Inspiring Climate Action in Barrie

Part 1: Rationale

Prepared for the City of Barrie by LURA Consulting, ICLEI Canada & Wood

Part 1: Rationale

Contents

Preamble

Land Acknowledgement

The City of Barrie is in the process of consulting on and updating the land acknowledgement used by the Corporation. The City will add the most updated version of the land acknowledgement to this document once the Plan is ready for implementation.

Message from the Mayor

Wrapped around Kempenfelt Bay, our City and its residents enjoy the beauty of nature, outdoor recreation and access to green space and the lake. We are fortunate to experience the four seasons. However, you may have noticed changes in our weather in recent years. Our climate is changing, with 2020 being the hottest year on record globally. In Barrie, we've seen the devastating experience of severe weather locally. It is very clear that climate change is already directly affecting our community. Science tells us that urgent action is needed to reduce our reliance on fossil fuels, which are causing our planet to warm.

In 2019, Barrie City Council declared a climate emergency, joining thousands of cities worldwide, taking leadership on this issue. At that time, Council asked that a Climate Change Mitigation Plan be implemented to reduce Barrie's corporate emissions to net-zero by the year 2050. This plan outlines a series of Big Moves and strategies to help reduce Barrie's energy use and emissions through ambitious yet attainable action and set our community on a path towards net-zero by 2050. This plan is our community's collective opportunity to address climate action – making Barrie an even better place to live, work, shop and play.

The City continues to work to address and adapt to climate change locally. This plan will take you through our community-wide approach to reducing emissions, optimizing infrastructure, creating opportunities for retrofit projects, and other innovative ways to reduce our carbon footprint and impact on the environment. The City remains committed to supporting these goals while providing exceptional services to our residents to enjoy and rely upon. We acknowledge and understand that taking action against climate change will also lead to positive outcomes for our health and economy.

Climate change is the most serious threat facing the planet as a whole. Taking action will require collaboration and partnership at the local level. Everyone in our community – our businesses, schools, government and residents – will need to contribute if we are to succeed in tackling climate change. The opportunity to shift to climate-friendly actions is also an opportunity to do things fundamentally differently and embrace more sustainable choices while supporting the health of our residents. Our children and grandchildren will thank us.

Sincerely,

Mayor Jeff Lehman

Acknowledgements

We would like to acknowledge the following organizations, which contributed staff resources to the Stakeholder Advisory Group and the development of this Plan.

- Alectra Utilities
- City of Barrie Staff & Council
- County of Simcoe
- Enbridge Gas
- EV Society
- Georgian College
- IESO
- Lake Simcoe Region Conservation Authority
- Living Green Barrie
- Nottawasaga Valley Conservation Authority
- Ontario Association of Architects
- Royal Victoria Regional Health Centre
- Simcoe County District School Board
- Simcoe County Home Builders' Association
- Simcoe Muskoka District Health Unit

Glossary of Terms

Term	Definition
Active transportation	Using an individual's power to get from one place to another. This includes walking, biking, skateboarding, rollerblading, jogging and running, non-mechanized wheel chairing, snowshoeing, and cross-country skiing.
Baseline	Estimation of the 2018 energy use, energy costs, and greenhouse gas emissions.
Business-as-Planned	The Business-as-Planned (BAP) scenario is developed to understand future energy consumption, energy costs, and emissions for the Barrie community - based on changes in population and employment. It considers the impacts of provincial and federal government commitments and assumes no local action to reduce energy or emissions.
Carbon budget	The cumulative amount of carbon dioxide (CO_2) emissions permitted over time to keep within a certain temperature threshold.
Carbon sequestration	The long-term removal of carbon dioxide (CO_2) from the atmosphere through storage in solid or liquid form.
Circular economy	An economy that strives to eliminate waste and pollution; circulate products and materials; and regenerate nature.
Co-benefits	The added benefits to the community from climate action, above and beyond the direct benefits of a more stable climate. Some examples of climate action co-benefits include cleaner air, improved human health, and a stronger local economy.
Complete streets	Streets planned to balance the needs of all road users, including pedestrians, cyclists, transit-users, and motorists.
Cost avoidance	Costs not incurred because of specific actions taken.
Deep energy efficiency retrofit (DEER)	A project involving multiple energy efficiency and/or renewable energy measures in an existing building and building processes, designed to achieve substantial reductions in energy use
District Energy System (DES)	District energy systems (DES) use pipes to supply heating, cooling and/or power to multiple connected buildings from a decentralized energy source. Buildings that produce excess energy ("anchor tenants") can redistribute energy to nearby buildings.
Embodied carbon	The total carbon dioxide emitted by the production of a building. It includes the emissions created from extracting, transporting, and manufacturing all input materials and emissions from the

Term	Definition
	construction process. This also includes emissions generated from end-of-life disposal or recycling.
Emission intensity	The emission rate of a given pollutant relative to the intensity of a specific activity or industrial production process. The measure is used to derive estimates of air pollutants or GHG emissions based on the amount of fuel combusted. It can also be used to compare the environmental impact of different fuels or activities. For example, grams of carbon dioxide released per megajoule of energy produced.
Emission lock-in	The dynamic where previous decisions relating to GHG emitting technologies, infrastructure, and systems delay or prevent future transition to low-carbon alternatives. For example, an investment in a vehicle fleet can commit the owner to high emissions over the fleet's lifetime – even though more efficient options become available.
Energy use intensity (EUI)	A metric that expresses a building's energy use as a function of its size. It is typically calculated by dividing the total energy consumed by the building in one year (measured in GJ) by the total gross floor area (measured in square metres).
Gigajoule (GJ)	A gigajoule (GJ) is a derived unit of energy in the International System of Units. It equals one billion Joules. The amount of energy represented by one GJ is equivalent to 278 kWh.
Greenhouse gas emissions	Emissions of gasses known to cause warming by trapping heat in the lower atmosphere that otherwise would be lost in space. The main greenhouse gases are carbon dioxide (CO_2), methane (CH_4), chlorofluorocarbons (CFCs), and nitrous oxide (N_2O). The most abundant greenhouse gas is CO_2 – carbon dioxide. Measured in tonnes of carbon dioxide equivalent (tCO_2e).
Ground-mounted solar	Ground-mounted solar panels are anchored to the ground rather than rooftop systems. They can range from single units to much larger arrays covering a field or parking lot.
Heat pumps	Devices that can warm and cool buildings by transferring heat. There are three types: air-to-air, water source, and geothermal – each providing an outside medium for heat transfer. They transfer available heat to spaces requiring heating and transfer heat out of spaces requiring cooling. Because they are heat transfer systems, they are an energy-efficient alternative to furnaces and air conditioners.

Term	Definition
Local improvement charge (LIC)	Charges that a municipality levies on a property to recoup municipal projects' costs directly benefit the property. In 2012, an amendment came into effect that allows Ontario municipalities to use LICs to provide financing for home energy efficiency projects. Repayment of the LIC is often spread over multiple years and remains with the property, not the owner.
Mitigation	Reducing or avoiding the emission of greenhouse gases into the atmosphere to limit the severity of climate change.
Net-zero emissions	A system that generates no greenhouse gas emissions or offsets all its emissions through actions and technologies that remove the amount generated from the atmosphere.
Net-zero ready	Net-zero Ready provides building owners with an achievable first step towards a Net-zero building. Buildings that are Net-zero Ready are built to a high energy efficient standard. The building owner can incorporate renewable energy in the building later and at a lower cost due to reduced energy requirements. For example, a Passive House or Canadian Green Building Council Zero Carbon Building.
Offset	Through carbon offsetting, emission reductions are sold to the purchaser in an "offset". Offsets (measured in tonnes of CO_2e) effectively reduce the purchaser's net emissions.
Passive House	A high-performance building standard. Passive House buildings consume as little as 10% of the energy required to heat and cool traditional buildings.
Recommissioning	Optimizing building performance to reduce energy use and improve occupant comfort. Recommissioning is used in existing buildings and systems to optimize energy efficiency, building operations and improve energy demand management.
Solar photovoltaic (PV)	A device that converts sunlight into electrical energy. A single PV device is known as a cell and can generate a few watts of power. Solar panels can be connected to form solar arrays. Multiple solar arrays can connect to the electricity grid as part of a PV system.
Solar thermal	Solar thermal energy harnesses the sun's energy to heat water, air, or other fluids in industry and the residential, institutional, and commercial sectors. Solar thermal technology uses energy from the sun for domestic water heaters and can be used year-round in Canada.
Stationary Energy	Stationary energy sources are those used in buildings – including homes, stores, offices, and schools. Stationary energy is one of the largest sources of GHG emissions in many communities.

Term	Definition
Thermal energy demand intensity (TEDI)	A measure of the amount of annual heating energy delivered to a building for maintaining its internal temperature. It is calculated by dividing the total energy output from all space conditioning and ventilation equipment (measured in kWh) by the building's enclosed floor area (measured in square metres).
Transportation demand management	The application of policies, programs, and services that redistribute the travel demand on the transportation network, resulting in fewer trips by car and reduced congestion.
Vulnerable Populations	Groups who have a limited capacity to adapt to climate change due to systemic inequalities, thereby making them more vulnerable to negative impacts on health, safety, and security.
Waste diversion	Preventing waste from entering a landfill through reuse, repair, recycling, or composting.

Abbreviations

Abbreviation	Full reference
BAP	Business-as-Planned
CDM	Conservation Demand Management
COP26	26th United Nations Climate Change Conference (Conference of the Parties)
DEER	Deep energy efficiency retrofit
DES	District Energy System
EV	Electric vehicle
FCM	Federation of Canadian Municipalities
GDS	Green Development Standard
GHG	Greenhouse gas
GJ	Gigajoule
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
ICI	Industrial, Commercial, and Institutional
ICLEI	Local Governments for Sustainability (previously known as International Council for Local Environmental Initiatives)
IESO	Independent Electricity System Operator
IPCC	Intergovernmental Panel on Climate Change

Abbreviation	Full reference
LBG	Living Green Barrie
LEED	Leadership in Energy and Environmental Design
LIC	Local Improvement Charge
LSRCA	Lake Simcoe Region Conservation Authority
MDE	Markham District Energy
MMC	Mayors' Megawatt Challenge
NRCan	Natural Resources Canada
OBC	Ontario Building Code
OEB	Ontario Energy Board
OP	Official Plan
PV	Photovoltaic (solar)
RCO	Recycling Council of Ontario
RER	Regional Express Rail
SAG	Stakeholder Advisory Group
tCO_2e	Tonnes of carbon dioxide equivalent
TDM	Transportation demand management
TEDI	Thermal energy demand intensity
TGS	Toronto Green Standard
ZEN	Zero-emissions neighbourhood

Executive Summary

Introduction

Energy is part of our daily lives – it powers our homes and appliances, fuels our local businesses, and moves us around the City. Access to efficient and reliable energy plays a key role in our economy and our quality of life. While energy will continue to play a key role in our future, **our relationship with it needs to change**. Reducing our reliance on fossil fuels is essential to mitigating climate change, and will improve the health of our residents, our local economy, and the environment.

In 2019, Barrie City Council declared a **climate emergency** and adopted a Climate Change Mitigation Plan to reach Barrie's corporate GHG emissions target of net-zero by the year 2050.

Developing this plan to reduce our community's energy use and emissions – *Inspiring Climate Action in Barrie* - was the next logical step in our journey. This plan will help the community better understand current energy consumption, identify energy efficiency opportunities, and help meet the community's climate priorities.

Together, we can collectively re-imagine the way we travel, work, and play to maximize the positive benefits to our environment, health, economy – making Barrie a better place to live for everyone.

Barrie's Energy Use & Emissions

Without further climate action, Barrie's community energy use is estimated to increase by 36% by 2050, and GHG emissions are expected to increase by 40% by 2050, compared to 2018 levels.

The Barrie community aims to reduce overall GHG emissions 45% below 2018 levels by 2030 and to become net-zero by 2050.

Barrie's Big Moves for Climate Action

Our Plan outlines four **'Big Moves' - buildings, transportation, circular economy, natural environment and land use**. Overall, the Big Moves aim to achieve:

- Near-zero emissions in new and existing buildings
- Near-zero emissions from transportation
- Waste reduction through a circular economy

Our Energy & GHG Emissions Snapshot (2018)

- As a whole, we used over **20 million GJ** of energy. This equates to about **132 GJ per person**.
- Our energy use produced **over a million tonnes** of carbon dioxide equivalent – almost **seven tonnes per person**.
- We spent $**598 million** on energy (most of which left our local economy).
- The average person spent **$3,870** on annual energy costs.
- Our **homes, buildings and travel** use the most energy, generate the most emissions and energy costs.
- In terms of transportation, **private vehicle use** is responsible for the largest use of energy and emissions.
- Without action, **our energy use will increase by 36% and our emissions will increase by 40%** by 2050.
- Associated **energy costs could increase by as much as 60%.**

- Livable neighbourhoods that support energy efficiency, mixed-use, complete communities, and environmental protection

Buildings

Buildings are responsible for more than 40% of our community-wide emissions. There are six strategies in the Buildings Big Move.

The first two strategies – Deep Energy Efficiency Retrofit Program and Green Development Standard – will be critical in achieving the plan's emission reduction targets. The other four strategies include advancing energy management and benchmarking in industrial buildings, installing solar generation, exploring the creation of a district energy system, and exploring the development of large-scale renewable and energy storage infrastructure projects.

Transportation

Transportation is responsible for more than 55% of our community-wide emissions, with most of this attributed to personal vehicles. The Transportation Big Move involves five strategies that prioritize a shift away from single-occupancy, fossil-fuel powered vehicles to other modes of travel. These include investing in local public transit options (Barrie Transit) and supporting transit-oriented development, working with Metrolinx to increase GO Train use, promoting walking, cycling and rolling by expanding active transportation routes, promoting car-sharing, and advancing the adoption of electric vehicles.

Circular Economy

Creating a Circular Economy is about shifting the perception of "waste" towards being viewed as a resource. The City of Barrie is committed to the continual development of policies around a Circular Economy Framework. This includes four pillars for encouraging reuse, recycling, responsible consumption, and recovery. The Circular Economy Big Move strategies include strengthening the community sharing economy, phasing-out single-use plastics, energy recovery from waste management activities, and encouraging circular construction.

Natural Environment & Land Use

Our final Big Move, Natural Environment & Land Use includes four strategies that cover the protection and expansion of natural assets that sequester carbon, promoting a culture of growing and buying local food, and creating high-density and mixed-use neighbourhoods that use less energy, are transit and active transportation oriented, and reduce residents' commuting times through better mobility options. This Big Move includes the possibility of developing a Zero Emissions Neighbourhood (ZEN) in either a new or existing neighbourhood within the city.

Implementation

***Inspiring Climate Action in Barrie* is a plan for our entire community**. The strategies outlined within each Big Move require significant effort and collaboration between all community members, including businesses, institutions, residents, and the City of Barrie to achieve these reductions. A gap will likely remain to achieving net-zero, which will require the City to consider potential offset measures, and advocacy with the provincial and federal governments to implement additional climate-supportive policies that bolster local climate action.

Our Plan therefore outlines implementation components and key actions to begin immediately. The proposed governance model calls for the creation of an Internal Working Group comprised of cross-departmental staff to lead the implementation of City-led actions, and a series of Action Tables consisting of both staff and external stakeholders to lead the implementation of

community actions. The Plan also requires ongoing operational funding, including full-time dedicated staff resource(s) to serve as Staff Lead(s) responsible for the overall coordination of the Plan's implementation, and for providing regular progress updates.

Key considerations for engagement and communications, as well as potential partners and their suggested roles in supporting implementation, are also identified. The plan concludes with a list of immediate actions to start the Plan's strategies that should be completed in the next one to three years.

How to Read this Plan

Inspiring Climate Action in Barrie is presented in three parts. **Part 1** – this document – **focuses on the "why"**. It presents where we are now and the rationale for taking climate action at the local level. **Part 2 focuses on the "what"** and outlines the strategies we need to reduce our energy use and emissions collectively. Finally, **Part 3 focuses on the "how"** and provides actionable next steps for moving this plan forward. These three parts are envisioned as "chapters in a book" and should be read in tandem.

Introduction

The Need for a Plan

Why Develop a Community Energy & Emissions Reduction Plan?

Energy is a part of our daily lives – it powers our homes and appliances, fuels our local businesses, and moves us around the City. Access to efficient and reliable energy plays a key role in our economy and our quality of life. While energy will continue to play a key role in our future, **our relationship with it needs to change**. Through public consultation, we heard that the Barrie community cares about reducing local energy-use so that we can fight climate change and reduce pollution, improve our air quality, and save residents money. We can collectively re-imagine the way we travel, work, and play to maximize the positive benefits to our environment, health, economy – making Barrie a better place to live for everyone. This plan - *Inspiring Climate Action in Barrie* - is our community's collective opportunity to address climate action.

Impacts on Our Environment

The use of fossil fuels - such as coal, petroleum, and natural gas - emit greenhouse gases (GHG) that trap heat within the earth's atmosphere and contribute to warming the planet. This warming leads to changes in the average weather conditions around the world, which is known as climate change.

On a global scale, 2020 was the hottest year on record (tied with 2016)[1]. In 2015, nearly 200 countries developed the Paris Agreement to keep the global average temperature rise well below two degrees Celsius. Science tells us that surpassing this 2°C threshold would result in a significant increase in the severity, frequency, and duration of extreme heat periods around the world. This would also result in significantly greater risk to the Antarctic ice sheet melting, which would contribute to higher global average sea-level rise and a dramatic increase in extreme flooding events[2].

Within the Paris Agreement, there was a further push to drive efforts to limit the temperature increase to 1.5 degrees Celsius[3]. In 2018, underscoring the need for urgent action, the Intergovernmental Panel on Climate Change (IPCC) released a special report on the impacts of a global temperature rise of 1.5°C. Limiting global warming to 1.5°C would lessen the risks to health, livelihoods, food security, water supply, and economic growth. The IPCC indicates that limiting warming to 1.5°C "would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems"[4]. In August

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[1] NASA. (2021). *2020 Tied for Warmest Year on Record, NASA Analysis Shows*. Retrieved from https://www.nasa.gov/press-release/2020-tied-for-warmest-year-on-record-nasa-analysis-shows
[2] NASA. (2019). *A Degree of Concern: Why Global Temperatures Matter.* Retrieved from https://climate.nasa.gov/news/2865/a-degree-of-concern-why-global-temperatures-matter/
[3] Government of Canada. (2016). *The Paris Agreement*. Retrieved from https://www.canada.ca/en/environment-climate-change/services/climate-change/paris-agreement.html
[4] Intergovernmental Panel on Climate Change. (2018). *Special Report: Summary for Policymakers.* Retrieved from https://www.ipcc.ch/sr15/chapter/spm/

2021, the IPCC issued a 'reality check,' warning that without immediate, rapid, and large-scale GHG reductions, limiting warming to 1.5°C or even 2°C will not be possible[5].

Locally, Barrie residents have seen increased intense storms (such as the tornado in July 2021, which displaced more than 100 residents[6]) and extreme cold and hot days. In 2017, the City developed a Climate Change Adaptation Strategy, which projected Barrie's climate to 2080 - including higher temperatures, more intense precipitation, and more extreme weather events. The Adaptation Strategy consisted of a number of actions to increase local resilience to the consequences of climate change. In 2018, an Implementation Plan was developed that has guided the implementation of these actions.

Taking climate action now will help to preserve greenspace, maintain habitats and ecosystem services, and reduce pollution. Furthermore, natural assets can help us adapt to a changing climate through stormwater management and a reduction in the urban heat island effect[7].

Barrie's climate is changing

Barrie has already seen notable changes in its climate and local weather. Increases in average annual temperatures, changes in the timing and amount of precipitation and increases in the intensity, duration and frequency of extreme storm events have already been seen locally.

These local climate impacts, which include more severe ice storms, windstorms, flooding events, heatwaves, and watermain breaks, have resulted in significant costs to Barrie residents and damage to infrastructure. For example, the March 2016 ice storm damaged or destroyed trees on 70% of Barrie's streets and resulted in more than $25 million in insurance claims.

The July 2021 tornado left 71 homes uninhabitable and caused $75 million in insurable damage. Meanwhile, heavier summer rainfalls are causing certain streets in Barrie to experience regular flooding, causing extensive damage to basements, vehicles, and other assets. The costs of these impacts are projected to increase without climate adaptation and mitigation strategies.

Paglinawan, D. (2021). *Tornado that hit Barrie caused $75 million in insured damages: Insurance Bureau*. CP24. Retrieved from https://www.cp24.com/news/tornado-that-hit-barrie-caused-75-million-in-insured-damages-insurance-bureau-1.5552266?cache=%3FautoPlay%3FclipId%3D104070%3FautoPlay%3Dtrue
City of Barrie. (n.d). *Climate Change Adaptation*. Retrieved from: https://www.barrie.ca/Living/Environment/Conservation/Pages/Climate-Change.aspx

[5] Intergovernmental Panel on Climate Change. (2021). *Climate change widespread, rapid, and intensifying - IPCC*. Retrieved from https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/
[6] Paglinawan, D. (2021). *Tornado that hit Barrie caused $75 million in insured damages: Insurance Bureau*. CP24. Retrieved from https://www.cp24.com/news/tornado-that-hit-barrie-caused-75-million-in-insured-damages-insurance-bureau-1.5552266?cache=%3FautoPlay%3FclipId%3D104070%3FautoPlay%3Dtrue

[7] Federation of Canadian Municipalities. (2021). *Strengthening your community's approach to climate change with green infrastructure.* Retrieved from https://fcm.ca/en/case-study/mcip/strengthening-your-communitys-approach-climate-change-green-infrastructure

Temperature

- Barrie can expect to see an annual increase in mean temperature of approximately 3°C by 2050 and 4.7°C by 2080
- Greatest warming will occur in the spring and summer
- Increase in the number of hot days (days >30°C) from 4 days per year between 1971-2000 to 28 days per year by 2050 and 49 days by 2080
- Heatwaves projected to become more frequent and prolonged
- Increased surface warming of lakes, rivers, and streams
- Greater variability in winter temperatures, including more freeze/thaw events

Precipitation

- Annual increase in precipitation by 72.9 mm by 2050 and 106.3 mm by 2080
- Increase in precipitation in the winter, spring, and fall
- Decrease in precipitation in summer
- Decrease in annual snowfall, with more winter precipitation falling as rain instead of snow
- Increased incidents of freezing rain

Extreme Events

- Increase in the intensity, duration, and frequency of extreme rainfall events
- Historically rare extreme rain events will occur almost twice as often by mid-century
- Increased occurrences of storm events (ice storms, thunderstorms, etc.)

Impacts on Our Health

The Simcoe Muskoka District Health Unit has identified climate change as a priority health issue. Climate change can negatively impact our health; however, equity-seeking populations are disproportionately impacted. By taking local action, we have an opportunity to lessen negative health impacts and improve overall health outcomes for our residents.

Reducing our reliance on fossil fuels in favour of active transportation improves air quality, increases physical activity, and results in measurable reductions in mortality rates[8]. One study found that cycling could reduce mortality rates by 40%[9]. Built environments designed for active transportation and public transport support improved physical fitness, mental health and wellbeing, and stronger community networks[10]. Energy efficiency retrofits can help to lessen the

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[8] Government of Ontario. (2017). *Community Emissions Reduction Planning: A Guide for Municipalities*. Retrieved from http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2018/013-2083.pdf

[9] JAMA Internal Medicine. (2000). *All-Cause Mortality Associated With Physical Activity During Leisure Time, Work, Sports, and Cycling to Work.* Retrieved from https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/485349

[10] Government of Ontario. (2017). *Community Emissions Reduction Planning: A Guide for Municipalities*. Retrieved from http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2018/013-2083.pdf

impact of extreme heat and cold events on residents, especially amongst vulnerable populations such as the elderly[11].

Impacts on Our Economy

Taking action on climate change is good for our local economy. Reducing our reliance on fossil fuels and generating more green energy in Barrie means that more of the money spent on energy will stay in our community, drive technical and social innovation, and attract private investment. Additional economic benefits of climate action include:

- Cost savings on energy and water use, as well as healthcare costs
    - Efficiency programs in Canada have been shown to generate $3 to $5 of savings for every $1 of program spending[12]
- Creation of additional jobs in emerging sectors and the attraction of high-quality workers
    - Clean energy generation is generally more labour-intensive and can generate twice as many jobs in the short-to-medium-term[13]
- Reduced costs for municipal infrastructure (capital and operating) for high-density, transit-oriented development
    - A recent study conducted for the City of Ottawa found that servicing low-density homes on undeveloped land costs $465/person, while high-density infill development pays for itself and saves $606/person each year[14]

Climate Equity Impacts

Climate change does not impact everyone in our community in the same way. It is well-recognized that certain groups – such as seniors, racialized communities, and systemically marginalized communities – are more vulnerable to the effects of a changing climate[15]. Inequities can be further reinforced due to climate impacts that cause or lead to a loss of income or

Climate adaptation aims to reduce the effects of climate change on built, natural and social systems. In 2017, the City of Barrie developed its Climate Adaptation Strategy. Climate adaptation and mitigation – the focus of this plan – are closely linked. Mitigation focuses on reducing the overall amount of GHGs in the atmosphere. Both adaptation and mitigation efforts need to be implemented to ensure a safe, healthy and climate-resilient community.

While the strategies outlined in this plan focus on mitigation, many also have adaptation benefits. For example, planting trees not only sequesters carbon (mitigation), but also provide shade and relief during extreme heat events (adaptation).

City of Barrie (2017). *Climate Change Adaptation Strategy*. Retrieved from: https://www.barrie.ca/Living/Environment/Conservation/Pages/Climate-

[11] Ibid.
[12] Ibid.
[13] World Resources Institute. (2020). *10 Charts Show the Economic Benefits of US Climate Action*. Retrieved from https://www.wri.org/insights/10-charts-show-economic-benefits-us-climate-action
[14] CBC News. (2021). *Suburban expansion costs increase to $465 per person per year in Ottawa.* Retrieved from https://www.cbc.ca/news/canada/ottawa/urban-expansion-costs-menard-memo-1.6193429#:~:text=Suburban%20expansion%20costs%20increase%20to%20%24465%20per%20person%20per%20year%20in%20Ottawa,-Infill%20development%20is
[15] Joseph Rowntree Foundation. (2014). *Climate change and social justice: an evidence review.* Retrieved from https://www.jrf.org.uk/report/climate-change-and-social-justice-evidence-review

personal assets[16]. Low-income populations living in less-energy efficient housing are at risk of extreme temperatures and reduced air quality. Exposure to extreme temperatures and reduced air quality negatively impacts physical and mental health[17,18]. Despite having lower carbon footprints, lower-income households spend more on energy and have less disposable income to spend on necessities and dedicate to climate mitigation and adaptation[19].

The impacts of climate change also affect future generations and people living in developing nations disproportionately. Our children and grandchildren will experience impacts of climate change in the future that are locked-in based on emissions emitted in the present[20]. Developing nations, particularly small island states, are most impacted by climate change as they generally have fewer resources to prevent and respond to these impacts. Climate change also has the potential to reverse economic development and deepen existing social inequalities in these countries[21].

Municipalities play an important role in ensuring that policies meant to address climate change reduce these inequities. As a community, it is our responsibility to ensure that everyone can benefit from the opportunities presented by local climate action and to do our part in addressing the global climate crisis.

Benefits of Taking Action

Actions we take collectively at the local level can help make Barrie a desirable place to live, work and play for years to come. Taking action now to reduce energy use will have many benefits to our community. Municipalities worldwide report several benefits to local climate action, including positive social, health, and economic outcomes and overall environmental benefits. The co-benefits most commonly referenced by North American cities include[22]:

- A shift to more sustainable behaviours amongst residents, such as changes in diet and reduced consumption.
- Using food, water, and energy resources more efficiently to meet the population's needs.
- Enhanced resilience to extreme events, such as flooding.
- Improved public health due to improved air quality, increased activity through active transportation, increased access to healthy foods locally, and improvements in the social and ecological determinants of health and equity.
- A greener and more sustainable local economy.

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[16] Department of Economic & Economic Affairs. (2017). *Climate Change and Social Inequality*. Retrieved from https://www.un.org/esa/desa/papers/2017/wp152_2017.pdf
[17] The Atmospheric Fund. (2019). *Inequalities in climate change: the impacts of policy on people.* Retrieved from https://taf.ca/wp-content/uploads/2019/07/Inequities-in-Climate-Change-July-2019.pdf
[18] Ibid.
[19] Ibid.
[20] The New York Times. (2021). *Climate Disruption Is Now Locked In. The Next Moves Will Be Crucial.* Retrieved from https://www.nytimes.com/2020/09/22/climate/climate-change-future.html
[21] Government of Canada. (2020). *Climate change in developing countries*. Retrieved from https://www.international.gc.ca/world-monde/issues_development-enjeux_developpement/environmental_protection-protection_environnement/climate-climatiques.aspx?lang=engonal.gc.ca
[22] Chronic Disease Prevention. (2020). *The Co-Benefits of Climate Action.* Retrieved from https://www.cdp.net/en/research/global-reports/co-benefits-climate-action

Municipal Climate Action

Municipalities have a role to play in reducing energy use and GHG emissions. It is estimated that, collectively, our communities (cities and towns) account for up to 70% of global emissions[23]. The City of Barrie has been actively engaged in climate action for almost two decades. Highlights of the City's achievements include:

- In 2012, the City developed its Sustainable Waste Management Strategy to promote waste reduction and diversion. The City is currently in the process of developing its first Circular Economy Strategy.
- Establishment of an energy management branch, which has realized over $9.4 million in cost avoidance and generated over $1.6 million of incentive revenue since its inception in 2013.
- In 2015, the City converted over 10,000 streetlights to LEDs. This has resulted in $575,000 of energy costs avoided each year.
- The City was awarded by the Mayor's Megawatt Challenge (MMC) Program multiple times. The award recognizes municipalities from across Ontario that reduce energy consumption within a facility by 10% year over year. City Hall, the Allandale Recreation Centre, and East Bayfield Community Centre have been recognized by the MMW program.
- The City has representatives that participate in the Simcoe Muskoka Climate Change Exchange.
- Water Operations and Energy Management staff launched an optimization team that works to identify conservation opportunities at the Water Treatment Facilities. The latest project reduced electricity consumption by 20% through January and February 2019, realizing a cost avoidance of $20,000.
- The Wastewater Operations Branch has reduced potable water usage by 95% since 2015 reducing operating costs by $1.25 million over this period.
- In 2017, the City developed a Climate Change Adaptation Strategy that outlines actions to increase local resilience to climate change. In 2018, the City developed an Implementation Plan for the Adaptation Strategy that has guided implementation of these actions.
- In 2019, the City adopted its Transportation Master Plan which includes network plans for future transit, active transportation, and trails, and policies to promote inclusive multimodal mobility and safety.
- Developing the 2020-2024 Conservation Demand Management (CDM) Plan to reduce further the energy intensity of City facilities and drinking water and wastewater processes.
- Approved the Barrie Transit Field Trip Pass Program (providing barrier-free access to Barrie Transit for elementary-aged students, their teachers, and chaperones). Barrie Transit also provides free transit to youth 12 and under.

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[23] UN-Habitat. (2011). *Global Report on Human Settlements 2011 Cities and Climate Change, United Nations Human Settlements Programme*. Retrieved from https://unhabitat.org/sites/default/files/download-manager-files/Cities%20and%20Climate%20Change%20Global%20Report%20on%20Human%20Settlements%202011.pdf

- In 2020, the City added 27 km of bike lanes, urban shoulders, sidewalks, and trails for a total of 1000 km of active transportation routes in Barrie.
- In June 2021, Council endorsed transitioning the transit fleet to battery-electric buses. A pilot program is currently under development.
- In June 2021, Council endorsed in principle the conversion of the City's corporate fleet (non-transit vehicles) to lower/zero-emission vehicles through a phased program. The program will be developed over 2022/23.
- Developing a new Official Plan (OP). The OP includes several founding principles, which align with advancing climate action through land use that creates healthy, complete, and safe communities, supports connectivity and mobility, and is green and resilient.

In the past few years, energy and climate change issues have become even greater priorities for City Council and staff. Through developing the Council Strategic Priorities for 2018-2022, Council elevated the discussion on climate change by requesting that "mitigating and adapting to climate change" be added to the priority of "Building a greener Barrie." Through these efforts, the City has demonstrated significant progress towards addressing climate change within its operations and establishing frameworks for community action.

Recently, communities worldwide have increasingly been calling governments to act on climate change at the local level. In September 2019, several hundred residents took to the streets of Barrie, asking for climate action. At the same time, Barrie Council declared a climate emergency. Later that year, Council subsequently adopted a Climate Change Mitigation Plan to reduce Barrie's corporate GHG to net-zero by the year 2050. Residents and grassroots organizations continue to call for collective climate action in Barrie[24,25].

Developing *Inspiring Climate Action in Barrie* was the next logical step in Barrie's climate action journey. The plan will help the community better understand current energy consumption, identify energy efficiency opportunities, and help meet the community's climate priorities.

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[24] D. Roberts, CTV News. (2021). *Barrie climate group calls for heightened focus on climate change.* Retrieved from https://barrie.ctvnews.ca/barrie-climate-group-calls-for-heightened-focus-on-climate-change-1.5401878

[25] R. Vanderline, Barrie Advance, Simcoe County. (2021). *'I'm gonna choose hope': Climate change fighter calls on Barrie residents to get involved.* Retrieved from https://www.simcoe.com/news-story/10471974--i-m-gonna-choose-hope-climate-change-fighter-calls-on-barrie-residents-to-get-involved/

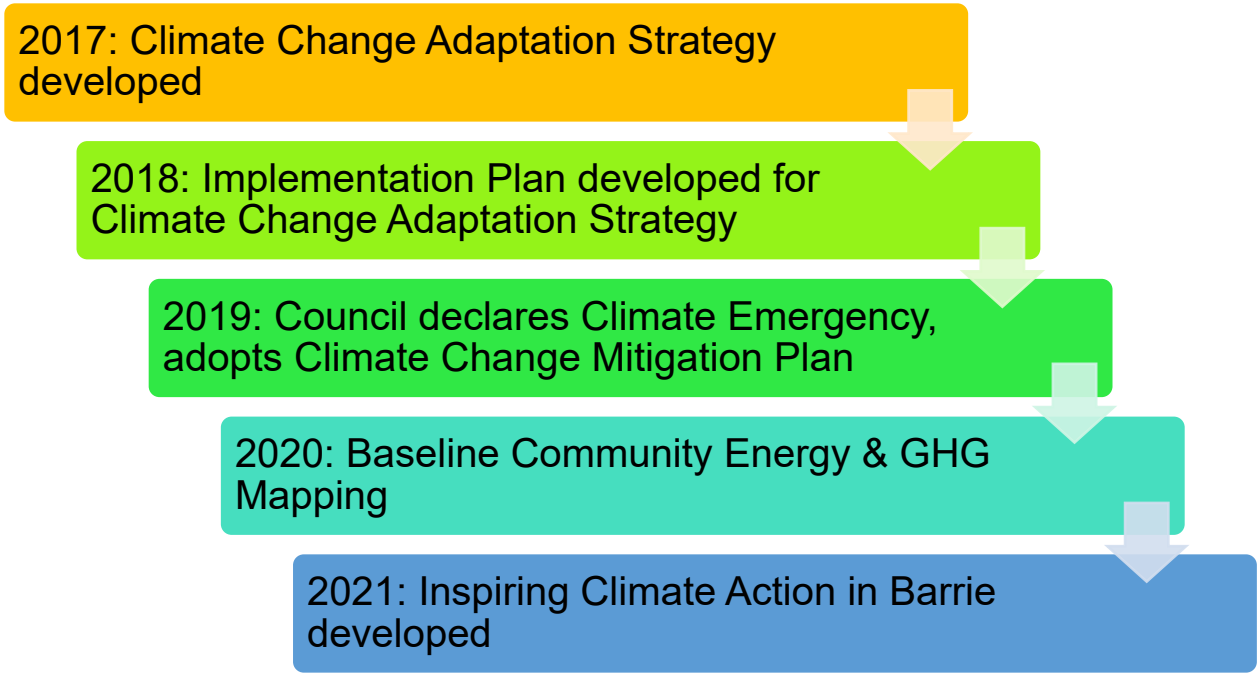

Figure 1: Barrie's Climate Action Journey

Understanding our Energy Use & Emissions

Our Energy Use & Emissions Now

In 2018[26], Barrie's residents and businesses used 20.4 million GJ of energy to heat and power their homes and buildings and for transportation fuel within the City. As a community, we spent over $598 million on energy in 2018 alone. The average person used 132 GJ of energy per year and spent $3,870 on energy. More than one-quarter of households in Barrie (about 11,500 households) have a high home energy cost burden[27]. This means that these households spend six percent or more of their after-tax income on home energy.

[26] When developing our plan, 2018 was used as the baseline since this was the most recent year with complete data available.
[27] Canadian Urban Sustainability Practitioners. (n.d). *Energy Poverty and Equity Explorer, Housing & Demographics Theme*. Retrieved from https://energypoverty.ca/mappingtool/

Residential, commercial, institutional and industrial buildings accounted for 57% of energy consumption and 45% of energy costs. Transportation fuel use contributed 43% of all energy and 55% of energy costs, most of which was personal vehicle use.

Research conducted by the University of Toronto and Lakehead University (Orillia) provides an estimate of current and potential **carbon sequestration** within Barrie (within Lake Simcoe watershed only). Current landcover (forests and wetlands) sequesters an estimated 11,800 tonnes/per year. With additional restoration opportunities, landcover could sequester approximately 12,500 tonnes/year. This would represent about 5% of the carbon emissions per year if it were to include street trees and Nottawasaga Valley Conservation Area lands.

Source: Lake Simcoe Region Conservation Authority. (2020). *Climate Change Mitigation Strategy for the Lake Simcoe Watershed*. Retrieved from: https://www.lsrca.on.ca/Shared%20Documents/reports/Climate-Change-Mitigation-Report.pdf

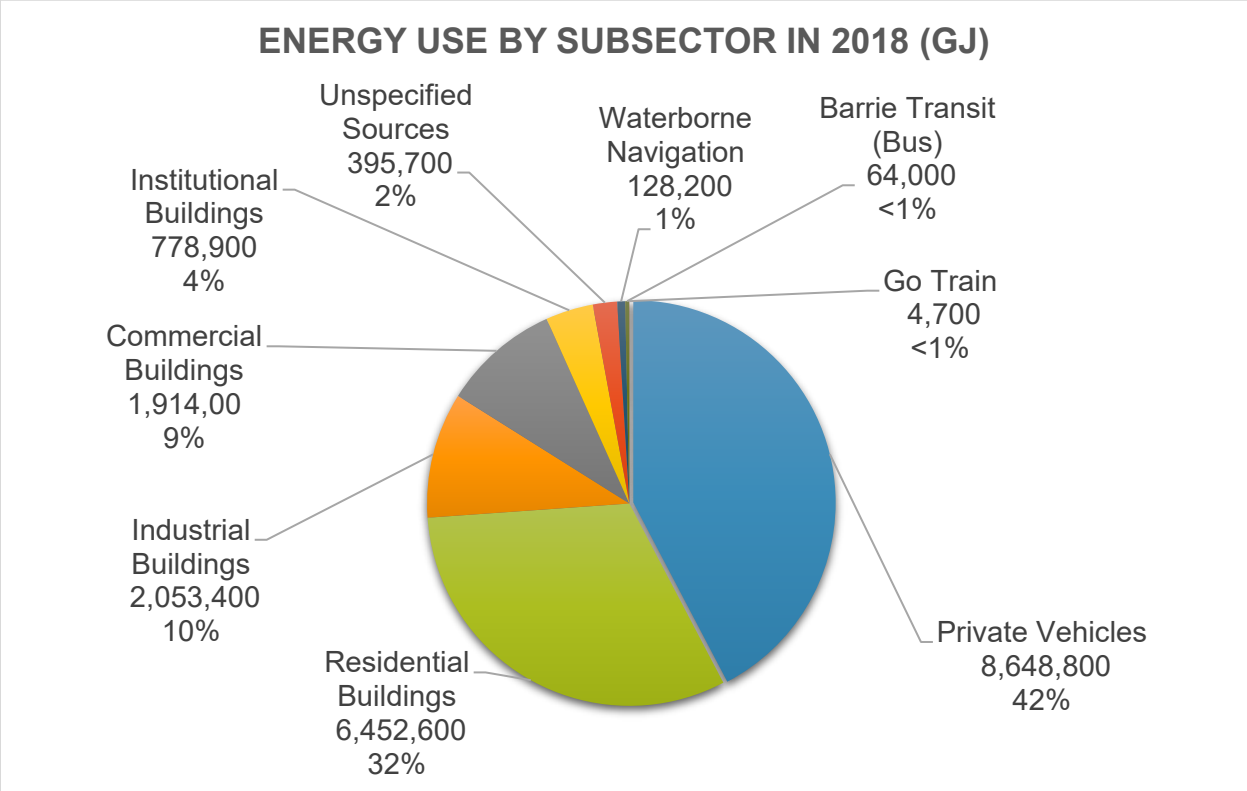

Figure 2: Energy consumption by subsector in 2018 (GJ)

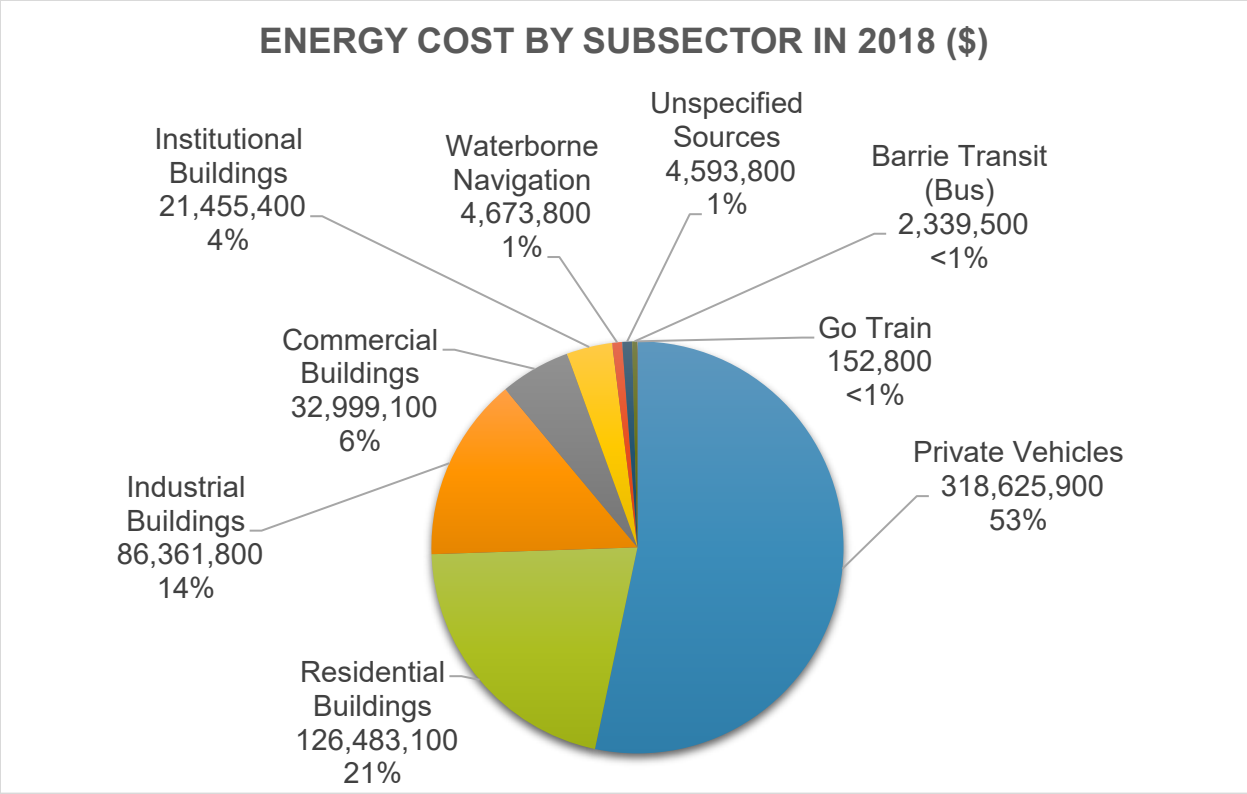

Figure 3: Energy expenditures by subsector in 2018

When looking at energy use by fuel type, gasoline was the most significant fuel type used across all sectors, making up 39% of fuel consumption, followed by natural gas at 33%. As a general rule, gasoline and natural gas produce more emissions than electricity, which is comparatively "clean" in Ontario.

Although residents and businesses in Barrie spent $598 million on energy in 2018, most energy dollars left the community. In fact, 87% of the money spent on energy left the local economy and ended up elsewhere in Ontario, Canada, and in some cases in the United States. Using the City of London as an example, a typical city in Ontario may see as much as 90% of all energy costs leaving the community.

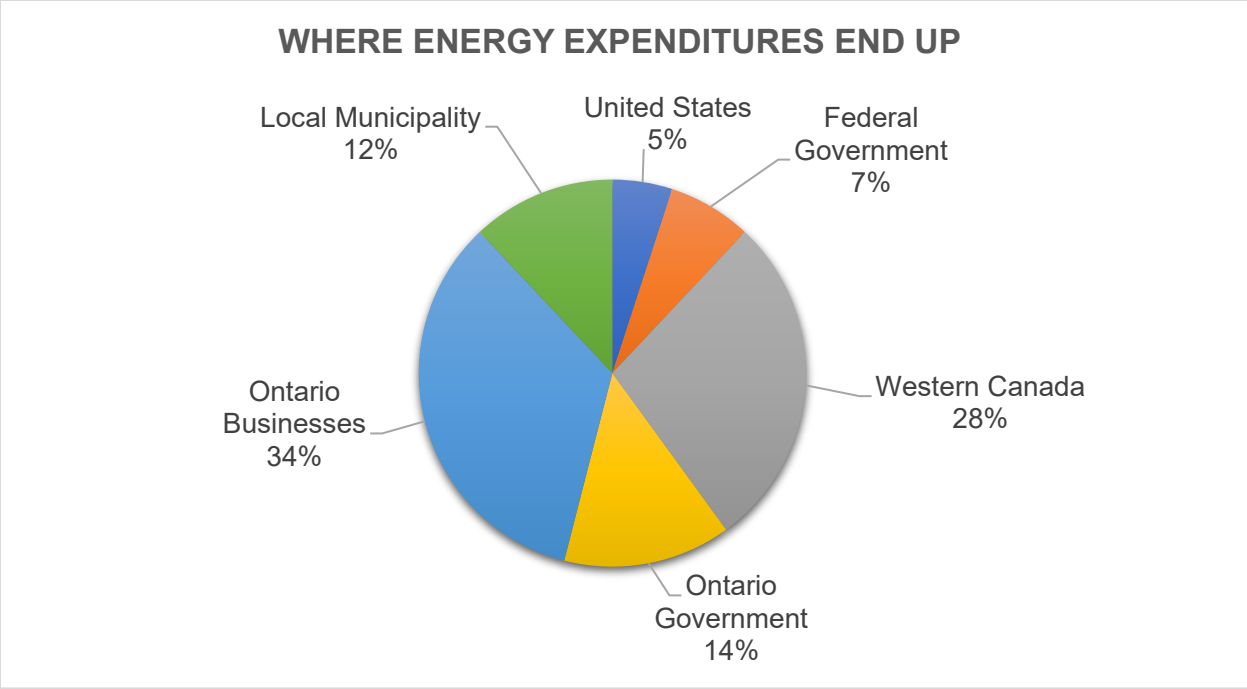

Figure 4: Energy expenditures in Ontario Cities (example)[28]

In 2018, the community of Barrie generated 1.07 million tonnes of carbon dioxide equivalent (tCO_2e), equivalent to the annual emissions from 230,000 cars, and 6.9 tCO_2e per capita.

[28] Quest Canada. (2016). *Community Energy Planning: The Value Proposition.* Retrieved from https://questcanada.org/wp-content/uploads/2018/08/Community-Energy-Planning-The-Value-Proposition_Full_Report_2016.pdf

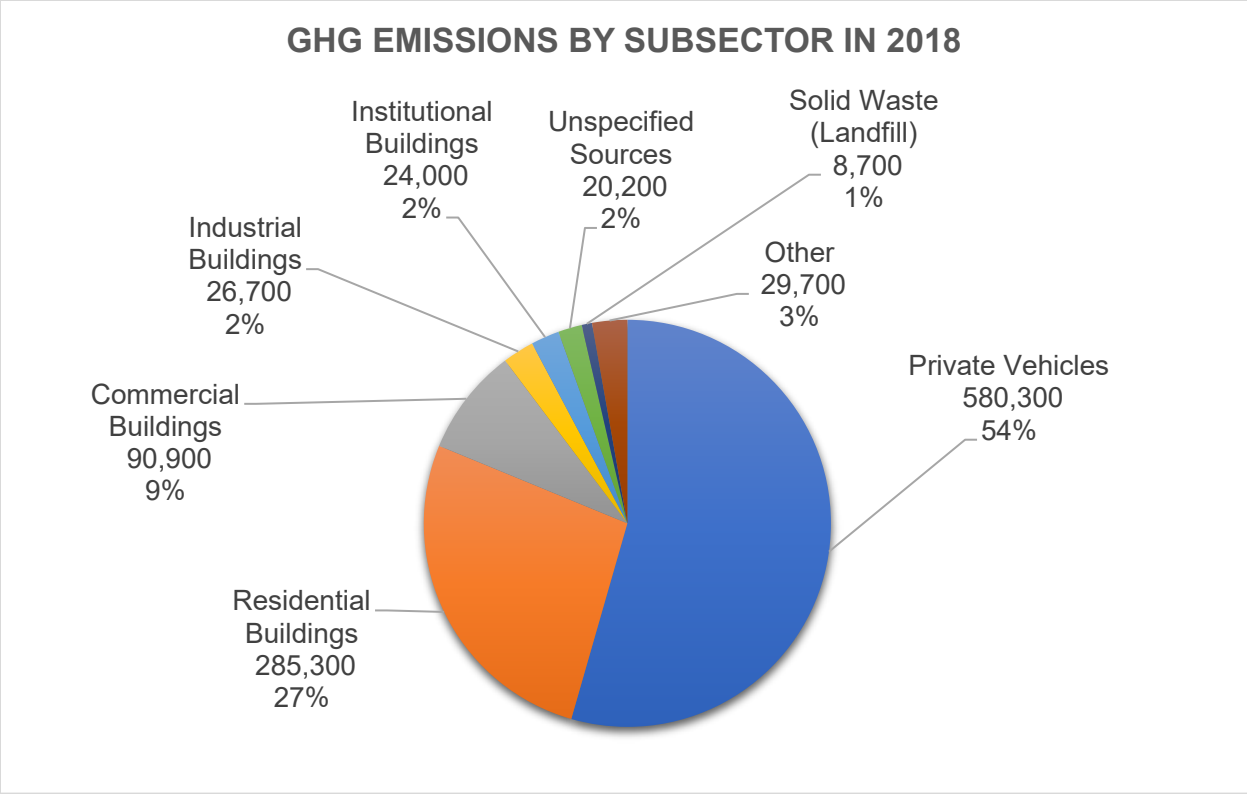

Figure 5: GHG emissions by subsector in 2018 (tonnes of carbon dioxide equivalent)

Our Energy Use & Emissions in the Future

A Business-as-Planned (BAP) scenario was developed to understand Barrie's future energy use, costs, and emissions. The BAP assumes that no action is taken to reduce energy or emissions. It is estimated that without any local climate action, energy use will increase by 36% from 2018 to 2050.

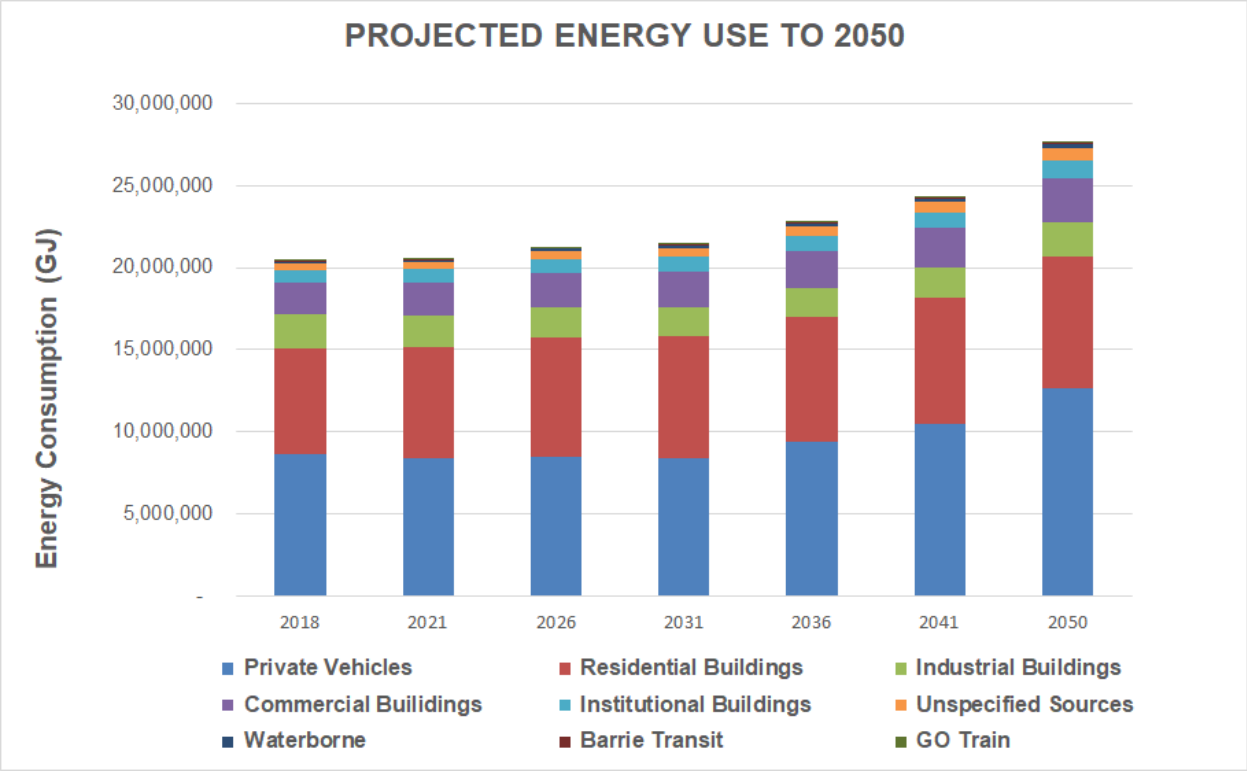

Figure 6: Projection of energy use under a business-as-planned scenario, by subsector

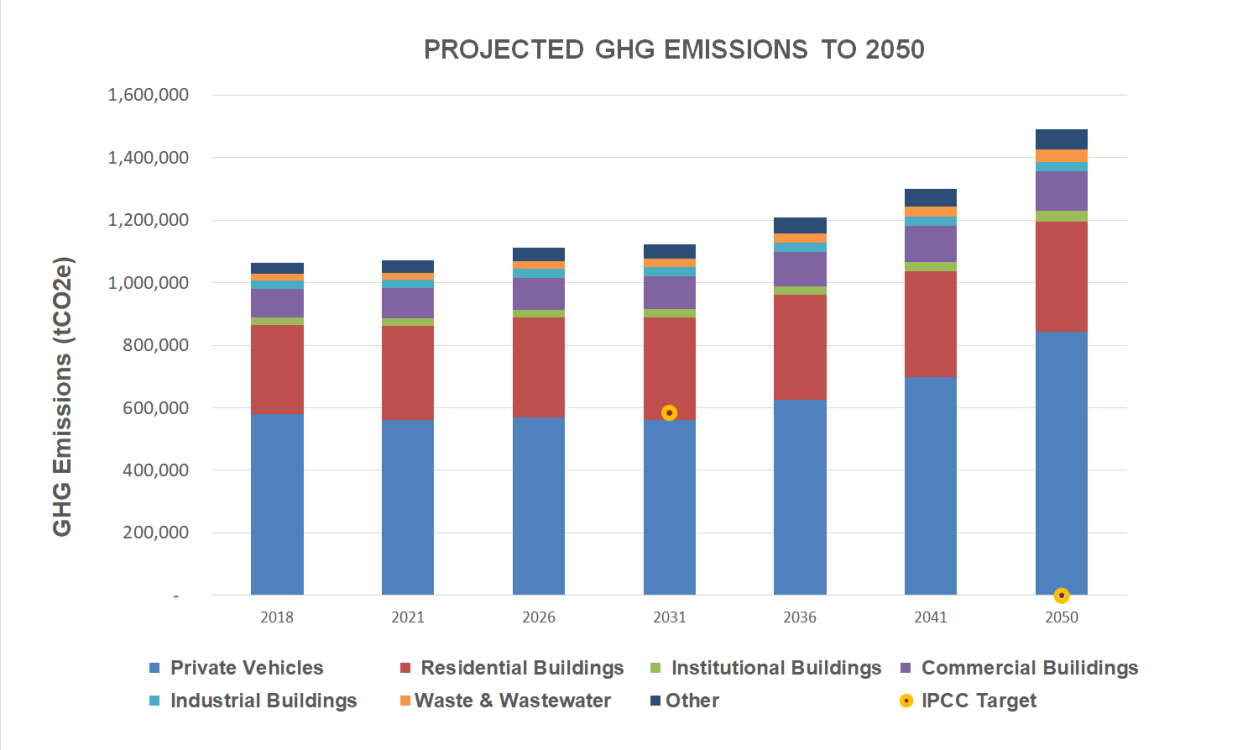

Figure 7: Projection of GHG emissions under a business-as-planned scenario, by subsector

GHG emissions are expected to increase by 40% by 2050 from the 2018 baseline under the business-as-planned scenario.

The modelled BAP scenario accounts for projected population and employment growth. Growth in Barrie will lead to more houses, more businesses, more cars on the road, and more waste, and therefore increases to energy consumption and emissions. Changes that occur outside the influence of the municipality will also influence Barrie's energy consumption and emissions in the future. This might include actions from higher levels of government and technology changes driven by broader economic trends. For example, due to the shutdown of the Pickering nuclear power plant and the refurbishment of the Darlington and Bruce nuclear power stations, Ontario's energy grid could potentially become more emissions-intensive in the future if supply is sourced from higher-carbon fuels[29].

The BAP also includes a forecast of energy costs in Barrie for residents and businesses. The Canada Energy Regulator projects what the energy prices could look like in the future under two scenarios. We have modelled a "high-cost" future where energy prices increase considerably and a "low-cost" future where energy prices increase by a smaller amount or decrease. Both cost scenarios were used to develop a range of expected energy expenditures for the Barrie community in the BAP scenario.

[25] TVO. (2019). *Why Ontario's Electricity is about to get dirtier*. Retrieved from https://www.tvo.org/article/why-ontarios-electricity-is-about-to-get-dirtier

Under the high-cost scenario, energy costs are expected to increase by 61% by 2050 from the 2018 baseline. Under the low-cost scenario, energy costs are expected to increase by 21% by 2050 from the 2018 baseline.

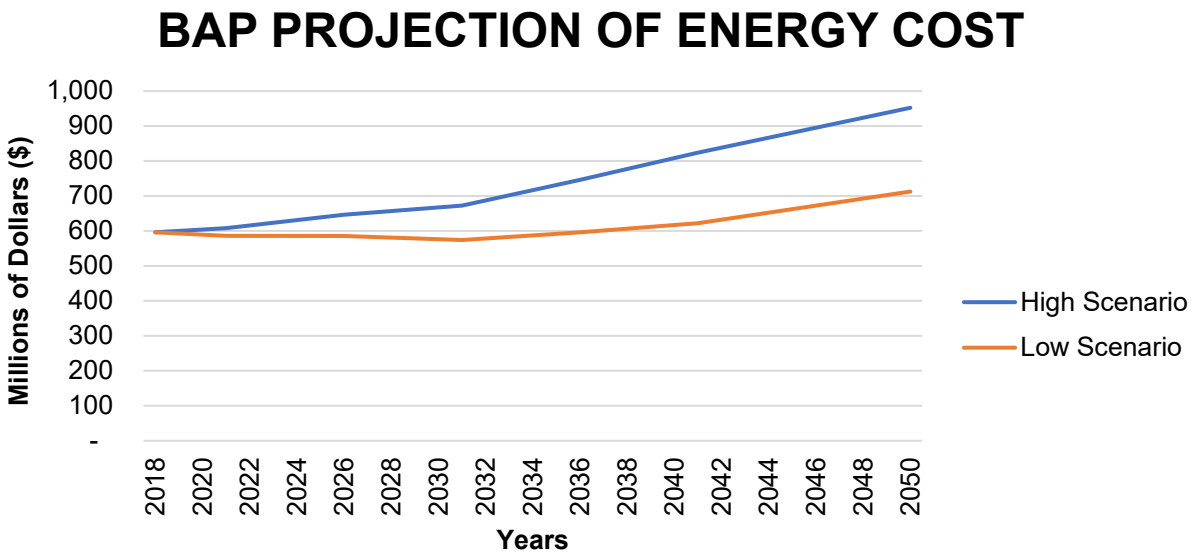

Figure 8: Projection of energy expenditures under a business-as-planned scenario, under a low and high-cost scenario

Developing Our Plan

Stakeholder & Community Engagement

The Development of *Inspiring Climate Action in Barrie* began in early 2020 with the formation of a Stakeholder Advisory Group (SAG). The SAG met regularly throughout the plan's development and advised on all key elements – from vision and overall direction to emissions reduction targets and plan implementation. All meetings occurred virtually due to COVID-19 restrictions.

The SAG included representation from various stakeholders, including members from local utilities, school boards, Conservation Authorities, staff and Council, post-secondary institutions, the development industry, the Simcoe Muskoka District Health Unit, local business, and local environmental groups.

Community	•Building Barrie Digital Engagement •Virtual Public Engagement Meeting •Building Barrie Digital Engagement
Stakeholder Advisory Group	•Seven Virtual Meetings throughout the Plan Development Process
Stakeholders	•One-on-One and Small Group Discussions

Three rounds of community engagement also informed the plan's development. The first, an online survey through Building Barrie, occurred in the fall of 2020. The survey solicited high-

level feedback on energy use and climate change, Barrie's ideal energy future, and opportunities for residents, businesses, institutions, and the City to take action. A second opportunity for feedback was provided in the spring of 2021 through a virtual public engagement meeting. The meeting provided community members with a chance to learn more about the project and contribute to the energy and GHG reduction strategies relating to buildings, transportation, waste, land use and natural assets. Additional opportunities to provide feedback after the meeting were made available through Building Barrie.

The third round of community engagement began in fall of 2021 and included one-on-one small group discussions with various stakeholder groups, including students at Eastview Secondary School, the Simcoe County Environmental Youth Alliance, and the Masonry Works trades association. These one-on-one stakeholder discussions gathered feedback on the Draft Plan, communicated the need for community participation in implementing the Plan, and identified which strategies and actions each group was most interested in supporting. After revisions to the Draft Plan based on this feedback, the Draft Plan was posted on Building Barrie in Winter 2022, alongside a second online survey. This survey gathered feedback from the broader community on what strategies individuals are most interested in supporting, and how the City can help individuals in taking action. All four Big Moves were supported by a strong majority of participants, and participants expressed eagerness to support a broad range of actions, including home energy-efficiency improvements, purchasing EVs and increasing public transit use, reducing single-use plastics, planting trees, and growing and buying locally grown food.

Setting Our Target

In 2020, the Canadian government committed to "moving to net-zero emissions by 2050"[30]. In this case, "net-zero" is defined as either emitting zero greenhouse gas emissions or offsetting any remaining emissions that cannot be reduced. In 2021, Canada announced that it would enhance its emissions reduction target under the Paris Agreement to 40-45% below 2005 levels by 2030[31]. Barrie has aligned its GHG reduction target with the IPCC, which aims to limit global warming to 1.5°C or a maximum of 2.0°C (45% by 2030 and net-zero by 2050 from global 2010 levels)[32]. **The Barrie community aims to reduce overall GHG emissions 45% below 2018 levels by 2030 and to become net-zero by 2050**.

This plan outlines a series of Big Moves and strategies (Part 2) to help reduce Barrie's energy use and GHG emissions through ambitious yet attainable action and set our community on a path towards net-zero by 2050. The emission reduction potential of strategies is informed by comprehensive research, which considers current technologies, best practices, and learnings from other municipalities and what makes sense for Barrie. It should be noted that modelling is not a crystal ball but provides an example of the level of effort needed and a pathway on how we may accomplish our goals.

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[30] Government of Canada. (2021). *Net-Zero Emissions by 2050*. Retrieved from https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html

[31] Prime Minister of Canada. (2021). *Prime Minister Trudeau announces increased climate ambition.* Retrieved from https://pm.gc.ca/en/news/news-releases/2021/04/22/prime-minister-trudeau-announces-increased-climate-ambition

[32] Intergovernmental Panel on Climate Change. (2018). *Special Report: Summary for Policymakers*. Retrieved from https://www.ipcc.ch/sr15/chapter/spm/

The graph below outlines the emissions our community will produce without action (Business-as-Planned – black line) compared to our emissions following the Big Moves (red line). Implementing each of the Big Moves to their fullest would bring the overall reduction in emissions to 32 percent by 2030 and 72 percent by 2050.

Fully implementing the strategies outlined in the Big Moves is no small feat – it will take concerted effort and commitment from all sectors of our community. At the same time, front-loading action and spending will be less costly both for the economy and the environment. The sooner we collectively take action, the better chance we will have of achieving our net-zero target.

There are two key actions, which if accelerated, will put us on a better trajectory to reaching our net-zero target. These actions include drastically increasing EV sales (as outlined in Strategy 10) and incorporating a natural gas phase out within the Deep Energy Efficiency Retrofit program (Strategy 1). Redoubling our efforts in these areas would put our community on the best path possible for a more sustainable future.

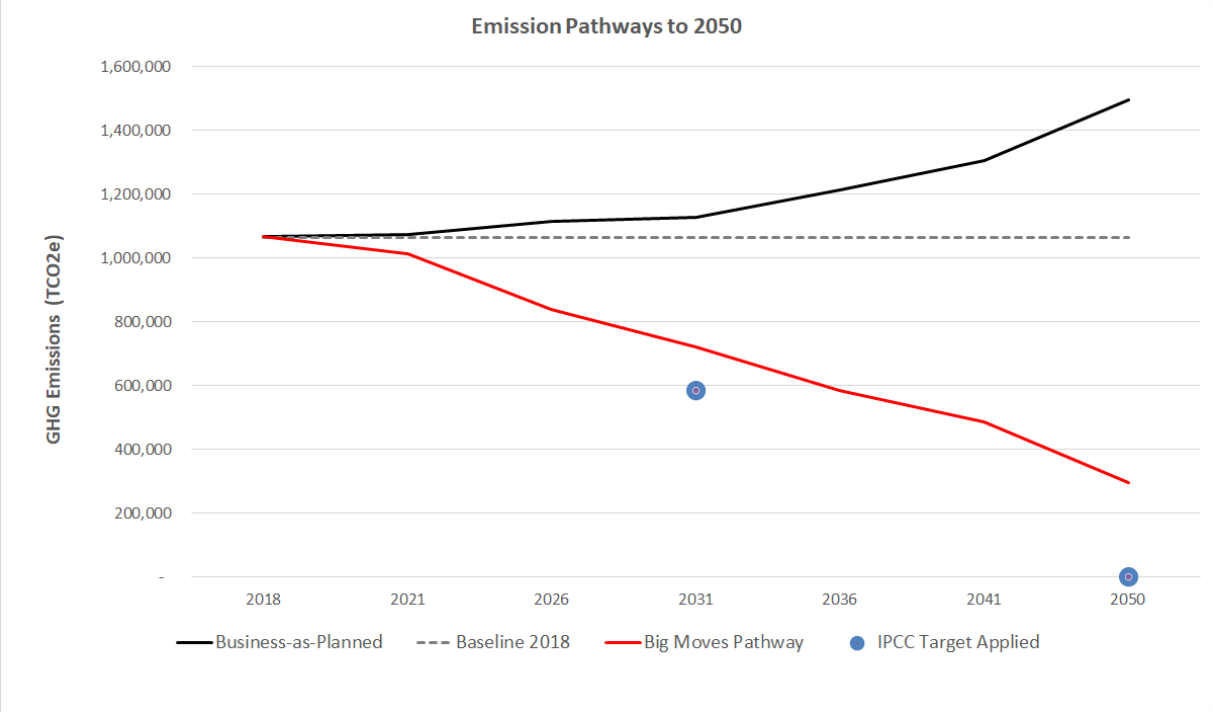


Figure 9: Graph depicting the potential GHG reduction from Barrie's Big Moves and the IPCC climate targets.

Plan Framework

Our plan contains a vision and principles, Big Moves with associated goals and strategies, and guidance for implementation. The following section provides an overview of the key elements of the plan's framework. Further details are provided in Parts 2 and 3 of the Plan.

Vision	• Barrie's "big picture" for climate action.
Principles	• Values to guide our path forward.
Big Moves	• Four areas where we will focus our efforts.
Goals	• What we hope to achieve within each Big Move.
Strategies	• Concrete steps to reduce energy and emissions.
Implementation	• How we will move this plan forward.

Vision

The Barrie community is taking an integrated, ambitious, and action-oriented approach to climate action providing positive environmental, social, economic, and health outcomes for all.

Principles

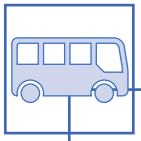
- There are economic benefits in pursuing climate action at the local level.
- Recognize and promote the inextricable link between the natural and built environments, climate change and our communities' health and wellbeing, and foster the health co-benefits of climate action.
- Pursue innovative solutions and an evidence-based approach to climate action.
- Educate and inspire residents and businesses to make positive environmental change, building on the City's leadership.
- Develop strategies that are equitable and enhance the quality of life for all residents.
- Benchmark against best practices and look for continuous improvement.
- Enable positive environmental actions amongst Barrie's residents.
- Advance Barrie's climate and energy goals in partnership with residents, organizations, and businesses.

Big Moves, Goals, Strategies

Our plan outlines four **'Big Moves'** - **buildings, transportation, circular economy, natural environment and land use**. Each Big Move includes a goal and supporting strategies, as outlined below.

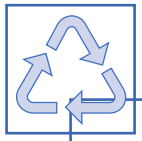
Big Move: Buildings

- **Goal:** Near zero emissions in new and existing buildings
- **Strategies:**
  - Deep energy efficiency retrofit program
  - Green development standard
  - Energy management and benchmarking
  - Solar generation
  - District energy (pre-feasibility study)
  - Larger renewables (pre-feasibility study)



Big Move: Transportation

- **Goal**: Near zero emissions from transportation
- **Strategies:**
  - Active travel and complete streets
  - Local transit options
  - GO transit use
  - Electric vehicle adoption
  - Car-sharing



Big Move: Circular Economy

- **Goal**: Waste reduction through a circular economy
- **Strategies:**
  - Community sharing economy
  - Phase-out of single-use plastics
  - Recovering energy
  - Circular construction

Big Move: Natural Environment & Land Use

- **Goal**: Liveable neighbourhoods that support energy efficiency, mixed-use, complete communities & protection of the natural environment.
- **Strategies:**
  - Higher density, mixed-use developments
  - Zero-emissions neighbourhood
  - Local food
  - Nature-based solutions