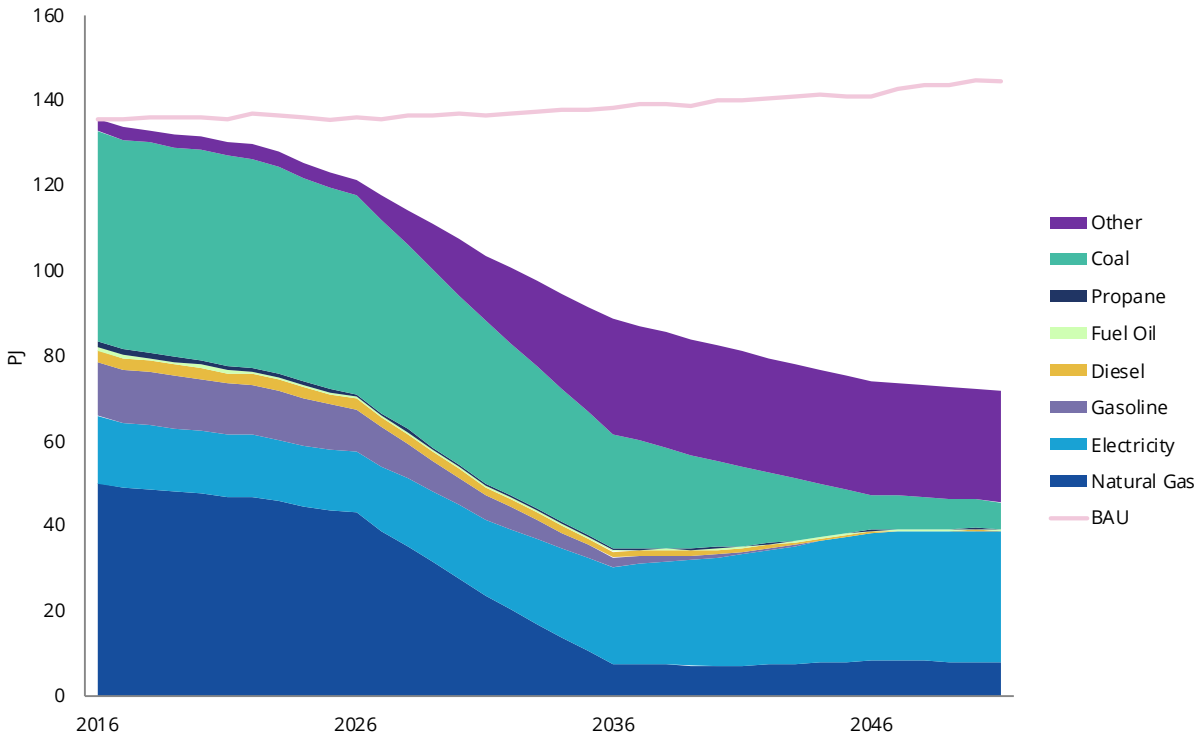


Figure 46. Projected LC energy consumption (PJ) by fuel, Hamilton 2016-2050.

The industrial sector is the primary energy consumer in Hamilton, accounting for 63% of energy use in 2016. Efficiencies in this sector, as well as a reduction in steel manufacturing account for the 40% decrease in energy consumption by 2050 in the LC scenario.

Improvements to vehicle efficiency standards drive some of the decrease in transportation energy use, but the majority of the energy savings are from the electrification of the personal and commercial vehicles and a reduction in vehicle use (transit and active transportation use increasing).

Building retrofits, improvements in the efficiency of new buildings, increased use of heat pumps and solar hot water, and electrification contribute to the reduction in residential energy use.

Energy use in 2016 is 37% natural gas, 36% coal (in the steel industry), 12% electricity, and 9% gasoline. In the LC scenario, electricity becomes the dominant energy source (43%), and fossil fuels are reduced by 84% to 100%, depending on the fuel type. Coal use is reduced by 87% in the LC scenario.

PER CAPITA ENERGY

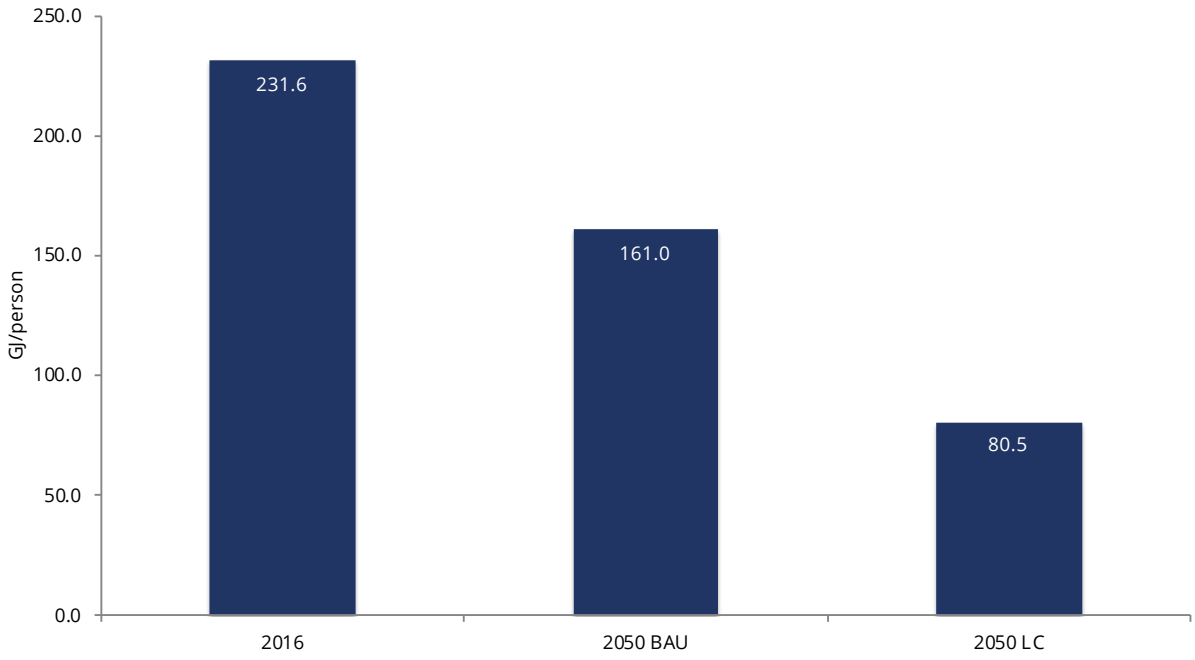


Figure 47. Projected energy per capita (GJ/person), 2016, 2050 BAU and 2050 LC, Hamilton.

Overall, the LC scenario results in a total energy use decrease from 136 PJ in 2016, to 72 PJ in 2050. This is a 47% reduction from the 2016 baseline, and a 50% reduction over the BAU in 2050.

Per capita energy use decreases by 65% from the baseline, and 50% over the BAU in 2050. When industrial energy is removed, the per capita energy use drops to 56 GJ/person in 2050, a decrease of 76% from 2016, and 65% over the BAU in 2050. Table 10 shows full details of the reduction in energy use by sector and by fuel type.

Table 9. Community energy consumption, Hamilton.

ENERGY BY SECTOR (GJ)	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050 LC
Industrial	85,246,721	62.8%	89,009,643	61.5%	50,854,324	70.3%	-40.3%	-42.9%
Residential	20,234,366	14.9%	22,701,528	15.7%	9,976,934	13.8%	-50.7%	-56.1%
Transportation	16,022,809	11.8%	14,213,034	9.8%	5,416,976	7.5%	-66.2%	-61.9%
Commercial	14,133,156	10.4%	18,816,133	13.0%	6,123,469	8.5%	-56.7%	-67.5%
Total	135,637,053		144,740,338		72,371,704		-46.6%	-50.0%
ENERGY BY FUEL (GJ)	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050 LC**
Natural Gas	50,087,377	36.9%	57,451,517	39.7%	8,086,846	11.2%	-83.9%	-85.9%
Coal	49,411,059	36.4%	49,435,449	34.2%	6,645,300	9.2%	-86.6%	-86.6%
Electricity	15,719,196	11.6%	19,676,183	13.6%	30,750,112	42.5%	95.6%	56.3%
Gasoline	12,669,000	9.3%	10,947,700	7.6%	7,257	0.0%	-99.9%	-99.9%
Other	2,856,859	2.1%	3,395,892	2.3%	26,258,901	36.3%	819.2%	673.3%
Diesel	2,822,480	2.1%	2,214,033	1.5%	222,530	0.3%	-92.1%	-89.9%
Propane	1,185,520	0.9%	1,042,217	0.7%	195,116	0.3%	-83.5%	-81.3%
Fuel Oil	885,562	0.7%	577,348	0.4%	205,643	0.3%	-76.8%	-64.4%
Total	**135,637,053**		**144,740,338**		**72,371,704**		**-46.6%**	**-50.0%**
ENERGY PER CAPITA (GJ/CAP)	**231.6**		**161.0**		**80.5**		**-65.2 %**	**-50.0%**

ENERGY FLOW AND CONVERSIONS

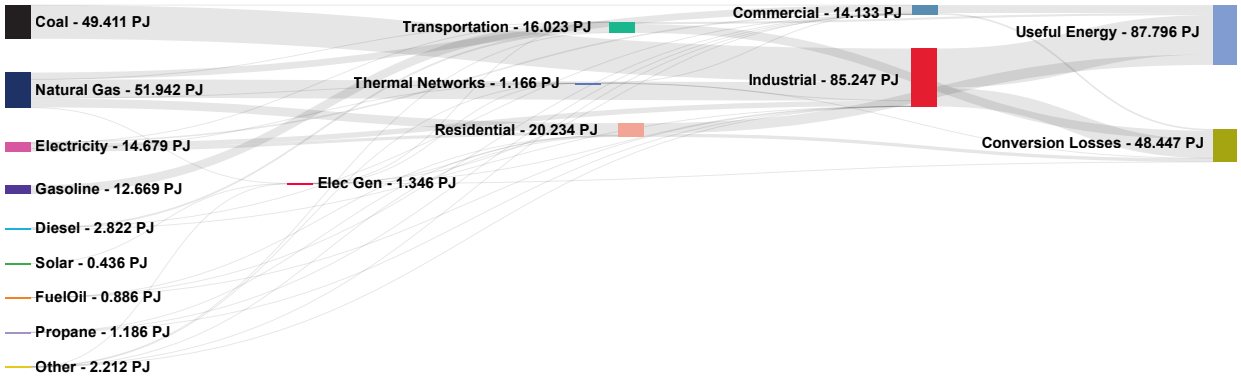


Figure 48. 2016 Energy Flow- Hamilton.

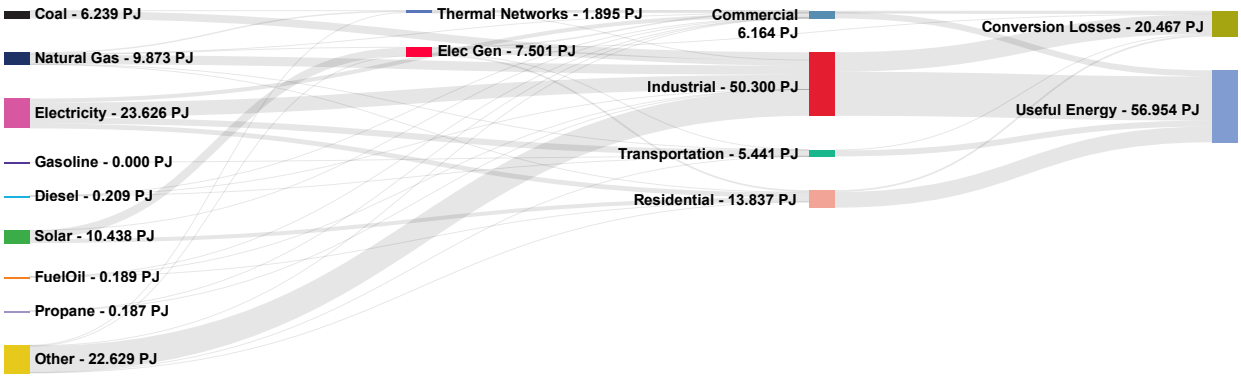


Figure 49. Energy flow, 2050 (LC)- Hamilton.

The Sankey diagrams for 2016 (Figure 48) and the LC scenario in 2050 (Figure 49) show the energy flow by fuel and sector for the City of Hamilton. The ratio of useful energy to conversion losses is 1.8:1 in 2016, and in 2050 this climbs to 2.8:1, indicating a gain in the efficient use of energy.

Local generation of electricity increases from 1.3 PJ to 7.5 PJ in 2050, and the district energy network (thermal network) increases from 1.2 PJ to 1.9 PJ.

The Sankey also shows a significant decline in coal and natural gas between 2016 and 2050, and an increase in electricity use.

The drop from 85 PJ to 50 PJ in the industrial sector has the biggest impact on energy use in Hamilton.

COMMUNITY EMISSIONS

EMISSIONS BY SECTOR

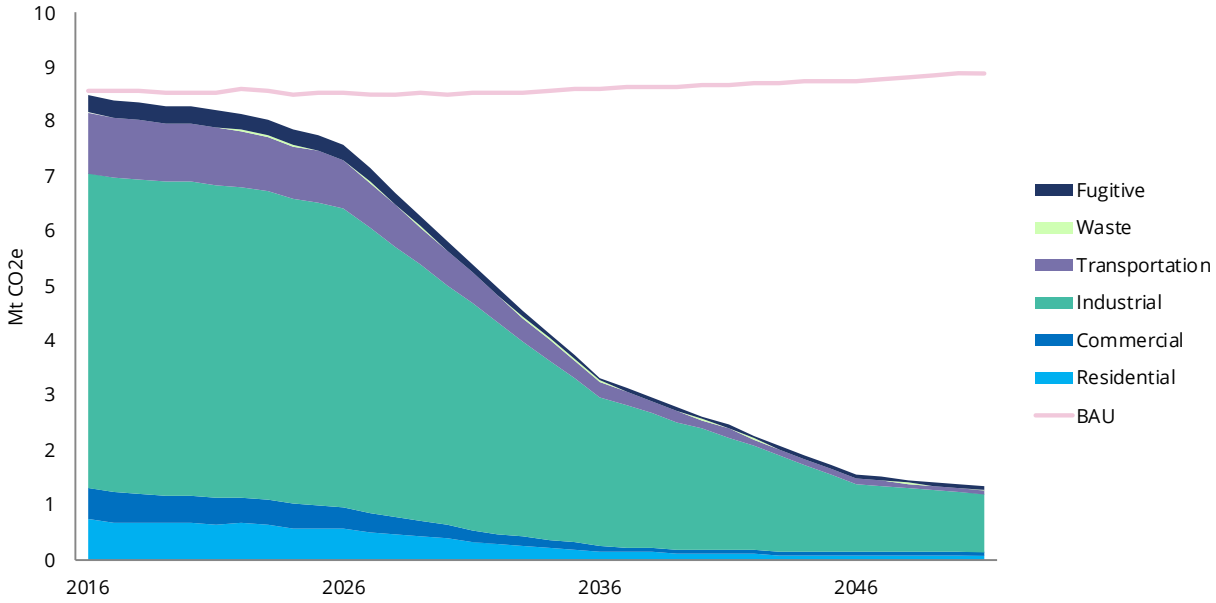


Figure 50. Projected LC emissions (MtCO2e) by sector in Hamilton, 2016-2050.

EMISSIONS BY SOURCE

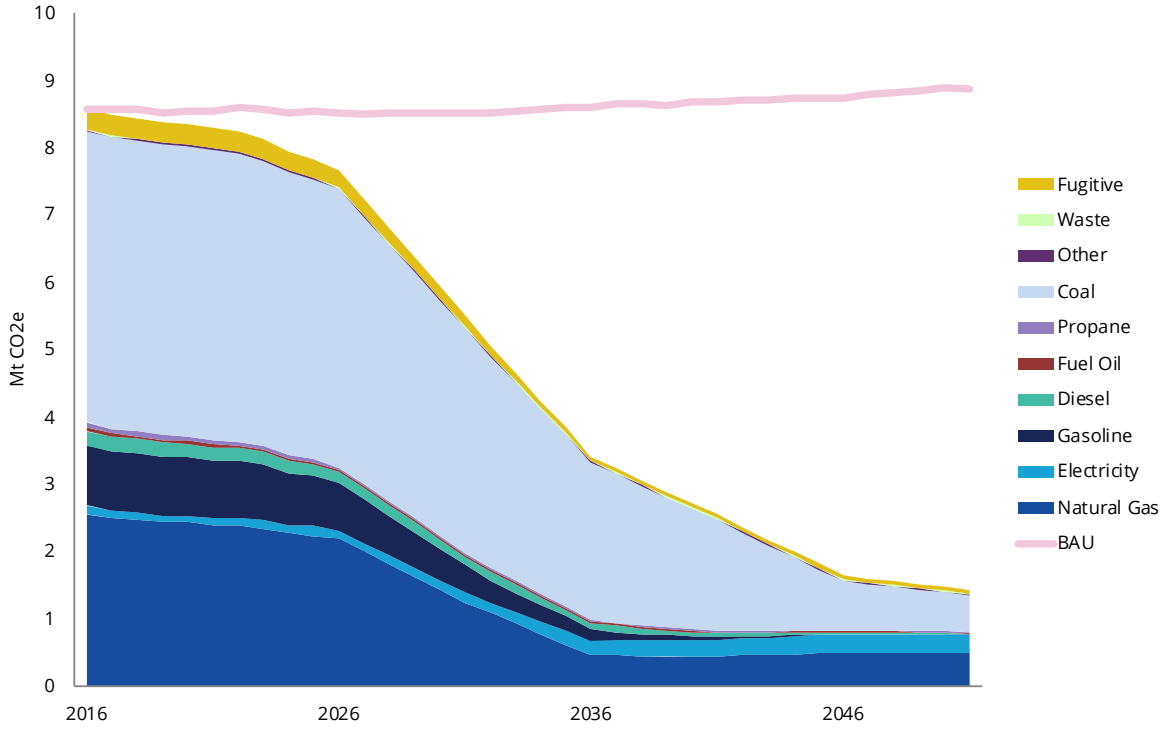


Figure 51. Projected LC emissions (MtCO2e) by source, in Hamilton, 2016-2050.

Total GHG emissions decline from 8.6 MtCO2e in 2013 to 1.5 MtCO2e in 2050 in the LC scenario, a decrease of 83%.

All sectors except waste show a reduction in GHG emissions ranging from 81% in industry to 94% in transportation. The waste sector shows an increase of 27% from 2016 to 2050 in the LC scenario, driven by population growth. This sector shows a reduction of 13% over the BAU scenario because of reduced waste generation, and increased capture of methane.

The LC scenario illustrates a reduction in carbon-intensive fuel sources, specifically coal (50% of 2016 emissions), natural gas (30% of 2016 emissions) and gasoline (10% of 2016 emissions), and a switch to low or zero emissions sources. As a result of electrification, GHG emissions from electricity increase by 112% from 2016 to 2050 in the low-carbon scenario.

PER CAPITA EMISSIONS

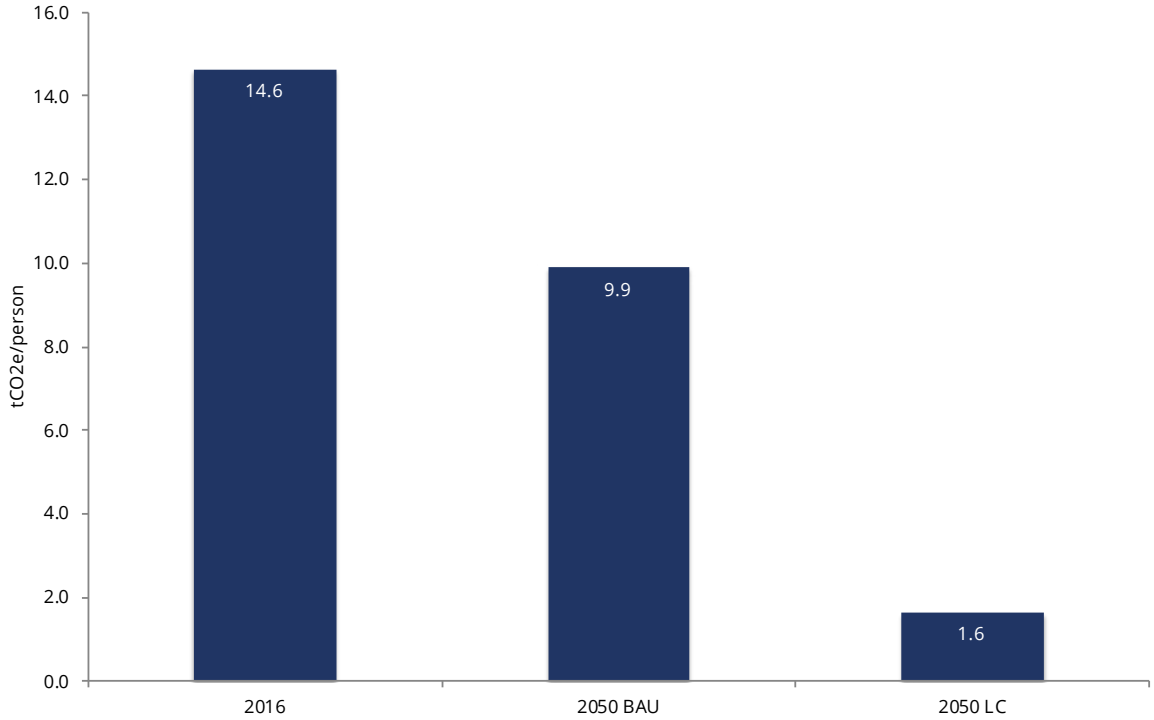


Figure 52. Projected emissions per capita (tCO2e/person), Hamilton.

GHG emissions decline from 14.6 tCO2e per person in 2016, to 1.6 tCO2e in 2050 in the LC scenario. This is a 89% decrease from 2016 to 2050 in the LC scenario, and an 83% decrease between the BAU and LC scenarios in 2050. Table 10 provides a comparison of the total GHG emissions for Hamilton in 2016, and the two scenarios in 2050.

Table 10. Community emissions results- Hamilton.

EMISSIONS BY SECTOR (tCO2e)	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050 LC
Industrial	5,747,685	67.0%	5,952,081	67.0%	1,098,561	74.3%	-80.9%	-81.5%
Transportation	1,096,430	12.8%	938,692	10.6%	71,724	4.8%	-93.5%	-92.4%
Residential	749,898	8.7%	771,762	8.7%	82,212	5.6%	-89.0%	-89.3%
Commercial	566,942	6.6%	755,545	8.5%	61,212	4.1%	-89.2%	-91.9%
Fugitive	315,811	3.7%	360,585	4.1%	60,443	4.1%	-80.9%	-83.2%
Energy Industries	90,968	1.1%	90,988	1.0%	90,901	6.1%	-0.1%	-0.1%
Waste	11,264	0.1%	16,526	0.2%	14,334	1.0%	27.2%	-13.3%
Total	**8,578,997**		**8,886,180**		**1,479,387**		**-82.8%**	**-83.4%**
EMISSIONS BY SOURCE (tCO2e)	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050 LC**
Coal	4,323,437	50.4%	4,325,570	48.7%	581,459	39.3%	-86.6%	-86.6%
Natural Gas	2,546,767	29.7%	2,907,825	32.7%	487,507	33.0%	-80.9%	-83.2%
Gasoline	898,352	10.5%	777,840	8.8%	454	0.0%	-99.9%	-99.9%
Fugitive	315,811	3.7%	360,585	4.1%	60,443	4.1%	-80.9%	-83.2%
Diesel	201,454	2.3%	158,095	1.8%	15,925	1.1%	-92.1%	-89.9%
Electricity	133,086	1.6%	219,032	2.5%	281,444	19.0%	111.5%	28.5%
Propane	72,510	0.8%	63,744	0.7%	11,934	0.8%	-83.5%	-81.3%
Fuel Oil	60,602	0.7%	39,736	0.4%	14,146	1.0%	-76.7%	-64.4%
Other	15,716	0.2%	17,227	0.2%	11,742	0.8%	-25.3%	-31.8%
Waste	11,264	0.1%	16,526	0.2%	14,334	1.0%	27.2%	-13.3%
Total	**8,578,997**		**8,886,180**		**1,479,387**		**-82.8%**	**-83.4%**
Emissions per capita (tCO2e/ person)	**14.6**		**9.9**		**1.6**		**-88.8 %**	**-83.4 %**

BUILDINGS SECTOR: ENERGY

BUILDING ENERGY USE BY FUEL

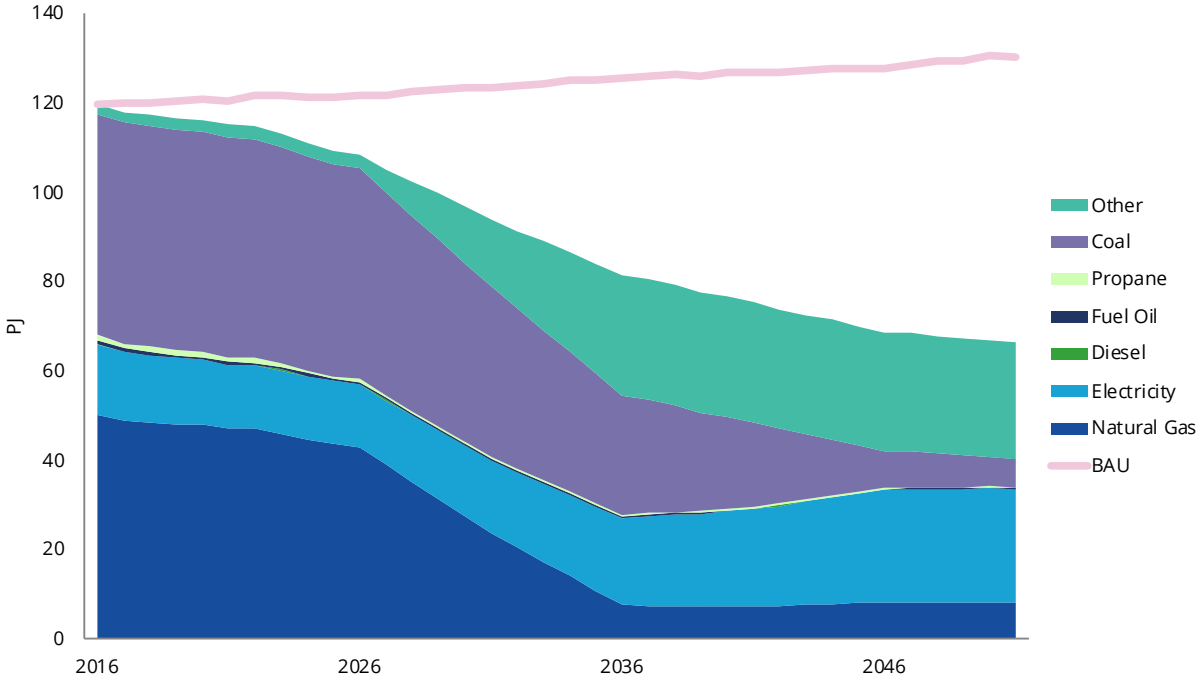


Figure 53. Projected LC building energy use (PJ) by fuel, Hamilton, 2016-2050.

BUILDING ENERGY BY END USE

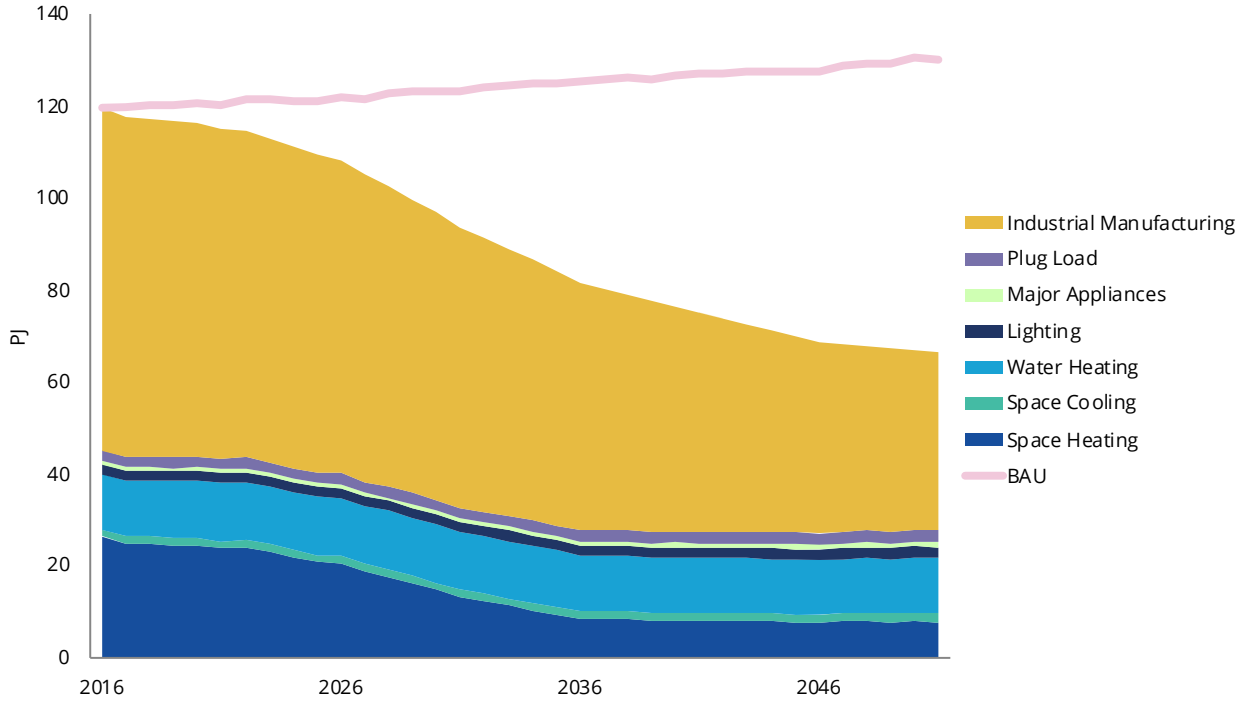


Figure 54. Projected LC building energy use (PJ) by end use, Hamilton, 2016-2050.

The buildings sector sees an overall reduction of energy use from 119 PJ in 2016 to 67 PJ in 2050 under the LC scenario. Electricity consumption increases by 63% over this period, but coal, natural gas, propane, diesel, and fuel oil decrease. The “other” category, which includes solar PV, renewable natural gas, and district energy grows to account for 39% of the energy used by the building sector by 2050.

The overall decrease of 44% in building energy use is a result of a reduction in coal use in industrial manufacturing, retrofits to existing buildings, and improvements to the energy efficiency of new residential buildings. The reduction in energy consumption for industrial manufacturing accounts for 58% of the energy savings, space heating accounts for 12% of the energy savings, and the increased use of solar hot water accounts for an 18% reduction in energy use. Space heating shifts to the use of air source and ground source heat pumps in residential and commercial buildings.

The reduction in heating degree-days was the primary reason energy use increased only a small amount in the BAU scenario as the population grew. The same reduction in heating degree-days is applied to the LC scenario, along the other actions.

BUILDING ENERGY USE BY BUILDING TYPE AND FUEL

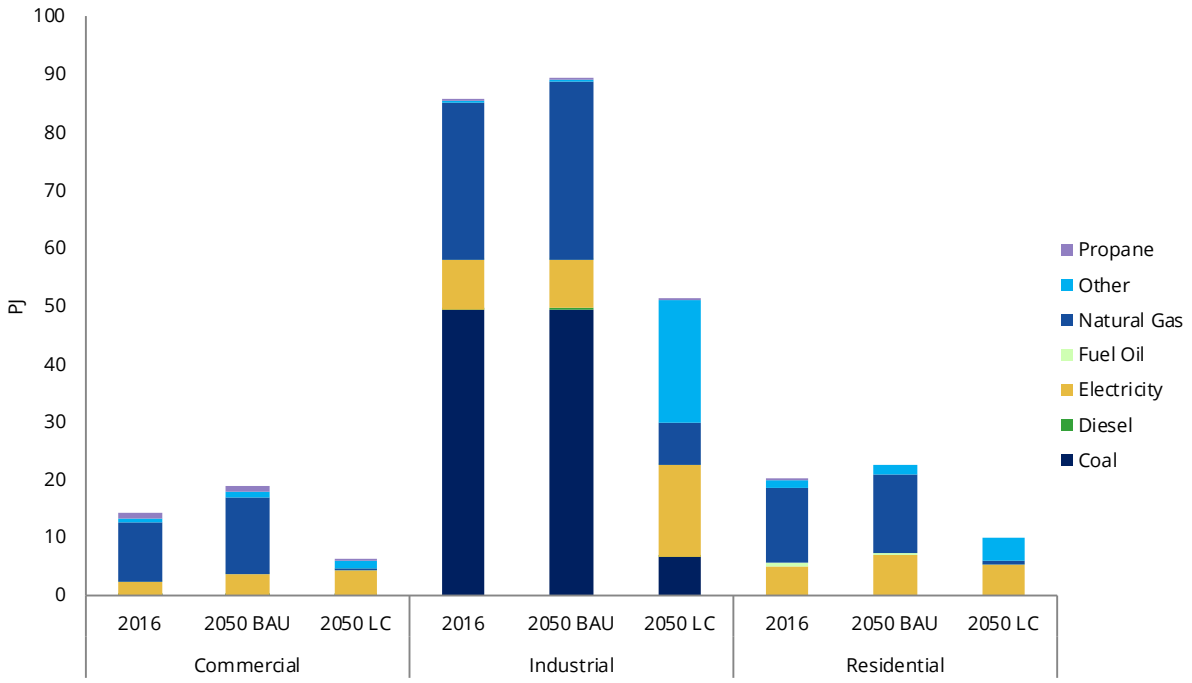


Figure 55. Projected building energy use (PJ) by building type and fuel, Hamilton.

BUILDING ENERGY USE BY BUILDING TYPE AND END USE

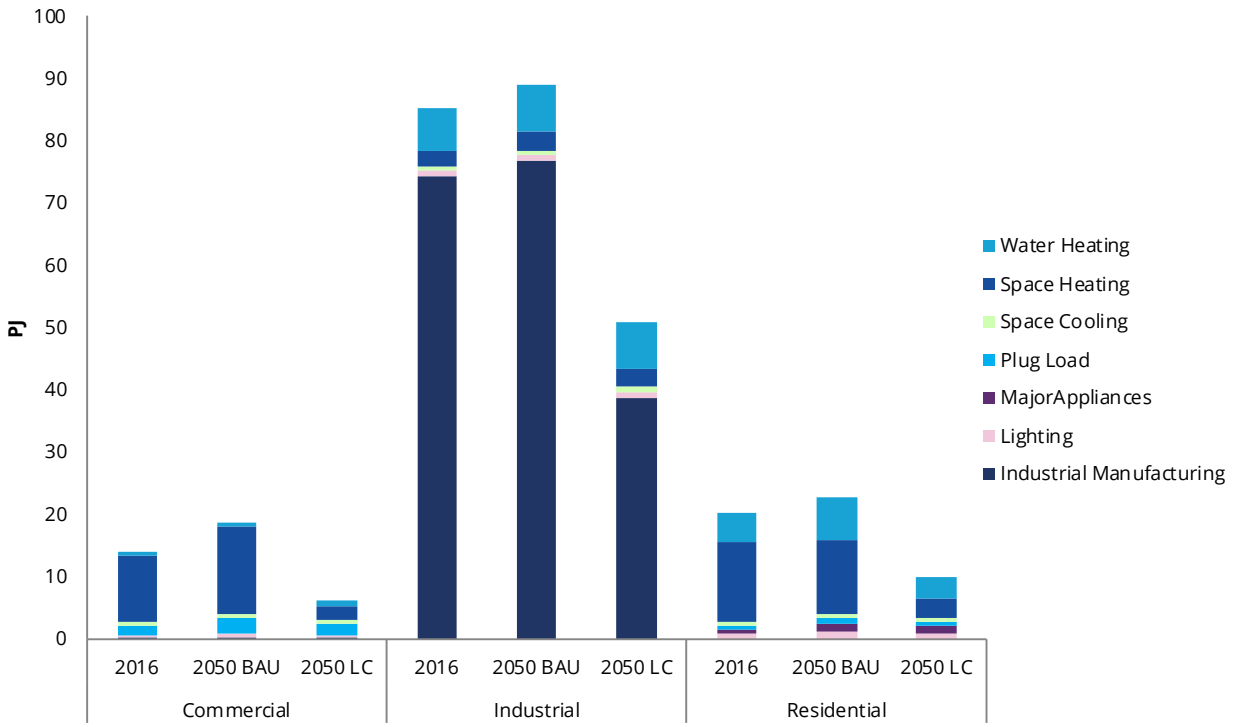


Figure 56. Projected building energy use (PJ) by building type and end use, Hamilton.

The increased use of electricity as the primary fuel source applies to all sectors of buildings. The residential and industrial sectors show a shift to “other” fuel sources, including biogas and locally-generated electricity, with a reduction of coal use by the industrial sector.

By 2030, 100% of new buildings are projected to achieve Passive House levels of performance, and existing buildings are retrofitted to achieve 50% reduction in electrical consumption.

For commercial buildings, the LC scenario projects a reduction in floor space per employee of 25% by 2050, as well as building efficiencies for both new and existing buildings.

While industrial buildings account for the majority of building energy use, all sectors are targeted to reduce overall energy consumption.

PER HOUSEHOLD ENERGY

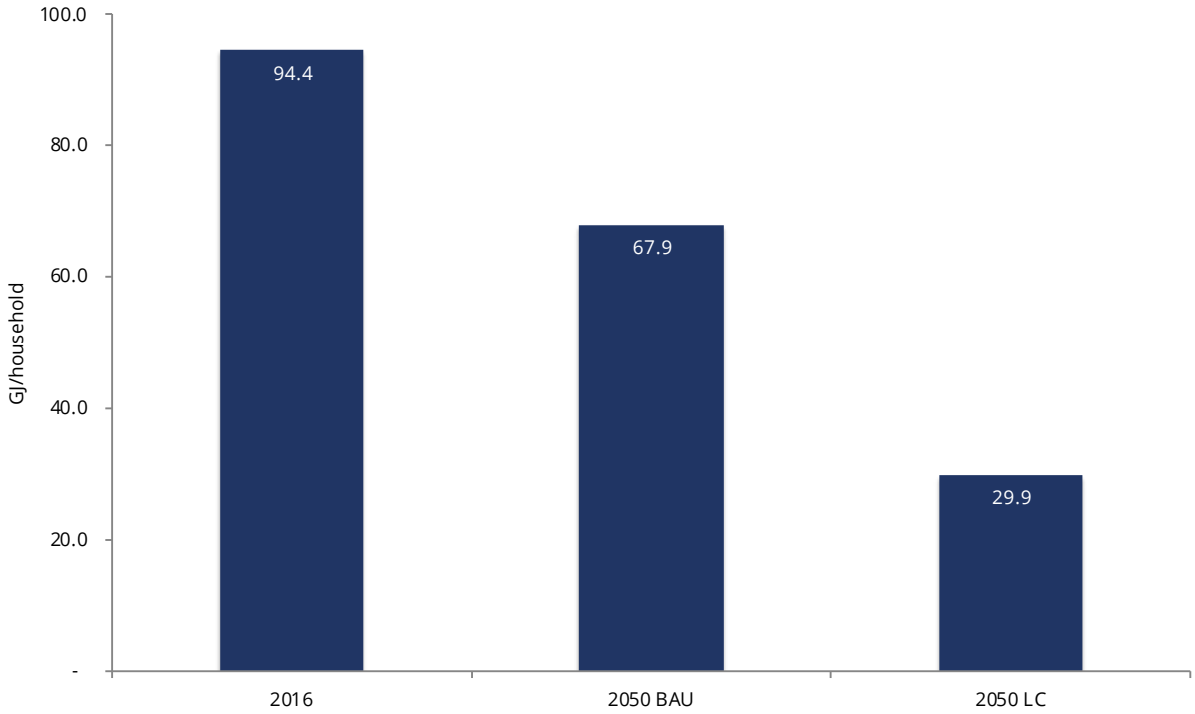


Figure 57. Projected residential energy per household (GJ/household), Hamilton.

Residential energy use per household declines from 94 GJ to 30 GJ between 2016 and 2050 in the LC scenario, a reduction of 68%.

Table 11. Buildings sector energy- Hamilton.

BUILDINGS ENERGY (GJ) BY BUILDING TYPE	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050LC
Industrial	85,246,722	71.3%	89,009,634	68.2%	50,854,322	76.0%	-40.3%	-42.9%
Residential	20,234,365	16.9%	22,701,528	17.4%	9,976,934	14.9%	-50.7%	-56.1%
Commercial	14,133,156	11.8%	18,816,129	14.4%	6,123,469	9.1%	-56.7%	-67.5%
Total	**119,614,244**		**130,527,291**		**66,954,725**		**-44.0%**	**-48.7%**
BUILDINGS ENERGY (GJ) BY FUEL	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Natural Gas	50,068,489	41.9%	57,432,617	44.0%	8,067,117	12.0%	-83.9%	-86.0%
Coal	49,411,059	41.3%	49,435,446	37.9%	6,645,299	9.9%	-86.6%	-86.6%
Electricity	15,718,922	13.1%	19,059,713	14.6%	25,537,507	38.1%	62.5%	34.0%
Other	2,283,939	1.9%	2,906,511	2.2%	26,254,597	39.2%	1049.5%	803.3%
Propane	1,185,520	1.0%	1,042,217	0.8%	195,116	0.3%	-83.5%	-81.3%
Fuel Oil	885,562	0.7%	577,348	0.4%	205,643	0.3%	-76.8%	-64.4%
Diesel	60,753	0.1%	73,439	0.1%	49,448	0.1%	-18.6%	-32.7%
Total	**119,614,244**		**130,527,291**		**66,954,725**		**-44.0%**	**-48.7%**
BUILDINGS ENERGY (GJ) BY END USE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/ 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Industrial Manufacturing	74,441,332	62.2%	77,121,304	59.1%	39,065,408	58.3%	-47.5%	-49.3%
Space Heating	26,333,528	22.0%	28,937,516	22.2%	7,995,828	11.9%	-69.6%	-72.4%
Water Heating	12,102,880	10.1%	15,109,045	11.6%	11,991,537	17.9%	-0.9%	-20.6%
Plug Load	2,317,607	1.9%	3,367,141	2.6%	2,618,609	3.9%	13.0%	-22.2%
Lighting	2,159,332	1.8%	2,640,426	2.0%	2,385,106	3.6%	10.5%	-9.7%
Space Cooling	1,501,792	1.3%	2,170,364	1.7%	1,842,710	2.8%	22.7%	-15.1%
Major Appliances	757,772	0.6%	1,181,495	0.9%	1,055,527	1.6%	39.3%	-10.7%
Total	**119,614,244**		**130,527,291**		**66,954,725**		**-44.0%**	**-48.7%**

BUILDINGS SECTOR: EMISSIONS

BUILDING EMISSIONS BY FUEL SOURCE

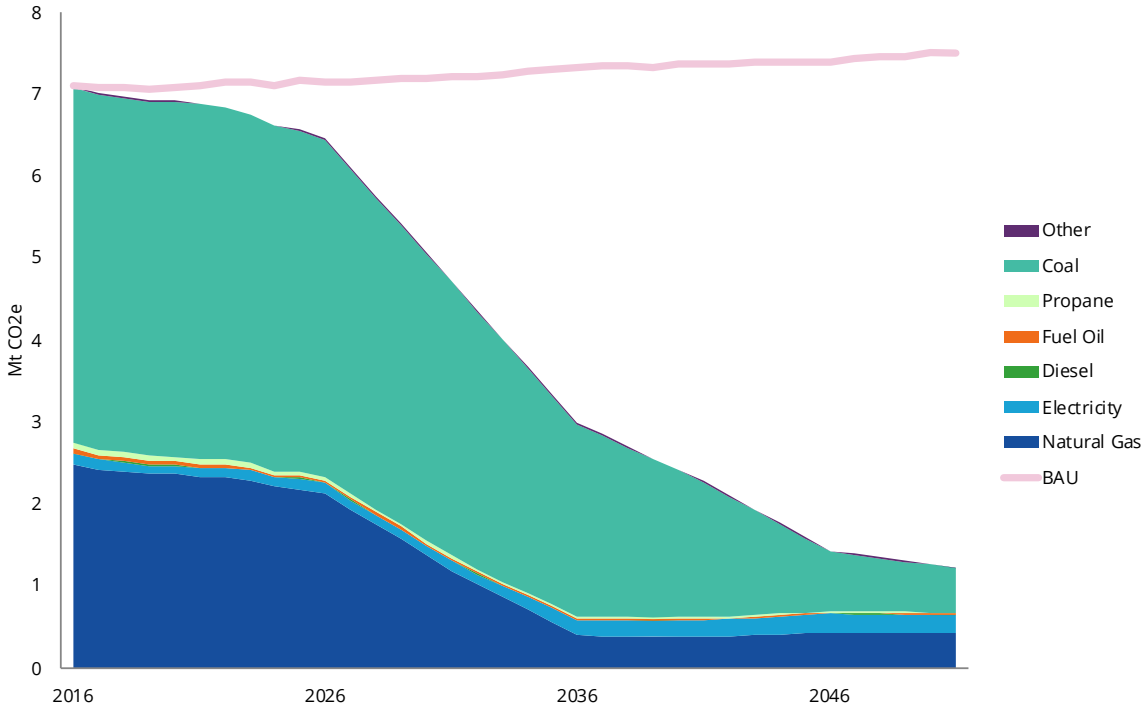


Figure 58. Projected LC building GHG emissions (MtCO2e) by source, Hamilton, 2016-2050.

BUILDING EMISSIONS BY END USE

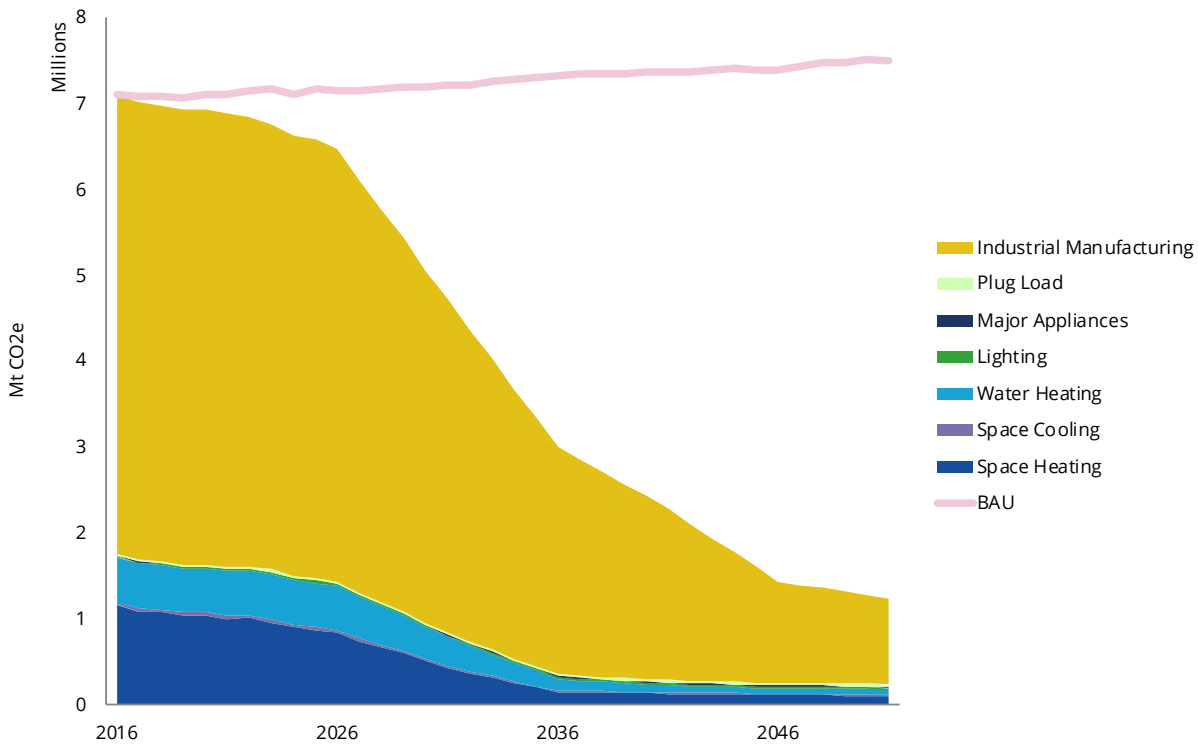


Figure 59. Projected LC building GHG emissions (MtCO2e) by end use, Hamilton, 2016-2050.

The shift away from carbon-intensive fuel sources, particularly coal and natural gas, results in GHG emissions reduction of 46% from the 2016 baseline. The reduction in overall consumption of energy through retrofits and Passive House standards for new residential and commercial buildings drives the reduction in non-industrial emissions, followed by the switch to low- and zero-emission fuel sources.

The switch to heat pumps for space heating, and solar for water heating result in a shift from a fossil fuel source to a low or zero GHG emissions source. These reductions are augmented by the decreased demand for energy as a result of more efficient buildings, as well as the reduction in GHG emissions from industrial manufacturing by fuel switching, and a decreased volume of steel produced.

BUILDING EMISSIONS BY BUILDING TYPE AND FUEL

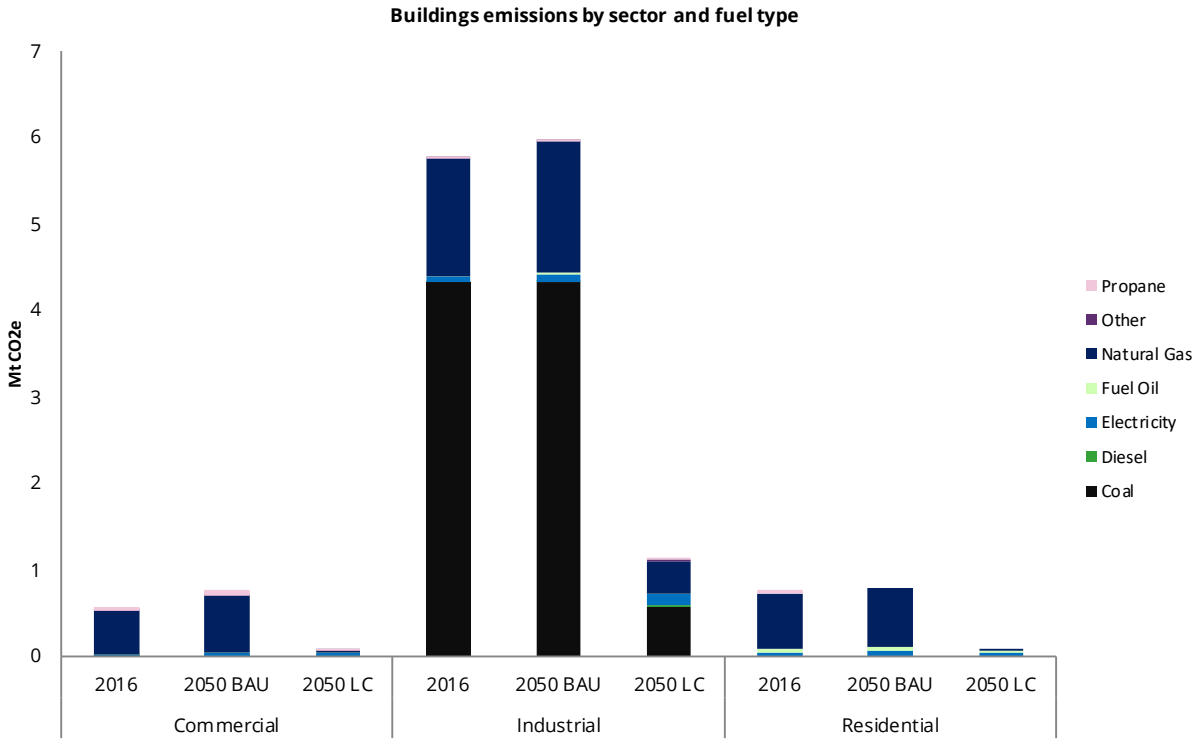


Figure 60. Projected building GHG emissions (MtCO2e) by building type and source, Hamilton.

BUILDING EMISSIONS BY BUILDING TYPE AND END USE

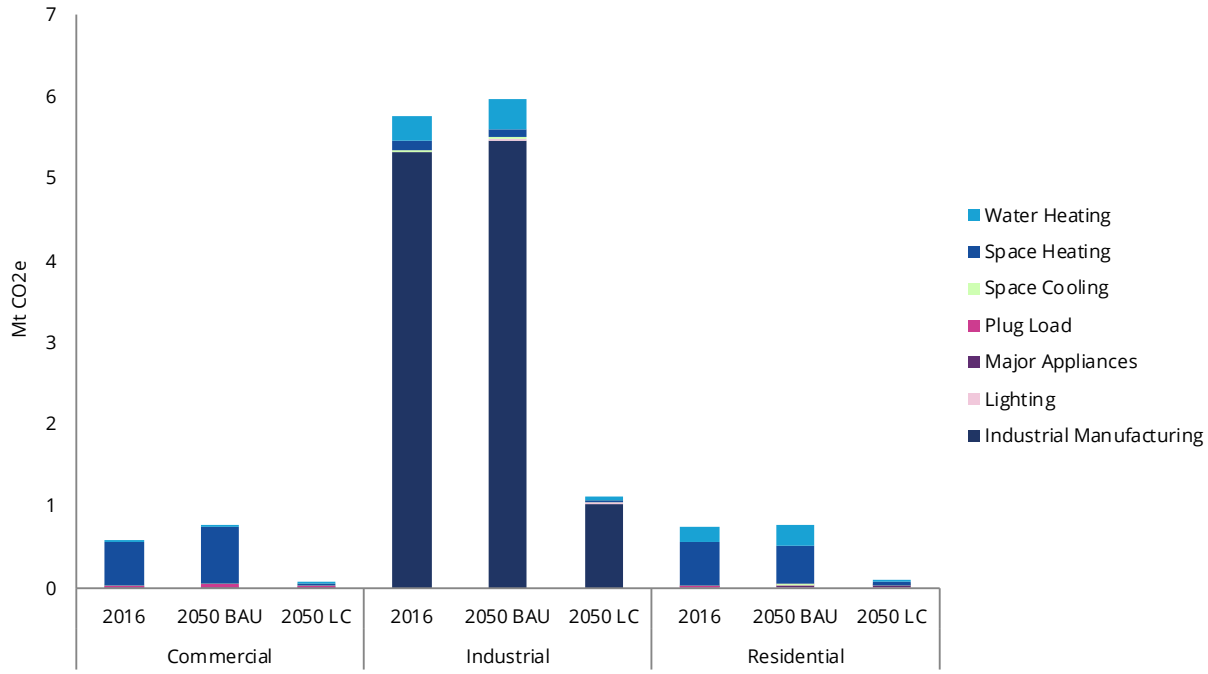


Figure 61. Projected building emissions (MtCO2e) by building type and end use, Hamilton.

In 2016, coal is the dominant source of GHG emissions in the buildings sector, which is reduced by 81% in the LC scenario. Natural gas is the primary fuel source for residential and commercial buildings. By switching to electricity and reducing overall consumption, GHG emissions are reduced by 88% in these sectors.

Total GHG emissions are reduced by 82% between the 2016 baseline, and the 2050 LC scenario.

Industrial manufacturing accounts for 75% of GHG emissions in 2016, and is reduced by 81% in the LC scenario.

Space heating and water heating are the primary non-industrial source of GHG emissions in 2016. By switching to heat pumps and solar hot water, and changing from natural gas to electricity as the primary fuel source, GHG emissions are reduced by 91% and 89% for space heating and water heating, respectively.

PER HOUSEHOLD EMISSIONS

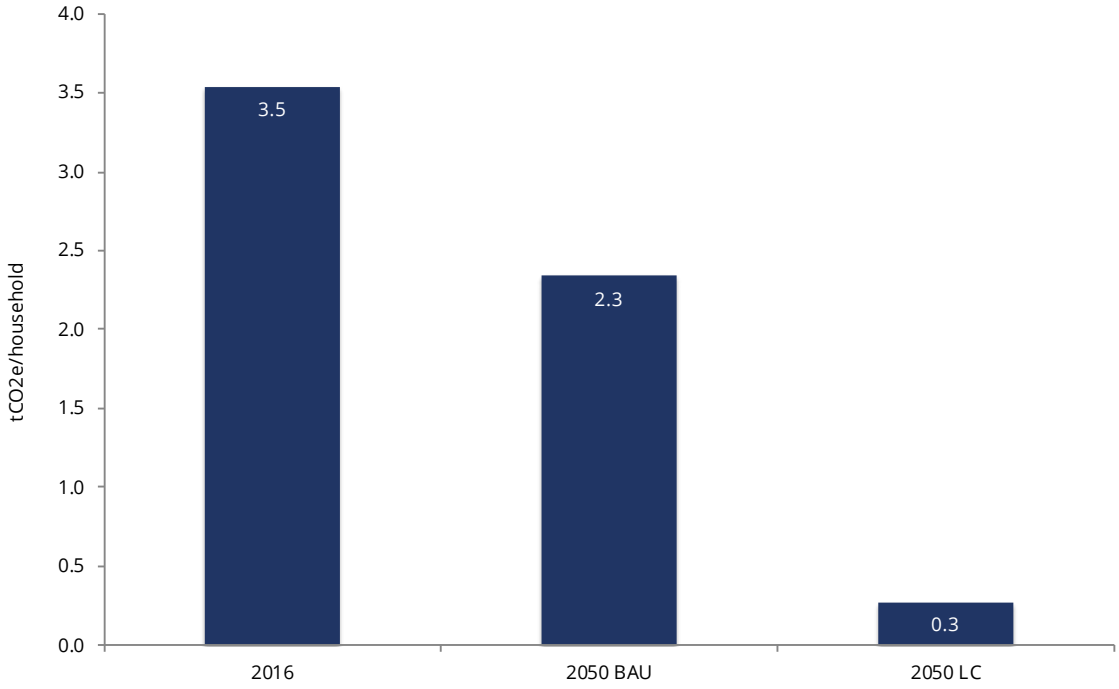


Figure 62. Projected residential emissions per household (tCO2e/household), Hamilton.

Residential GHG emissions decrease by 88% by 2050 in the LC scenario. These emissions savings are a result of retrofits to existing buildings to maximize energy efficiency, Passive House standards for new houses, use of energy efficient heating sources, and fuel switching away from fossil fuels.

Details of the buildings emissions results are shown in Table 12.

Table 12. Buildings sector emissions- Hamilton.

BUILDINGS EMISSIONS (tCO2e) BY BUILDING TYPE	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050LC
Industrial	5,762,966	81.2%	5,964,617	79.4%	1,119,659	87.7%	-80.6%	-81.2%
Residential	758,992	10.7%	782,054	10.4%	89,366	7.0%	-88.2%	-88.6%
Commercial	571,418	8.1%	761,112	10.1%	67,075	5.3%	-88.3%	-91.2%
Total	**7,093,376**		**7,507,783**		**1,276,100**		**-82.0%**	**-83.0%**
BUILDINGS EMISSIONS (tCO2e) BY FUEL	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/ 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Coal	4,323,437	61.0%	4,325,570	57.6%	581,460	45.6%	-86.6%	-86.6%
Natural Gas	2,483,632	35.0%	2,844,234	37.9%	429,588	33.7%	-82.7%	-84.9%
Electricity	133,017	1.9%	211,877	2.8%	223,599	17.5%	68.1%	5.5%
Propane	72,510	1.0%	63,744	0.8%	11,934	0.9%	-83.5%	-81.3%
Fuel Oil	60,602	0.9%	39,736	0.5%	14,146	1.1%	-76.7%	-64.4%
Other	15,716	0.2%	17,227	0.2%	11,742	0.9%	-25.3%	-31.8%
Diesel	4,463	0.1%	5,395	0.1%	3,633	0.3%	-18.6%	-32.7%
Total	**7,093,376**		**7,507,783**		**1,276,100**		**-82.0%**	**-83.0%**
BUILDINGS EMISSIONS (tCO2e) BY END USE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Industrial Manufacturing	5,332,512	75.2%	5,474,249	72.9%	1,033,250	81.0%	-80.6%	-81.1%
Space Heating	1,159,078	16.3%	1,267,244	16.9%	106,836	8.4%	-90.8%	-91.6%
Water Heating	515,916	7.3%	627,681	8.4%	57,445	4.5%	-88.9%	-90.8%
Space Cooling	32,074	0.5%	45,307	0.6%	14,990	1.2%	-53.3%	-66.9%
Plug Load	25,727	0.4%	45,872	0.6%	27,263	2.1%	6.0%	-40.6%
Lighting	18,273	0.3%	29,352	0.4%	20,883	1.6%	14.3%	-28.9%
Major Appliances	9,797	0.1%	18,078	0.2%	15,434	1.2%	57.5%	-14.6%
Total	**7,093,376**		**7,507,783**		**1,276,100**		**-82.0%**	**-83.0%**

TRANSPORTATION SECTOR ENERGY

TRANSPORTATION ENERGY BY FUEL

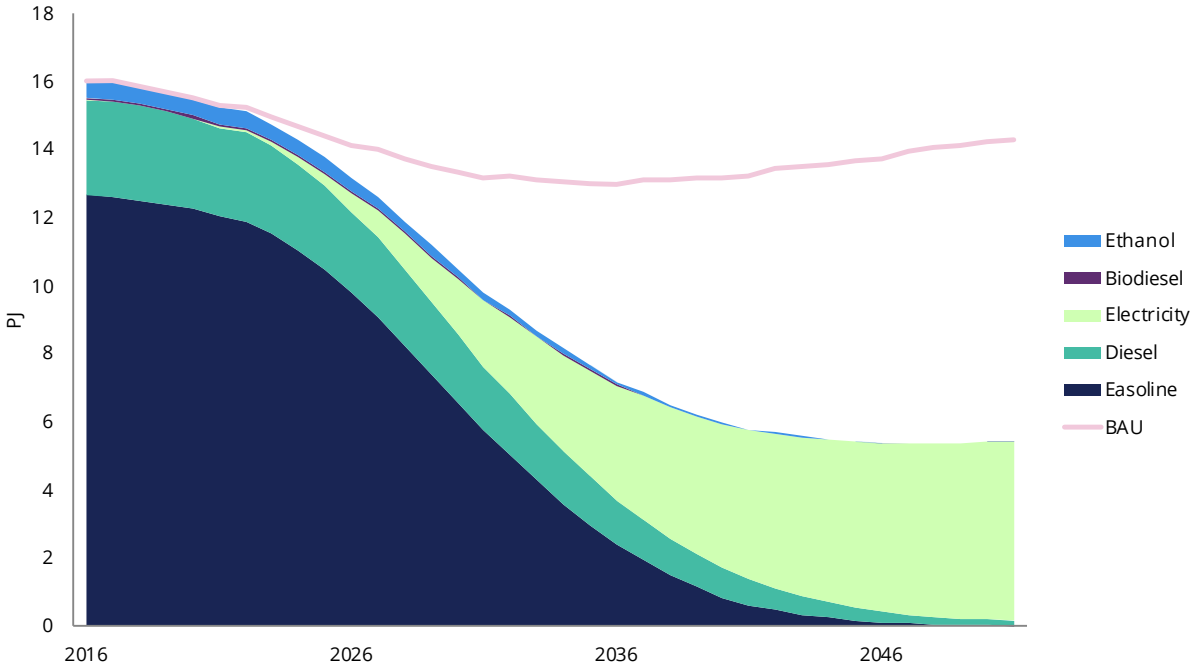


Figure 63. Projected LC transportation energy use (PJ) by fuel, Hamilton, 2016-2050.

TRANSPORTATION ENERGY BY VEHICLE TYPE

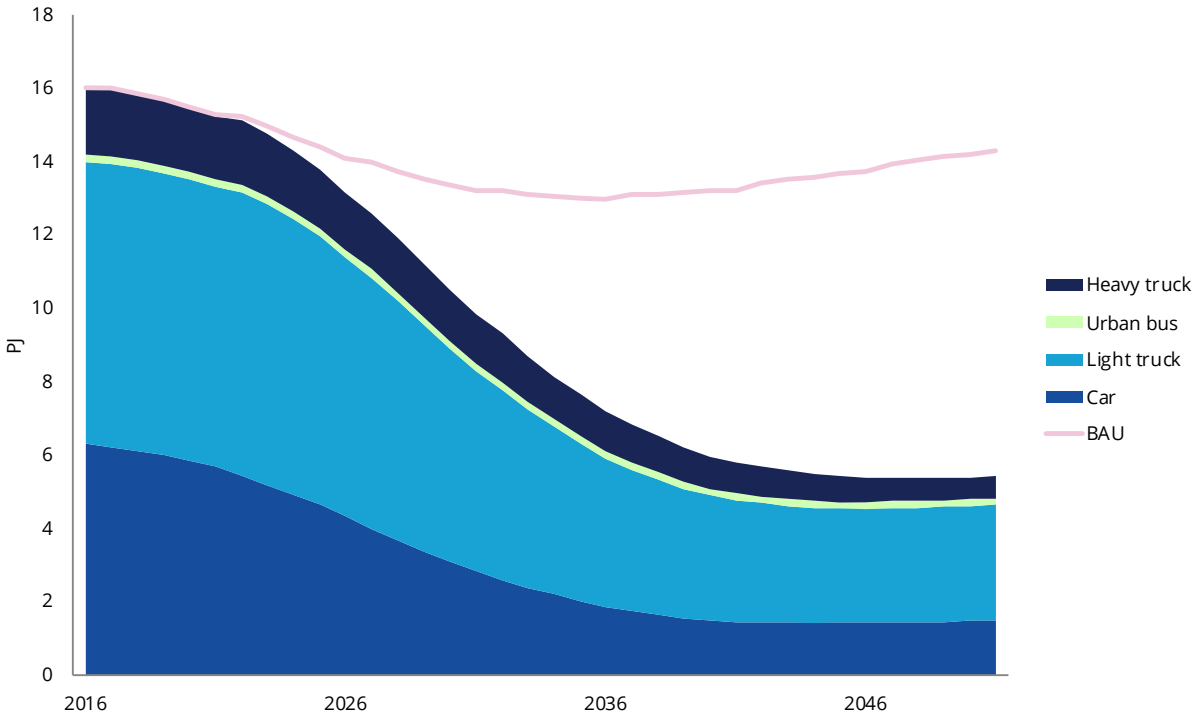


Figure 64. Projected LC transportation energy use (PJ) by vehicle type, Hamilton, 2016-2050.

Transportation energy consumption declines by 66% in 2050 in the LC scenario over the 2016 baseline, and by 62% in comparison with the 2050 BAU. Fossil fuels are entirely, or almost entirely, eliminated as a fuel source, and are replaced by electricity.

In addition to fuel switching, energy consumption is reduced by behavioural changes like mode-shifting to transit and active transportation.

Light trucks and cars represent the majority of the vehicle market in 2016, and market trends predict that light trucks will become dominant, representing 58% of the energy demand in 2050.

All vehicle classes become more efficient, which accounts for the decline in energy consumption in the BAU scenario, in spite of the growing population. This is also reflected in the reduced energy consumption in the LC scenario.

TRANSPORTATION ENERGY BY VEHICLE TYPE & FUEL

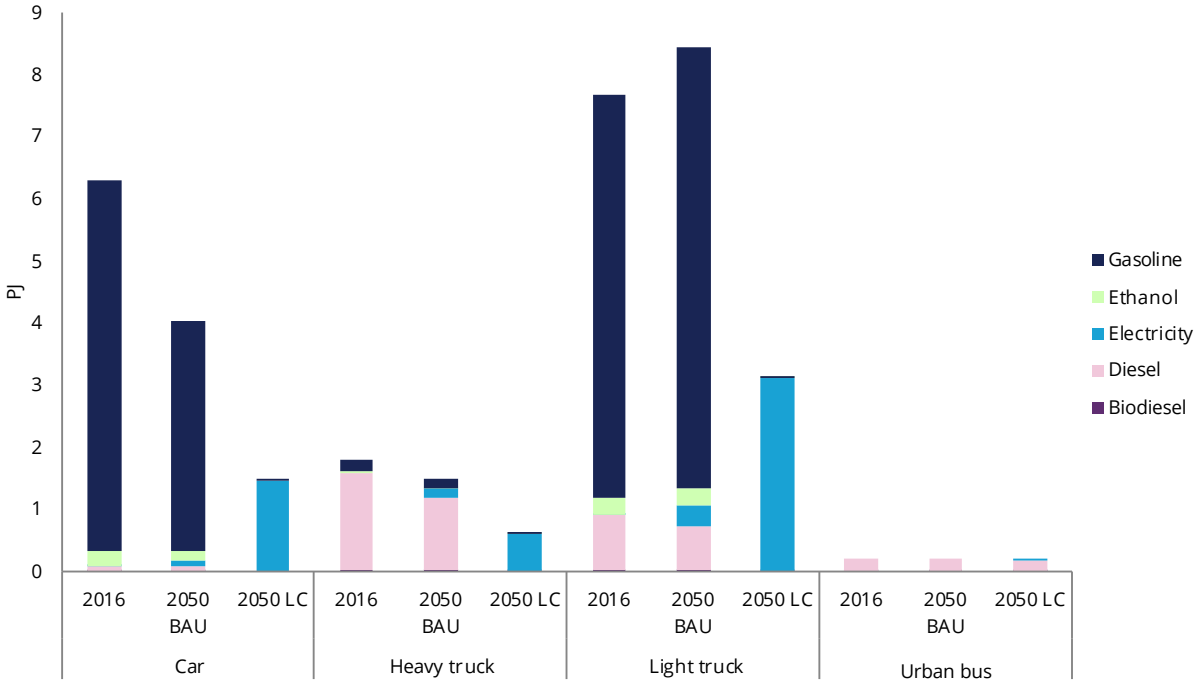


Figure 65. Projected transportation energy use (PJ) by vehicle type and fuel, Hamilton.

Cars and light trucks consume 87% of the transportation energy demand in 2016, and 85% of the energy demand in the LC scenario in 2050.

Table 13. Transportation sector energy - Hamilton

TRANSPORTATION ENERGY (GJ) BY FUEL	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/- 2016-2050 LC	% +/- 2050 BAU-2050LC
Gasoline	12,669,002	79.2%	10,947,703	77.1%	7,257	0.1%	-99.9%	-99.9%
Diesel	2,761,727	17.3%	2,140,594	15.1%	173,083	3.2%	-93.7%	-91.9%
Ethanol	508,923	3.2%	439,777	3.1%	291	0.0%	-99.9%	-99.9%
Biodiesel	63,996	0.4%	49,603	0.3%	4,011	0.1%	-93.7%	-91.9%
Electricity	274	0.0%	616,470	4.3%	5,212,606	96.6%	1905353.8%	745.6%
Total	**16,003,923**		**14,194,148**		**5,397,247**		**-66.3%**	**-62.0%**
TRANSPORTATION ENERGY (GJ) BY VEHICLE TYPE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/- 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Light truck	7,668,791	47.9%	8,441,118	59.5%	3,134,777	58.1%	-59.1%	-62.9%
Car	6,306,739	39.4%	4,045,665	28.5%	1,470,016	27.2%	-76.7%	-63.7%
Heavy truck	1,805,299	11.3%	1,484,272	10.5%	613,523	11.4%	-66.0%	-58.7%
Urban bus	223,094	1.4%	223,094	1.6%	178,932	3.3%	-19.8%	-19.8%
Total	**16,003,923**		**14,194,148**		**5,397,247**		**-66.3%**	**-62.0%**

TRANSPORTATION SECTOR EMISSIONS

TRANSPORTATION EMISSIONS BY SOURCE

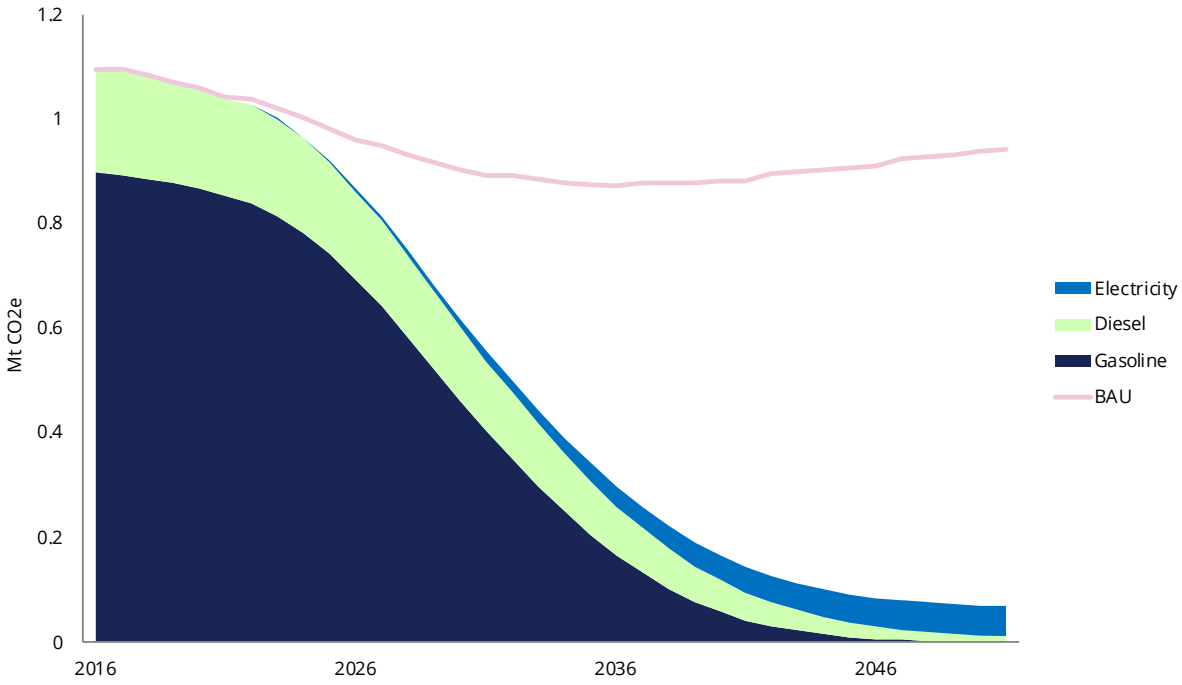


Figure 66. Projected LC transportation GHG emissions (MtCO2e) by source, Hamilton, 2016-2050.

TRANSPORTATION EMISSIONS BY VEHICLE TYPE

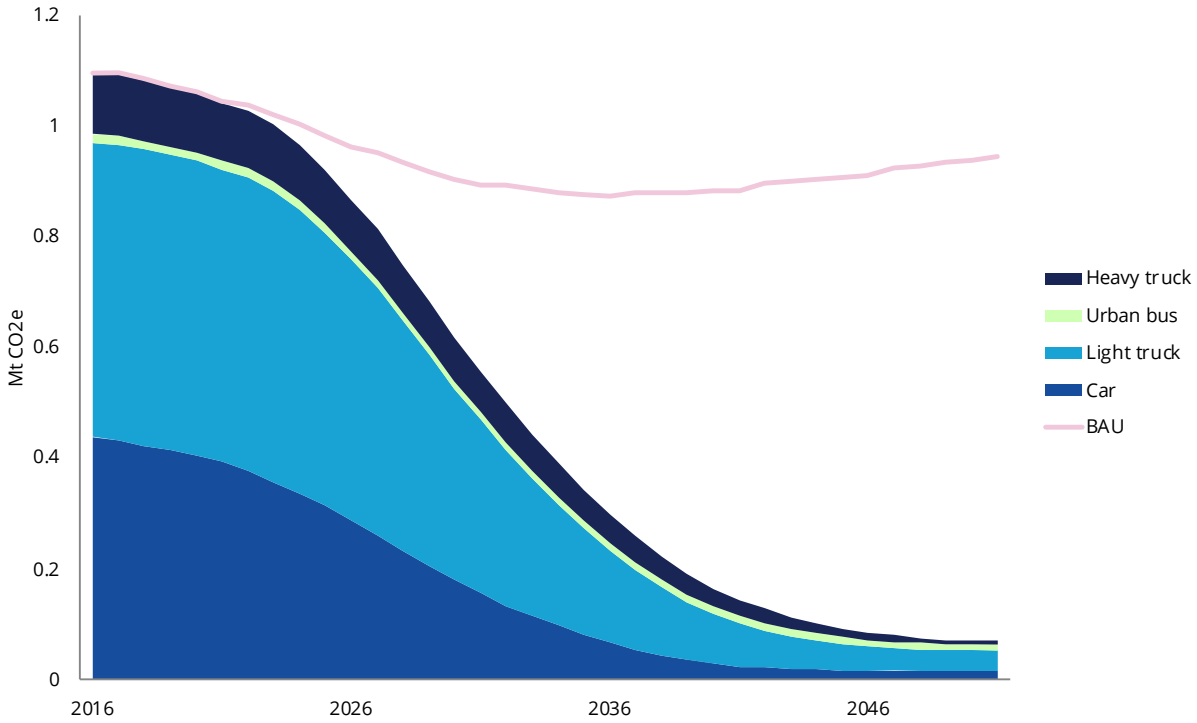


Figure 67. Projected LC transportation GHG emissions (MtCO2e) by vehicle type, Hamilton, 2016-2050.

GHG emissions from transportation are dominated by gasoline (82%), with lesser contributions from diesel (18%) in 2016. By switching to electric vehicles for all classes, GHG emissions are reduced by 94% in the LC scenario by 2050. While reduced vehicle use and increased transit and active transportation contribute to the reduction in GHG emissions, the elimination of carbon-intensive fuel sources is critical to achieving these levels of emissions reductions.

The market share of light trucks is projected to increase, representing 50% of the GHG emissions in 2050. GHG emissions fall from 531 ktCO2e from light trucks in 2016 to 35 ktCO2e in 2050 because of improved efficiency standards, and the uptake of electric vehicles by 2030.

Total GHG emissions from vehicles decrease by 94% between 2016 and 2050 in the LC scenario, a decrease of 93% from the BAU scenario.

TRANSPORTATION EMISSIONS BY SOURCE AND VEHICLE TYPE

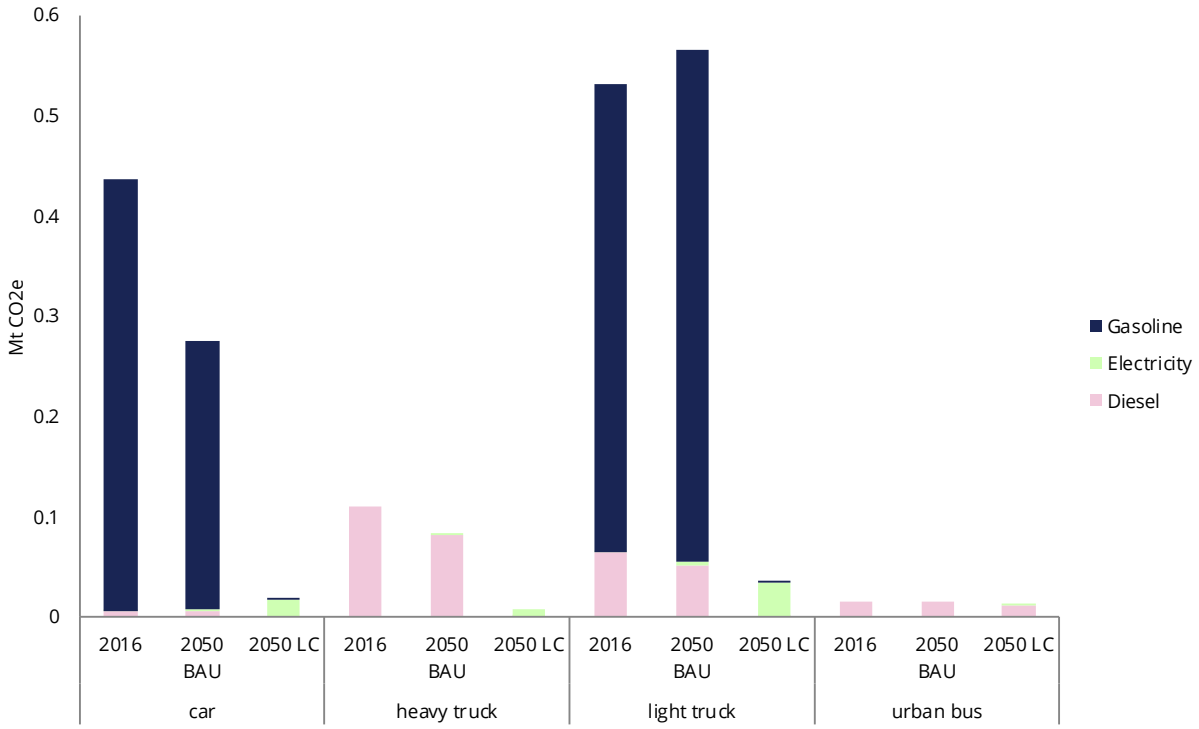


Figure 68. Projected transportation GHG emissions (MtCO2e) by source and vehicle type, Hamilton.

In 2016, cars and light trucks are the primary source of GHG emissions (88%), producing a combined 969 ktCO2e. While they are still the dominant source of GHG emissions (73%) by 2050 in the LC scenario, total emissions from cars and light trucks drops to 52 ktCO2e.

Table 14. Transportation sector emissions- Hamilton.

TRANSPORTATION EMISSIONS (tCO2e) BY FUEL	2016	SHARE 2016	2050 (BAU)	SHARE 2050	2050 (LC)	SHARE 2050	% +/ 2016-2050 LC	% +/- 2050 BAU-2050LC
Gasoline	898,352	82.0%	777,840	82.9%	454	0.6%	-99.9%	-99.9%
Diesel	196,991	18.0%	152,700	16.3%	12,292	17.4%	-93.8%	-91.9%
Electricity	3	0.0%	7,302	0.8%	57,845	81.9%	2,278,214.1%	692.1%
Total	**1,095,345**		**937,843**		**70,591**		**-93.6%**	**-92.5%**
TRANSPORTATION EMISSIONS (tCO2e) BY VEHICLE TYPE	**2016**	**SHARE 2016**	**2050 (BAU)**	**SHARE 2050**	**2050 (LC)**	**SHARE 2050**	**% +/ 2016-2050 LC**	**% +/- 2050 BAU-2050LC**
Light truck	531,787	48.5%	564,793	60.2%	35,426	50.2%	-93.3%	-93.7%
Car	437,236	39.9%	274,335	29.3%	16,314	23.1%	-96.3%	-94.1%
Heavy truck	110,842	10.1%	83,234	8.9%	7,230	10.2%	-93.5%	-91.3%
Urban bus	15,480	1.4%	15,480	1.7%	11,621	16.5%	-24.9%	-24.9%
Total	**1,095,345**		**937,843**		**70,591**		**-93.6%**	**-92.5%**

WASTE SECTOR EMISSIONS

WASTE EMISSIONS BY TYPE

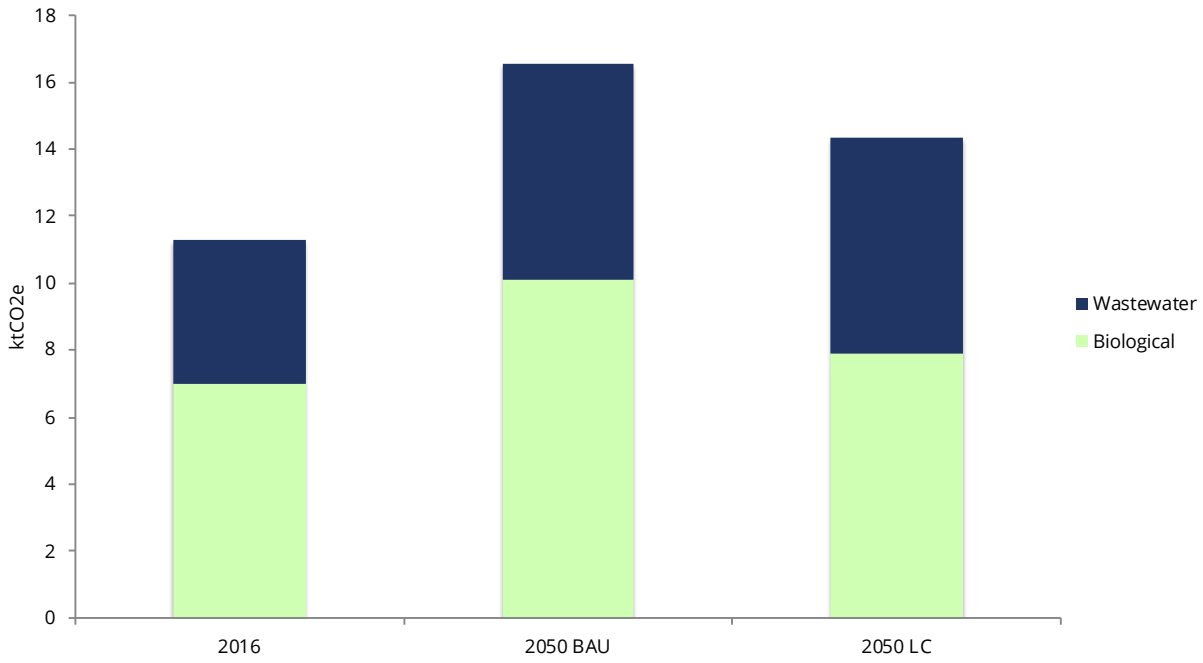


Figure 69. Projected waste emissions (tCO2e), Hamilton.

The LC scenario assumes that waste generation will decrease by 50% per capita by 2050, and that diversion rates will increase by 50% per capita in the same time period. Wastewater GHG emissions change little between the BAU and the LC scenarios. The reduction in GHG emissions in landfills is the result of increased capture of methane, as well as the reduction in per capita waste production.

ENERGY EXPENDITURES

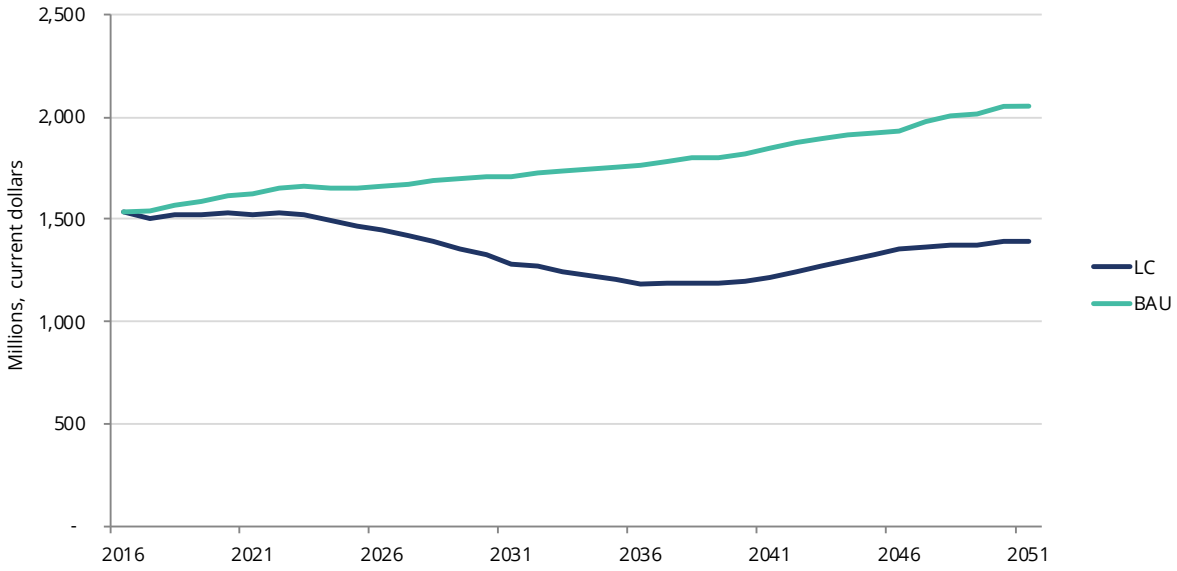


Figure 70. Total energy expenditures for BAU and LC, Hamilton, 2016-2050.

Total energy expenditures in Hamilton were $1.54 million in 2016, climbing to $2.05 billion in 2050 in the BAU scenario. The LC scenario results in annual energy expenditure savings of $650 million by 2050. Cumulative savings between 2018 and 2050 on energy expenditures are $14 billion. Figure 71 shows that the energy expenditures in Hamilton are roughly split between electricity and natural gas and as natural gas is phased out due to electrification of heating and transportation, expenditures on electricity double by 2050.

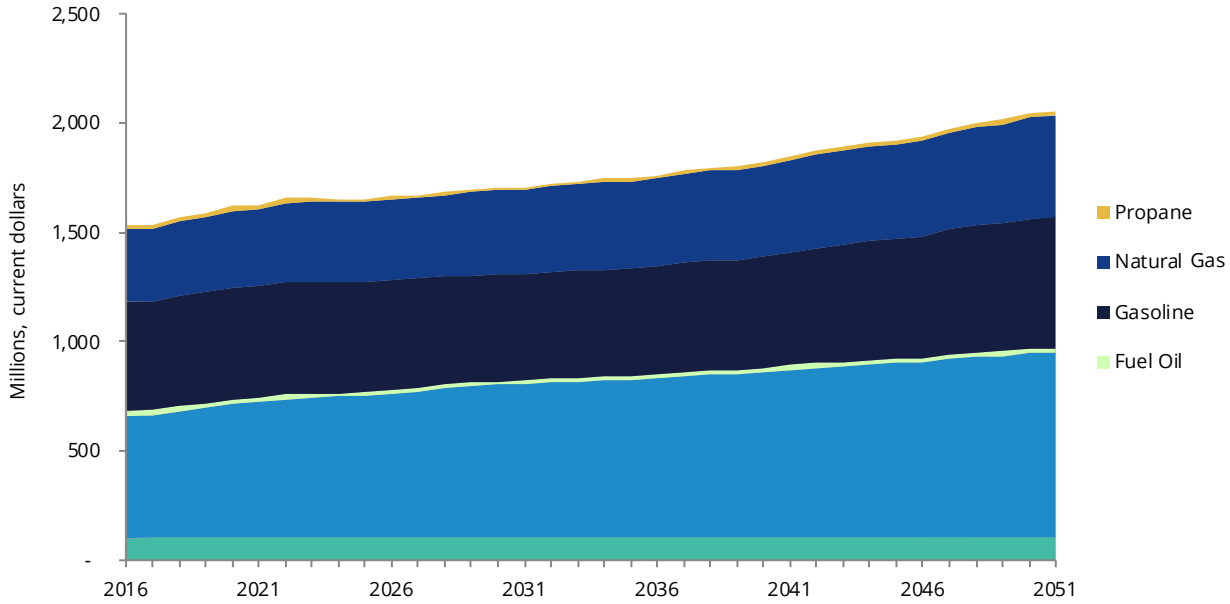


Figure 71. BAU energy costs by fuel type, Hamilton

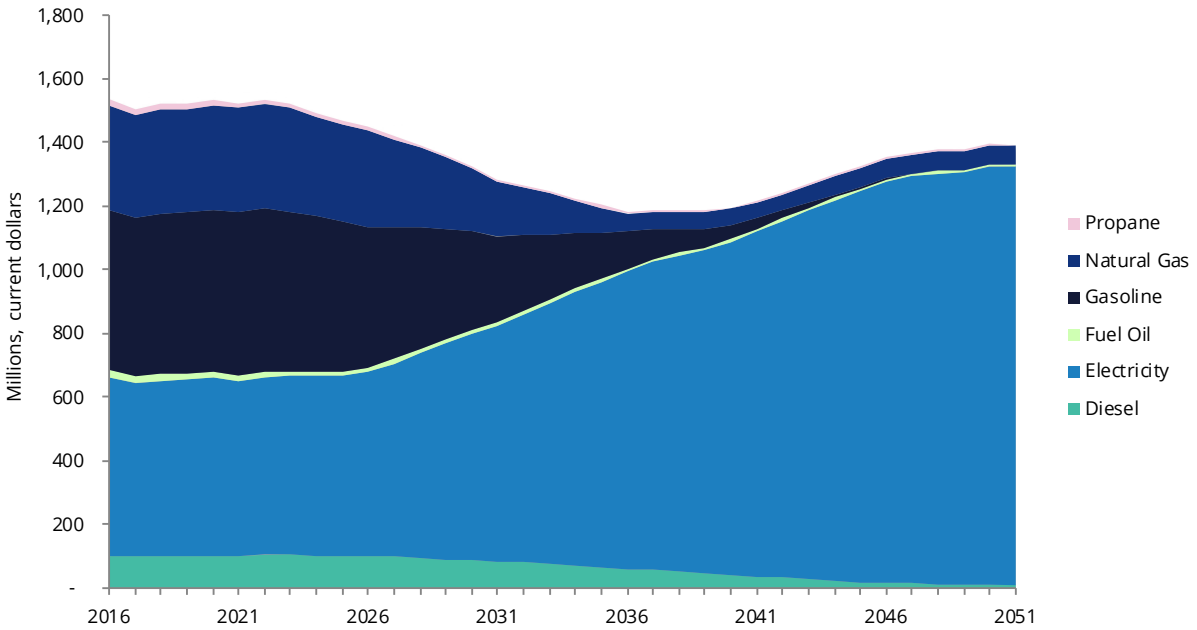


Figure 72. LC energy costs by fuel type, Hamilton.

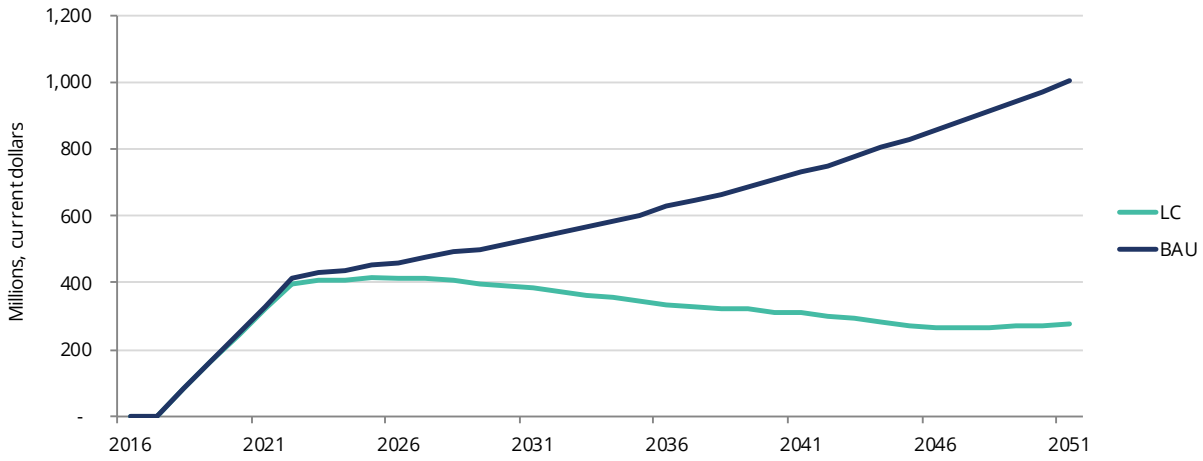


Figure 73. Total cost of carbon emissions. Hamilton, BAU vs LC.

The costs associated with the Federal carbon tax were also evaluated. In 2019, carbon tax expenditures total $164 million per year, climbing to $1 billion per year by 2050 in the BAU. In the low-carbon scenario, carbon tax expenditures fall to $277 million in 2050, a savings of $730 million. Cumulative savings between 2019 and 2050 are $9 billion between 2019 and 2050. Figures 74 and 75 illustrate the impact of the carbon tax on various sectors. Carbon tax expenditures are dominated by the industrial sector. In the low-carbon scenario, carbon tax expenditures in the industrial sector decline by more than half, and other sectors head towards zero.

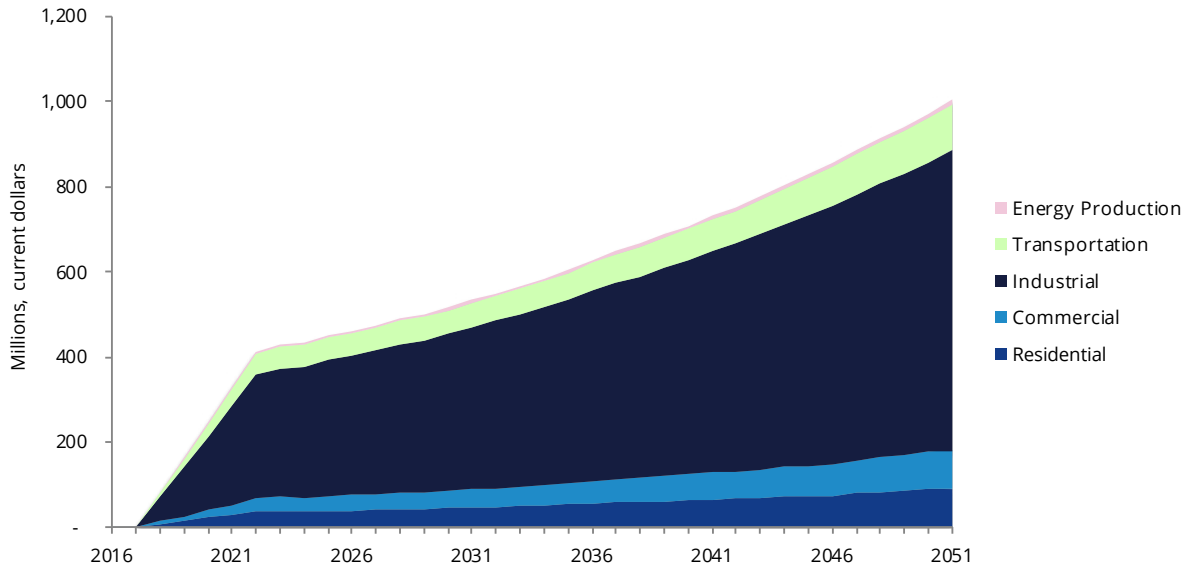


Figure 74. BAU emission costs by fuel type, Hamilton.

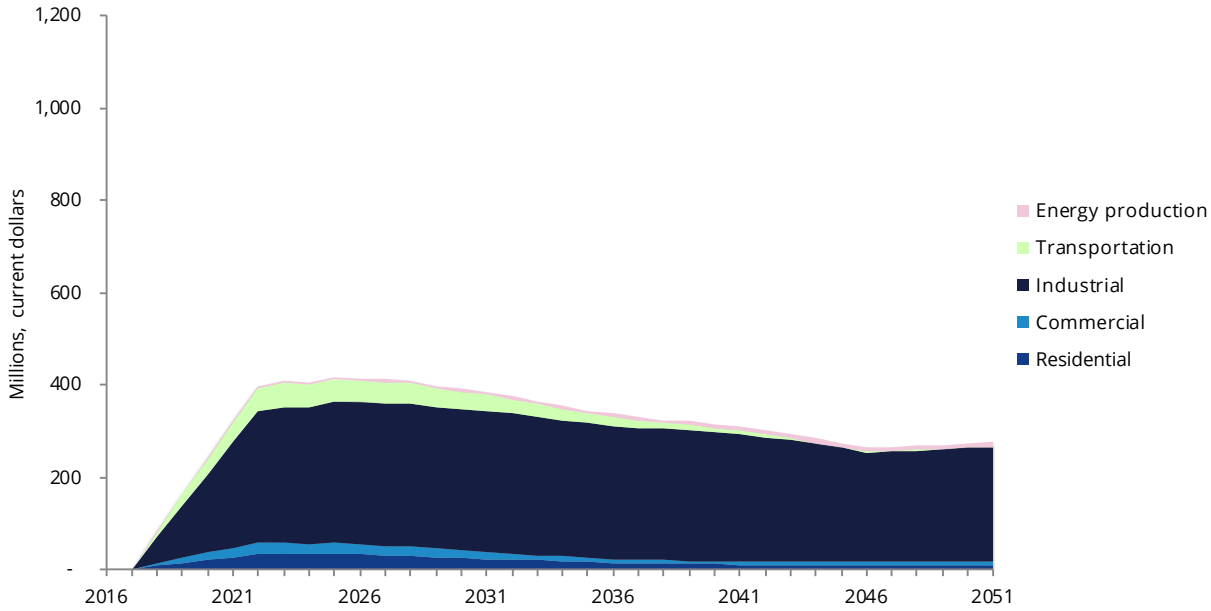


Figure 75. LC emission costs by fuel type, Hamilton.

PART 4: SHORT, MEDIUM AND LONG-TERM ACTION RECOMMENDATIONS

TARGETS

Targets for GHG emissions have been identified by decade out until 2050 for each of the cities and the Bay Area as a whole. GHG emissions targets by sectors can also be specified in order to align with the low-carbon scenario. In addition to the decadal targets, a carbon budget is also specified; a carbon budget represents the cumulative GHG emissions associated with the low-carbon pathway over the period from 2018 to 2050. The carbon budget, like a financial budget, is an envelope of GHG emissions from which the city subtracts its annual GHG emissions to identify whether or not the overall trajectory is on track. Additionally, a carbon budget allows the City or Bay Area to align with the global carbon budget, which seeks to limit warming to either 1.5° or 2°. The latest science indicates that in order to restrict warming to less than 2°, the global carbon budget is approximately 1,000 GtCO2, assuming a 66% degree of confidence.[6] Restricting GHG emissions to 1.5° implies an even more strict budget of 400 GtCO2.[7],[8]

The 2050 GHG target for the Bay Area is 1.6 MtCO2e, a significant drop over the 2016 total of 9.8 MtCO2e. The cumulative total, or carbon budget, between 2018 and 2050 is 176 MtCO2e.

6 Allen, M. R., Barros, V. R., Broome, J., Cramer, W., Christ, R., Church, J. A., ... & Edenhofer, O. (2014). IPCC fifth assessment synthesis report-climate change 2014 synthesis report.
7 Carbon countdown (2016). Carbon Brief. Analysis: Only five years left before 1.5C carbon budget is blown. Retrieved from: https://www.carbonbrief.org/analysis-only-five-years-left-before-one-point-five-c-budget-is-blown
8 Note that Hamilton and Burlington's targets have not been aligned with the global carbon budget as part of this project.

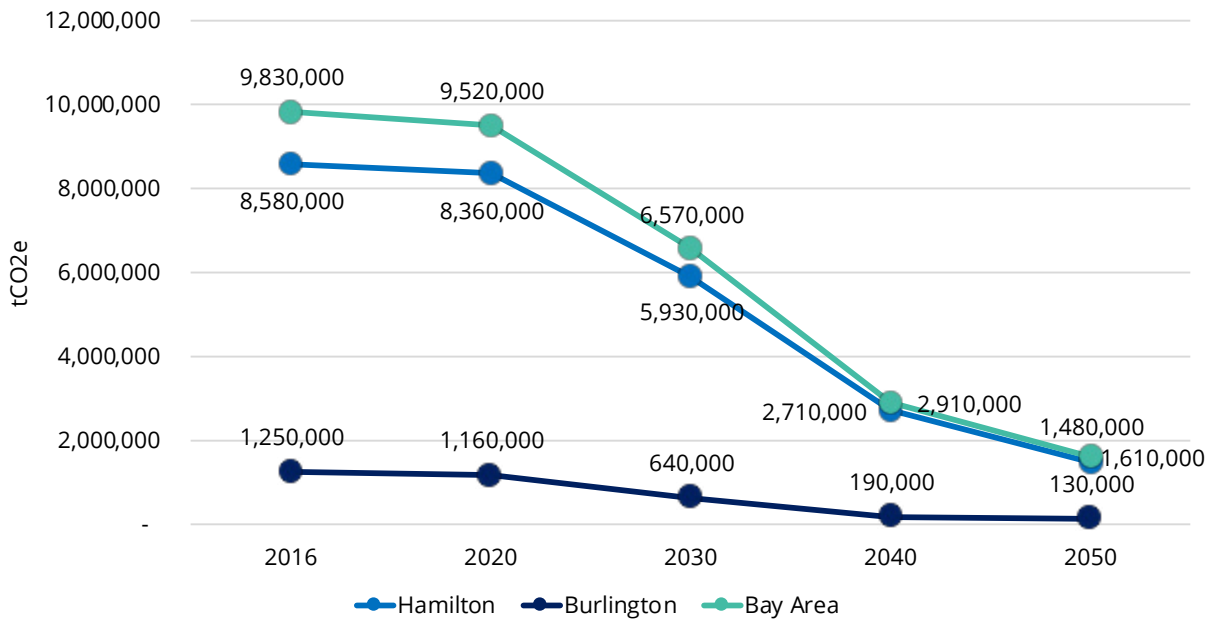


Figure 76. GHG targets for Hamilton, Burlington and the Bay Area.

CO-BENEFITS

In many cases, actions that reduce GHG emissions in cities correspond or directly overlap with actions that create a vibrant community, improve public health outcomes, reduce municipal operating and capital costs, and support innovation; these are no-regrets policies.[9] Actions that reduce GHGs are synergistic with a wide range of other public goods, and in fact, these actions can be justified from the perspective of any of a number of public goods. One review of more than a dozen studies on GHG mitigation policies found that the co-benefits of reduced air pollution—a single co-benefit—often equaled or exceeded the benefit of the GHG reduction itself.[10]

The transition to a low-carbon economy represents a massive economic opportunity. One analysis pegged the global economic opportunity of investments in low-carbon urban actions at $16.6 trillion[11]—the financial savings resulting from energy savings and lower cost generation in transportation, buildings and waste sectors. The value of energy savings is such that energy efficiency has been re-conceptualized as the "first fuel", in recognition that the energy use avoided by International Energy Agency countries was larger than any other supply-side resource including oil, gas, coal and electricity. In addition to seizing the economic opportunity, actions to reduce GHG

9 Kamal-Chaoui, L., & Robert, A. (2009). Competitive cities and climate change. Retrieved from http://www.oecd-ilibrary.org/governance/competitive-cities-and-climate-change_218830433146
10 OECD. (2000). Ancillary Benefits and Costs of Greenhouse Gas Mitigation. OECD Publishing.
11 Gouldson, A. P., Colenbrander, S., Sudmant, A., Godfrey, N., Millward-Hopkins, J., Fang, W., & Zhao, X. (2015). Accelerating low-carbon development in the world's cities. Retrieved from http://eprints.whiterose.ac.uk/90740/

emissions also support competitiveness and innovation, reduce municipal operating costs and capital costs and reduce household and business energy costs.

Table 15 describes the co-benefits associated with the low-carbon actions evaluated for the Bay Area.

Table 15. Co-benefits of low-carbon actions.

CO-BENEFITS/ CO-HARMS	IMPACT OVERVIEW	BUILDINGS	TRANSPORTATION	ENERGY	WASTE
Health					
Air quality	Improvement in air quality		Improved: reduced combustion of gasoline in vehicles	Improved: reduced natural gas combustion	Improved: some reduced emissions from waste treatment processes
Physical activity	Increased active transportation mode share		Improved: high increase in walking and cycling trips		
Decreasing noise	Decreased engine noise	Improved: insulation in buildings reduces exterior noise	Improved: decreased engine noise from combustion engines		
Increasing accessibility	Destinations are more accessible		Improved: dwellings are centred around transit corridors and hubs		
Improved buildings	Building quality is improved	Improved: indoor environments from retrofits		Improved: energy performance is enhanced	

ECONOMIC PROSPERITY

Co-benefits/ co-harms	Impact overview	Buildings	Transportation	Energy	Waste
Employment	New employment opportunities are created	Improved: new jobs will be created in retrofits and as a result of enhanced building codes	Improved: new jobs will be created in manufacturing EVs and other high tech sectors; jobs will be lost in maintenance. Jobs may also be lost as autonomous vehicles replace drivers of cabs and delivery vehicles and the overall vehicle fleet is smaller	Improved: new jobs will be created in supplying and installing and maintaining, solar PV, heat pumps, district energy	Improved: new jobs will be created in recycling and waste diversion
Household incomes	Energy costs for households decline	Improved: operations costs of buildings declines	Improved: household energy costs from transportation decline	Negative: Household energy costs decrease as a result of efficiency measures	
Economic development	Major new economic sectors emerge	Improved: new investment opportunities in retrofits	Improved: new investment opportunities in vehicle fleets	Improved: new investment opportunities in renewable energy and district energy	Improved: new investment opportunities waste diversion
Municipal finances	Municipal finances associated with existing services are more stable; New services are required	Unknown: conditional on the policies and mechanisms to support retrofits	Unknown: conditional on the policies and mechanisms to support EVs and mode shifts	Improved: opportunities to generate financial returns from renewable energy generation	Likely improved: solid waste management costs will decline and revenue will be generated from waste
Innovation	The Low-Carbon Scenario will stimulate innovation	Improved: scaled up approaches to renovations, retrofits and green building technology	Improved: electric vehicles and autonomous vehicles	Improved: mass deployment of renewable energy systems	Improved: waste diversion strategies
Reputation	The reputation of the City is enhanced	Improved: high performance buildings are constructed in the Bay Area	Improved: the area has an enhanced transit system	Improved: renewable energy and district energy increase exposure	Improved: reduced waste goes to landfill

ECONOMIC PROSPERITY					
Social capital	People interact more as a result of mixed-use development and increased walking and cycling		Improved: people interact more when walking or cycling		

EQUITY					
Co-benefits/ co-harms	Impact overview	Buildings	Transportation	Energy	Waste
Poverty	Household energy costs increase but the cost of transportation decreases	Improved: social housing is retrofit: operating costs of housing decline	Improved: cost of moving around the city declines due to enhanced walking, cycling and transit, and overall VKT declines	Negative: opportunities to participate in the renewable energy economy may be limited for those in poverty; district energy can provide secure and cost effective heating and cooling	
Elderly	Accessibility for the elderly increases. The built environment is healthier	Improved: buildings are healthier	Improved: walking and transit infrastructure is improved. Autonomous vehicles represent a new option for travel	Improved: air conditioning is widespread reducing the impacts of heat waves.	
Children	Accessibility for children increases. The built environment is healthier	Improved: buildings are healthier	Improved: walking and transit infrastructure is improved: autonomous vehicles represent a new option for travel		
Intergenerational equity	The burden on future generations is decreased. Stranded costs are avoided	Improved: damage from climate change is reduced	Improved: damage from climate change is reduced	Improved: damage from climate change is reduced: stranded costs are avoided	Improved: damage from climate change is reduced

PROGRAMS

The low-carbon scenario will require a major effort by the municipalities, businesses and other partners in the Bay Area. This effort will lead to dramatically reduced greenhouse gas emissions, lower energy costs for households and businesses, the creation of new businesses, reduced air pollution and improved quality of life.

Examples of programs that will support the implementation of the actions in low-carbon scenario are described in Table 17.

Table 16. Programs that support the low-carbon pathway.

THEME	PROGRAMS
Program #1: Low-carbon new buildings	Develop a program for new construction that parallels the Toronto Green Standard (TGS). TGS provides a clear pathway for significantly increasing the performance of new buildings and an incentive program offsets part or all of the incremental costs of increased performance. The Bay Area municipalities can build directly on the City of Toronto's experience, avoiding considerable start-up costs. In order to apply the TGS, municipalities need to have the necessary provisions in their Official Plans and site plan control by-laws. The TGS model does not apply to single family dwellings, so a new approach would be required for this component of the building stock.
Program #2: Deep retrofit program	The deep retrofits program is envisioned as a partnership with utilities, industry and higher education. Building on examples such as Toronto's Home Energy Loan Program (HELP), Bridgewater's PACE Clean Energy and Halifax's Solar City, a program can be developed using the PACE or LIC mechanism and combined with incentives from other levels of government and the utilities. Retrofits can be targeted to groups of buildings, such as neighbourhoods, sectors (restaurants, grocery stores, etc) as opposed to individual buildings to pool risk and develop larger, more sophisticated projects. Renewable energy including district energy, solar PV, energy storage and ground-source heat pumps can be included in the program.
Program #3: Renewable energy co-operative	In order to scale up local renewable energy generation, a new mechanism is required that includes municipalities, utilities and other partners; an economic development entity focussed on renewable energy. The cooperative model is appropriate structure to support the renewable energy targets evaluated in the low-carbon scenario. The co-operative can advocate for, develop, commission and finance projects, depending on which strategy is appropriate to a particular context. The co-operative can be technology agnostic, with a mandate to work on district energy, wind, solar, storage and geothermal. Financing will come from community bonds, loans and grants from various levels of government. A similar approach is being used by the GridSmartCity Cooperative, a joint effort of 12 electricity utilities.
Program #4: Electric vehicles joint venture	The municipalities can undertake on a joint strategy to support electric vehicles. The mandate will be to coordinate infrastructure investments, bulk purchases, educational activities, municipal policies relating to charging stations and incentives. The joint venture can be established as a technical working group with representatives from each of the relevant organisations.

THEME	PROGRAMS
Program #5: Education and outreach	In order to support the implementation of the low-carbon scenario broad based and targeted stakeholder education is critical. Aspects of the effort both educate and build capacity. Building on a similar program by the Town of Bridgewater, two specific components can include: Energy Partnership: A learning and action program for local businesses and organizations that encourages innovative energy solutions and increases the collective knowledge of energy sustainability. Energy Partners can hold bi-monthly workshops to learn about energy issues and how to address them in practical ways. Energy Laboratory: A project incubator for innovative energy projects that demonstrate practical approaches to achieving a local energy economy. A panel of judges will evaluate projects and award small grants to support and encourage innovation.

TIMELINE OF ACTIVITIES (2018-2020)

A sample timeline of activities is proposed over the next three years in order to launch the low-carbon scenario. This timeline is designed to achieve some quick wins in order to build momentum, to develop and articulate key mechanisms that will support implementation.

Table 17. Implementation timeline.

PROGRAMS	PROGRAM LAUNCH	PROGRAM DEVELOPMENT COST ESTIMATE (EXCL. STAFF TIME)	STAFF REQUIREMENTS	SHORT TERM TASKS
Program #1: Low-carbon new buildings	January, 2019	$200,000	0.5 FTE	Review of the TGS, legal review, OP update, bylaw development, development cost charge rebate structure
Program #2: Deep retrofit program	October 2019	$300,000	0.5 FTE	Financial analysis, risk evaluation, marketing design, program scoping.
Program #3: Renewable energy co-operative	December, 2019	$100,000	1 FTE	Legal structure, membership outreach, governance/bylaw development, project development.
Program #4: Electric vehicle joint venture	March, 2019	$75,000	No additional staff	Coordination; memorandum of understanding; infrastructure gaps and opportunities assessment

PROGRAMS	PROGRAM LAUNCH	PROGRAM DEVELOPMENT COST ESTIMATE (EXCL. STAFF TIME)	STAFF REQUIREMENTS	SHORT TERM TASKS
Program #5: Education and outreach	2018	$100,000	1 FTE	Webpage; branding; infographics; hiring of coordinator

REPORTING

Tracking the effectiveness of the actions in the low-carbon scenario contributes to managing the risk and uncertainty associated with these efforts, as well as external forces such as evolving senior government policy, and new technologies which can disrupt the energy system. Key motivations for monitoring and evaluation include the following:

- Identify unanticipated outcomes.
- Adjust programs and policies based on their effectiveness.
- Manage and adapt to the uncertainty of climate change.
- Manage and adapt to emerging technologies.

Specific activities which have been identified to support the implementation of the low-carbon scenario are described in Table 19.

Table 18. Monitoring and evaluation activities

ACTIVITY	PURPOSE	DESCRIPTION	FREQUENCY
Annual work plan and review	Review work to-date and set annual priority actions	Annual report with prioritized actions	Annual
Inventory	Update energy and GHG emissions profile	Re-calculate the GHG emissions and energy inventory	Every 2 years
Update the modelling	Update the modelling to reflect changing conditions	Review each action and the progress being achieved. Identify new actions.	Every 5 years

PART 5. EMISSIONS FACTORS

EMISSIONS FACTORS

CATEGORY	DESCRIPTION	COMMENT
Natural gas	49 kg CO2e/GJ	Environment and Climate Change Canada. National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Part 2. Tables A6-1 and A6-2, Emission Factors for Natural Gas.
Electricity	2016: CO2: 28.9 g/kWh CH4: 0.007 g/kWh N2O: 0.001 g/kWh 2050: CO2: 37.4 g/kWh CH4: 0.009 g/kWh N2O: 0.001 g/kWh	National Energy Board. (2016). Canada's Energy Future 2016. Government of Canada. Retrieved from https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/2016pt/nrgyftrs_rprt-2016-eng.pdf
Gasoline	g/L CO2: 2316 CH4: 0.32 N2O: 0.66	Environment and Climate Change Canada. National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Part 2. Table A6–12 Emission Factors for Energy Mobile Combustion Sources
Diesel	g/L CO2: 2690.00 CH4: 0.07 N2O: 0.21	Environment and Climate Change Canada. National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Part 2. Table A6–12 Emission Factors for Energy Mobile Combustion Sources

CATEGORY	DESCRIPTION	COMMENT
Fuel oil	Residential g/L CO2: 2560 CH4: 0.026 N2O: 0.006 Commercial g/L CO2: 2753 CH4: 0.026 N2O: 0.031 Industrial g/L CO2: 2753 CH4: 0.006 N2O: 0.031	Environment and Climate Change Canada. National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Part 2. Table A6–4 Emission Factors for Refined Petroleum Products
Propane	g/L Transport CO2: 1515.00 CH4: 0.64 N2O: 0.03 Residential CO2: 1515.00 CH4 : 0.027 N2O: 0.108 All other sectors CO2: 1515.00 CH4: 0.024 N2O: 0.108	Environment and Climate Change Canada. National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Part 2. Table A6–3 Emission Factors for Natural Gas Liquids Table A6–12 Emission Factors for Energy Mobile Combustion Sources
Coal	0.088 kg CO2e/MJ	Environment and Climate Change Canada. National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Part 2. Table A6–3 Emission Factors for Natural Gas Liquids
Waste	Landfill emissions are calculated from first order decay of degradable organic carbon deposited in landfill. Derived emission factor in 2016 = 0.015 kg CH4/tonne solid waste (assuming 70% recovery of landfill methane); 0.050 kg CH4/tonne solid waste not accounting for recovery.	Landfill emissions: IPCC Guidelines Vol 5. Ch 3, Equation 3.1

CATEGORY	DESCRIPTION	COMMENT
Wastewater	CH4: 0.48 kg CH4/kg BOD N2O: 3.2 g / (person * year) from advanced treatment 0.005 g /g N from wastewater discharge	CH4 wastewater: IPCC Guidelines Vol 5. Ch 6, Tables 6.2 and 6.3; MCF value for anaerobic digester N2O from advanced treatment: IPCC Guidelines Vol 5. Ch 6, Box 6.1 N2O from wastewater discharge: IPCC Guidelines Vol 5. Ch 6, Section 6.3.1.2

APPENDIX 1

CITY OF BURLINGTON GPC EMISSIONS SCOPE TABLE, 2016

GPC ref No.	Scope	GHG Emissions Source	Inclusion
I		STATIONARY ENERGY SOURCES	
I.1		Residential buildings	
I.1.1	1	Emissions from fuel combustion within the city boundary	Yes
I.1.2	2	Emissions from grid-supplied energy consumed within the city boundary	Yes
I.1.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	Yes
I.2		Commercial and institutional buildings/facilities	
I.2.1	1	Emissions from fuel combustion within the city boundary	Yes
I.2.2	2	Emissions from grid-supplied energy consumed within the city boundary	Yes
I.2.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	Yes
I.3		Manufacturing industry and construction	
I.3.1	1	Emissions from fuel combustion within the city boundary	Yes
I.3.2	2	Emissions from grid-supplied energy consumed within the city boundary	Yes
I.3.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	Yes
I.4		Energy industries	
I.4.1	1	Emissions from energy used in power plant auxiliary operations within the city boundary	No
I.4.2	2	Emissions from grid-supplied energy consumed in power plant auxiliary operations within the city boundary	No
I.4.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption in power plant auxiliary operations	No
I.4.4	1	Emissions from energy generation supplied to the grid	No
I.5		Agriculture, forestry and fishing activities	
I.5.1	1	Emissions from fuel combustion within the city boundary	No
I.5.2	2	Emissions from grid-supplied energy consumed within the city boundary	No
I.5.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	No

GPC ref No.	Scope	GHG Emissions Source	Inclusion
I.6		Non-specified sources	
I.6.1	1	Emissions from fuel combustion within the city boundary	No
I.6.2	2	Emissions from grid-supplied energy consumed within the city boundary	No
I.6.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	No
I.7		Fugitive emissions from mining, processing, storage, and transportation of coal	
I.7.1	1	Emissions from fugitive emissions within the city boundary	No
I.8		Fugitive emissions from oil and natural gas systems	
I.8.1	1	Emissions from fugitive emissions within the city boundary	Yes
II		TRANSPORTATION	
II.1		On-road transportation	
II.1.1	1	Emissions from fuel combustion for on-road transportation occurring within the city boundary	Yes
II.1.2	2	Emissions from grid-supplied energy consumed within the city boundary for on-road transportation	Yes
II.1.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	Yes
II.2		Railways	
II.2.1	1	Emissions from fuel combustion for railway transportation occurring within the city boundary	No
II.2.2	2	Emissions from grid-supplied energy consumed within the city boundary for railways	No
II.2.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	No
II.3		Water-borne navigation	
II.3.1	1	Emissions from fuel combustion for waterborne navigation occurring within the city boundary	No
II.3.2	2	Emissions from grid-supplied energy consumed within the city boundary for waterborne navigation	No
II.3.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	No
II.4		Aviation	
II.4.1	1	Emissions from fuel combustion for aviation occurring within the city boundary	No

GPC ref No.	Scope	GHG Emissions Source	Inclusion
II.4.2	2	Emissions from grid-supplied energy consumed within the city boundary for aviation	No
II.4.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	No
II.5		Off-road	
II.5.1	1	Emissions from fuel combustion for off-road transportation occurring within the city boundary	No
II.5.2	2	Emissions from grid-supplied energy consumed within the city boundary for off-road transportation	No
III		WASTE	
III.1		Solid waste disposal	
III.1.1	1	Emissions from solid waste generated within the city boundary and disposed in landfills or open dumps within the city boundary	Yes
III.1.2	3	Emissions from solid waste generated within the city boundary but disposed in landfills or open dumps outside the city boundary	Yes
III.1.3	1	Emissions from waste generated outside the city boundary and disposed in landfills or open dumps within the city boundary	No
III.2		Biological treatment of waste	
III.2.1	1	Emissions from solid waste generated within the city boundary that is treated biologically within the city boundary	Yes
III.2.2	3	Emissions from solid waste generated within the city boundary but treated biologically outside of the city boundary	No
III.2.3	1	Emissions from waste generated outside the city boundary but treated biologically within the city boundary	No
III.3		Incineration and open burning	
III.3.1	1	Emissions from solid waste generated and treated within the city boundary	No
III.3.2	3	Emissions from solid waste generated within the city boundary but treated outside of the city boundary	No
III.3.3	1	Emissions from waste generated outside the city boundary but treated within the city boundary	No
III.4		Wastewater treatment and discharge	
III.4.1	1	Emissions from wastewater generated and treated within the city boundary	Yes
III.4.2	3	Emissions from wastewater generated within the city boundary but treated outside of the city boundary	No

GPC ref No.	Scope	GHG Emissions Source	Inclusion
III.4.3	1	Emissions from wastewater generated outside the city boundary	No
IV		INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)	
IV.1	1	Emissions from industrial processes occurring within the city boundary	No
IV.2	1	Emissions from product use occurring within the city boundary	No
V		AGRICULTURE, FORESTRY AND LAND USE (AFOLU)	
V.1	1	Emissions from livestock within the city boundary	No
V.2	1	Emissions from land within the city boundary	No
V.3	1	Emissions from aggregate sources and non-CO2 emission sources on land within the city boundary	No
VI		OTHER SCOPE 3	
VI.1	3	Other Scope 3	No

CITY OF HAMILTON GPC EMISSIONS SCOPE TABLE, 2016

GPC ref No.	Scope	GHG Emissions Source	Inclusion
I		STATIONARY ENERGY SOURCES	
I.1		Residential buildings	
I.1.1	1	Emissions from fuel combustion within the city boundary	Yes
I.1.2	2	Emissions from grid-supplied energy consumed within the city boundary	Yes
I.1.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	Yes
I.2		Commercial and institutional buildings/facilities	
I.2.1	1	Emissions from fuel combustion within the city boundary	Yes
I.2.2	2	Emissions from grid-supplied energy consumed within the city boundary	Yes
I.2.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	Yes
I.3		Manufacturing industry and construction	
I.3.1	1	Emissions from fuel combustion within the city boundary	Yes
I.3.2	2	Emissions from grid-supplied energy consumed within the city boundary	Yes
I.3.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	Yes
I.4		Energy industries	
I.4.1	1	Emissions from energy used in power plant auxiliary operations within the city boundary	Yes
I.4.2	2	Emissions from grid-supplied energy consumed in power plant auxiliary operations within the city boundary	Yes
I.4.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption in power plant auxiliary operations	Yes
I.4.4	1	Emissions from energy generation supplied to the grid	No
I.5		Agriculture, forestry and fishing activities	
I.5.1	1	Emissions from fuel combustion within the city boundary	No
I.5.2	2	Emissions from grid-supplied energy consumed within the city boundary	No
I.5.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	No
I.6		Non-specified sources	
I.6.1	1	Emissions from fuel combustion within the city boundary	No
I.6.2	2	Emissions from grid-supplied energy consumed within the city boundary	No
I.6.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	No
I.7		Fugitive emissions from mining, processing, storage, and transportation of coal	

GPC ref No.	Scope	GHG Emissions Source	Inclusion
I.7.1	1	Emissions from fugitive emissions within the city boundary	No
I.8		Fugitive emissions from oil and natural gas systems	
I.8.1	1	Emissions from fugitive emissions within the city boundary	Yes
II		TRANSPORTATION	
II.1		On-road transportation	
II.1.1	1	Emissions from fuel combustion for on-road transportation occurring within the city boundary	Yes
II.1.2	2	Emissions from grid-supplied energy consumed within the city boundary for on-road transportation	Yes
II.1.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	Yes
II.2		Railways	
II.2.1	1	Emissions from fuel combustion for railway transportation occurring within the city boundary	No
II.2.2	2	Emissions from grid-supplied energy consumed within the city boundary for railways	No
II.2.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	No
II.3		Water-borne navigation	
II.3.1	1	Emissions from fuel combustion for waterborne navigation occurring within the city boundary	No
II.3.2	2	Emissions from grid-supplied energy consumed within the city boundary for waterborne navigation	No
II.3.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	No
II.4		Aviation	
II.4.1	1	Emissions from fuel combustion for aviation occurring within the city boundary	No
II.4.2	2	Emissions from grid-supplied energy consumed within the city boundary for aviation	No
II.4.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	No
II.5		Off-road	
II.5.1	1	Emissions from fuel combustion for off-road transportation occurring within the city boundary	No
II.5.2	2	Emissions from grid-supplied energy consumed within the city boundary for off-road transportation	No
III		WASTE	
III.1		Solid waste disposal	

GPC ref No.	Scope	GHG Emissions Source	Inclusion
III.1.1	1	Emissions from solid waste generated within the city boundary and disposed in landfills or open dumps within the city boundary	Yes
III.1.2	3	Emissions from solid waste generated within the city boundary but disposed in landfills or open dumps outside the city boundary	Yes
III.1.3	1	Emissions from waste generated outside the city boundary and disposed in landfills or open dumps within the city boundary	No
III.2		Biological treatment of waste	
III.2.1	1	Emissions from solid waste generated within the city boundary that is treated biologically within the city boundary	Yes
III.2.2	3	Emissions from solid waste generated within the city boundary but treated biologically outside of the city boundary	No
III.2.3	1	Emissions from waste generated outside the city boundary but treated biologically within the city boundary	No
III.3		Incineration and open burning	
III.3.1	1	Emissions from solid waste generated and treated within the city boundary	No
III.3.2	3	Emissions from solid waste generated within the city boundary but treated outside of the city boundary	No
III.3.3	1	Emissions from waste generated outside the city boundary but treated within the city boundary	No
III.4		Wastewater treatment and discharge	
III.4.1	1	Emissions from wastewater generated and treated within the city boundary	Yes
III.4.2	3	Emissions from wastewater generated within the city boundary but treated outside of the city boundary	No
III.4.3	1	Emissions from wastewater generated outside the city boundary	No
IV		INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)	
IV.1	1	Emissions from industrial processes occurring within the city boundary	No
IV.2	1	Emissions from product use occurring within the city boundary	No
V		AGRICULTURE, FORESTRY AND LAND USE (AFOLU)	
V.1	1	Emissions from livestock within the city boundary	No
V.2	1	Emissions from land within the city boundary	No
V.3	1	Emissions from aggregate sources and non-CO2 emission sources on land within the city boundary	No
VI		OTHER SCOPE 3	
VI.1	3	Other Scope 3	No

APPENDIX 2

CITY OF BURLINGTON GPC EMISSIONS REPORT, 2016

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
I		STATIONARY ENERGY SOURCES				
I.1		Residential buildings				
I.1.1	1	Emissions from fuel combustion within the city boundary	244,805	5	5	246,358
I.1.2	2	Emissions from grid-supplied energy consumed within the city boundary	20,094	5	1	20,4259
I.1.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	2,233	1		2,269
I.2		Commercial and institutional buildings/ facilities				
I.2.1	1	Emissions from fuel combustion within the city boundary	157,259	3	4	158,419
I.2.2	2	Emissions from grid-supplied energy consumed within the city boundary	9,664	2		9,823
I.2.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	1,074			1,091
I.3		Manufacturing industry and construction				
I.3.1	1	Emissions from fuel combustion within the city boundary	115,975	2	3	116,921
I.3.2	2	Emissions from grid-supplied energy consumed within the city boundary	19,247	4	1	19,564
I.3.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	2,139	1	0	2,174
I.4		Energy industries				
I.4.1	1	Emissions from energy used in power plant auxiliary operations within the city boundary				
I.4.2	2	Emissions from grid-supplied energy consumed in power plant auxiliary operations within the city boundary				

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
I.4.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption in power plant auxiliary operations				
I.4.4	1	Emissions from energy generation supplied to the grid				
I.5		Agriculture, forestry and fishing activities				
I.5.1	1	Emissions from fuel combustion within the city boundary				
I.5.2	2	Emissions from grid-supplied energy consumed within the city boundary				
I.5.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption				
I.6		Non-specified sources				
I.6.1	1	Emissions from fuel combustion within the city boundary				
I.6.2	2	Emissions from grid-supplied energy consumed within the city boundary				
I.6.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption				
I.7		Fugitive emissions from mining, processing, storage, and transportation of coal				
I.7.1	1	Emissions from fugitive emissions within the city boundary				
I.8		Fugitive emissions from oil and natural gas systems				
I.8.1	1	Emissions from fugitive emissions within the city boundary	13	1,701		57,835
II		TRANSPORTATION				
II.1		On-road transportation				
II.1.1	1	Emissions from fuel combustion for on-road transportation occurring within the city boundary	366,825	36	86	393,657
II.1.2	2	Emissions from grid-supplied energy consumed within the city boundary for on-road transportation	1			1
II.1.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	191,947	22	54	208,875

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
II.2		Railways				
II.2.1	1	Emissions from fuel combustion for railway transportation occurring within the city boundary				
II.2.2	2	Emissions from grid-supplied energy consumed within the city boundary for railways				
II.2.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption				
II.3		Water-borne navigation				
II.3.1	1	Emissions from fuel combustion for waterborne navigation occurring within the city boundary				
II.3.2	2	Emissions from grid-supplied energy consumed within the city boundary for waterborne navigation				
II.3.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption				
II.4		Aviation				
II.4.1	1	Emissions from fuel combustion for aviation occurring within the city boundary				
II.4.2	2	Emissions from grid-supplied energy consumed within the city boundary for aviation				
II.4.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption				
II.5		Off-road				
II.5.1	1	Emissions from fuel combustion for off-road transportation occurring within the city boundary				
II.5.2	2	Emissions from grid-supplied energy consumed within the city boundary for off-road transportation				
III		WASTE				
III.1		Solid waste disposal				

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
III.1.1	1	Emissions from solid waste generated within the city boundary and disposed in landfills or open dumps within the city boundary				
III.1.2	3	Emissions from solid waste generated within the city boundary but disposed in landfills or open dumps outside the city boundary		196		6,679
III.1.3	1	Emissions from waste generated outside the city boundary and disposed in landfills or open dumps within the city boundary				
III.2		Biological treatment of waste				
III.2.1	1	Emissions from solid waste generated within the city boundary that is treated biologically within the city boundary		66	5	3,698
III.2.2	3	Emissions from solid waste generated within the city boundary but treated biologically outside of the city boundary				
III.2.3	1	Emissions from waste generated outside the city boundary but treated biologically within the city boundary				
III.3		Incineration and open burning				
III.3.1	1	Emissions from solid waste generated and treated within the city boundary				
III.3.2	3	Emissions from solid waste generated within the city boundary but treated outside of the city boundary				
III.3.3	1	Emissions from waste generated outside the city boundary but treated within the city boundary				
III.4		Wastewater treatment and discharge				
III.4.1	1	Emissions from wastewater generated and treated within the city boundary			1	329
III.4.2	3	Emissions from wastewater generated within the city boundary but treated outside of the city boundary				
III.4.3	1	Emissions from wastewater generated outside the city boundary				
IV		INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)				
IV.1	1	Emissions from industrial processes occurring within the city boundary				
IV.2	1	Emissions from product use occurring within the city boundary				

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
V		AGRICULTURE, FORESTRY AND LAND USE (AFOLU)				
V.1	1	Emissions from livestock within the city boundary				
V.2	1	Emissions from land within the city boundary				
V.3	1	Emissions from aggregate sources and non-CO2 emission sources on land within the city boundary				
VI		OTHER SCOPE 3				
VI.1	3	Other Scope 3				

CITY OF HAMILTON GPC EMISSIONS REPORT, 2016

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
I		STATIONARY ENERGY SOURCES				
I.1		Residential buildings				
I.1.1	1	Emissions from fuel combustion within the city boundary	703,511	13	13	707,971
I.1.2	2	Emissions from grid-supplied energy consumed within the city boundary	37,1241	9	1	37,735
I.1.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	4,125	1	0	4,193
I.2		Commercial and institutional buildings/facilities				
I.2.1	1	Emissions from fuel combustion within the city boundary	542,244	10	12	546,3071
I.2.2	2	Emissions from grid-supplied energy consumed within the city boundary	18,271	4	1	18,571
I.2.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	2,030	0	0	2,063
I.3		Manufacturing industry and construction				
I.3.1	1	Emissions from fuel combustion within the city boundary	5,643,734	136	97	5,677,230
I.3.2	2	Emissions from grid-supplied energy consumed within the city boundary	62,382	14	2	36,409
I.3.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	6,931	2	2	7,045
I.4		Energy industries				
I.4.1	1	Emissions from energy used in power plant auxiliary operations within the city boundary	90,370	2	2	90,901
I.4.2	2	Emissions from grid-supplied energy consumed in power plant auxiliary operations within the city boundary	95	0	0	60

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
I.4.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption in power plant auxiliary operations	7	0	0	7
I.4.4	1	Emissions from energy generation supplied to the grid				
I.5		Agriculture, forestry and fishing activities				
I.5.1	1	Emissions from fuel combustion within the city boundary				
I.5.2	2	Emissions from grid-supplied energy consumed within the city boundary				
I.5.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption				
I.6		Non-specified sources				
I.6.1	1	Emissions from fuel combustion within the city boundary				
I.6.2	2	Emissions from grid-supplied energy consumed within the city boundary				
I.6.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption				
I.7		Fugitive emissions from mining, processing, storage, and transportation of coal				
I.7.1	1	Emissions from fugitive emissions within the city boundary				
I.8		Fugitive emissions from oil and natural gas systems				
I.8.1	1	Emissions from fugitive emissions within the city boundary	69	9,287	0	315,811
II		TRANSPORTATION				
II.1		On-road transportation				
II.1.1	1	Emissions from fuel combustion for on-road transportation occurring within the city boundary	777,077	78	176	832,079
II.1.2	2	Emissions from grid-supplied energy consumed within the city boundary for on-road transportation	2			2

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
II.1.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption	242,919	28	69	264,349
II.2		Railways				
II.2.1	1	Emissions from fuel combustion for railway transportation occurring within the city boundary				
II.2.2	2	Emissions from grid-supplied energy consumed within the city boundary for railways				
II.2.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption				
II.3		Water-borne navigation				
II.3.1	1	Emissions from fuel combustion for waterborne navigation occurring within the city boundary				
II.3.2	2	Emissions from grid-supplied energy consumed within the city boundary for waterborne navigation				
II.3.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption				
II.4		Aviation				
II.4.1	1	Emissions from fuel combustion for aviation occurring within the city boundary				
II.4.2	2	Emissions from grid-supplied energy consumed within the city boundary for aviation				
II.4.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmission and distribution losses from grid-supplied energy consumption				
II.5		Off-road				

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
II.5.1	1	Emissions from fuel combustion for off-road transportation occurring within the city boundary				
II.5.2	2	Emissions from grid-supplied energy consumed within the city boundary for off-road transportation				
III		WASTE				
III.1		Solid waste disposal				
III.1.1	1	Emissions from solid waste generated within the city boundary and disposed in landfills or open dumps within the city boundary				
III.1.2	3	Emissions from solid waste generated within the city boundary but disposed in landfills or open dumps outside the city boundary				
III.1.3	1	Emissions from waste generated outside the city boundary and disposed in landfills or open dumps within the city boundary				
III.2		Biological treatment of waste				
III.2.1	1	Emissions from solid waste generated within the city boundary that is treated biologically within the city boundary		124	9	7,005
III.2.2	3	Emissions from solid waste generated within the city boundary but treated biologically outside of the city boundary				
III.2.3	1	Emissions from waste generated outside the city boundary but treated biologically within the city boundary				
III.3		Incineration and open burning				
III.3.1	1	Emissions from solid waste generated and treated within the city boundary				
III.3.2	3	Emissions from solid waste generated within the city boundary but treated outside of the city boundary				
III.3.3	1	Emissions from waste generated outside the city boundary but treated within the city boundary				

			in tonnes			
GPC ref No.	Scope	GHG Emissions Source	CO2	CH4	N2O	Total CO2e
III.4		Wastewater treatment and discharge				
III.4.1	1	Emissions from wastewater generated and treated within the city boundary			14	4,260
III.4.2	3	Emissions from wastewater generated within the city boundary but treated outside of the city boundary				
III.4.3	1	Emissions from wastewater generated outside the city boundary				
IV		INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)				
IV.1	1	Emissions from industrial processes occurring within the city boundary				
IV.2	1	Emissions from product use occurring within the city boundary				
V		AGRICULTURE, FORESTRY AND LAND USE (AFOLU)				
V.1	1	Emissions from livestock within the city boundary				
V.2	1	Emissions from land within the city boundary				
V.3	1	Emissions from aggregate sources and non-CO2 emission sources on land within the city boundary				
VI		OTHER SCOPE 3				
VI.1	3	Other Scope 3				

September 2018

Bay Area Climate Change Office Engagement

Recommendations Report

LURA CONSULTING
PREPARED FOR THE CENTRE FOR CLIMATE CHANGE MANAGEMENT AT MOHAWK COLLEGE

TABLE OF CONTENTS

This project is funded in part by proceeds from the Government of Ontario's carbon market, as part of Ontario's Climate Change Action Plan. The action plan and carbon market work together to support innovative initiatives that provide residents and businesses with more choices to reduce greenhouse gas pollution and save money.

The project team would like to thank all the stakeholders and members of the public who contributed to this engagement project and the Bay Area Climate Change Office.

This report was prepared by Lura Consulting, the independent facilitator and engagement specialist for the Bay Area Climate Change Office. If you have any questions or comments regarding this report, please contact:

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Executive Summary

Mohawk College has partnered with the City of Burlington and the City of Hamilton to launch and develop the Centre for Climate Change Management (CCCM). The CCCM leverages resources, partnerships, reputations, and experience to coordinate regional efforts to mitigate climate change through emissions reductions, position the Bay Area for success in the low-carbon economy, and develop and share best practices province-wide. The purpose of this project to establish one branch of the CCCM – **the Bay Area Climate Change Office (BACCO)**. Lura Consulting was hired to undertake a comprehensive engagement process to develop and launch BACCO, including defining its governance and implementation structure. Approximately 895 individuals were engaged including key stakeholders and members of the general public.

Engagement Tactic	Date	Number Engaged
Climate Change Forum	March 7 – 8, 2018	170
Online Engagement	March – May 2018	485
Pop-Up Events	April – May 2018	119 engaged, 501 reached
Stakeholder Interviews	April – May 2018	32 organizations (43 individuals)
Stakeholder Workshop	June 1, 2018	44 participants (31 organizations)
Public Meeting	June 27, 2018	34 participants
Total Individuals Engaged		**895**

Stakeholders and members of the public provided advice on the project and BACCO itself. Advice was categorized into five key themes, outlined below:

- **Setting goals and actions:** A mix of long and short-term goals should be established for BACCO, which are specific and measurable, and have associated metrics, targets, and deliverables. Actions for achieving these goals should be clear and results-focused. There should be prioritization of actions, with a large focus on reaching the implementation stage and achieving the highest return on investment.
- **Implementation:** Roles, responsibilities and resource commitments should be clearly defined. Budget was seen as a limiting factor; BACCO will require sufficient, sustainable funding. Existing climate action should be coordinated rather than duplicated.
- **Community engagement and communications:** Regular communication is important to maintain awareness, transparency and accountability. Engagement should be inclusive and include a diverse range of stakeholders. The goal of communications should be education to increase public understanding of climate change and how it impacts them. Participants suggested using diverse messaging, connecting climate change to other social and economic issues, and targeting different audiences appropriately.
- **Collaboration:** Stakeholders stressed the importance of teamwork and cooperation. BACCO should incorporate a multitude of opinions, respect conflicting ideas, and find compromise.
- **Organizational structure:** Representation from multiple sectors was seen as important. Participants discussed three key components of BACCO's structure: an overarching group to set the direction of BACCO; multiple groups responsible for the implementation of climate actions; and, a neutral coordinating body to facilitate operations.

This report provides recommendations for the structure (Section 3.1), membership (Section 3.2), and terms of reference (Section 3.3.) for BACCO, based on engagement results.

1. Introduction

1.1. Project Overview and Purpose

Mohawk College has partnered with the City of Burlington and the City of Hamilton to launch and develop the Centre for Climate Change Management (CCCM). The CCCM is a regional response to shared goals around climate action. Each of the three partners is looking to operationalize their climate and energy-related plans and continue progress and momentum through collaboration with each other and with Bay Area stakeholders. The input received and priorities identified through community engagement will allow both cities to further the efforts and implementation of their respective plans. The CCCM leverages resources, partnerships, reputations, and experience to coordinate regional efforts to mitigate climate change through emissions reductions and adapt to the impacts of climate change, position the Bay Area for success in the low-carbon economy, and develop and share best practices province-wide.

The purpose of this project was to work with Mohawk College, the City of Burlington, and the City of Hamilton to establish one branch of the CCCM – **the Bay Area Climate Change Office (BACCO)**. Both Burlington and Hamilton have Council direction to address climate change through a model that replicates the past successes of the Bay Area Restoration Council and the Bay Area Implementation Team. As part of this project, Lura Consulting was hired to undertake a comprehensive consultation and engagement process to develop and launch BACCO, including defining its governance and implementation structure.

1.2. Report Contents

This report contains an overview of the engagement completed and resulting recommendations. Section 2 outlines the engagement process, tactics, and numbers, and provides a high-level summary of key advice for BACCO. Section 3 provides a series of recommendations for the structure, membership and terms of reference for BACCO.

2. Engagement Process

To fulfill the objectives of the BACCO engagement strategy, a comprehensive approach targeting key stakeholders and the general public through a wide variety of engagement activities was adopted. This provided multiple opportunities for public participation as part of an inclusive process. Engagement activities are outlined in detail within this section of the report. Approximately 895 individuals were engaged throughout this process, including key stakeholders and members of the general public. More details on the number of individuals engaged within each activity is provided in the table below.

Table 1: Engagement numbers

Engagement Tactic	Date	Number Engaged
Climate Change Forum	March 7 – 8, 2018	170
Online Engagement	March – May 2018	485
Pop-Up Events	April – May 2018	119 engaged, 501 reached
Stakeholder Interviews	April – May 2018	32 organizations (43 individuals)
Stakeholder Workshop	June 1, 2018	44 participants (31 organizations)
Public Meeting	June 27, 2018	34 participants
Total Individuals Engaged		**895**

2.1. Engagement Activities

A number of different engagement activities were used to ensure meaningful and representative feedback was collected. The mix of engagement activities, outlined below, aimed to:

- Engage with as many residents and stakeholders as possible, allowing participants to provide feedback at their convenience;
- Engage with residents and stakeholders from across Hamilton and Burlington's diverse neighbourhoods, including urban and rural locations;
- Encourage active participation from the community by going to where people already spend time and providing online engagement opportunities; and to,
- Provide education on the Bay Area Climate Change Action Plan development process, including Hamilton's Community Climate Change Action Plan and Burlington's Community Energy Plan.

2.1.1. Climate Change Summit

The Bay Area Climate Change Summit was held on March 7 and 8, 2018. The summit consisted of two parts – an evening keynote presentation and a full-day conference. Approximately 90 participants attended the evening event and 80 attended the full-day conference. The evening event on March 7 featured a keynote presentation entitled "How Denmark is enlisting people and business to combat climate change". The full-day conference on March 8 featured a number of presentations, panel discussions and opportunities for community engagement.

Summit attendees were asked to participate in a number of engagement activities, including:

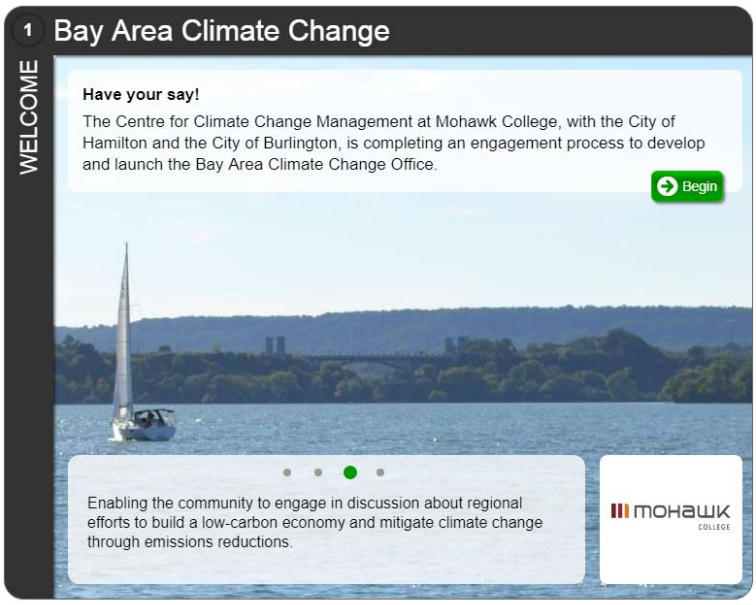
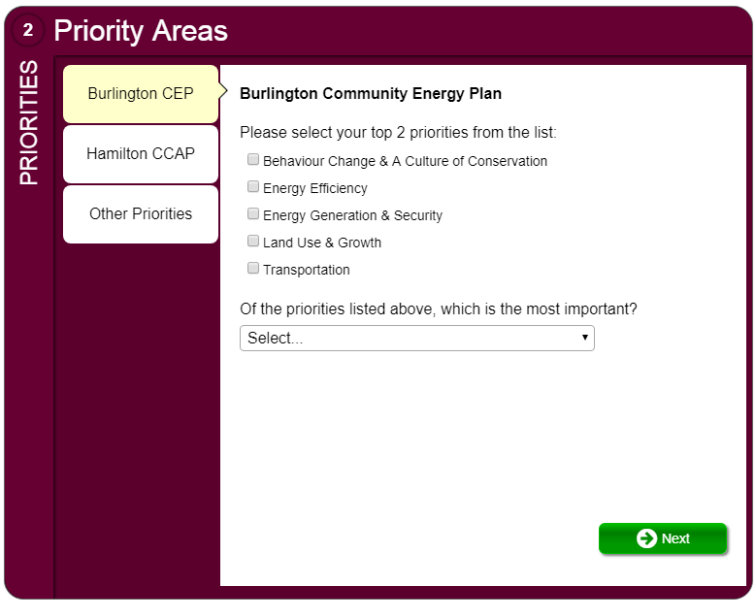
- Brainstorming responses to the question: "What climate action can we take together, today, for a better tomorrow in the Bay Area?". Participants were provided with sticky notes and asked to post their answer on a large format display board.
- Identifying sectors and organizations that they thought should be represented in a potential BACCO governance and implementation structure.

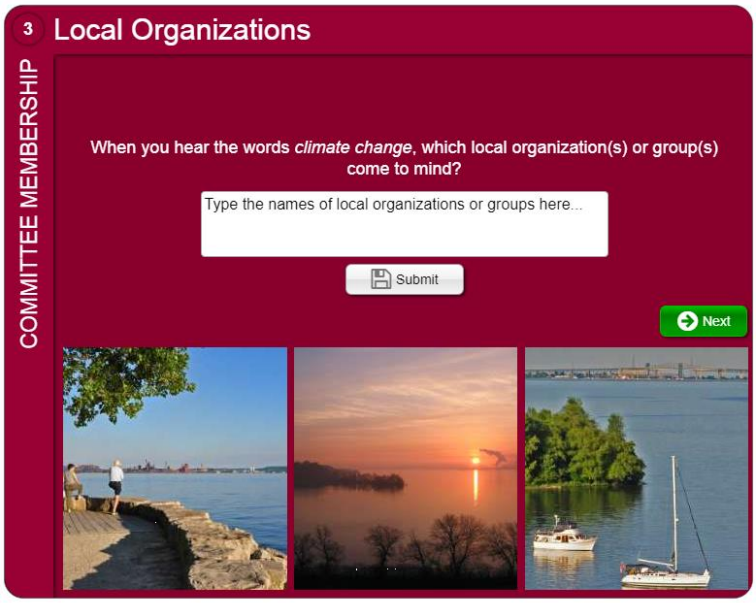
- Identifying priorities for addressing climate change in the Bay Area.
- Completing a feedback form asking for advice and support.

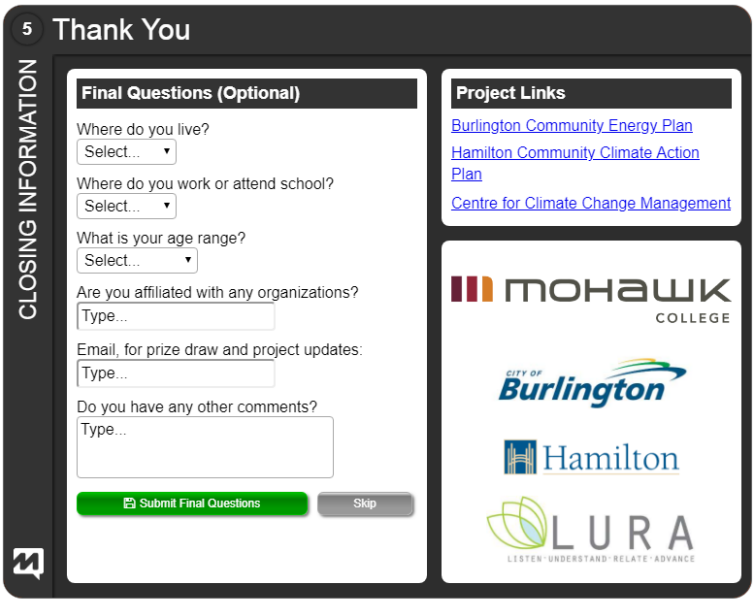
2.1.2. Online Engagement

Digital engagement for BACCO was conducted through MetroQuest (https://bayareaclimatechange-demo.metroquest.ca/) between March 7 and May 30, 2018. Online engagement tools are widely accessible and allow participants to provide feedback at their own convenience. Overall, 485 participants completed the digital engagement survey. The digital engagement survey featured various activity screens, as outlined below.

Table 2: MetroQuest screens

Screen Description	Screen Image
Screen 1: Welcome. This screen welcomed participants to the online engagement and included background information on the project.	
Screen 2: Prioritization Activity. Participants were asked to identify their top priorities within the focus areas identified in each plan, building on the existing work that has been done by each of the Cities.	

Screen Description	Screen Image
Screen 3: Committee Membership. On this screen, an open-ended question asked participants which organizations come to mind when discussing climate change.	
Screen 4: Mapping Climate Change. Participants were asked to drag and drop at least three markers on the map to identify climate actions that matter to them.	

Screen Description	Screen Image
Screen 5: Thank You. Participants were asked several demographic questions and provided links to the Burlington Community Energy Plan and Hamilton Community Climate Change Action Plan.	

2.1.3. Pop-Up Events

From March to May 2018, pop-up consultations were conducted for residents of the Bay Area to provide their input into the development of BACCO. The project team conducted twelve pop-up consultations in Burlington and Hamilton, as outlined in the table below. Pop-up locations were strategically chosen to reach a wide range of geographic areas within the Hamilton Burlington Bay Area (i.e. urban and rural). When selecting locations, accessibility was of paramount importance. The vast majority of the locations selected are free to access and many are accessible via public transportation. Pop-up engagements allow us to meet people where they are, rather than asking individuals to attend a public meeting. This approach ensures engagements efforts reach a wide range of audiences and understand issues "on the ground".

Table 3: Pop-up event locations

Date	Location	Estimated #	
		Reached	Engaged
April 21, 2018	Beautiful Alleys Event, Gibson and Landsdale, Hamilton	40	8
April 25, 2018	Mayor's Inspire Burlington Event, Royal Botanical Gardens, Burlington	40	12
April 26, 2018	Haber Community Centre, Burlington	70	10
April 28, 2018	Community Clean-Up Event, Rolston Neighbourhood, Hamilton	10	2
April 28, 2018	Right on Target Marketplace, Crown Point Neighbourhood, Hamilton	115	25
April 29, 2018	Burlington Art Gallery, Burlington	45	5
May 2, 2018	Tansley Woods Community Centre, Burlington	45	5
May 3, 2018	Burlington Central Library, Burlington[1]	N/A	N/A

[1] Materials were made available at the Burlington Sustainable Development Committee's display.

Date	Location	Estimated #	
		Reached	Engaged
May 6, 2018	Beasley Fair, Beasley Neighbourhood, Hamilton	20	15
May 11, 2018	Art Crawl, Evergreen Storefront, Hamilton	80	10
May 12, 2018	Hamilton Central Library, Hamilton	26	20
May 26, 2018	Waterdown Farmers Market, Hamilton	10	7
Total		**501**	**119**

"Reached" participants are those who spoke with staff at the booth and/or took a survey card. "Engaged" participants are those who contributed to the map display board and/or completed a survey on the spot.

Pop-up activities closely mirrored those of the digital engagement through MetroQuest, outlined further below. Participants could provide feedback in the following ways:

- Using a large format display board, participants could mark climate actions on a map of the Hamilton Burlington Bay Area.
- Participants were encouraged to fill out a paper version of the survey, which was later inputted into MetroQuest by Lura staff.
- Alternatively, participants could take a survey card, and complete the digital engagement directly through MetroQuest at their convenience.

2.1.4. Stakeholder Interviews

During April and May 2018, a series of stakeholder interviews were undertaken; the purpose of which was to explore the key issues, opportunities and challenges for BACCO. The results of the interviews will lay the foundation for the formation of BACCO. A total of 32 interviews were conducted with key external community stakeholders, which were identified in collaboration with the project team and interviewed by Lura Consulting. The stakeholders engaged exemplify the broad representation of sectors and groups within the Bay Area.

Table 4: Stakeholder interviews

Organization	Date
Alectra Utilities	May 15, 2018
Bay Area Restoration Council	May 1, 2018
Burlington Economic Development Corporation	May 2, 2018
Burlington Green	May 10, 2018
Burlington Hydro	May 8, 2018
Burlington Sustainable Development Committee	April 18, 2018
Clean Air Hamilton	May 4, 2018
Conservation Halton	May 14, 2018
Environment Hamilton	May 8, 2018
Evergreen	May 29, 2018
Golden Horseshoe Food & Farming Alliance	May 1, 2018
Halton Catholic District School Board	May 17, 2018
Halton Community Housing Corporation	May 9, 2018
Halton District School Board	April 23, 2018

Organization	Date
Halton Environment Network	May 17, 2018
Hamilton Chamber of Commerce	May 1, 2018
Hamilton Community Energy	May 8, 2018
Hamilton Community Foundation	May 22, 2018
Hamilton Conservation Authority	May 4, 2018
Hamilton Emergency Operations Centre	May 23, 2018
Hamilton Health Sciences	May 8, 2018
Hamilton Industrial Environmental Association	May 8, 2018
Hamilton Neighborhood Strategy Team	April 26, 2018
Hamilton Roundtable for Poverty Reduction	May 9, 2018
Hamilton Wentworth Catholic District School Board	May 4, 2018
Hamilton Wentworth District School Board	May 9, 2018
McMaster University Centre for Climate Change	May 3, 2018
Public Health – Halton	April 18, 2018
Public Health – Hamilton	May 17, 2018
Six Nations of the Grand River	May 23, 2018
Union Gas	April 30, 2018
YWCA Hamilton	May 16, 2018

2.1.5. Stakeholder Workshop

On June 1, 2018, the project team held a stakeholder workshop. Forty-four (44) participants attended this session held at the Royal Botanical Gardens in Burlington, Ontario. The purpose of this session was to share the results of engagement findings to date and discuss the governance and implementation approach and structure for BACCO. In addition, the workshop discussed the next steps for how to realize the identified priorities for climate action in the Bay Area.

The stakeholder workshop was comprised of a series of presentations and engagement activities. Presentations focused on the concept of BACCO, engagement efforts and findings to date, and best practices in implementation and governance. With respect to workshop elements, participants were asked to engage in two activities. For the first activity, participants were asked to think about BACCO and how it might look and function. For the second activity, participants were asked to reflect on their chosen priority and discuss next steps for action in the short-term and long-term. Participants were also asked to identify potential partners for implementation.

2.1.6. Public Meeting

On June 27, 2018, the Bay Area Climate Change Office (BACCO) held a public meeting. Thirty-four (34) participants attended this session held at the Royal Botanical Gardens in Burlington, Ontario. The purpose of this session was to share the results of engagement findings to date along with the proposed structure for the Bay Area Climate Change Office. In addition, the public meeting explored how to communicate climate change themes to diverse members the Bay Area community.

The public meeting was comprised of a series of presentations and engagement activities. Presentations focused on the concept of BACCO, engagement efforts and findings to date, and reviewing the proposed structure and associated roles and responsibilities. With respect to meeting elements, participants were

asked to engage in two activities. For the first activity, participants were asked to discuss their thoughts and feedback on the proposed structure as a group. For the second activity, individuals were first prompted to reflect on their personal thoughts on climate change. Then, tables were assigned a unique community member profile in order to consider how they may inspire that person to take action on climate change.

2.2. Key Advice

Throughout the engagement process, stakeholders and members of the public provided advice on the project and BACCO itself. Their advice is summarized below, within a number of key themes.

2.2.1. Setting Goals and Actions

A mix of long and short-term goals should be established for BACCO, which are specific and measurable, and have associated metrics, targets, and deliverables. One stakeholder shared from experience that if the community is involved in a process without clear actions, stakeholders or timelines, they will likely lose interest. Actions for achieving these goals should be clear and results-focused. Additionally, there should be prioritization of actions, with a large focus on reaching the implementation stage and achieving the highest return on investment. All of this should be within the parameters of a clearly defined scope that BACCO operates within, established at the outset. In order to streamline objectives and actions, participants recommended combining the mission statements of Hamilton's and Burlington's respective plans.

2.2.2. Implementation

Roles and responsibilities should be clearly identified, tying actions to specific job titles/roles or organizations. Resource commitments should also be outlined, being mindful of the financial and time constraints of those involved. Budget was seen as a limiting factor and it was advised that BACCO will require sufficient, sustainable funding. Participants felt that, given its importance, specific individuals within BACCO should be responsible for managing and attracting funds.

Climate action should be coordinated, and care should be taken to leverage existing efforts rather than duplicating. Best practices should be reviewed and shared. To encourage stakeholder participation, considerations should be made to have actions align with the mandates and responsibilities of the agencies involved.

2.2.3. Community Engagement and Communications

Many stakeholders agreed that the community should be engaged through regular communication, in order to maintain awareness, transparency and accountability. Providing opportunities for community contribution to BACCO's priorities should be a primary goal of community engagement. Opportunities for involvement should be shared as they become available. Engagement should be inclusive and include a diverse range of stakeholders. Community engagement opportunities and the physical office space should be fully accessible, with collaborative workspace and resources for individuals contributing to local climate action.

Considering BACCO will be focusing on climate change actions, stakeholders advised against using fear tactics in communications, and instead focusing messaging on components the public can relate to. The goal of communications should be education to increase public understanding of climate change and

how it impacts them. Communication of short-term 'wins' should be prioritized, given that it is difficult for people to visualize long-term impacts. Participants suggested using diverse messaging, connecting climate change to other social and economic issues, and targeting different audiences appropriately. Communications should focus on: shifting societal values away from materialism and consumerism; demonstrating what we are losing as a result of climate change; educating around sustainability; highlighting existing incentives and regulations; and, personalizing climate impacts. BACCO should provide low-cost, tangible actions that could be implemented by community members, including changes to behavior. Finally, success should be measured, reported, and celebrated regularly in order to maintain accountability with stakeholders and the community.

2.2.4. Collaboration

Stakeholders stressed the importance of teamwork and cooperation. BACCO should incorporate a multitude of opinions, respect conflicting ideas, and find compromise. Those involved must be willing to act as equal partners. Stakeholders also recommended establishing trust through shared values and building strong relationships. It was advised that the group must be prepared to make tough choices, think outside the box, take risks, and to be mindful of the political climate.

2.2.5. Organizational Structure

Interviewees indicated that the resulting body/bodies leading climate action in the Bay Area needs credible leadership. Regarding potential membership, interviewees advised that there should be representatives from multiple sectors as well as subject matter experts. It was suggested to look at local examples of success with respect to collaborative action, learn what worked well there and apply it to BACCO. A decision-making method should be established to determine how decisions are made within the group(s). Individuals have also expressed that the structure of BACCO should provide opportunities for public engagement that is meaningful, continuous and regular. It was also requested that someone from BACCO be identified as a community liaison, ensuring that work being done is not redundant. Additionally, there were recommendations to get students, non-profits and other community members and groups engaged in the structure.

Participants at the stakeholder workshop discussed three key components of BACCO's structure. First, participants felt the need for an overarching group to set the direction of BACCO (i.e. the council). Second, participants described multiple groups responsible for the implementation of climate actions (i.e. the implementation team(s)). Finally, participants recommended a neutral coordinating body to facilitate operations (i.e. the neutral backbone). Any BACCO paid staff members should be neutral in the office's operations. There was some concern regarding the bureaucracy of the many components working together.

More information on the proposed structure and membership of BACCO is provided in Section 3.

3. Recommendations

3.1. Structure

A tentative structure for BACCO was presented at the public meeting. Most groups identified that they agreed with the proposed structure; however, a few refinements were suggested. Participants felt that hosting the public forum every two years (as originally proposed) was not frequent enough, given the urgency to act on climate change. Public meeting attendees were supportive of a public forum but expected more details regarding what information would be shared/collected and how they would be able to influence the future of BACCO in the forum setting. Attendees also mentioned that one implementation team may not suffice (i.e. that there should be one for each key area). Changes have been made within the graphic below to address these comments.

Additionally, there was one group of participants who were not in favor of the terminology “neutral backbone”. The term “neutral backbone” has been maintained below, but it is suggested that other names be explored. Regardless of the name, this component should indeed be a neutral participant within the BACCO structure.

3.1.1. Recommended BACCO Structure

After reviewing local examples of best practices and reviewing the advice and feedback collected from engagement activities, the following structure is recommended for BACCO:

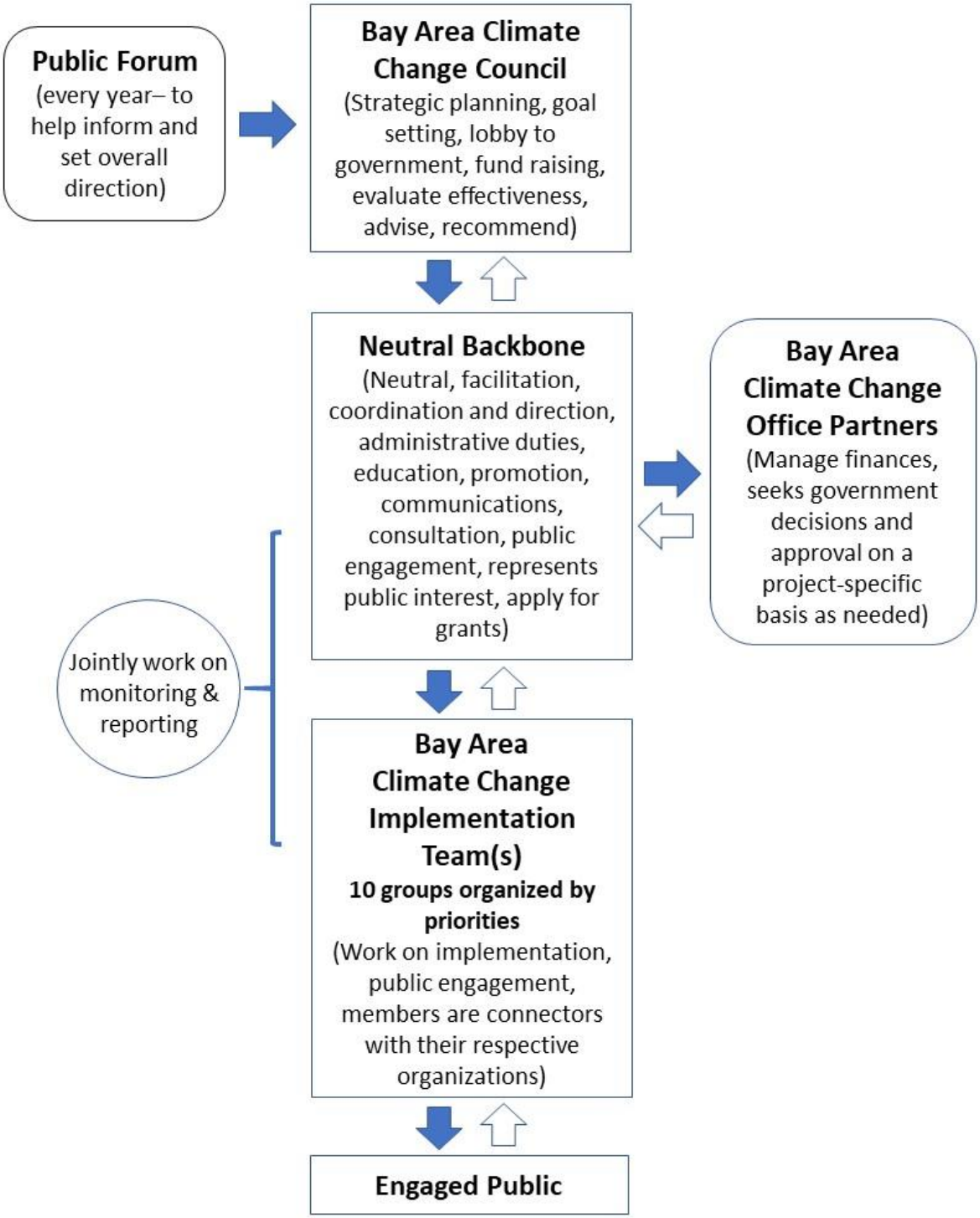
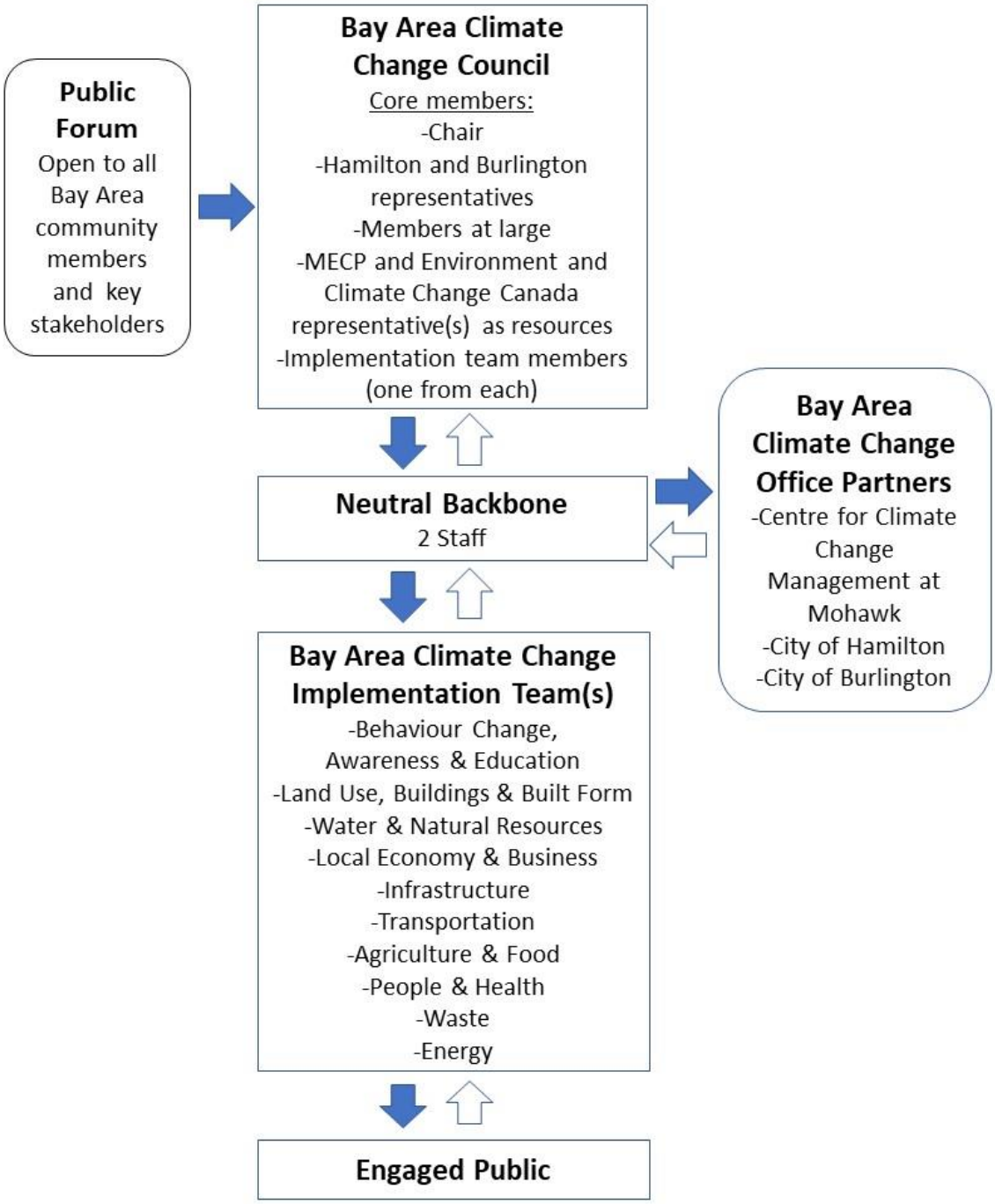


Figure 1: Recommended structure for BACCO, including functions and responsibilities.

The following figure highlights potential membership for the Council[2] and potential focus areas for the implementation team(s)[3]:



[2] Government representatives will participate in the Council as advisory (non-voting) members.
[3] Priorities for the implementation team(s) originated from the Hamilton Community Climate Action Plan and the Burlington Community Energy Plan and were informed by the engagement process. The Greenhouse Gas Inventory Report (forthcoming) will also inform the priorities to be focused on.

Figure 2: Recommended structure for BACCO, including roles and priorities.

3.2. Membership

Throughout the engagement process, participants were asked to provide recommendations for individuals, groups and organizations who should be involved with BACCO, either as a member of the council or an implementation team. Lura compiled a master list of all recommendations for membership, including any organization that was involved in the engagement process (i.e. through stakeholder interviews). This resulted in a list of over 200 recommendations, which was pared down into the list (n=69) below using the following criteria. Organizations were provided a score based on:

- Their involvement in the BACCO process to date;
- Their interest in remaining involved in the process;
- Relevance of "climate change" to the organization's mandate;
- Ability or influence of the organization to affect change; and,
- Whether or not the organization has an established local presence.

Care was taken to ensure coverage across both Hamilton and Burlington, and within each of the ten priority areas identified above. The list of organizations recommended for the council and implementation team(s) are listed below, organized alphabetically.

Organizations	
Alectra Utilities	Hamilton Food Advisory Committee
ArcelorMittal Dofasco	Hamilton FoodShare
Asset Management (City Departments)	Hamilton Health Sciences
Bay Area Restoration Council	Hamilton Industrial Environmental Association
Building Owners and Managers Association	Hamilton International Airport
Burlington Chamber of Commerce	Hamilton Neighbourhood Action Strategy Team
Burlington Economic Development Corporation	Hamilton Port Authority
Burlington Hydro	Hamilton Public Health
Burlington Sustainable Development Committee	Hamilton Roundtable for Poverty Reduction
Burlington Transit	Hamilton Street Railway
BurlingtonGreen	Hamilton Waste Management
City Housing (City Departments)	Hamilton Wentworth Catholic District School Board
City Manager's Office	Hamilton Wentworth District School Board
City of Burlington	Hamilton-Wentworth Federation of Agriculture
City of Hamilton	Insurance Companies
Clean Air Hamilton	McMaster Academic Sustainability Programs Office
Conservation Halton	McMaster Centre for Climate Change
Credit Unions	McMaster University
Economic Development (City Department)	Metrolinx (GO, SmartCommute)
Environment and Climate Change Canada	Ministry of the Environment, Conservation and Parks

Organizations	
Environment Hamilton	Mississaugas of the New Credit First Nation
Environmental (City Departments)	Mohawk College
Evergreen	Mohawk College Sustainability Office
Golden Horseshoe Food and Farming Alliance	Parks (City Departments)
Green Venture	Planning (City Departments)
Halton Catholic District School Board	Public Works (City Departments)
Halton Climate Collective	Royal Botanical Gardens
Halton Community Housing Corporation	Six Nations of the Grand River
Halton District School Board	Social Planning Research Council
Halton Food Council	Stelco
Halton Public Health	Sustainable Hamilton Burlington
Halton Region	Sustainable Mobility / Transportation (City Departments)
Halton Region Federation of Agriculture	Transportation Committee(s) of Council
Halton Waste Management	Union Gas
Hamilton Chamber of Commerce	Waste Management
Hamilton Community Energy	Water (City Departments)
Hamilton Community Foundation	Youth
Hamilton Conservation Authority	YWCA Hamilton

Table 5: Recommended organizations for BACCO membership

3.3. Terms of Reference

The following is the proposed terms of reference from the Bay Area Climate Change Council and Implementation Team(s).

3.3.1. Background

Mohawk College, the City of Hamilton, and the City of Burlington (the “partners”) have established a Centre for Climate Change Management (CCCM) at Mohawk. The Centre leverages collective resources, relationships, reputations, community-based partnerships, and experience to coordinate efforts and accomplish shared goals with a regional approach. The CCCM is a regional response to shared goals around climate change action and sustainability.

The Cities of Hamilton and Burlington have council mandates to address climate change using a model that replicates and builds on the success of the Bay Area Restoration Council and Bay Area Implementation Team. The partners are aiming to operationalize these plans to the greatest extent possible, and leverage resources through coordinated action.

As part of its mandate, the CCCM will establish the Bay Area Climate Change Office (BACCO), which will develop the governance and implementation structure necessary for the collaborative implementation of Burlington’s *Community Energy Plan* and Hamilton’s *Climate Change Action Plan*. A community governance structure with multiple partners has been proposed and will result in a collective, regional approach to climate change management. This model will consist of the Bay Area Climate Change

Council (BACCC) and the Bay Area Climate Change Implementation Team (BACCIT), as outlined in Section 3.1 and described below.

3.3.2. Mandates

BACCO will coordinate regional efforts to mitigate climate change through emissions reductions, create adaptation strategies, position the Bay Area for success in the low-carbon economy, and develop and share best practices across Ontario. BACCC and BACCIT will each have distinct mandates.

Bay Area Climate Change Council

The mandate of the Bay Area Climate Change Council (BACCC) is to provide an ongoing forum for advice, feedback and guidance to the Bay Area Climate Change Implementation Team(s) (BACCIT) via the neutral backbone. The purpose of the council is to set priorities for action by the implementation team(s) and to drive local climate action through goal setting and evaluation. The BACCC is a non-political advisory committee. Committee members are guided by these Terms of Reference and participate on the BACCC at the discretion of the partners. The council is not intended to address specific political issues or concerns.

Bay Area Climate Change Implementation Team(s)

The mandate of the Bay Area Climate Change Implementation Team(s) (BACCIT) is/are to implement climate change mitigation and adaptation strategies as recommended by the council. The team(s) is/are non-political in nature. Committee members are guided by these Terms of Reference and participate on the BACCIT at the discretion of the partners and council. BACCIT members will be experts in the designated areas and/or projects related to the relevant priority actions. Multiple “teams” may be formed to take on specific priority actions, as decided by the council.

3.3.3. Membership

It is anticipated that BACCC will be composed of approximately 14 representatives. Membership for BACCC will include:

- Advisory (non-voting) members:
    - Municipal representatives from the City of Hamilton and the City of Burlington
    - Representatives from the Ministry of the Environment, Conservation and Parks, and Environment and Climate Change Canada (as resources)
- Voting members:
    - Members at large (members of the public and/or stakeholder groups)
    - Implementation team members (one representative per team)

It is anticipated that BACCIT will be composed of various working groups with approximately 10 representatives each. Membership for BACCIT will be comprised of representatives from interested and affected stakeholder organizations. Members will be identified from the following sectors; however, multi-sectoral representation will be encouraged within each working group, recognizing the interdisciplinary nature of the priorities:

1. Agriculture & Food
2. Behaviour Change, Education & Awareness
3. Energy
4. Infrastructure

5. Land Use, Buildings & Built Form
6. Local Economy & Business
7. People & Health
8. Transportation
9. Waste
10. Water & Natural Resources

Membership will be formed on a voluntary basis; no compensation will be provided.

3.3.4. Terms & Conditions

The following are the key terms and conditions of BACCC and BACCIT membership:

- Membership is voluntary and open to representatives of interested and affected stakeholder organizations.
- Members will have a demonstrated interest or expertise in at least one of the topic areas listed above.
- Members understand, accept and agree to abide by these Terms of Reference.
- Members are willing to commit to participate on the council/implementation team for the duration of their term.
- Members agree to attend as many BACCC and BACCIT meetings as possible and to identify and brief an alternate from their organization in the event that attendance is not possible.
- Through their participation in the council/implementation team, members agree to ensure a two-way flow of information between the organizations they represent and BACCC and BACCIT.

3.3.5. Selection Criteria

Final membership decisions for the council, as well as any selection criteria, will be at the sole discretion of staff members from the CCCM partners (Mohawk College, City of Hamilton, and City of Burlington). The council will decide on members for the implementation team(s).

Within both the council and implementation team, efforts will be made to include a diverse group of stakeholders that is representative of the wider community.

3.3.6. Term of Membership

Membership for the council and implementation team will be for a two-year term. Members can be renewed for a second term, for a maximum service of four years.

3.3.7. Roles & Responsibilities

Bay Area Climate Change Council

Roles and responsibilities of BACCC include:

- Strategic planning and setting of overarching goals for BACCC and BACCIT, as informed by the annual public forum;
- Advocate to government (federal and provincial) in support of climate action;
- Leading fundraising efforts on behalf of BACCC and BACCIT; and,
- Evaluating effectiveness of BACCC and BACCIT, providing advice and recommendations to BACCIT through the neutral backbone.

Neutral Backbone

Roles and responsibilities of the neutral backbone include:

- Providing neutral facilitation, direction and coordination to BACCIT;
- Providing administrative duties for BACCC and BACCIT, including applying for grants;
- Facilitate all education, communications, and promotions – including the public forum - on behalf of BACCC and BACCIT;
- Representing the public interest in BACCC and BACCIT, through public engagement and consultation; and,
- Facilitating monitoring and reporting of BACCIT progress.

Bay Area Climate Change Implementation Team

Roles and responsibilities of BACCIT include:

- Establishing working groups organized by priorities (as directed by BACCC);
- Assisting with education, communications, and promotions through organizational affiliations;
- Planning, developing and implementing priority actions identified in the Hamilton Community Climate Action Plan and Burlington Community Energy Plan; and,
- Providing updates on progress to the neutral backbone for monitoring and reporting.

BACCO Partners

Roles and responsibilities of the CCCM at Mohawk College and the Cities of Hamilton and Burlington include:

- Managing finances on behalf of BACCC and BACCIT;
- Providing input to strategic planning and setting of overarching goals (managed by BACCC);
- Informing City Councils on the progress of climate change initiatives; and,
- Seeking local government approval on a project-specific basis (where required).

3.4.8. Decision-Making

High-level decision-making for BACCC and BACCIT will be the responsibility of BACCC. Decision-making at the municipal level will flow through the neutral backbone to the partners and respective City Councils on an as-needed basis.

When making decisions within their mandates, BACCC and BACCIT members will use a consensus-based approach. If consensus is not achieved, differing perspectives and viewpoints will be recorded and noted in meeting minutes. Voting will then be utilized to reach a decision.

3.4.9. Meetings

Chair

Members of the BACCC and BACCIT will appoint a chair for their respective groups.

Frequency & Timing of Meetings

It is anticipated that BACCC and BACCIT will meet monthly. Specific meeting dates will be agreed upon by the members. Working group meetings may be organized as needed by BACCIT. It is anticipated that BACCC and BACCIT meetings will be two hours in length. Meetings will generally be held in the evening in an accessible location, as determined by the Coordinator(s).

Meeting Agenda

An agenda for the meeting and minutes of the previous meeting will be created by the respective Coordinator for the group and sent out one week prior to the meeting. Members of BACCC and BACCIT will be encouraged to contribute to the agenda.

Meeting Minutes

The respective Coordinator will take notes at each meeting. The secretary will document key comments, questions, responses and action items. Finalized meeting notes and other materials will be posted publicly on the CCCM web page within ten business days.

Quorum

At least 50% of BACCC and BACCIT members must be present at a meeting to make final decisions. Final decisions cannot be made without quorum.

Absences

If a member cannot attend a meeting, he/she will send a representative to participate on their behalf. The representative will be able to share information and join discussions but will not be a voting replacement. Members who miss three consecutive meetings without a legitimate reason will be asked to resign from the BACCC and BACCIT.

Members of the Public

Members of the public are welcome to attend meetings of BACCC and BACCIT.

HAMILTON'S CLIMATE CHANGE EMERGENCY AND ACTIONS

Board of Health (BOH19022)
June 17, 2019

Trevor Imhoff, Senior Project Manager,
Air Quality and Climate Change

Public Health Services
Healthy Environments Division

Hamilton's Climate Change Emergency

WHAT DOES IT MEAN?

Climate change is a global and local emergency. In March 2019, Hamilton joined 435 municipal councils across the world representing 36 million citizens to declare that we need immediate action to achieve the transformative change required for our planet to prevent global averages temperature rise of 1.5°C.

GLOBAL SCIENTIFIC CONSENSUS

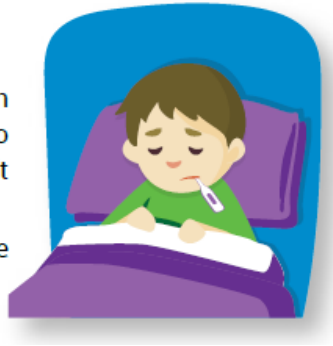
97% of climate scientists around the world agree that 1.5°C is the upper limit of warming we can tolerate before impacts become so great as to threaten the stability of human civilization.

They also warned, in an International Panel on Climate Change (IPCC) report in October 2018, that if global carbon emissions are not halved by 2030 and eliminated by 2050, we will have lost the opportunity to hold warming to that level.

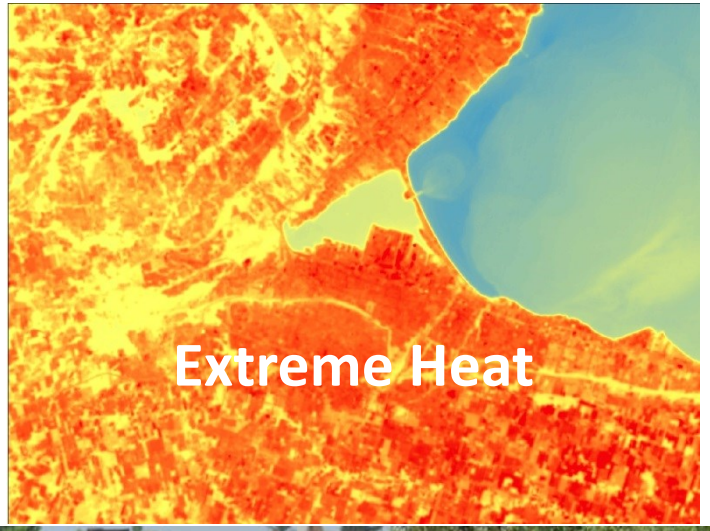
WHAT'S THE BIG DEAL WITH A FEW DEGREES?

1.5˚C doesn't seem like a big change, does it? But much like a human fever or disease, it doesn't take a big change in average temperature to indicate a serious problem. Similar to a fever or disease if left untreated it could become fatal.

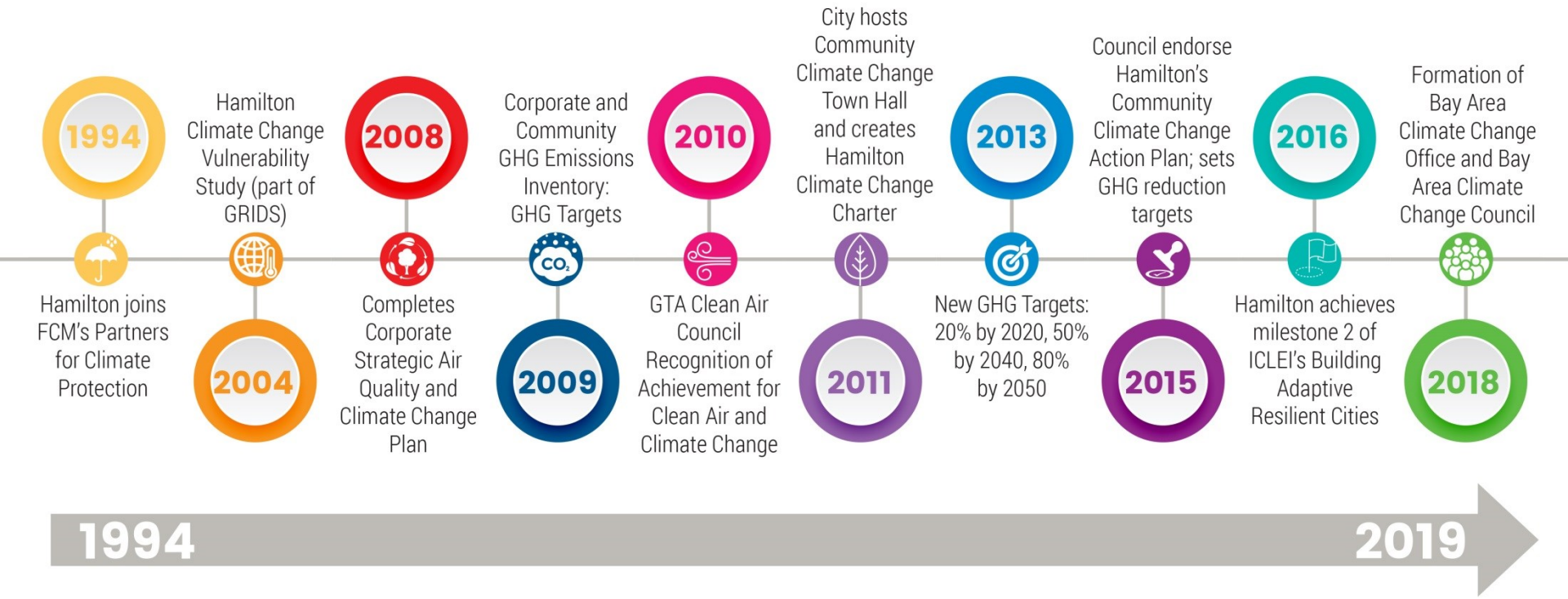
This informative video from leading atmospheric scientist Dr. Katharine Hayhoe demonstrates why: What's the Big Deal With a Few Degrees?



Climate Change Impacts

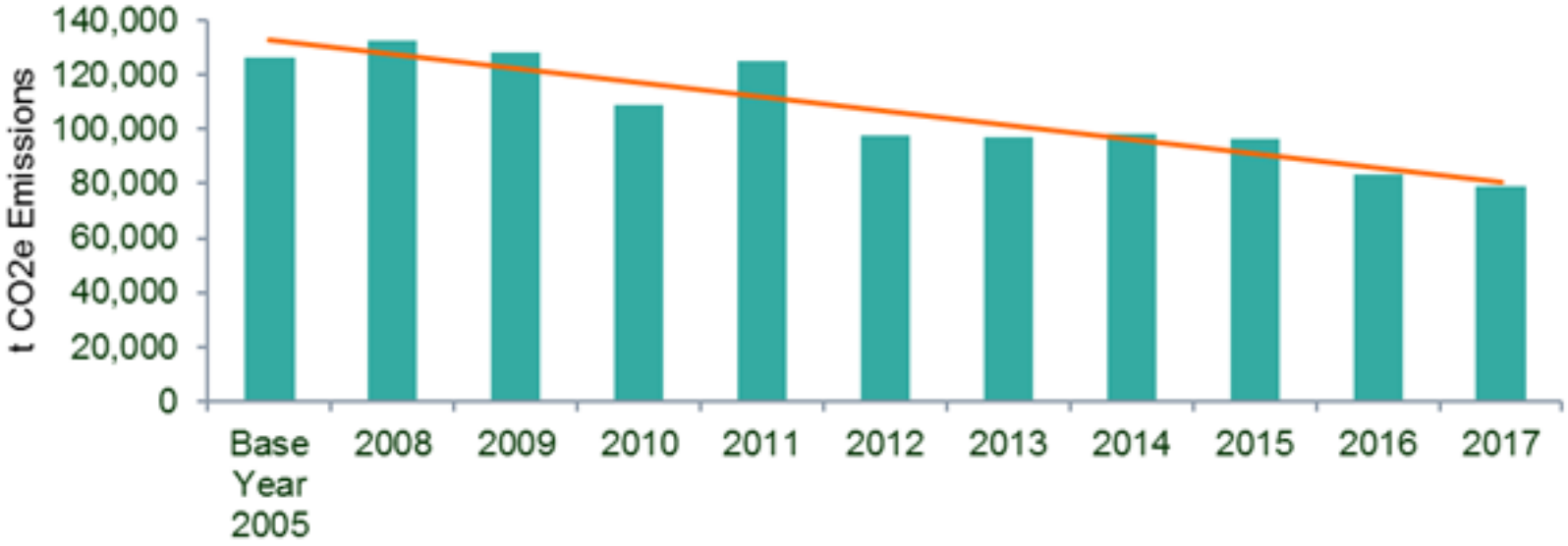


Hamilton's Climate Change Actions



Hamilton's Corporate Mitigation Achievements

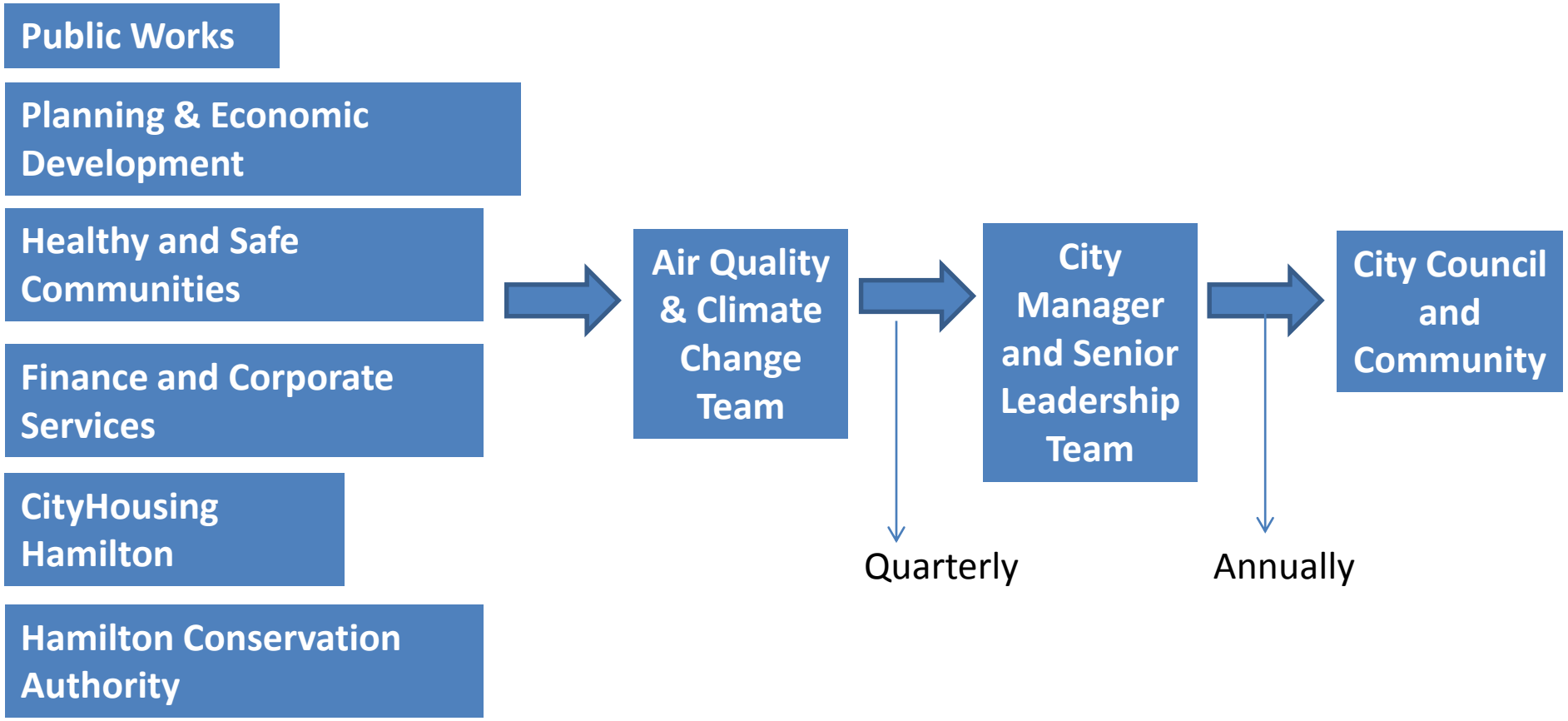
City of Hamilton Corporate GHG Emissions Annual Trends



Corporate Climate Change Task Force Framework

- Reporting Structures
- Climate Adaptation
- Planning
- Buildings
- Transportation
- Industry
- Procurement
- Financing
- Education & Awareness

Proposed Reporting Framework



Climate Change Adaptation

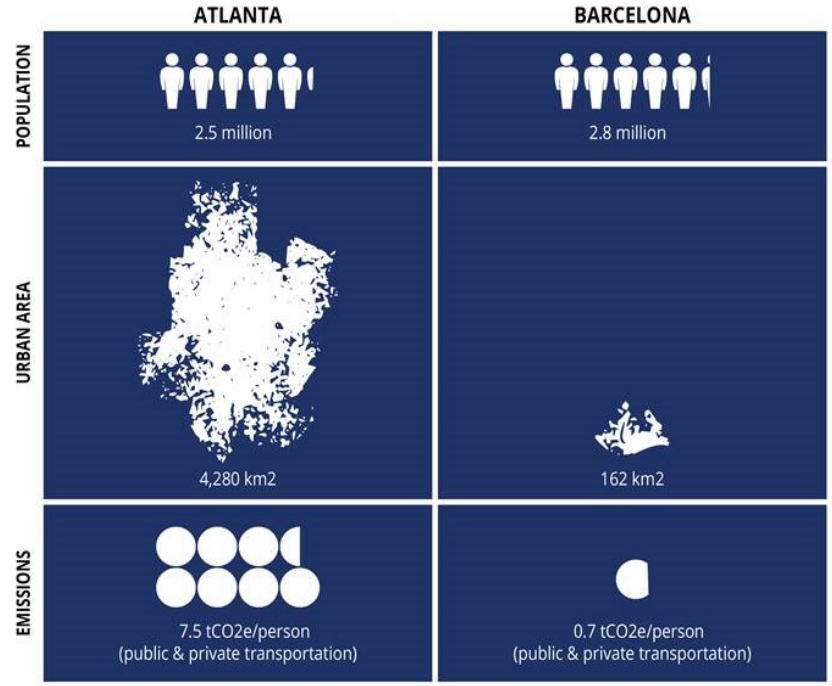
ICLEI Canada Building Adaptive Resilient Cities

Planning

- Corporate Climate Change Task Force will participate in MCR and GRIDS 2 update
- Preparing to amend Urban Hamilton's Official Plan (UHOP) and Rural Hamilton's Official Plan (RHOP)

The spatial configuration of a community determines its current and future GHG emissions.

The durability of the patterns of built environment and the associated infrastructure results in a phenomenon called lock-in or path dependence



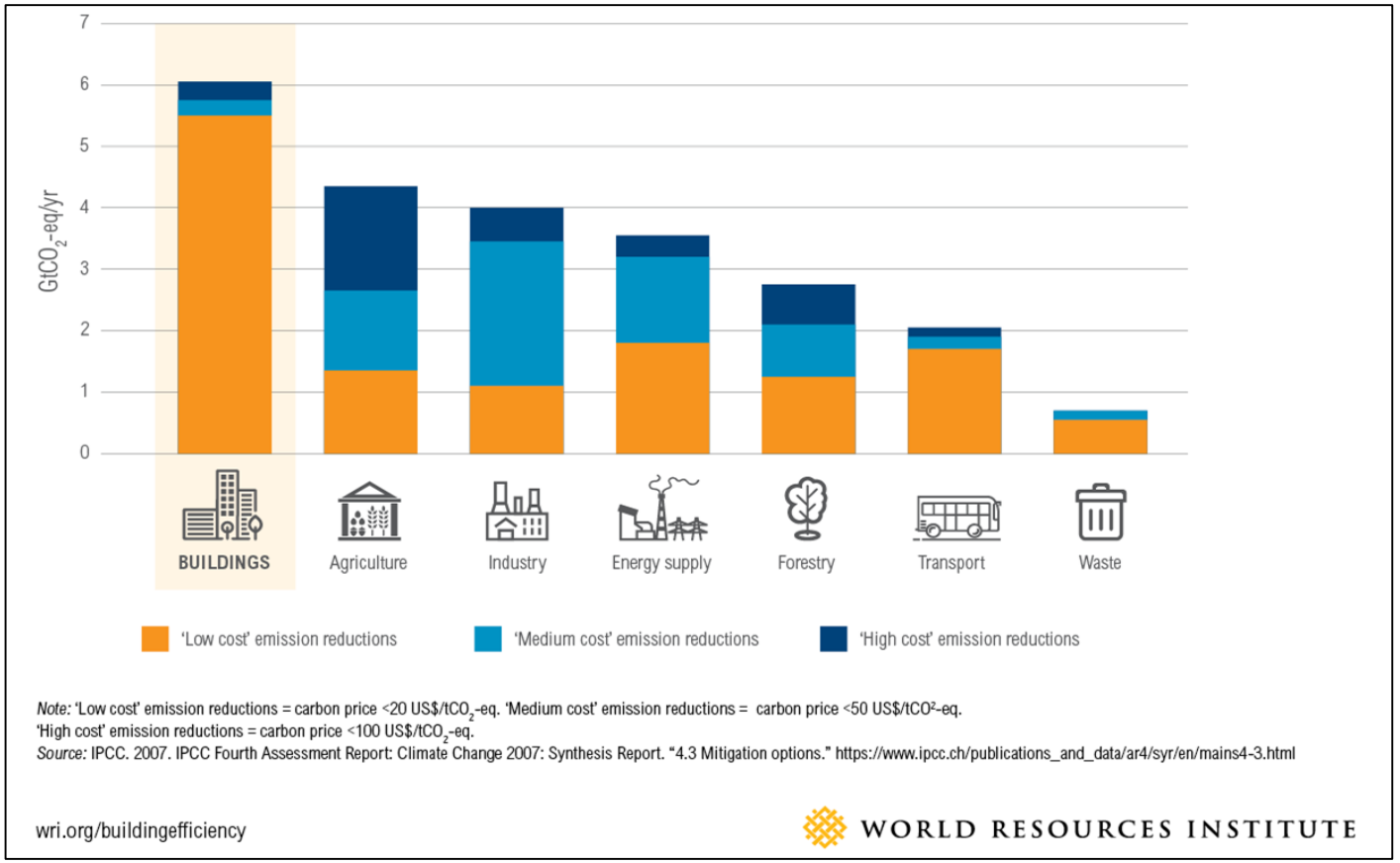
Source: Transit Density: Atlanta, the United States and Western Europe. Bertaud and Richardson, 2004.

Prioritizing a complete transit connected and walkable built environment that reduces GHG emissions and improves the health of the population

Buildings

City-Wide Community Energy Plan:

- ❑ Develop Green Development Standards
- ❑ Develop Local Improvement Charge (LIC) building retrofit program



Transportation

- Transportation Master Plan addresses several factors towards reducing GHG emissions and improving health through:
  - ✓ Complete-Liveable-Better (CLB) Streets;
  - ✓ The Role of Health in the Built Environment
  - ✓ Future Travel Demand Modelling;
  - ✓ Sustainable Mobility Program Review; and
  - ✓ Cycle Master Plan Review
- City can lead through the Corporate Energy Plan and prioritization of zero emission vehicles

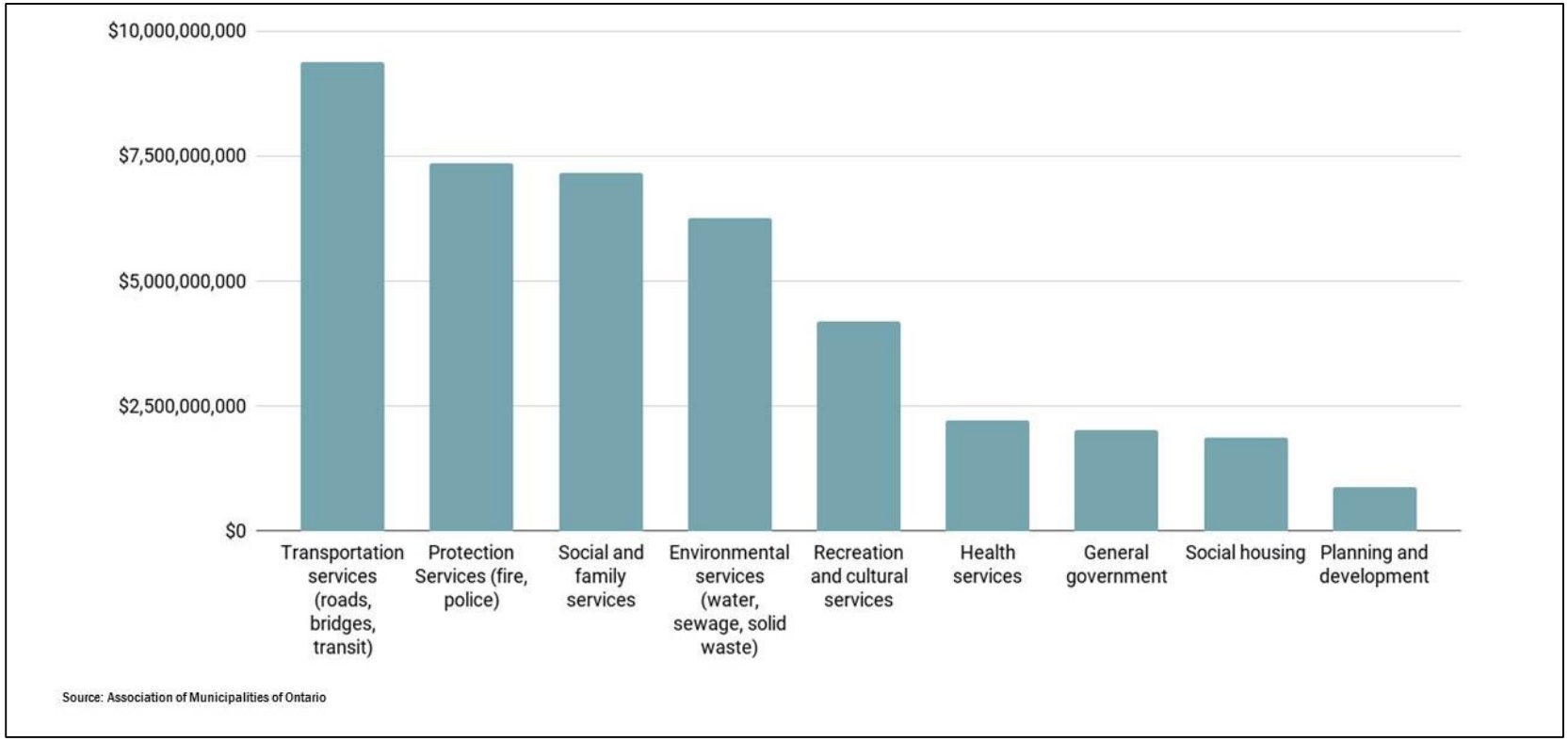
Transportation Emissions by Source & Vehicle Type

Prioritize public and active transportation networks to improve modal shift away from personal vehicles

Procurement

- Social and Environmental Strategic Procurement
- Procurement process as strategic function to support city and community priorities

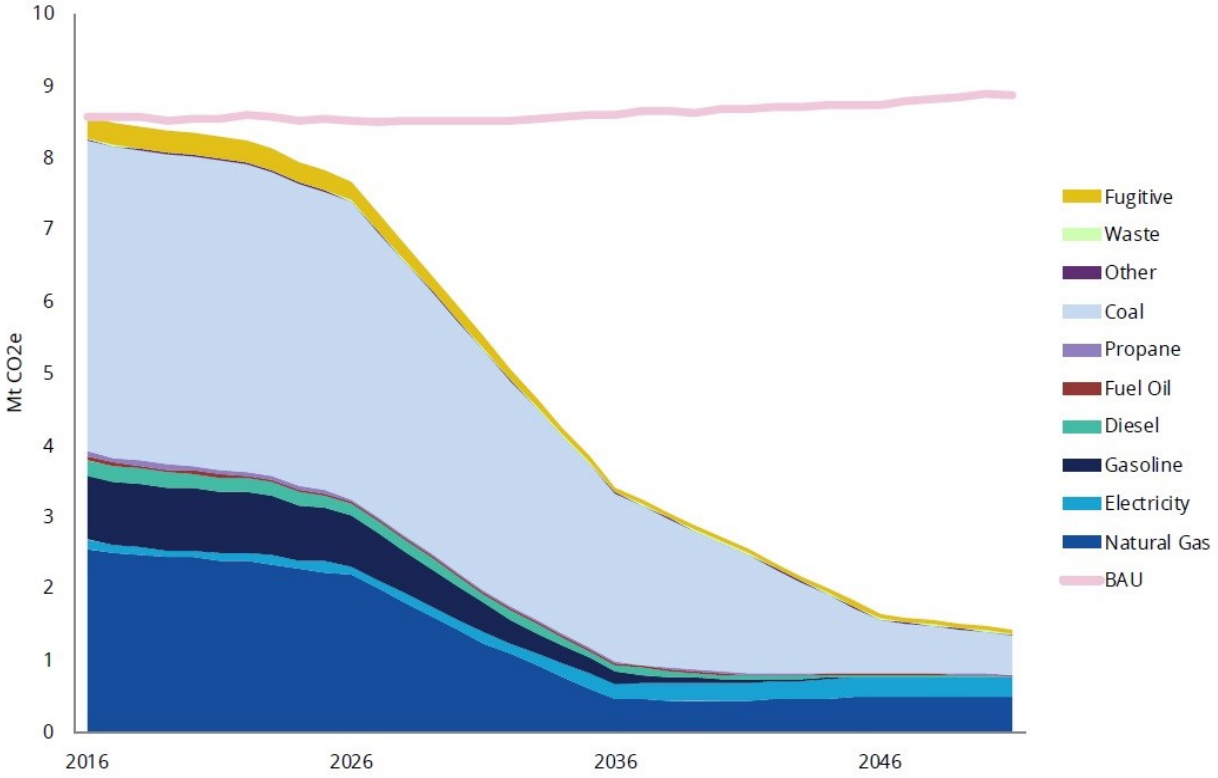
2015 Local Government Operating Expenditures: $41.4B



Industry

- Industrial emissions regulated by Provincial and Federal Governments
- Steel directly employs 10,000 people - $2B local procurement
- Important to partner and advocate together to higher levels of government for funding
  - Innovative low carbon solutions
  - Bio-carbons as fuel source
- Waste Heat Feasibility Study with Hamilton Chamber & Industrial partners

Projected LC Emissions ($MtCO_2e$) by Source, in Hamilton 2016-2050



Financing

North America

- Verizon Green Bond
- CIBC Women in Leadership Bond
- City of Toronto Green Debenture
- City of Ottawa Green Debenture
- Manulife Financial Green Bond
- Ontario Power Generation Green Bond
- Apple Inc. Green Bond
- New York MTA Green Bond
- Mexico City Government (CDMX) Green Bond
- Nacional Financiera Green & Social Bonds
- Port of Los Angeles Green Bond
- State of Connecticut Water Revolving Fund Green Bond
- Starbucks Corporation Sustainability Bond
- University of Vermont Medical Center Green Bond
- Renovate America Green Bond

(Slide Adapted from Sustainalytics Bay Area Climate Change Summit, March 2019)

- ❑ $8.3B of Green Bonds issued in Canada
- ❑ ESG Green Bond Market ↑28% between 2018 and 2019
- ❑ Finance key stakeholder in finding alternative financing mechanism for our zero carbon transition and climate adaptation work such as;
  - ❑ ESG Green Bond
  - ❑ Stormwater Utility Fee
  - ❑ Local Improvement Charge Program

Education and Awareness

- Bay Area Climate Change Office Community Engagement Seminar and Educational Series
- Youth Challenge International: Local Youth Climate Opportunity
- City of Hamilton Climate Change Website Development
- Utilization and Collaboration with Bay Area Climate Change Council:

Hamilton Health Sciences	Burlington Economic Development Corp
Hamilton Conservation Authority	Conservation Halton
Hamilton Industrial Environmental Association	Burlington Sustainable Development Committee
Hamilton Chamber of Commerce	Clean Air Hamilton
Environment Hamilton	Burlington Green
Sustainable Hamilton Burlington	United Way Halton & Hamilton

Regional Collaboration

Hamilton/Burlington Community	City of Hamilton	City of Burlington
❑ Bay Area Climate Change Council Priority Climate Change Action Plan	❑ Updating Climate Action Plan	❑ New Burlington Climate Action Plan
❑ Bay Area Climate Change Council Priority Climate Change Action Plan	❑ New Community Energy Plan	❑ Existing Community Energy Plan
❑ Bay Area Climate Change Implementation Team for Buildings	❑ Green Development Standards	❑ Green Development Standards
❑ Bay Area Climate Change Implementation Team for Buildings	❑ Building Energy Retrofit Program	❑ Building Energy Retrofit Program
❑ Bay Area Climate Change Implementation Team for Transportation	❑ Enhancing Regional Transit Connections	❑ Enhancing Regional Transit Connections
❑ Bay Area Climate Change Office Community Engagement Campaign	❑ City of Hamilton community awareness required	❑ City of Burlington community awareness required

Bay Area Climate Change Partnership allows City's to leverage and advance ongoing and future climate change action

THANK YOU

Trevor Imhoff, Senior Project Manager
Air Quality and Climate Change
Trevor.Imhoff@hamilton.ca
(905) 546-2424 x1308

CITY OF HAMILTON
PUBLIC HEALTH SERVICES
Healthy Families Division

TO:	Mayor and Members Board of Health
COMMITTEE DATE:	June 17, 2019
SUBJECT/REPORT NO:	Arrell Youth Centre Secondment (BOH17008(a)) (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Michelle Boersema (905) 546-2424 Ext. 3784
SUBMITTED BY: **SIGNATURE:**	Jennifer Vickers-Manzin, CNO Director, Healthy Families Division Public Health Services

RECOMMENDATION(S)

That the Medical Officer of Health, or designate, be authorized and directed to execute any agreement and ancillary documents required to implement a contract between the City of Hamilton and Banyan Community Services Inc., operating as Arrell Youth Centre, that supports a 0.34 FTE Public Health Nurse secondment to Arrell Youth Centre for the term of July 1, 2019 to June 30, 2021 with an option to further renew the contract until June 30, 2023 in a form satisfactory to the City Solicitor.

EXECUTIVE SUMMARY

Banyan Community Services Inc., operating as Arrell Youth Centre (the “Arrell Youth Centre”) is the only secure custody youth detention program in Hamilton providing services to youth between the ages of 12-18 years who have been found guilty of an offence under the *Youth Criminal Justice Act*, and, received a custodial disposition.

Public Health Nurse (PHN) services have been seconded on site to Arrell Youth Centre since 1990. In May 1, 2017 a 0.46 FTE PHN was seconded to Arrell Youth Centre (BOH17008). Examples of services provided include, and are not limited to, supporting the physician with primary care duties, vaccination screening and administration, sexually transmitted infection (STI) testing, supporting and implementing various programming for youth (e.g. groups, health education, etc.).

Arrell Youth Centre has continued to value the PHN services that are provided, and they are seeking a renewal of the PHN secondment within a reduced FTE of 0.34 in response to their budget considerations. This reduction of FTE will still enable PHN services to continue at Arrell Youth Centre with their priority population served by only a slight reduction in clinic and programming support.

Alternatives for Consideration – See Page 4

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: The City of Hamilton will continue to invoice Arrell Youth Centre on a monthly basis for all salary, benefits and other work-related expenses, such as mileage reimbursement, payable by Arrell Youth Centre. The wages, benefits and any staff reimbursements will be subject to adjustment in accordance with the Ontario Nurses' Association collective agreement or otherwise in accordance with salary and benefit adjustments authorized by the City.

Staffing: Reduction in secondment FTE from 0.46 to 0.34 FTE will be realized through attrition.

Legal: Legal Services has been engaged in the ongoing renewal of the agreement with Arrell Youth Centre, to maintain the secondment as outlined in this report.

HISTORICAL BACKGROUND

Arrell Youth Centre is one of the community services provided under Banyan Community Services. Arrell Youth Centre is the only secure custody youth detention program in Hamilton, providing services to youth between the ages of 12-18 years who have been found guilty of an offence under the *Youth Criminal Justice Act* and received a custodial disposition.[1]

In 1990, PHS first entered into an agreement with the Ministry of Community and Social Services, which encompassed Arrell Youth Centre, to initiate Public Health Nursing services within this facility, and has since been renewed every two years. The initial funding source was the Ministry of Community and Social Services. Prior to 2012, this contract was a Purchase of Service Agreement, and then in 2012, as per recommendations from Legal Services, this contract was shifted to a Secondment Agreement. This shift was enacted in recognition that a secondment agreement supports

the provision of one particular employee (secondee) to provide services, as opposed to a Purchase of Service Agreement which does not require a specific employee.

The role of the PHN has remained relatively constant over the years, with the PHN providing health promotion services as per the Ontario Public Health Standards, 2018 (OPHS)[2], as well as some clinical services in collaboration with the physician and staff at Arrell Youth Centre. Examples of services include, but are not limited to: health assessment and teaching, running peer support groups, provision of vaccinations, and STI testing.

The secondment of a PHN to Arrell Youth Centre has continued to be mutually beneficial to both organizations as it provides Arrell Youth Centre with PHN services not otherwise available at this site, and it also is an opportunity for PHS to work with a population "at greater risk of poor health outcomes", as required in the OPHS. PHS has been able to work with this priority population on several mandates within OPHS such as: chronic disease prevention and well-being, substance use and injury prevention, infectious disease prevention, and school health.

Given the ongoing mutually beneficial terms of the PHN secondment, PHS recommends the continued renewal of this agreement, at a reduced FTE of 0.34, until June 30, 2021, with the option to re-evaluate and renew the secondment for up to an additional two year period at that time on the same terms.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

There are no policy implications or legislative requirements; however, services provided are in alignment with several OPHS.

RELEVANT CONSULTATION

Legal and Risk Management Services were consulted on the terms of the current secondment agreement, and are regularly involved in supporting the regular contract renewal. No issues have been identified.

Finance & Administration reviewed and made recommendations on processes for execution of the agreement.

Director of Arrell Youth Services was consulted regarding the terms of the renewal of the secondment and this Report.

ANALYSIS AND RATIONALE FOR RECOMMENDATION(S)

As stated previously, Arrell Youth Centre is the only secure custody youth detention facility in Hamilton, providing support and service to this youth population at risk of poor health and well-being outcomes.

The benefits to the City in supporting the renewal of the secondment agreement are as follows:

- The PHS PHN will continue to have access to and influence over health outcomes for one of Hamilton's priority populations in accordance with the OPHS;
- It maintains a long-standing community partnership with an organization providing a valuable service to this priority population; and,
- It continues to meet an identified local need in the community.

ALTERNATIVES FOR CONSIDERATION

The PHN secondment to Arrell Youth Centre is not renewed.

Financial: All costs associated with the agreement, covered by Arrell Youth Centre, would discontinue.

Staffing: Discontinuation of the agreement would result in a 0.46 FTE reduction in staffing complement.

Legal: The City's existing secondment agreement would expire. No secondment agreement would be required.

Pro: The work associated with maintaining the PHN secondment and overseeing a PHN in this role would be eliminated.

Con: Discontinuing the PHN secondment could have a negative impact on the relations that the City has with this community agency, as well as reducing an important service provided to this priority population.

Given these considerations this alternative is not recommended at this time.

ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Economic Prosperity and Growth
Hamilton has a prosperous and diverse local economy where people have opportunities to grow and develop.

Healthy and Safe Communities
Hamilton is a safe and supportive City where people are active, healthy, and have a high quality of life.

References

1. Banyan Community Services (2017). *Banyan Community Services.* Retrieved from http://www.banyancommunityservices.org/programs.

2. Ministry of Health & Long-Term Care, (2018). *The Ontario Public Health Standards: Requirements for Programs, Services and Accountability.* Retrieved from www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards

APPENDICES AND SCHEDULES ATTACHED

Not Applicable.

CITY OF HAMILTON
PUBLIC HEALTH SERVICES
Healthy Environments Division

TO:	Mayor and Members Board of Health
COMMITTEE DATE:	June 17, 2019
SUBJECT/REPORT NO:	By-law No. 11-080 To Prohibit Smoking Cannabis and Vaping Within City Parks and Recreation Properties (BOH07034(n)) (City Wide) **(Outstanding Business List Item)**
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Heidi McGuire (905) 546-2424 Ext. 6170
SUBMITTED BY and SIGNATURE:	Jennifer Vickers-Manzin on behalf of Kevin McDonald Director, Healthy Environments Division Public Health Services

RECOMMENDATION(S)

(a) That the by-law attached as Appendix “A” to Report BOH07034(n), being a by-law to amend By-law No. 11-080 to Prohibit Smoking within City Parks and Recreation Properties (the “Amending By-law”), be approved.

(b) That this subject matter be identified as completed and removed from the Outstanding Business List.

EXECUTIVE SUMMARY

City of Hamilton By-law No. 11-080 To Prohibit Smoking Within City Parks and Recreation Property currently applies only to smoking tobacco in and on City-owned parks and recreational properties. The Smoke-Free Ontario Act, 2017, which prohibits smoking of tobacco and cannabis and vaping any substance, already applies to some of the locations covered by By-law No. 11-080. Amending the By-law to incorporate smoking of cannabis and vaping would create a uniform approach in all parks and

recreation properties in Hamilton, which would assist with communications and enforcement.

Public Health Services staff conducted a public consultation to obtain feedback from sports organizations and residents who use recreation facilities regarding amendments to Hamilton's by-law. Results from a survey of 991 residents show that there is 62–78% support for a prohibition on smoking cannabis and vaping at parks and recreational facilities, depending on type of facility. Survey results for sports organizations similarly show 60-80% support for the same facilities.

Alternatives for Consideration – See Page 6

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: By-law implementation costs associated with public awareness and education, and signage will be absorbed within Public Health Services' approved 2019 operating budget.

Staffing: Public Health Services' Tobacco Enforcement Officers will be utilized for enforcement of the amendments to By-law No. 11-080 as these changes represent an extension of existing enforcement work being conducted against the by-law.

Legal: The Municipal Act, 2001 empowers municipalities to pass by-laws with respect to the health, safety and well-being of persons, and particularly s.115 as amended by the Restoring Trust, Transparency and Accountability Act, 2018, provides that municipalities may prohibit or regulate the holding of lit tobacco and cannabis, as well as consumption of tobacco or cannabis through an electronic cigarette. In considering a by-law under this authority, municipalities may define "public place" for the purposes of the by-law.

Although initial enforcement will focus on public awareness and education, it is possible that in the future challenges and charges could result for individuals found to be smoking or vaping within a City-owned park or recreation property. Public Health Services' experience with the existing by-law indicates that adequate enforcement accompanied by an education campaign results in compliance with the by-law being high resulting in minimal charges. Legal Services staff may be required to attend to review lease agreements in place between the City of Hamilton and third parties to advise on legal issues arising from the by-law.

HISTORICAL BACKGROUND

Hamilton's By-law No. 11-080 To Prohibit Smoking Within City Parks and Recreation Properties came into effect on May 31, 2012. It prohibits smoking of tobacco in City of Hamilton outdoor recreational areas (outlined in the table below).

The Smoke-Free Ontario Act, 2017 came into effect on October 17, 2018. It prohibits smoking of cannabis and tobacco, as well as use of electronic cigarettes containing any substance in a range of locations, including enclosed public places and workplaces and a range of outdoor recreational areas (outlined in the table below).

A motion was introduced at the January 14, 2019 Board of Health meeting requesting that Public Health Services staff, in conjunction with Legal Services, review the feasibility of amending City of Hamilton By-law No. 11-080 To Prohibit Smoking Within City Parks and Recreation Property to include additional prohibitions on the smoking of cannabis and vaping within City-owned parks and recreation properties; and that public consultation be undertaken in relation to the additional prohibitions.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

The City of Hamilton — Human Resources' policy Smoke-Free Workplace Policy No. HR-31-10 prohibits employees from smoking tobacco or medical cannabis or using an electronic cigarette within nine metres of another employee or entrance, window, pathway, ventilation area and hazardous storage area in City workplaces. Smoking non-medical cannabis in any City workplace is strictly prohibited.

By-law No. 11-080 To Prohibit Smoking Within City Parks and Recreation Properties, came into effect on May 31, 2012; any amendments would alter this By-law.

RELEVANT CONSULTATION

Corporate Services, Legal Services Division; Public Works, Parks and Recreation Division; and, Healthy and Safe Communities, Recreation Division were consulted in relation to the feasibility of implementing the outlined amendments to By-law No. 11-080.

ANALYSIS AND RATIONALE FOR RECOMMENDATION(S)

The same considerations for prohibiting smoking of tobacco in outdoor recreational areas apply to smoking cannabis and vaping: health concerns from second-hand smoke and vape, littering, fire safety, role modeling for youth, as well as support for those who have quit smoking. In addition to these considerations, staff reviewed by-laws in other municipalities, gaps in local by-laws and public consultation results.

By-laws in Other Municipalities

Other municipalities that have incorporated smoking of cannabis and vaping into outdoor recreational spaces by-laws include: Barrie, Brant, Gananoque, Huron County, Kingston, Markham, Norfolk County, Orillia, Ottawa, Peterborough, Prince Edward County, Richmond Hill, Stratford, Windsor-Essex and others. In addition, the following municipalities are currently considering an amendment to outdoor recreational by-laws through public consultation: Durham Region (Whitby, Oshawa), Guelph, Niagara, Peel Region, and Trenton.

Gaps in Local By-law

The following table outlines the differences between the proposed amendment, Hamilton's current By-law No. 11-080, and the *Smoke-Free Ontario Act, 2017*. It illustrates the differences in products and locations included, which has led to a patchwork of legislation that is difficult to communicate and enforce.

	Proposed Amendment to By-law No. 11-80	**Hamilton's Current By-law No. 11-080**	**Smoke-Free Ontario Act**
Products included	Smoking of tobacco, cannabis, waterpipe, other substances Vaping any substance	Smoking of tobacco, waterpipe tobacco	Smoking of tobacco, cannabis, shisha containing tobacco Vaping any substance
Locations Included			
Parks	Yes – 100% prohibition	Yes – 100% prohibition	Only parks with playgrounds, slides, swings, splash pads, have prohibitions within 20m of these structures

Sports Fields	Yes – 100% prohibition	Yes – 100% prohibition	Yes – 100% prohibition Also includes within 20m of sports fields
Recreation Centres & Arenas	Yes – 100% prohibition Includes entire property	Yes – 100% prohibition Includes entire property	Yes – 100% prohibition Includes entire property, and within 20 m of property
Skateboard Parks	Yes – 100% prohibition	Yes – 100% prohibition	Yes – 100% prohibition
Outdoor Pools	Yes – 100% prohibition	Yes – 100% prohibition	Yes – prohibition within 20 m
Public Beaches	Yes – 100% prohibition	Yes – 100% prohibition	Only beaches with swimming lessons or other activity
Leash-Free Dog Parks	Yes – 100% prohibition	Yes – 100% prohibition	No
Trails	Trails within parks Other trails such as Waterfront Trail	Trails within parks Other trails such as Waterfront Trail	No

Public Consultation for Amendments

Public Health Services staff conducted an online survey with sports associations and City of Hamilton residents who use recreation facilities to obtain feedback on amendments incorporating smoking of cannabis and vaping into By-law No. 11-080 in March 2019. Results from the survey of 991 residents show that:

- 12% smoke tobacco and vape daily or occasionally;
- 32% smoke cannabis daily or occasionally;
- Approximately 78% support a by-law to prohibit smoking cannabis and vaping at playgrounds, splash pads and pools;
- 71%-75% support a by-law to prohibit smoking cannabis and vaping at sports fields, arenas and community recreational facilities;
- 62%-64% support a by-law to prohibit smoking cannabis and vaping in parks and beaches;
- 58% support a by-law to prohibit smoking cannabis and vaping on trails; and,

- Approximately 80% would not change their future use of parks and recreational areas if a by-law prohibiting smoking cannabis and vaping were introduced. Of these, 40% would these areas more often; only 17% indicated they would use these areas less frequently.

Results from the survey of 25 sports associations show that:

- 80% support a by-law to prohibit smoking cannabis and vaping at playgrounds and splash pads;
- 76% support a by-law to prohibit smoking cannabis and vaping at pools, arenas and community recreational facilities;
- 60-68% support a by-law to prohibit smoking cannabis and vaping at sports fields, beaches and parks; and,
- 52% support a by-law to prohibit smoking cannabis and vaping on trails.

Education, Signage and Enforcement

Areas that have introduced outdoor spaces legislation have found that it is generally self-enforcing and witness good compliance from the public. In most instances the peer pressure, will itself, contribute to compliance. Past no-smoking by-laws implemented by the City of Hamilton have demonstrated high compliance rates.

A public awareness and education strategy that clearly communicates the changes to the By-law will be used in conjunction with enforcement activities. The public awareness and education strategy will consist of a variety of media. The Tobacco Hotline and City of Hamilton website will be used as a point of access to information and materials about the By-law as well as to report complaints for follow-up from enforcement. Previously existing no-smoking signs will remain in place, with the addition of no smoking/no vaping signs in highly trafficked areas. The By-law will continue to be enforced on a complaint basis by existing Tobacco Enforcement Officers using a risk management model. The initial phase of enforcement will primarily consist of public awareness and education, moving progressively towards warnings and/or charges as appropriate.

ALTERNATIVES FOR CONSIDERATION

The alternative to amending Hamilton's By-law No. 11-080 is to leave the By-law as written and maintain status quo. At present, the recently introduced provincial laws and rules for outdoor recreational areas make it challenging to communicate and enforce.

ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Community Engagement and Participation
Hamilton has an open, transparent and accessible approach to City government that engages with and empowers all citizens to be involved in their community.

Healthy and Safe Communities
Hamilton is a safe and supportive City where people are active, healthy, and have a high quality of life.

Clean and Green
Hamilton is environmentally sustainable with a healthy balance of natural and urban spaces.

APPENDICES AND SCHEDULES ATTACHED

Appendix “A” to Report BOH07034(n): Amending By-law No. 11-080

Appendix "A" to Report BOH07034(n)
Page 1 of 2

Authority: Item ,
Report (BOH07034(n))
CM:
Ward: City Wide

Bill No.

CITY OF HAMILTON

BY-LAW NO.

To Amend By-law No. 11-080, being a By-law to Prohibit Smoking within City Parks and Recreation Properties

WHEREAS the *Municipal Act, 2001*, and particularly sections 9, 10, and 115, authorizes the City of Hamilton to pass by-laws respecting these matters; and,

WHEREAS Council deems it advisable to update By-law No. 11-080 to address the use of cannabis, vaping and the *Smoke-Free Ontario Act, 2017*, which repealed and replaced the *Smoke-Free Ontario Act, 1994*.

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. Subsection 1(1) of By-law No. 11-080 is amended by adding the following:

   (a.1) "cannabis" has the same meaning as in subsection 2(1) of the *Cannabis Act* (Canada);

   (i) "vaporizer" means an inhalant-type device or electronic cigarette, regardless of the name of the device, that contains a power source and heating element designed to heat a substance and produce a vapour intended to be inhaled by the user of the device directly through the mouth, whether or not the vapour contains nicotine, cannabis, cannabis extract or any other intoxicating substance.

2. Subsection 1(1) of By-law No. 11-080 is amended by deleting clause (f) and adding the following:

   (f) "smoke" includes the inhaling or holding of a lighted substance, joint, cigar, cigarette, pipe, water-pipe or any other lighted smoking equipment, and "smoking" has a corresponding meaning.

3. Subsection 1(1) of By-law No. 11-080 is amended by deleting clause (h) and adding the following:

   (h) "vape" means inhaling or exhaling vapour from a vaporizer or holding an activated vaporizer, and "vaping" has a corresponding meaning.

4. Subsection 1(4) of By-law No. 11-080 is deleted and the following substituted:

1.(4) The provisions of this By-law apply even where the City grants a permit to or enters into an agreement with a person, corporation or organization for the exclusive use of all or part of a park or recreation property.

5. Section 2 is amended by adding the underlined text as follows:

2. No person shall:
   (a) smoke or vape tobacco or cannabis or any other substance on recreation property;
   (b) fail to leave recreation property after authorized staff has given the person notice or direction to leave for smoking or vaping tobacco or cannabis or any other substance on recreation property; or,
   (c) enter or use recreation property after authorized staff have prohibited the persons entry or use for smoking or vaping tobacco or cannabis or any other substance on recreation property.

6. Section 3 is amended by adding the underlined text as follows:

3. The prohibitions in section 2 above apply whether or not a "No Smoking/No Vaping" sign of any format or content is posted.

7. Section 8 is deleted and the following substituted:

8. Subject to section 19 of the *Smoke-Free Ontario Act, 2017* (the "Act"), in the event of a conflict between the provisions of this By-law and the Act or a regulation passed under the Act, the provision that is more restrictive of the matter to which this By-law applies prevails.

8. This By-law shall come into force on July 1, 2019.

PASSED this _____ ____, _____

F. Eisenberger
Mayor

J. Pilon
Acting City Clerk

11.1

CITY OF HAMILTON
MOTION

Board of Health: June 17, 2019

MOVED BY MAYOR F EISENBERGER…….

SECONDED BY COUNCILLOR…….

Establishment of Departmental Climate Change Workplans within the City of Hamilton

WHEREAS; Public Health Services in its document, Corporate Climate Change Task Force Response to the Climate Change Emergency Declaration, has identified key strategic climate change adaptation and mitigation priority areas to be addressed by the City; and

WHEREAS; Public Health Services, in collaboration and cooperation with City departments, has made a compelling case continued action by the City of Hamilton in addressing the Climate Change Emergency Declaration;

THEREFORE, BE IT RESOLVED:

(a) That Staff develop a comprehensive, corporate-wide climate change adaptation and mitigation workplan, incorporative of all City departments, under the direction of the City Manager within six months;

(b) That the corporate-wide climate change adaptation and mitigation climate workplan be presented at the General Issues Committee meeting of November 20, 2019, and

(c) That Staff report annual updates on progress against the corporate-wide climate change adaptation and mitigation workplan to the General Issues Committee, commencing November 2020.