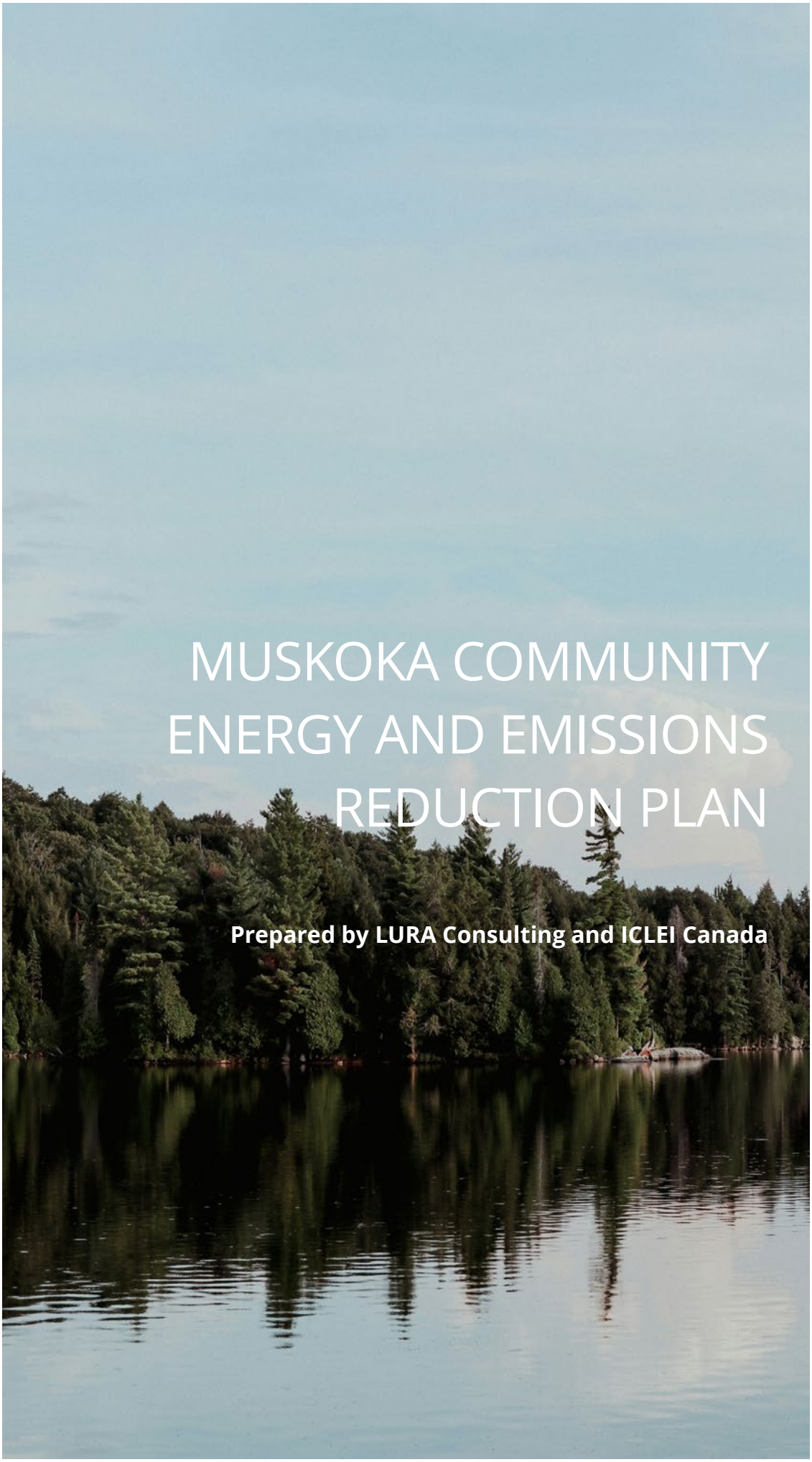

MUSKOKA COMMUNITY ENERGY AND EMISSIONS REDUCTION PLAN

Prepared by LURA Consulting and ICLEI Canada

February 28, 2024

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Land Acknowledgement

This land acknowledgement is an expression of gratitude and appreciation to those on whose territory we gather, and as a way of honoring the Indigenous Peoples who have been living and working on this land for centuries. We honor all Indigenous Peoples – First Nations, Métis, and Inuit – for their cultures, their languages, their wise teachings, and ways of being that have shaped this country since time began.

In Muskoka, we are on the traditional territory of the Anishnaabeg, which includes the Ojibwe, Odawa, and Potawatomi Nations, collectively known as the Three Fires Confederacy. The Huron-Wendat and the Haudenosaunee Nations have also walked on this territory over time. Southern portions of Muskoka were the traditional territory of the Wendat when they resided in Simcoe County between AD 1300 and 1650 and they travelled regularly through Muskoka during those centuries.

Today Muskoka is home to three sovereign nations: Wahta Mohawks First Nations, Moose Deer Point First Nation, and the Moon River Métis. These lands are covered by the Williams Treaty (of 1923), the Robinson Huron Treaty of 1850 and the J. Collins land purchase (of 1785) and we must respect these treaties.

Indigenous Peoples have cared for this territory for the benefit of future generations and their stewardship throughout the ages is recognized.

G'chi miigwech.

Thank you very much.

Executive Summary

Muskoka's climate is changing. The energy used by homes, buildings, vehicles and gases emitted from landfills all contribute to this change. As a community, we can tackle climate change by changing how we live, work, and travel. There is an urgent need to act now to protect the environment, economy, and health of future generations. This Plan – Muskoka's Community Energy and Emissions Reduction Plan or CEERP – represents our community's opportunity to act on climate change in Muskoka.

Reducing the amount of energy used by the Muskoka community can contribute to the economy, reduce greenhouse gases (GHGs), support an active community, and support a healthier climate for everyone.

The CEERP provides strategic direction and sets Muskoka on a path to 50% GHG emissions reduction by 2030 and towards net-zero emissions by 2050. "Net-zero emissions" means GHG emissions are balanced between the amount produced and the amount taken out of the atmosphere. While removing or sequestering emissions will be a part of achieving a net-zero target, actions that avoid GHG emissions in the first place are still the most effective way to mitigate climate change. Based on current technologies and with the ambitious approach outlined in this Plan, Muskoka can reach its emission reduction target of 50% by 2030 and set the community on a strong path to net zero, reducing emissions by 85% by 2050. The remaining 15% of required emissions reductions will come from a combination of carbon sequestration, offsets and developments in GHG mitigation. Developments such as nature-based solutions that continue to increase and protect Muskoka's forests, wetlands, watersheds and other natural areas, and further advancements in renewable technology, green infrastructure, and sustainable community design that reduce dependence on fossil fuels and energy-intensive activities will all be important in achieving the 2050 target.

Based on the 2018 greenhouse gas baseline inventory conducted by ICLEI Canada, the Muskoka community used over **14 million GJ** of energy, produced **nearly 900,000 tonnes** of carbon dioxide equivalent and spent over **$541 million** on energy. **Private vehicles, homes, and businesses** use the most energy and generate the most GHG emissions and energy costs[1].

[1] ICLEI Canada, "Methodology, Baseline & Business as Planned: District of Muskoka GHG Inventory and Emission Reduction Strategy", (2020), https://www.muskoka.on.ca/en/Environment/Documents-and-Forms/MuskokaMethodology-Baseline-BAPReport-_DecemberFINAL.pdf.

Looking to the future, without intervention, energy and GHG emissions for Muskoka are anticipated to drop slightly by 2030 and 2050 despite the expected population growth[2]. This slight decline results from increased vehicle fuel efficiency and increased energy performance of new buildings. However, these actions alone cannot meet Muskoka's net-zero or federal or international targets by 2050. Community action is needed to reduce energy consumption, generate benefits for the local economy, and, over time, create significant cost savings.

The CEERP includes three 'Pillars' – **Transportation, Buildings, and Community Systems**. The Pillars represent the priority areas where Muskoka should focus on achieving significant energy and emissions reductions. Fourteen 'Areas for Action' are embedded in the Pillars, and a fifteenth area relates to implementation. The Areas for Action highlight how all community members play a role in achieving reductions and include actions that permanent and seasonal residents, businesses, industry, institutions, government, and community organizations can take to help make this CEERP successful.

Figure 1 includes the Pillars and Areas for Action.

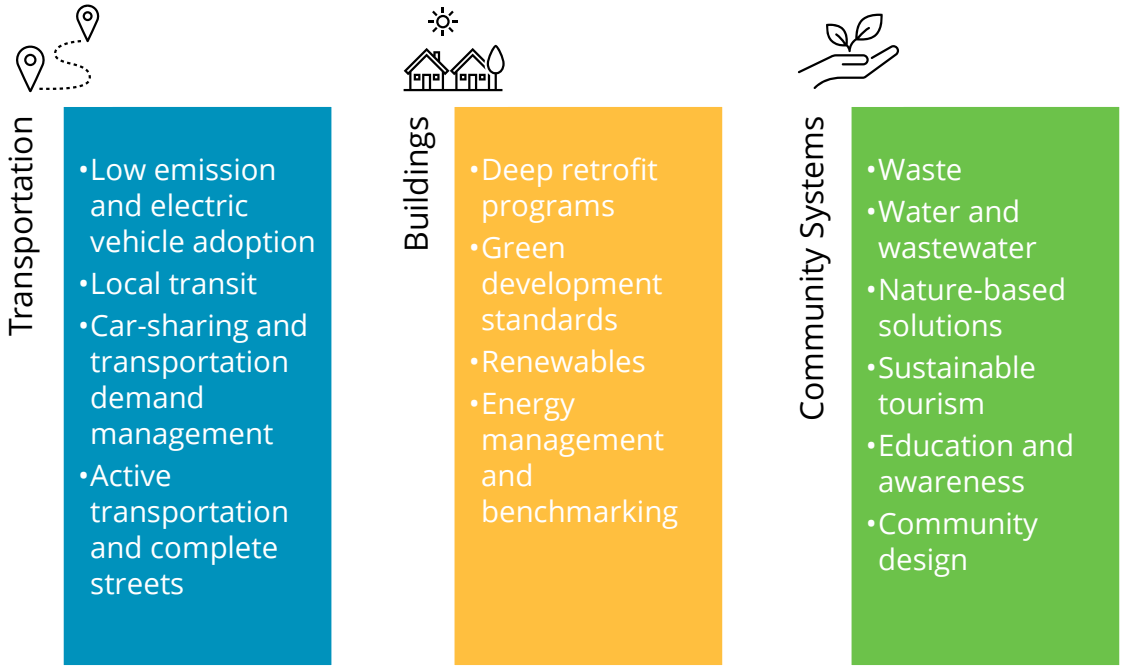


Figure 1: CEERP Areas for Action

[2] Hemson Consulting, "District of Muskoka 2019 Growth Strategy. Forecast & Growth Allocation Report," (2019). https://muskoka.civicweb.net/filepro/document/33446/2019%20Growth%20Strategy%20Phase%201%20-%20Forecast%20and%20Growth%20Allocation%20Report.pdf

In 2018, transportation accounted for 66% of all energy use, 67% of energy costs, and 74% of greenhouse gas emissions in Muskoka, most of which came from personal vehicles. There are four Areas for Action in the Transportation pillar. The first Area of Action aims to support the adoption of low emission vehicles (such as electric vehicles (EVs), hybrid-electric, and hydrogen), while subsequent areas focus on reducing GHG emissions through "shifting" travel modes away from personal vehicles to local transit, active transportation, and carpooling.

Buildings are responsible for 34% of all energy use, 33% of energy costs and 20% of GHG emissions in Muskoka. There are four building-related Areas for Action. The first Area for Action identifies voluntary deep energy retrofit programs for existing homes and buildings. The second calls for designing and implementing a Green Development Standard (GDS). The GDS focuses on new construction where developers, construction companies, individuals (and anyone else building or renovating homes in Muskoka) would be encouraged to meet higher levels of energy efficiency when building new homes. The last two Areas for Action focus on increasing the amount of renewable energy in the community and continuing to improve the energy efficiency in industrial buildings.

The final pillar, with six Areas for Action, involves community systems, including increasing waste reduction and diversion efforts and mitigating GHG emissions from wastewater treatment. The pillar also includes Areas for Action relating to nature-based solutions that support capturing and storing carbon in the environment, sustainable tourism efforts that integrate climate action, education and awareness as a critical need to ensure everyone can act on climate change, and community design to create compact neighbourhoods and urban areas.

There is an immediate need for global, national, and local climate action to slow the impacts of climate change. The actions identified in the CEERP will require a significant effort to meet the GHG emission reduction targets. Action will be needed by all levels of government, including the District and Area Municipalities, community groups, homeowners, businesses, residents, and visitors. The Areas for Action associated with all three Pillars, if implemented fully, in conjunction with expected increases in building and vehicle fuel efficiency, will collectively reduce annual emissions in Muskoka by 455,810 tonnes CO_2e or 51% in 2030 and by 759,795 tonnes CO_2e or 85% in 2050 as shown in Figure 2 below.

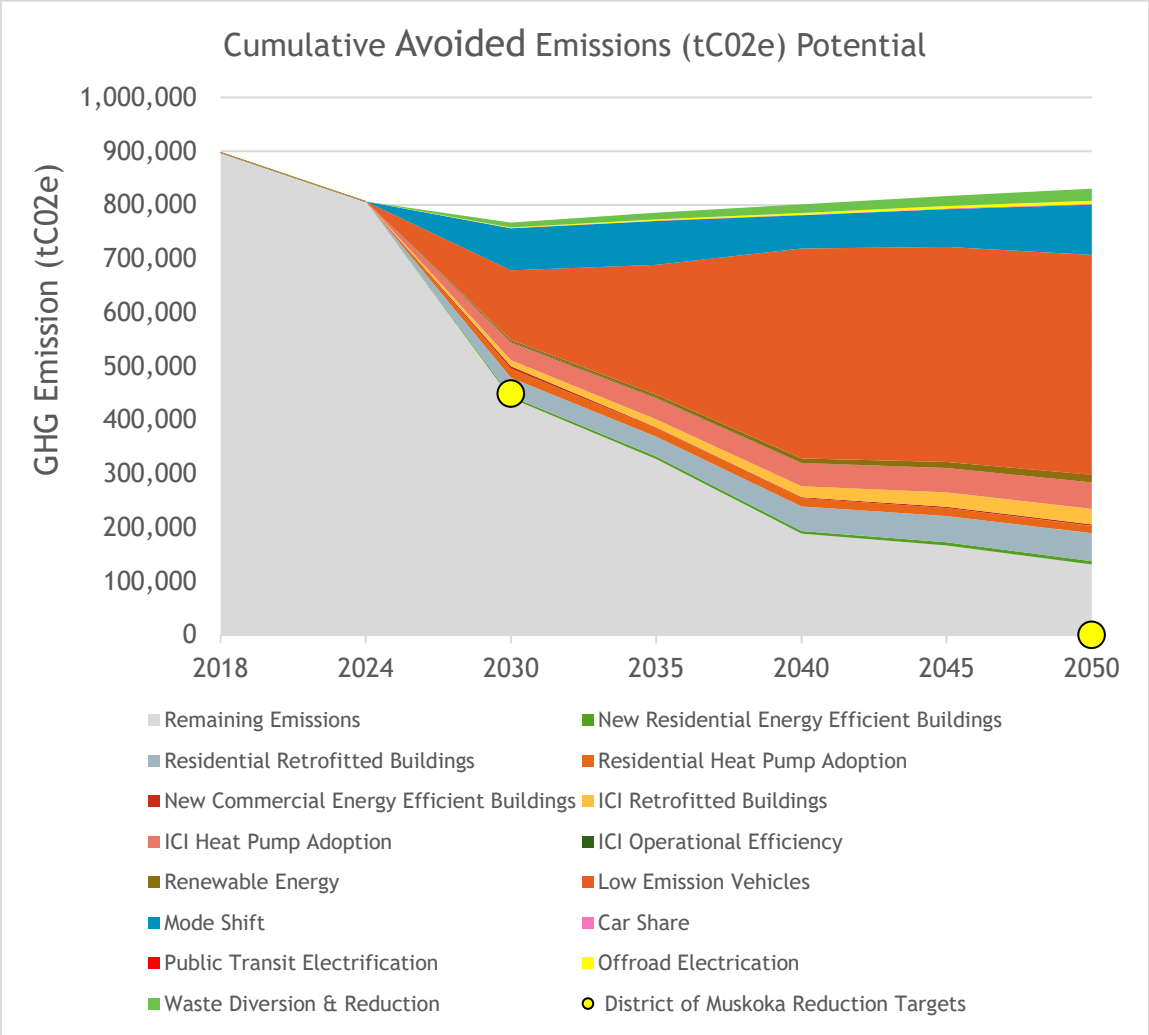


Figure 2: Potential GHG emission avoidance potential (tCO_2e) from all Areas for Action to 2050.

The CEERP will continue to be monitored and updated to integrate emerging technologies and deepen emissions reduction in the future. The District and its partners will look to the federal and provincial governments for additional capacity to achieve further reductions.

The CEERP provides a pathway for hope and a call to action for everyone in Muskoka to act for a healthy economy, environment and community.

Acknowledgements

The Muskoka Community Energy and Emissions Reduction Plan was developed in collaboration with LURA Consulting and ICLEI Canada, with input from a broad range of interested groups from the District of Muskoka, Area Municipalities, local community groups, community partners and the wider community.

From December 2022 until December 2023, the District of Muskoka's Climate Initiatives Coordinator led the project team and coordinated the Climate Change Mitigation Task Force (CCMT), which informed this Plan.

The development of the CEERP was guided by the significant contributions of community members, organizations, businesses, students, and subject matter experts in the Community Climate Change Mitigation Taskforce (CCMT). In addition to the municipal staff and elected officials, representatives from the following organizations were invaluable in the process:

- Budget Propane
- Climate Action Muskoka
- Enbridge
- EV Society
- Friends of the Muskoka Watershed
- Gravenhurst Environmental Advisory Committee
- Hydro One
- Kimberly-Clark
- Lake of Bays Association
- Lakeland Power
- Muskoka Algonquin Healthcare
- Muskoka Lakes Association
- Muskoka Watershed Council
- ReThink Green
- Simcoe Muskoka District Health Unit
- Student Representatives from Gravenhurst High School, Huntsville High School, and St. Dominic Catholic Secondary School

The CCMT also included two elected representatives from District Council, Councillor Peter Johnston and Councillor Michael Peppard, who provided valuable insight and liaised with other Councillors throughout the process.

The Plan was also guided by the support of various staff from across multiple departments at the District Municipality of Muskoka, including the following:

- Finance and Corporate Services
- Engineering and Public Works
- Community and Planning Services

The six Area Municipalities in Muskoka all participated through involvement from senior staff from:

- Town of Bracebridge
- Town of Gravenhurst
- Town of Huntsville
- Township of Georgian Bay
- Township of Lake of Bays
- Township of Muskoka Lakes

Introduction



Introduction and Rationale

Muskoka's climate is changing. The energy used by homes, businesses, industry, vehicles, and gases emitted from landfills all contribute negatively to this change. As a community, we can tackle climate change by changing how we live, work and travel. There is an urgent need to act now to protect the environment, economy, and health of future generations. This Plan – the Community Energy and Emissions Reduction Plan or CEERP – represents our community's opportunity to act on climate change in Muskoka.

What Causes Climate Change?

Greenhouse gases (GHGs), including carbon dioxide, methane, nitrous oxide, sulphur oxide and chlorofluorocarbons, are the primary cause of climate change.

The quantity of GHGs emitted into the atmosphere from human-caused activities has significantly increased over the past century. As concentrations of GHGs increase, they act like a blanket around the earth, trapping solar energy that gradually increases the temperature of the atmosphere, known as the greenhouse effect. Climate change causes various life-altering impacts like extreme weather (heat waves, droughts, flooding, extreme precipitation, etc.) that can be seen worldwide and in Muskoka.

Protecting our Environment

The past eight years have been the hottest on record[3]. In 2015, Canada was one of 195 countries to sign the Paris Agreement to limit the global average temperature rise to below 2°C and pursue efforts to limit the increase to 1.5°C[4]. In its most recent report, the United Nations Intergovernmental Panel on Climate Change (IPCC) states that even with significant GHG emission reductions in the short term, there is greater than a 50% likelihood of reaching or exceeding the 1.5°C threshold[5]. Warming of even 1.5 degrees will lead to temperature extremes, droughts, extreme precipitation, and impacts on biodiversity, ecosystems, and

[3] World Meteorological Organization, "Past eight years confirmed to be the hottest on record", (2023), https://wmo.int/news/media-centre/past-eight-years-confirmed-be-eight-warmest-record#:~:text=Annual%20global%20temperatures%20have%20reached,affected%20millions%20and%20cost%20billions accessed July 2023.
[4] Government of Canada, "The Paris Agreement," (2016), https://www.canada.ca/en/environment-climate-change/services/climate-change/paris-agreement.html accessed July 2023.
[5] IPCC, "Working Group III: Mitigation of Climate Change," (2022), https://www.ipcc.ch/report/ar6/wg3/ accessed July 2023.

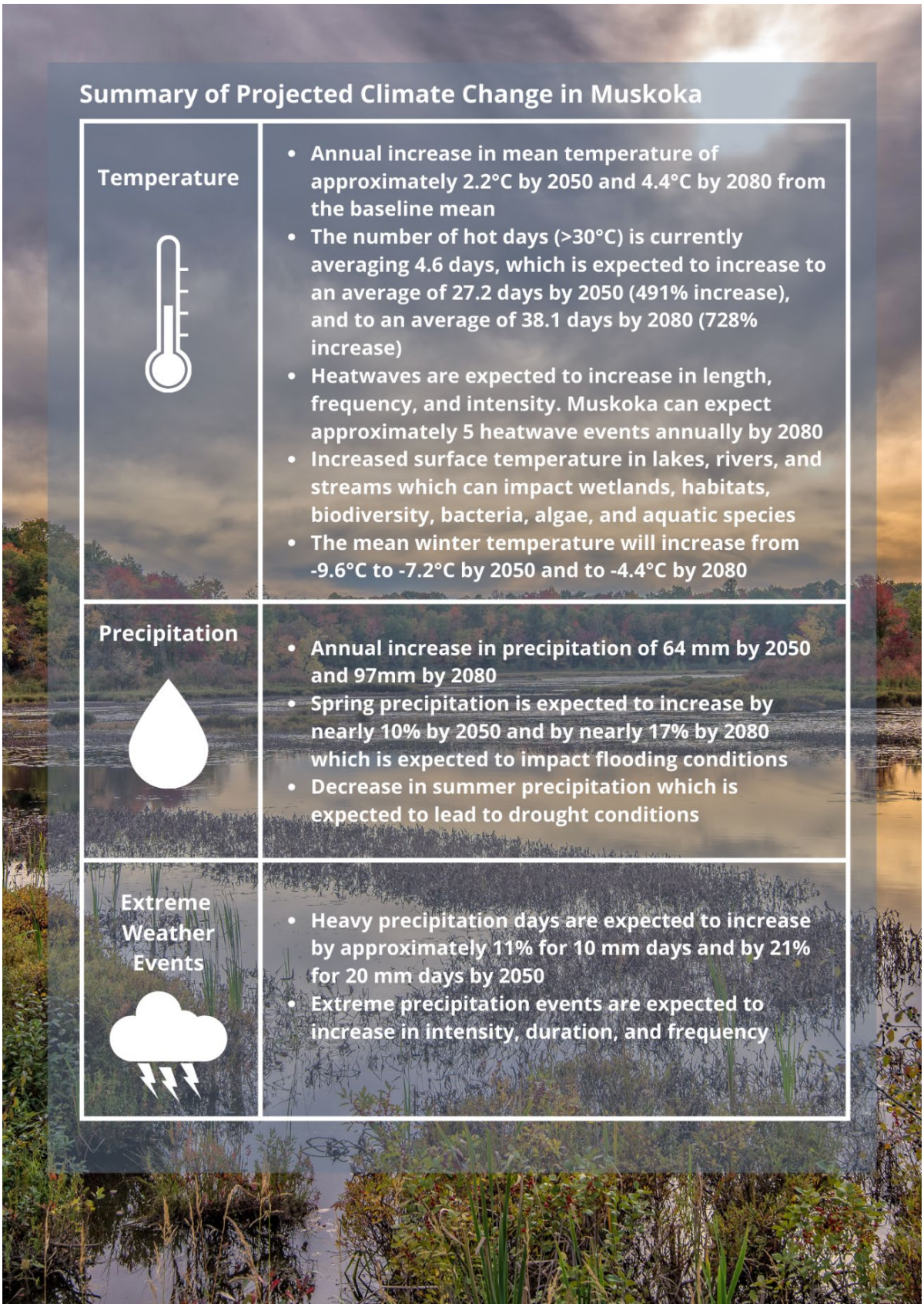
oceans[6]. Canada's average temperature has risen by 1.9°C from 1948 to 2021 as polar regions are warming at roughly twice the global rate[7].

Locally, Muskoka has already seen the impacts of a changing climate on our environment, such as flooding, increased temperatures, extreme wind events, smoke from forest fires and intense rainfall. In 2023, Muskoka's Regional Climate Adaptation Plan (ReCAP) was created to address climate change adaptation in Muskoka. The ReCAP included climate projections for the District to 2050 and 2080. Without action on climate, Muskoka can anticipate further impacts, including[8]:

- increased temperatures, number of days over 30°C and heat waves;
- increased water temperatures impacting wetlands, habitats, biodiversity and aquatic species;
- more precipitation, with flooding in spring and drought in the summer months; and,
- extreme precipitation events increase in intensity, duration and frequency.

While we adapt to the impacts of climate change that are 'locked-in' from the GHGs that have already been emitted, it is our responsibility to reduce future impacts that are still avoidable. Taking urgent action to reduce GHGs now will help protect Muskoka's unique environment for future generations.

[6] Alan Buis, "A Degree of Concern: Why Global Temperatures Matter," *NASA's Global Climate Change Website*, (2019), https://climate.nasa.gov/news/2865/a-degree-of-concern-why-global-temperatures-matter/ accessed July 2023.
[7] Government of Canada, "Temperature Change in Canada," (2023), https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/temperature-change.html accessed July 2023.
[8] ICLEI Canada, "Muskoka's Regional Climate Change Adaptation Plan," (2023), https://www.muskoka.on.ca/en/Environment/Documents-and-Forms/ReCAP-Final.-March-2023.pdf.


Summary of Projected Climate Change in Muskoka
Temperature
• Annual increase in mean temperature of approximately 2.2°C by 2050 and 4.4°C by 2080 from the baseline mean
• The number of hot days (>30°C) is currently averaging 4.6 days, which is expected to increase to an average of 27.2 days by 2050 (491% increase), and to an average of 38.1 days by 2080 (728% increase)
• Heatwaves are expected to increase in length, frequency, and intensity. Muskoka can expect approximately 5 heatwave events annually by 2080
• Increased surface temperature in lakes, rivers, and streams which can impact wetlands, habitats, biodiversity, bacteria, algae, and aquatic species
• The mean winter temperature will increase from -9.6°C to -7.2°C by 2050 and to -4.4°C by 2080
Precipitation
• Annual increase in precipitation of 64 mm by 2050 and 97mm by 2080
• Spring precipitation is expected to increase by nearly 10% by 2050 and by nearly 17% by 2080 which is expected to impact flooding conditions
• Decrease in summer precipitation which is expected to lead to drought conditions
Extreme Weather Events
• Heavy precipitation days are expected to increase by approximately 11% for 10 mm days and by 21% for 20 mm days by 2050
• Extreme precipitation events are expected to increase in intensity, duration, and frequency

Climate Change Adaptation and Mitigation

Combatting the impacts of climate change requires communities to consider how they can reduce GHG emissions while preparing for and managing the risks and impacts of climate change that have already occurred. These strategies work together, as shown in Figure 3 below.

The District of Muskoka recognizes that a fulsome response to climate change has actions focused on climate adaptation and mitigation.

The ReCAP focuses on *climate adaptation* – taking steps to reduce the impacts of climate change on our social, economic, built, and natural systems. This includes upgrading infrastructure to withstand more intense weather conditions or using green infrastructure to reduce flood risk.

The CEERP focuses on *climate change mitigation* – reducing GHG emissions that lead to further climate change. This includes things like conserving energy and reducing our reliance on fossil fuels.

Adaptation = Managing the unavoidable

Mitigation = Avoiding the unmanageable

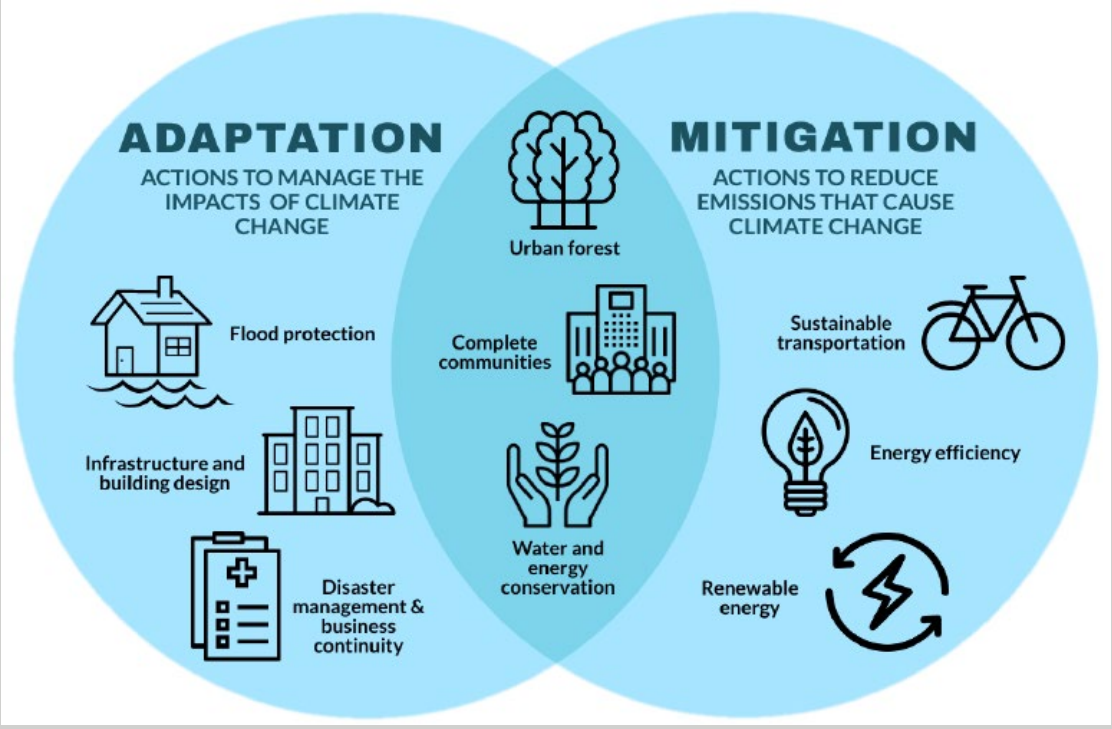


Figure 3: Overlap and Differences Between Adaptation and Mitigation (ICLEI Canada, 2019).

Growing our Economy

Taking climate action is beneficial for the community's bottom line. Energy efficiency programs in Canada can return $3 to $5 in savings to the local economy for every $1 invested[9]. Savings can be direct (e.g., reduced energy or water use) or more widespread (e.g., reduced healthcare costs).

Most fuel used to heat homes and power vehicles comes from outside Muskoka. This means money leaves the local economy each year – money that could support local businesses, infrastructure, and services. Research has shown that, even in small rural communities, several million dollars can leave the local economy each year by purchasing gasoline and natural gas[10]. Reducing the use of these fossil fuels reduces GHG emissions and keeps more money in Muskoka. Investing in climate action can create new local employment opportunities and attract high-quality workers[11].

Climate change can also threaten the tourism industry, comprising at least 15% of jobs in Muskoka[12]. Warming temperatures reduce opportunities for winter activities like skiing and snowmobiling and contribute to lake algal blooms in the summer[13]. Acting on climate change now will support our community's tourism industry and overall economic health.

[9] Government of Ontario, "Guideline on Community Emissions Reduction Planning," (2018), https://ero.ontario.ca/notice/013-2083.
[10] Ibid.
[11] Renee Cho, "How Climate Change Impacts the Economy," (2019), https://news.climate.columbia.edu/2019/06/20/climate-change-economy-impacts/ accessed July 2023.
[12] Andrew Hind, "Tourism in Muskoka Hardest Hit and Last to Recover from COVID-19 Pandemic," *Muskoka Region*, (2021), https://www.muskokaregion.com/things-to-do/tourism-in-muskoka-hardest-hit-and-last-to-recover-from-covid-19-pandemic/article_62827bcd-d46a-5151-9990-d6a32cdb2acb.html accessed July 2023.
[13] Renee Cho, "How Climate Change Impacts the Economy," (2019), https://news.climate.columbia.edu/2019/06/20/climate-change-economy-impacts/accessed July 2023.

Protecting our Health

As temperatures increase and we experience more extreme weather events, Muskoka can anticipate impacts on residents' and visitors' health. The Simcoe Muskoka District Health Unit has projected the following climate-related health impacts[14]:

- heat and cold-related illnesses (heat stress, exhaustion, frostbite, etc.);
- injuries related to extreme weather events;
- increased rates of food insecurity and associated physical and mental health outcomes;
- exposure to food- and waterborne illnesses;
- exposure to West Nile virus and Lyme disease;
- respiratory illnesses, such as asthma, are caused by poor air quality from smoke and smog from forest fires and/or pollution; and
- rates of non-melanoma skin cancers.

While these impacts concern the entire community, certain groups, such as seniors, young children, those living below the poverty line, and those with respiratory illnesses, are often more vulnerable. Taking local climate action will help facilitate healthier lifestyle choices and reduce adverse health outcomes for everyone. For example, designing our homes and buildings to be more energy efficient will provide relief during extreme temperatures. Promoting active and sustainable transportation reduces pollution and improves air quality while improving physical and mental health. Taking action to mitigate and adapt to climate change now will help protect our community's physical and mental health.

[14] Charles Gardner, "Health in a Changing Climate," *Simcoe Muskoka District Health Unit*, (n.d.), https://d3n8a8pro7vhmx.cloudfront.net/greenbelt/pages/9712/attachments/original/1548085130/ClimateChange-Health.pdf?1548085130 .

Who is the Community Energy and Emissions Reductions Plan for?

The CEERP covers the entire Muskoka community, including permanent and seasonal residents, businesses, industry, institutions, elected officials, municipal staff, youth, and community organizations. There are actions for everyone to support Muskoka's path to a low-carbon future, protecting individual health, our economy and everyone's well-being from the impacts of climate change.

Supporting all Communities

As Muskoka acts to reduce GHG emissions, there is a need to ensure that actions support vulnerable populations. Not all groups experience the impacts of a changing climate in the same way. Seniors, those experiencing homelessness, low-income residents, racialized and other systemically marginalized communities are more vulnerable to the effects of a changing climate[15]. For example, individuals experiencing homelessness will be especially vulnerable during extreme heat events due to exposure to the elements. Younger generations – children and grandchildren - will bear the brunt of "locked-in" GHG emissions emitted in the present[16], and by acting now, we help to protect those vulnerable populations.

Municipal governments are responsible for ensuring climate action benefits everyone in the community and does not deepen existing inequities[17]. Equity-deserving populations may have the most difficulty coping with climate impacts despite contributing the least GHG emissions[18]. The Partners in Climate Protection Program (PCP) recommends that climate investments be directed to lower-income neighbourhoods so that groups of lower socio-economic status can benefit from reduced household energy bills and improved health outcomes.

[15] Nick Banks et al, "Climate Change and Social Justice: An Evidence Review," JRF, (2014), https://www.jrf.org.uk/report/climate-change-and-social-justice-evidence-review.
[16] John Branch & Brad Plumer, "Climate Disruption is Now Locked In. The Next Moves will Be Crucial," *The New York Times*, (2020), https://www.nytimes.com/2020/09/22/climate/climate-change-future.html.
[17] Nikasha Tangirala, "Resource: Integrating Equity, Diversity and Inclusion Into Municipal Climate Action," *Partners for Climate Protection*, (n.d.), https://www.pcp-ppc.ca/resources/edi.
[18] World Resources Institute, "Climate Equity," (n.d.), https://www.wri.org/initiatives/climate-equity.

Municipal Climate Planning in Muskoka

Climate change planning in Muskoka is unique due to its vast geographic area (~4,700 km^2) and two-tier government structure. The six Area Municipalities in the District contain a mosaic of rural communities, urban centers, and expansive natural areas of forests and lakes. The District and Area Municipalities have distinct and shared responsibilities for serving Muskoka's residents and visitors. Municipalities across Muskoka continue to coordinate climate actions, ensuring they are cost-effective and reflect the priorities and needs of Muskoka's rural, urban and seasonal communities.

Year-Round Residents, Seasonal Residents, and Visitors

The CEERP accounts for Muskoka's increased energy consumption during peak seasons. The population of Muskoka more than doubles in the warmer months, adding over 83,300 seasonal residents[19] to a base of about 66,700 year-round residents. Additionally, with approximately 5 million people living within a two-hour driving distance, the number of people in the District is strongly influenced by its proximity to the Greater Golden Horseshoe and the number of visitors that come to the area annually[20]. The CEERP engages all residents and visitors in climate action initiatives to foster a sense of shared responsibility for meeting the CEERP's targets and ensure that actions effectively mitigate the climate impacts of Muskoka's population throughout the year.

Relation to Existing Plans

Reducing community GHG emissions aligns with the District's overarching policy objectives and strategic direction detailed in its planning documents. The Muskoka Official Plan (MOP) establishes objectives related to "adapting to and mitigating the impacts of climate change by fostering resilient ecosystems and communities." The MOP also calls for integrating a "climate change lens" within the approval process on Planning Act applications to advance its goal of increasing energy efficiency and reducing or eliminating GHG emissions in the community[21]. The District's 2023-2026 Strategic Plan specifies "preserve and protect our natural

[19] District Municipality of Muskoka, "Fast Facts," (2021), https://www.muskoka.on.ca/en/finance-and-administration/resources/Documents/District-of-Muskoka-2021-Fast-Facts.pdf.
[20] Planning and Economic Development Committee, "Muskoka Official Plan Review Work Plan Update," *The District Municipality of Muskoka*, (2015), https://muskoka.civicweb.net/document/26052/ accessed August 2023.
[21] Community and Planning Services Department, "Office Consolidation of the Official Plan of the Muskoka Planning Area," *The District Municipality of Muskoka*, (2023), https://www.muskoka.on.ca/en/business-planning-development/Planning-Docs-Forms/March-MOP-Consolidated---Website.pdf.

environment, take climate action, and be more resilient to its impacts" as one of its ten objectives[22].

In December 2020, the Muskoka District Council declared a Climate Emergency to deepen the District's commitment to addressing climate change. District Council unanimously endorsed Muskoka's New Leaf Climate Action Strategy and the Muskoka Climate Change Action Plan (MCCAP). The MCCAP aims to reduce corporate and community GHG emissions in Muskoka and set a target of achieving a 50% GHG emissions reduction by 2030 and net-zero GHG emissions by 2050. Since Council approved the MCCAP, considerable progress has been made, with the Climate Action Plan 2023 Report Card stating that of the 112 actions, 34 are complete, 51 are in progress or ongoing initiatives, and 27 are not started[23].

The creation of the CEERP was identified as one of the six pillars in the overarching New Leaf Climate Strategy, and it falls under the MCCAP, as one of its actions calls for the "development of a Muskoka-wide Community Climate Change Action Plan." The goals and actions of the CEERP align with other District planning processes and initiatives, including the Community Transportation Plan (CPT)[24], which seeks to develop sustainable transportation solutions for both urban and rural residents, and Muskoka's Roadmap to 60 percent waste diversion[25]. Between 2021 and 2023, the District worked with Area Municipalities to produce Muskoka's Regional Climate Change Adaptation Plan. The District and Area Municipalities will continue collaborating to implement the CEERP.

[22] The District Municipality of Muskoka, "District Asks Muskoka Residents to Confirm Top Community Priorities as it Updates Its Strategic Plan," (2023), https://www.muskoka.on.ca/en/news/district-asks-muskoka-residents-to-confirm-top-community-priorities-as-it-updates-its-strategic-plan.aspx accessed July 2023.

[23] The District Municipality of Muskoka, "Muskoka's New Leaf Climate Action Plan September 2023 Report Card" https://www.muskoka.on.ca/en/Environment/Documents-and-Forms/NewLeafClimateActionPlan-ReportCard2023.pdf

[24] Dillon Consulting Limited, "The District of Muskoka 5-Year Transportation Needs Assessment and Growth and Sustainability Plan," *Transit Consulting Network*, (2020), https://www.engagemuskoka.ca/community-transportation

[25] The District Municipality of Muskoka, "No Time to Waste," (n.d.), https://www.muskoka.on.ca/en/garbage-and-recycling/no-time-to-waste.aspx accessed July 2023.

History of Environmental Stewardship

Muskoka has a rich history of valuing and preserving its natural environment. When the District Municipality of Muskoka was formed, the conservation of natural assets was identified as the area's most important long-term planning challenge[26]. The region's deep-rooted appreciation for its natural surroundings creates a distinct context for climate planning. It supports a comprehensive approach concerned not only with reducing GHG emissions but also prioritizes the protection of Muskoka's ecosystems, wildlife habitats, and water resources. By embracing its unique heritage of environmental stewardship, the CEERP serves as a model for integrated climate action planning, highlighting the potential for sustainable coexistence between communities and nature in the face of a changing climate.

How was the CEERP developed?

Community Engagement

The development of the CEERP began in 2020 when the District completed a corporate and community GHG inventory analysis. This analysis used 2018 baseline data to quantify annual GHG emissions per sector for the District of Muskoka and the community. Following a pause due to the COVID-19 pandemic, the project restarted in 2023 with the formation of the Climate Change Mitigation Taskforce (CCMT). The CCMT met regularly throughout the CEERP's development and advised on all elements – from defining the Pillars, Areas for Action and actions to setting GHG emissions reduction targets and implementation.

The CCMT included representation from various interests, including local utilities, the Simcoe Muskoka District Health Unit, District and Area Municipality staff, District Council members, local businesses, local high school students, and local environmental groups.

Two community engagement formats informed the CEERP 's development: an online public survey in parallel with many pop-up engagements at public school events, community events, and farmers' markets. Collectively, the survey and pop-up engagements solicited high-level feedback from anyone interested in opportunities to take climate action.

Understanding our Energy Use and GHG Emissions

In 2018, the District of Muskoka's residents and businesses used 14,916,047 Gigajoules (GJ) of energy to heat and power homes and buildings and for transportation fuel for travel

[26] Donald M. Paterson, "Muskoka District Local Government Review: Final Report and Recommendations", *Queen's Printer*, (1969).

within the boundaries of the District as well as to and from the District[27]. Muskoka spent $541,881,353 on energy across the community in 2018[28]. On a per capita basis, Muskoka's year-round and seasonal residents used 103 GJ of energy per year and spent $3,540 on energy. Compared to Ontario's per capita energy usage of 218 GJ, Muskoka is below average due to the large seasonal population that does not use energy throughout the year[29].

Muskoka Energy and GHG Emissions Snapshot (2018)

- Muskoka used over **14 million GJ** of energy. This equates to about **103 GJ per person**
- Our energy use and waste produced **close to 900,000 tonnes** of carbon dioxide equivalent – over **6 tonnes per person**
- The community spent over **$541 million** on energy
- The cost per capita is **$3,540** annually
- **Private vehicles, homes and businesses** use the most energy, generate the most GHG emissions and have the highest energy costs
- **Private vehicle use** is the single largest use of energy and producer of GHG emissions

[27] ICLEI Canada, "Methodology, Baseline & Business as Planned: District of Muskoka GHG Inventory and Emission Reduction Strategy", (2020), https://www.muskoka.on.ca/en/Environment/Documents-and-Forms/MuskokaMethodology-Baseline-BAPReport-_DecemberFINAL.pdf.
[28] Ibid.
[29] Ibid.

As shown in Figures 4, 5, and 6, transportation fuel use is the primary driver of energy use and GHG emissions in Muskoka, making up 66% of all energy use (GJ), 67% of energy costs ($) and 74% of GHG emissions (tCO_2e), most of which are private vehicles[30].

38% of these GHG emissions are estimated to be because of trips within the Muskoka area, whereas 62% are from trips entering and leaving the area[31].

Figures 4, 5, and 6 also show that buildings in Muskoka, including year-round and seasonal homes, businesses, and institutions, accounted for 34% of energy consumption, 33% of energy costs and 20% of GHG emissions. Six percent of Muskoka's GHG emissions arise from the breakdown of organic material in landfills and wastewater treatment[32].

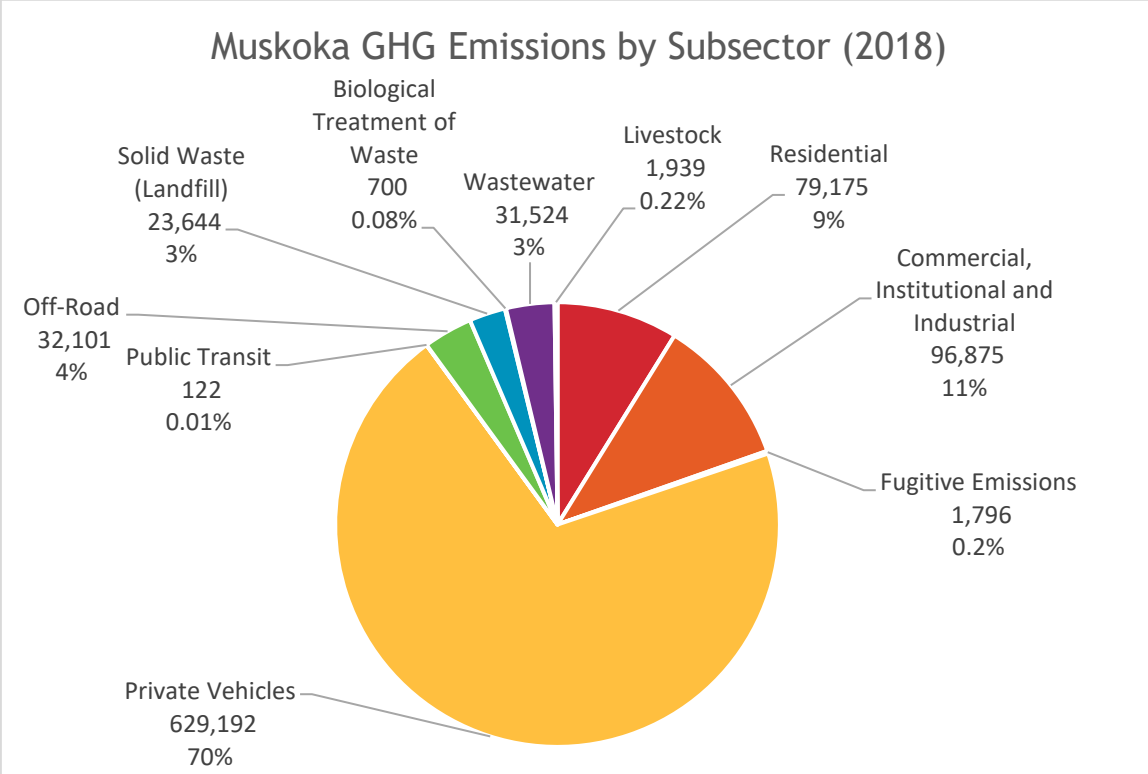


Figure 4: Tonnes of GHG emissions by subsector in 2018 in Muskoka (tC02e)

[30] Ibid.
[31] Google Environmental Insights Explorer, "Transportation Data for Muskoka District Municipality," (2018), https://insights.sustainability.google/places/ChIJ4WkxzVODKk0RguwczAvYKUI?hl=en-US.
[32] ICLEI Canada, "Methodology, Baseline & Business as Planned: District of Muskoka GHG Inventory and Emission Reduction Strategy", (2020), https://www.muskoka.on.ca/en/Environment/Documents-and-Forms/MuskokaMethodology-Baseline-BAPReport-_DecemberFINAL.pdf.

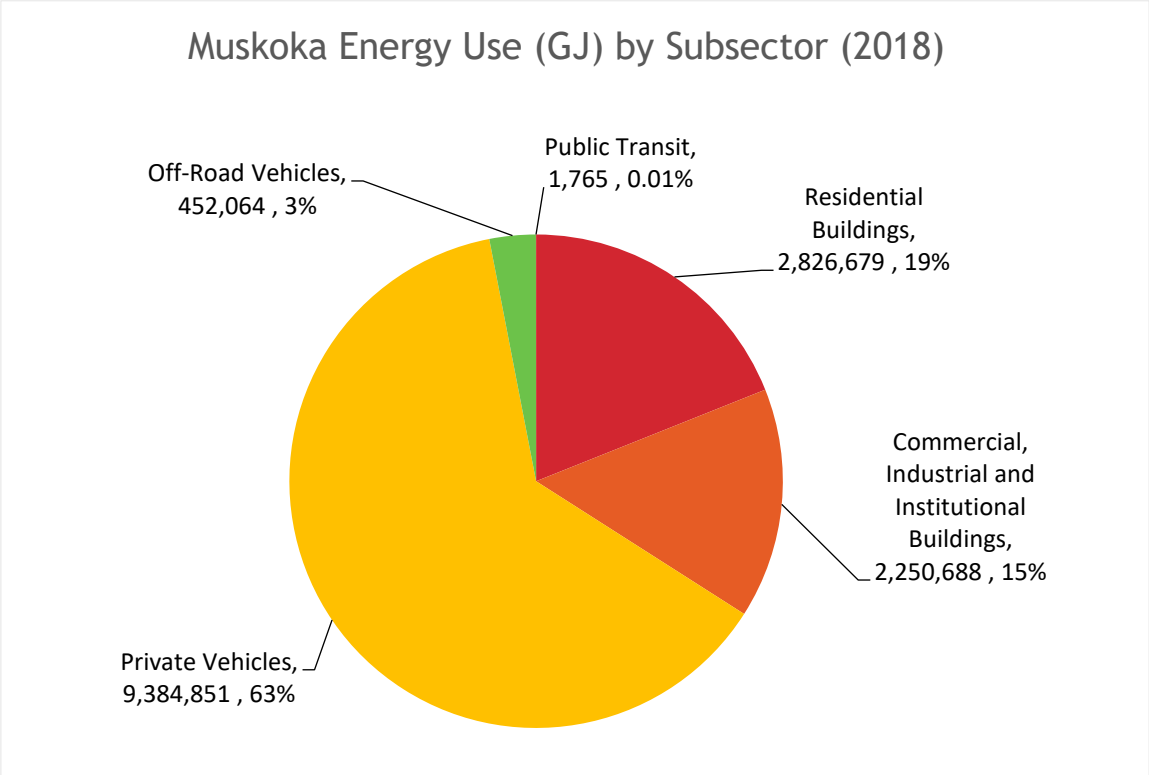


Figure 5: Energy Consumption by subsector in 2018 in Muskoka (GJ).

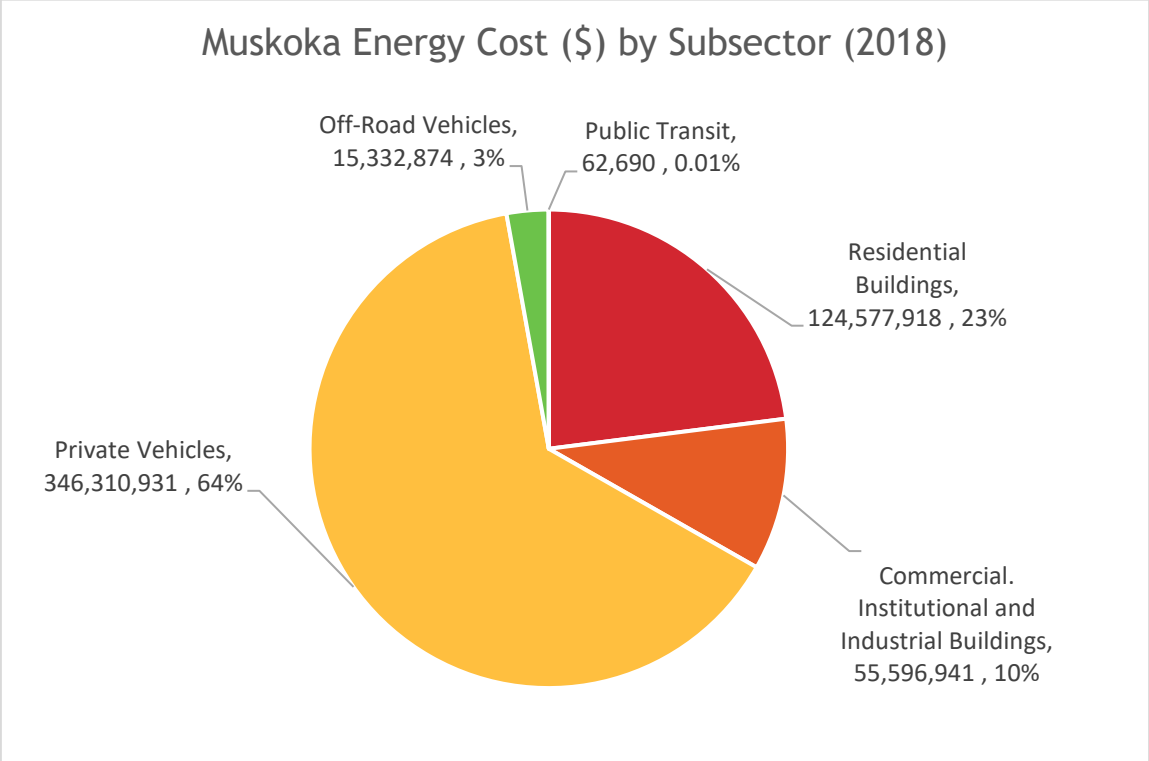


Figure 6: Energy expenditures by subsector in 2018 in Muskoka (%).

When considering the energy used by type of fuel, gasoline used for private vehicles is the most significant type of fuel used across all sectors, making up 59% of fuel consumption and 59% of energy costs[33]. This is followed by natural gas at 16% of energy use; however, electricity is the next largest contributor to energy costs due to its higher price.

Energy Use and Emissions to 2050

A Business-as-Usual (BAU) or business-as-planned scenario helps to understand future energy consumption, energy costs, and emissions for the District of Muskoka, assuming there are no new actions, programs, policies or strategies at the local level to reduce energy use or emissions. The BAU projects energy use and emissions beginning from the 2018 baseline. Energy use and emissions experienced a modest decline despite increases in population from 2018 - 2050, as shown in Figure 7. These patterns reflect the efficiency gains of the federal government's fuel standards that reduce the impacts of transportation energy use and emissions[34]. By 2030, emissions will decline by 14% despite population growth, primarily due to increased vehicle fuel efficiency standards, an assumed modest uptake of electric vehicles, and energy efficiency improvements in new buildings, as shown in Figure 8. However, after 2030, the fuel efficiency improvements and EV adoption rate are expected to level off. As a result, emissions start to rise again as population growth begins to offset the rate at which emissions are reduced, leading to a total emissions reduction of 7% (compared to 2018) by 2050 under the BAU scenario. The BAU scenario demonstrates that while Muskoka will experience a modest decrease in GHG emissions, it is not enough to achieve Muskoka's net-zero or federal or international targets. Without investing in further action, the BAU scenario implies that Muskoka will not realize the significant cost savings potential or benefits to the local economy of reducing energy consumption and will continue on a path of climate change.

[33] Ibid.

[34] Canada Energy Regulator, "Market Snapshot: Vehicle Emissions Standards Will Reduce Energy Use," (2018), https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2018/market-snapshot-vehicle-emissions-standards-will-reduce-gasoline-use.html#:~:text=For%20cars%2C%20estimated%20average%20fuel,km%20to%205.7%20litre%2F100km

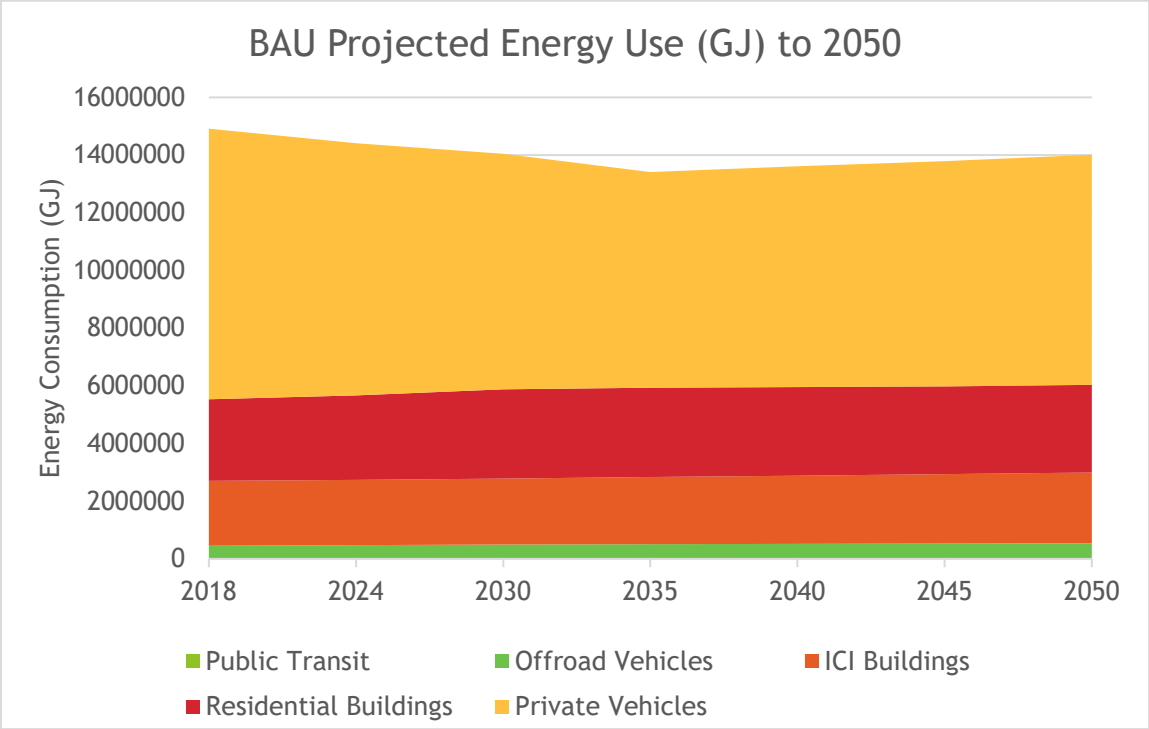


Figure 7: Projection of energy use in Muskoka under a business-as-usual (BAU) scenario by subsector.

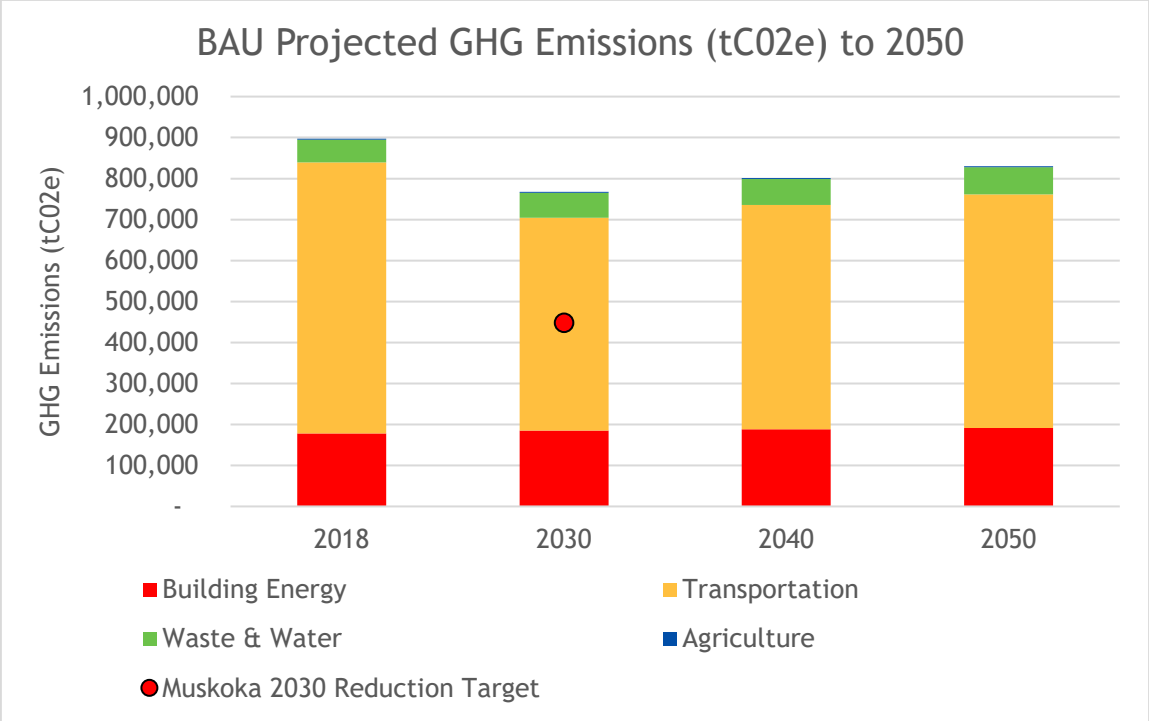


Figure 8: Projection of GHG emissions under a BAU scenario by sector.

Setting our Target

In 2020, the Canadian government committed to "moving to net-zero emissions by 2050"[35]. In this case, "net-zero" is either emitting zero greenhouse gas emissions or offsetting any remaining emissions. In 2021, Canada announced it would enhance its emissions reduction target under the Paris Agreement to 40-45% below 2005 levels by 2030[36]. Muskoka 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)[37]. **The Muskoka community aims to reduce GHG emissions by 50% below 2018 levels by 2030 and become net-zero by 2050.**

Defining Areas for Action

The CEERP outlines a low-carbon pathway based on understanding where energy is used and emissions are generated in the community. The CEERP includes a series of Areas for Action to reduce Muskoka's energy use and GHG emissions through ambitious yet attainable action and sets our community toward net-zero by 2050. Comprehensive research undertaken by ICLEI Canada, considering current technologies, best practices, and learnings from other municipalities along with knowledge about what makes sense for Muskoka, developed the low carbon model and informed the amount of emissions reduction possible for the Areas of Action. **The model demonstrates the level of effort and uptake required to achieve the District's climate change targets for 2030 and move towards the 2050 net zero target.**

[35] Government of Canada, "Net-Zero Emissions by 2050," (2021), https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html.
[36] Prime Minister of Canada, "Prime Minister Trudeau Announce Increased Climate Ambition," (2021), https://www.pm.gc.ca/en/news/news-releases/2021/04/22/prime-minister-trudeau-announces-increased-climate-ambition accessed August 2023.
[37] Intergovernmental Panel on Climate Change, "Special Report: Summary for Policymakers," (2018), https://www.ipcc.ch/sr15/chapter/spm/.



CEERP Framework

The CEERP includes three **'Pillars' – Transportation, Buildings, and Community Systems,** as shown in Figure 9. The Pillars represent the priority areas where Muskoka should focus on achieving significant energy and emissions reductions. Each pillar includes Areas for Action and corresponding actions. The Areas for Action highlight how all community members play a role in achieving reductions and include actions that permanent and seasonal residents, businesses, industry, institutions, government, and community organizations can take to reduce Muskoka's carbon emissions to mitigate climate change.

Each area requires action to achieve our targets. The first two Pillars – transportation and buildings – represent the largest sources of emissions in Muskoka (totalling 94%), meaning these actions require an immediate and concerted effort to meet our emission reduction target. These are the highest priorities for action. Our third pillar looks at the community systems contributing to energy use and emissions and will also require attention for Muskoka to become net-zero by 2050.

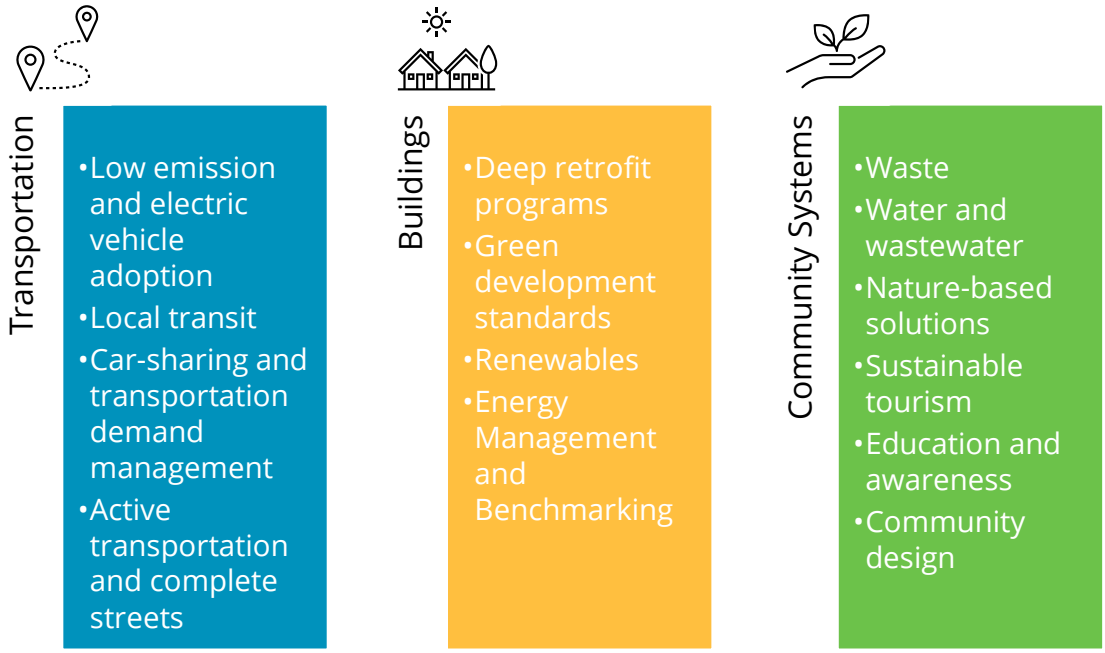


Figure 9: Three Pillars of the CEERP.

Across all three Pillars, it's vital to implement action now to prevent locking in future emissions. Taking a proactive approach will result in lower costs to the economy and the environment, compared to delaying action until the impacts of climate change worsen. Implementing climate actions generates significant community benefits beyond reducing GHG emissions, including reducing energy costs, improving health and well-being, creating sustainable tourism opportunities, and keeping energy dollars that would typically leave the community circulating in the local economy.

How to read this Plan

Each pillar includes the following:

- **Pillar name** – Represents the priority areas where Muskoka should focus on achieving significant energy and emissions reductions.
- **Description** – Provides an overview of current emissions and how the pillar contributes to GHG emissions and reduction.
- **Area for Action** – Defines the strategic areas that focus the CEERP's actions. They model emissions reduction potential, informed by best practices, average energy efficiency gains from technology adoption, industry trends and Canada's experience in climate action planning. The final emissions reduction potential for each Area for Action was refined with the CCMT to ensure it best reflects the Muskoka context, remains ambitious and ensures Muskoka reaches the 2030 emissions reduction target. As a result, there are fourteen Areas for Action across the three Pillars and one

area for action relating to implementation. Each Area of Action includes a brief description of the intent and outcomes of the Area for Action, the emissions reduction potential, and the actions needed to achieve GHG emissions reductions.

- **Actions** – These are discrete activities required to achieve GHG emissions reductions. Actions have been identified based on the insights of the CCMT, District staff and best practices. Each identifies potential key partners for implementation and should look to reduce barriers to participation so that benefits are equitable. Through the development of the CEERP, the various participating representatives have supported the actions identified. Similarly, community groups and utilities on the Climate Change Task Force have also expressed interest in supporting implementation. The District, Area Municipalities, and community groups will work with residents, businesses, and institutions to advance action at the local level. Community groups and organizations with interests and abilities to advance action will continue to be encouraged to participate in ongoing implementation.

Understanding the Icons

Each Area for Action includes a series of actions to support implementation. Iconography is used to identify the sectors that could play a role in implementation. The involvement is intended to be inclusive and not limited for all actions. Icon 8 indicates that all sectors have a role in implementing the action.

The following icons represent the sectors:



Icon 1: District of Muskoka



Icon 2: Area Municipalities of Muskoka



Icon 3: Businesses and Industries



Icon 4: Institutions



Icon 5: Community Groups



Icon 6: Residents



Icon 7: Utilities



Icon 8: All Sectors

Pillar 1: Transportation



Transportation activities are responsible for the most significant portion of greenhouse gas emissions in the District of Muskoka. **In 2018, transportation accounted for 66% of all energy use, 67% of energy costs, and 74% of greenhouse gas emissions in Muskoka.** Of this, 95% of transportation emissions are from on-road transportation, less than 1% is from public transit buses in the District of Muskoka, and 5% is from off-road vehicles[38].

The District of Muskoka is a large region of over 4,700 km^2 with a mix of urban centers and rural areas. It is a popular tourist destination, attracting 3.2 million visitors annually[39]. As a result of the significant geography, private vehicle use is the largest source of emissions as drivers travel both within and across Muskoka's boundaries. In 2018, 36% of vehicle kilometers travelled began and ended within the municipal boundaries (i.e., in-boundary), 32% were inbound (i.e., coming into the District), and 32% were outbound (i.e., leaving the District) for a total of 64% of all vehicle kilometers travelled being cross-boundary trips[40].

The transportation pillar includes **four critical Areas for Action** to significantly reduce private vehicle emissions, including accelerating the switch to low emission and electric vehicles and shifting to alternative means of transportation where possible. This includes walking and cycling, taking transit and participating in car-sharing or carpooling programs.

The Areas for Action are presented below in priority order based on the highest degree of GHG emission reduction. The pillar aims to reduce the overall need to travel, followed by shifting to low or no-emission forms of transportation.

#1: Low Emission and Electric Vehicle Adoption

As private vehicles are the largest source of emissions in Muskoka, shifting to low-emission vehicles (such as hybrid-electric, hydrogen, etc.) and electric vehicles (EVs) will be critical to meeting our emissions reduction goals. Achieving a cleaner transportation sector requires a combination of measures, including better urban design, public transportation, and more safe and accessible active transportation options to reduce demand for private vehicles. However, transitioning to low emission and EVs will be integral to the net-zero transition, particularly in areas where private vehicles may be necessary. EVs are a rapidly advancing technology, and the last 20 years have seen significant technological developments that have lowered their costs and reduced their environmental footprint. In provinces such as Ontario, where the electricity generation mix produces relatively low emissions, EVs reduce emissions significantly compared to fossil fuel vehicles. As EVs use electricity as fuel rather than gasoline, they have much more affordable operating costs, particularly if they are charged

[38] Local data on off-road vehicle use is not available. Energy and emissions are estimated based on Provincial totals and is likely an underestimate of off-road energy use and emissions.
[39] District Municipality of Muskoka, "Fast Facts," (2021), https://www.muskoka.on.ca/en/finance-and-administration/resources/Documents/District-of-Muskoka-2021-Fast-Facts.pdf.
[40] Google Environmental Insights Explorer, "Transportation Data for Muskoka District Municipality," (2018), https://insights.sustainability.google/places/ChIJ4WkxzVODKk0RguwczAvYKUI?hl=en-US.

over-night or on weekends when electricity costs are lower. EVs also have lower maintenance costs, and when compared over an 8 to 10-year period, the lower operating and maintenance costs of EVs also save money compared to gas cars. While EVs currently cost more to buy, government incentives such as the Federal iZEV program can help reduce upfront costs and future cost reductions as EV demand continues to increase and technologies improve. At the local level, Muskoka residents can consider purchasing a low emission or EV as their next car, and governments and others can invest in charging infrastructure and educating consumers.

GHG Emissions Reduction Potential

By 2030, the CEERP aims for 35% of registered vehicles, including on-road, off-road and public transit vehicles in Muskoka, to be low or zero-emission vehicles, avoiding close to 129,000 tC02e of GHG emissions per year and reducing total baseline GHG emissions by 17%. Switching from gasoline and diesel to more efficient electric vehicles will reduce total transportation energy dollars spent in 2030 by 12% across Muskoka.

By 2050, the CEERP aims for 95% of registered vehicles to be zero-emissions, avoiding close to 409,000 tC02e of GHG emissions per year, reducing total baseline GHG emissions by close to 50%, and reducing energy dollars spent on fuel by 43% across Muskoka.

Actions

1.1	Install EV charging stations (or support third-party ownership) at public facilities and parking lots with access to tourism destinations and amenities. Identify and pursue funding options and partnerships to execute. Expanding and installing EV charging infrastructure is key to the increased future use of EVs across Muskoka.	
1.2	Advocate for installing or including EV chargers in larger-scale developments (condominiums, MURBs, etc.). Support developers to pursue adoption.	
1.3	Purchase low emission or electric vehicle(s) as the next personal and/or fleet vehicles.	
1.4	Advocate to all levels of government to increase rebate programs to make low emission vehicles as affordable as combustion engine vehicles. One of the key barriers to making an EV the personal vehicle of choice is the higher upfront costs of EVs.	
1.5	Explore opportunities to allocate preferential parking spots, as appropriate, for zero-emission vehicles, carpools, and/or car-share to help incentivize sustainable transportation modes.	
1.6	Monitor advancements, consider infrastructure needs to decarbonize off-road transportation options such as e-boats, e-bikes, e-scooters and other equipment, and share resources to support and promote adoption where feasible.	
1.7	Develop and share an education campaign and host events to dispel myths about low emission and electric vehicles. Increase awareness about available financial supports, resources about used EVs, benefits, and functionality to increase adoption.	

#2: Local Transit

As part of the shift towards low-emission vehicles, there is a need to continue to develop accessible, affordable, and sustainable local transit solutions for both urban and rural residents so that they are viable alternatives to private vehicle use. As most of the energy use and GHG emissions in Muskoka are caused by private vehicles, increasing the uptake of transit can contribute significantly to GHG emission reductions. Increasing transit use also reduces traffic congestion, reduces air pollution, leads to fewer accidents, and creates greater independence and mobility for non-drivers.

Increasing local transit ridership and the local transit network are aligned with the District's Community Transportation Plan (2020) and the District Official Plan (see Section K3). Below are actions that support these policy directions, implement the recommendations from the Community Transportation Plan, contribute to GHG emission reduction and improve rural connectivity and local transit options for all users (age, ability, etc.).

GHG Emissions Reduction Potential

The CEERP aims to reduce private vehicle use and encourage more people to take public transit to move in and around Muskoka whenever possible. As a result, the CEERP aims to shift approximately 8% and 20% of the kilometers travelled by private vehicles to transit by 2030 and 2050, respectively. Electrification of the local transit fleet by 2035 will minimize any increased GHG emissions from transit. Furthermore, the CEERP aims to replace 4% and 10% of the kilometers travelled in private vehicles with Northlander Train ridership in 2030 and 2050, respectively. Given that 64% of all trips are cross-boundary, the Northlander train will target this emissions segment. Increasing transit ridership reduces kilometers travelled by personal vehicles and avoids a potential 47,000 tC02e and nearly 56,000 tC02e of GHG emissions per year by 2030 and 2050, respectively.


Icon 1: District of Muskoka


Icon 2: Area Municipalities of Muskoka


Icon 3: Businesses and Industries


Icon 4: Institutions


Icon 5: Community Groups


Icon 6: Residents


Icon 7: Utilities


Icon 8: All Sectors

Actions

2.1	Continue to improve the frequency of transit services and coordination with, and connections to, other networks beyond Muskoka (e.g., Simcoe County LINX, Northlander Train).	
2.2	Promote and prioritize transit-oriented development.	
2.3	Advocate to the Province on transit needs beyond Muskoka.	
2.4	Investigate a policy to mandate that all new vehicles purchased for local public transit must be electrified or decarbonized by 2030.	
2.5	Improve transit ridership by pursuing/supporting options for affordable, accessible, and safe mobility for all. Options could include offering discounted bus fares or passes and exploring new technologies to offer smart payment, live-service tracking, and on-demand services.	
2.6	Promote transit services and alternative means of transportation through education campaigns. Key messages can support first-time transit users and system navigation. - Create and share resources widely through multiple formats.	

2.7	Identify locations in the community with unmet transit demand and advocate for new bus stops and routes to expand current offerings.	
2.8	Commute by public transit and encourage kids to commute to school by public transit whenever possible.	
2.9	Advocate directly to Ontario Northland to improve the connectivity of their bus stop and future train station locations.	
2.10	Advocate for the electrification and/or decarbonization of school buses (health and environmental benefits).	

#3: Car Sharing and Transportation Demand Management

Carpooling and car-sharing programs and other Transportation Demand Management (TDM) initiatives help to address traffic congestion and reduce the community's dependence on private vehicles. TDM initiatives can further reduce emissions.

GHG Emissions Reduction Potential

Participating in car-share and carpooling programs reduces the number of single-occupancy vehicles on the road, the number of individual vehicle trips taken, and the total vehicle kilometers travelled (VKT) in the District. Some estimates show that each shared vehicle can reduce VKT by 29,000 annually. A car-share fleet of 50 vehicles in Muskoka by 2030 would result in approximately 183 tC02e of avoided emissions annually. Three hundred car-share vehicles by 2050 would result in close to 1,100 tC02e of avoided emissions per year.

Actions

3.1	Support the integration of a car-share company service in Muskoka to provide publicly accessible car-share vehicles and parking spaces.	
3.2	Encourage remote/virtual meeting opportunities, enable work-from-home policies, and promote car-sharing commuting practices.	
3.3	Participate in carpooling with family members, friends and co-workers and use grocery delivery programs (where available) to avoid individual trips. Create and share resources to encourage carpooling. Use best practices from other communities to encourage adoption (e.g., company-wide or neighbourhood carpool challenge).	

3.4 Support the establishment of car-share and carpool parking spots at key transportation hubs such as local transit stops, stations, and the Northlander Train stops to incentivize carpooling for travel.



#4: Active Transportation and Complete Streets

Active travel involves human power, such as walking, cycling, or rolling (in-line skating or skateboarding). Mode shifting to active forms of travel and reducing reliance on private vehicles will be integral to reaching net-zero, as not all residents will be able to transition to low emission vehicles. Complete streets are designed to be accessible and safe for all road users, making active travel feasible for more people and reducing reliance on motor vehicles. The CEERP aims to increase active travel by designing and implementing complete streets and encouraging active modes of travel, including electric micro-mobility (e.g., e-bikes, e-scooters, etc.).

Encouraging active transportation aligns with the District's Official Plan (see Section K2) and the District's Active Transportation Strategy (2010). As per these policies, the District, with Area Municipalities, should develop programs, infrastructure and facilities that encourage walking, cycling, and rolling with all age groups.



GHG Emissions Reduction Potential

By 2030, the CEERP aims to increase the number of kilometers travelled by walking or cycling, reducing private vehicle kilometers travelled by 8% compared to current levels, avoiding nearly 31,000 tC02e of GHG emissions per year.

By 2050, the CEERP aims to increase the number of kilometers travelled by walking and cycling by 20% compared to current levels, avoiding nearly 37,000 tC02e of GHG emissions per year[41].

Actions

4.1	Implement recommendations from the Muskoka Active Transportation Strategy, the upcoming Transportation Master Plan, and other plans to increase the regional walking and cycling network and active transportation options for all users in Muskoka. Prioritize strategies that increase affordable, accessible, and safe active transportation options.	
4.2	Promote and expand existing programs and explore partnerships to develop new programs like Bike Share and Ride Share. Use lessons learned from communities with a mix of permanent and seasonal residents and visitors.	
4.3	Implement an e-bike or regular bike incentive program to encourage riders to shift from personal vehicle use for short- and medium-trips. E-bikes are less expensive and more efficient than using a personal vehicle.	

[41] Note: The avoided emissions from mode shifting from private vehicles to walking and cycling to 2050 does not increase substantially from 2030 levels as most vehicles are electric by 2050.

4.4	Expand active transportation infrastructure for all ages and abilities through policy and programming (such as installing bike racks [stationary and on transit vehicles], connecting trails, sidewalks, integrating benches, etc.) at key destinations, local transit stops and stations, Northlander Train stops, and at larger scale developments, institutions, and businesses.	
4.5	Commute by active travel and encourage children and young people to commute to school by active travel whenever possible.	
4.6	Develop and promote low-carbon active transportation activities for permanent and seasonal residents and tourists. Create and share resources within networks through multiple formats.	
4.7	Update and align DMM and AM Official Plans and Strategies with Federal, Provincial, and local climate action plans to support active transportation.	


Icon 1: District of Muskoka


Icon 2: Area Municipalities of Muskoka


Icon 3: Businesses and Industries


Icon 4: Institutions


Icon 5: Community Groups


Icon 6: Residents


Icon 7: Utilities


Icon 8: All Sectors

Cumulative Impact of Transportation Areas for Action

Together, these four Areas for Action will support the goal of significantly reducing transportation sector GHG emissions from the 2018 baseline by close to 207,500 tC02e or 31% by 2030 and by 502,828 tC02e or 76% by 2050. This results in a District-wide total GHG reduction of 23% by 2030 and 56% by 2050 from the 2018 baseline. Each wedge in the graph below represents the avoided emissions due to the Areas for Actions implemented in the Transportation Pillar and demonstrates the contribution these make towards achieving the 2030 GHG reduction target. Mode shifting in Figure 10 below includes reducing the number of private vehicle trips and replacing them with transit, walking, and cycling. While shifting travel modes, increasing public transit, and the electrification of vehicles play a key role in achieving GHG emission reductions, other actions are still needed to reach the 2030 target and move closer to the net-zero 2050 target.

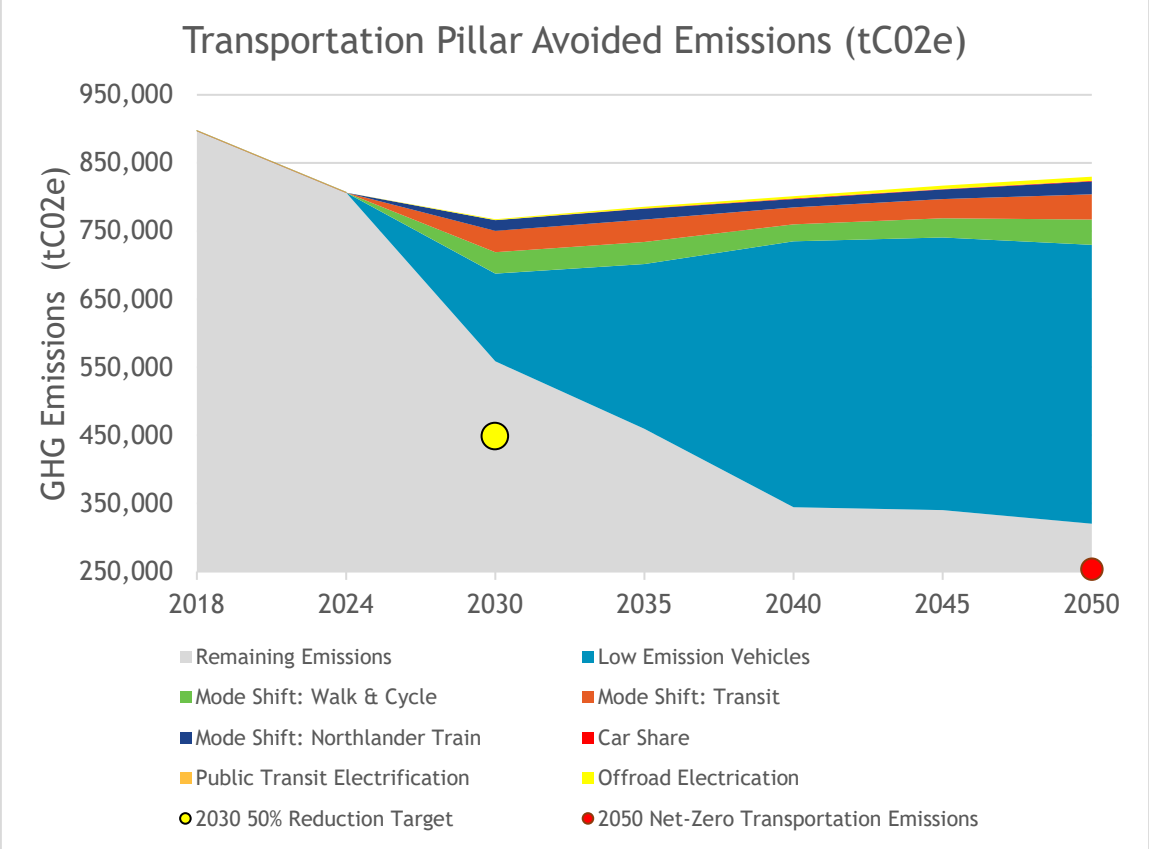


Figure 10: Avoided GHG emission reductions from the transportation pillar to 2050.

Pillar 2: Buildings



The building sector includes all GHG emissions from energy used for heating and powering homes, businesses, and Muskoka's institutions, commercial and industrial (ICI) sector buildings. Overall, buildings accounted for 34% of energy consumption, 33% of energy costs and 20% of GHG emissions in the District of Muskoka. The average resident in Muskoka consumed 20 GJ of energy and spent about $860 to heat and power their homes in 2018.

Residential buildings were the largest source of building energy use and GHG emissions in Muskoka in 2018, using 56% of the total building sector energy use and producing 45% of all building GHG emissions. Overall, residential buildings are responsible for 20% of energy use and GHG emissions across all sectors. Natural gas accounted for 27% of energy use and 50% of residential GHG emissions in 2018, whereas electricity accounted for 61% of energy use and 18% of all GHG emissions. Based on provincial averages, it is estimated that wood stove heating accounted for 7% of energy use and 22% of residential GHG emissions. In Muskoka, institutional, commercial, and industrial buildings (ICI) account for 15% of energy use and 11% of GHG emissions. Natural gas consumption accounted for 74% of ICI energy use and 87% of GHG emissions.

As shown in Figure 11**,** most homes in Muskoka are single-family detached homes, and approximately 47% of all households in Muskoka are seasonal dwellings or second homes[42]. The residential sector continues to grow. Based on the 2019 Growth Strategy, growth was forecasted to include 5,790 additional new year-round occupied housing units by 2036 and 7,700 by 2046, with the highest levels of growth anticipated in the urban centers of Huntsville, Bracebridge, and Gravenhurst[43]. However, these values are actively being finalized to reflect growth across Muskoka, which has exceeded this projection. The housing mix is expected to shift towards higher density forms with increased shares of rowhouses and apartments. However, single detached homes will continue to make up most buildings in Muskoka. Seasonal homes are expected to grow in line with historical trends but will be limited by available land supply. Two thousand four hundred and ten (2,410) and 3,280 seasonal homes are expected by 2036 and 2046, respectively. In the diagram below, SFD stands for single-family dwellings, and MURB stands for multi-unit residential buildings.

[42] The District Municipality of Muskoka Final Report, "2017 Second Home Study," (2017).
[43] Hemson Consulting, "District of Muskoka 2019 Growth Strategy. Forecast & Growth Allocation Report," (2019).
https://muskoka.civicweb.net/filepro/document/33446/2019%20Growth%20Strategy%20Phase%201%20-%20Forecast%20and%20Growth%20Allocation%20Report.pdf

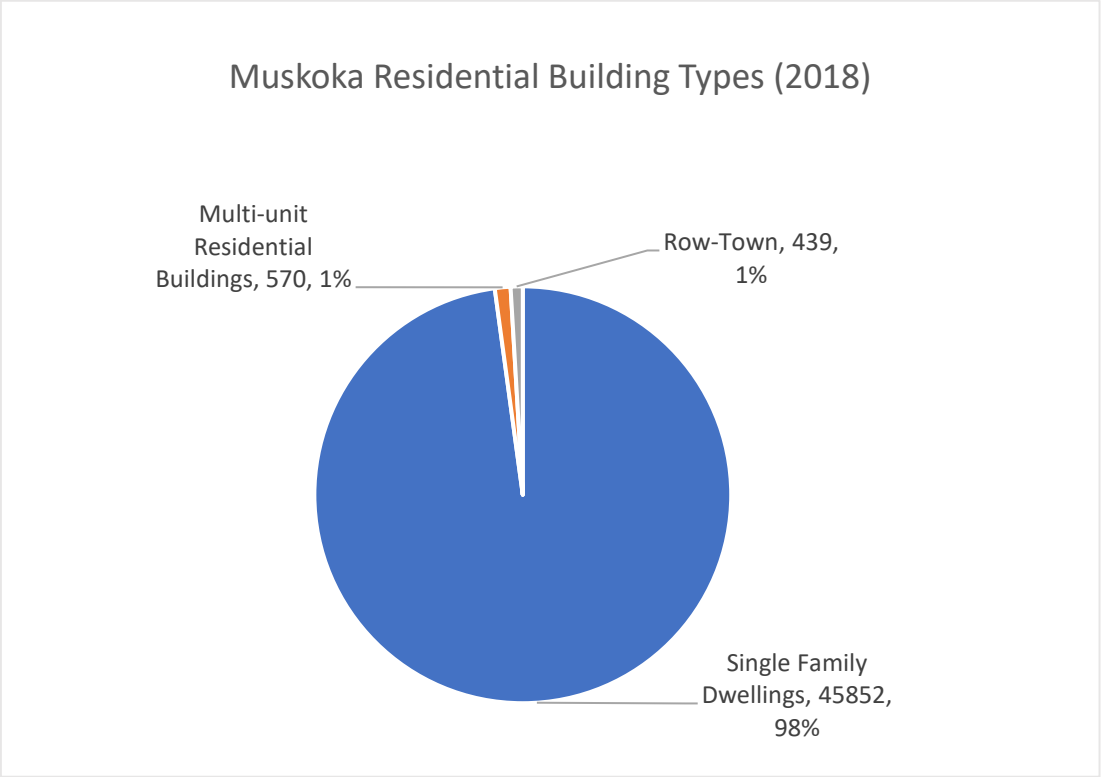


Figure 11: Type of residential dwellings in Muskoka in 2018 based on data from the Municipal Property Assessment Corporation (MPAC), described by name, number of dwellings, % of total dwellings.

Heating, cooling and powering homes require significant energy. A home's age and size, local weather/climate conditions, fuel costs, and the number of occupants all influence the total energy use and cost. As shown in Figure 12, most existing residential buildings in Muskoka were built between 1900-1959 and 1960-1979 and are much less efficient than new buildings. As a result, existing buildings will continue to be the largest source of energy use and GHG emissions in the building sector by 2050.

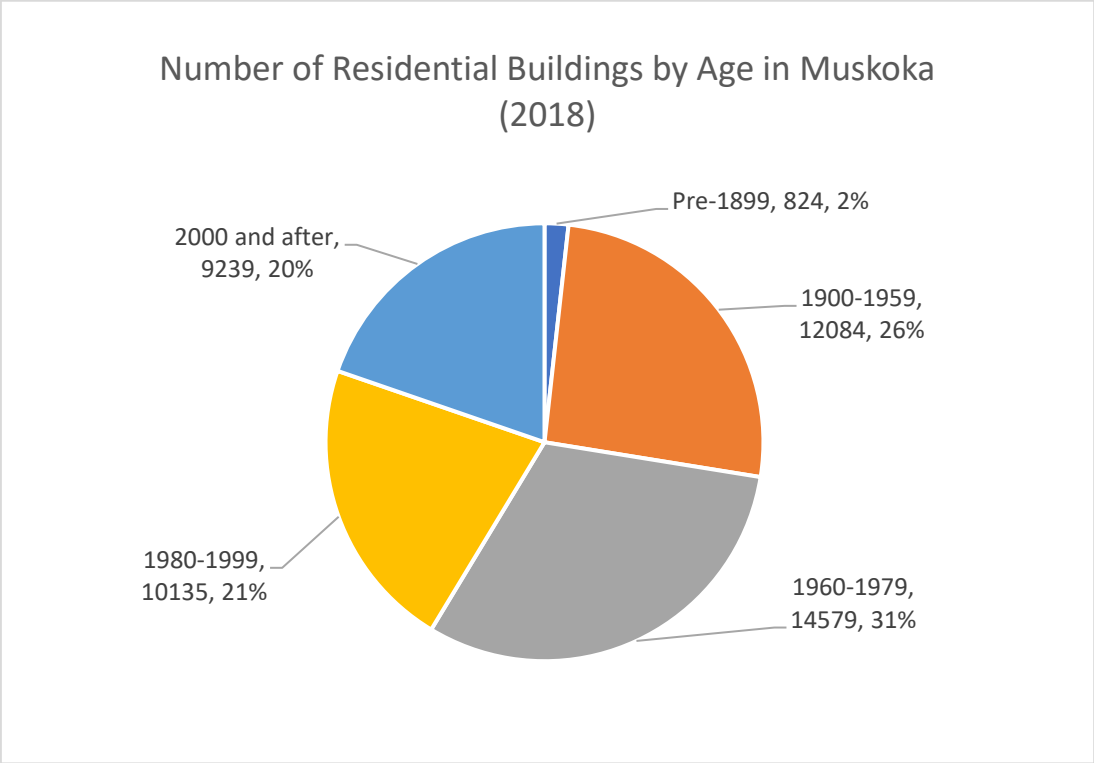


Figure 12: Age and number of residential homes in Muskoka in 2018 based on data from MPAC.

Single-detached homes also use the most energy per floor area on average (Table 1). They will need to be a focus of the deep energy efficiency retrofit program described below if Muskoka is to reduce GHG emissions from the building sector and meet targets. Without local action, GHG emissions from new buildings will account for 7% of the total by 2030 and 13% by 2050. Targeting all new buildings to be net-zero ready by 2030 minimizes GHG emissions and avoids retrofitting these buildings in the future.

Table 1: Average energy use and energy intensity of homes by type in Ontario in 2018

Housing Type	Average household energy use (GJ)[44]	Average energy intensity (GJ/m^2)[45]
Single-detached homes	140	0.79
Single attached homes (townhouses, duplexes, etc.)	101.8	0.69
Apartments	62.7	0.62

[44] Natural Resources Canada, "Comprehensive Energy Use Database, Residential Sector – Ontario," (2018).
[45] Ibid.

As seasonal dwellings are only occupied for part of the year, they are often retrofitted less frequently than permanent residences. Because they are not used year-round, seasonal dwellings have lower annual energy use and energy cost savings potential than year-round homes. This results in longer payback periods, which may deter some residents from investing in energy efficiency upgrades. Furthermore, many seasonal dwellings and older homes may require electrical, circuitry, and/or ducting upgrades to accommodate energy-efficient technologies such as heat pumps.

#5: Deep Energy Efficiency Retrofit Programs

Given that most of the GHG emissions stem from existing buildings, there is a need to develop and implement a deep energy retrofit program to improve energy efficiency in the community's existing buildings and transition from fossil fuel heating systems. Deep energy retrofit programs reduce energy use and GHG emissions by improving the performance and efficiency of building envelopes and systems used to heat, cool, and ventilate indoor spaces. They also can promote switching to electric heat pumps for heating and cooling. Deep energy retrofits typically target a 40-60% reduction in energy demand. Residential, institutional, and commercial buildings would be targeted in a voluntary retrofit program, with the oldest and least efficient buildings being targeted first.

Residential Deep Energy Retrofit Program:

- Retrofit approximately 3% of existing residential buildings per year starting in 2024
- By 2030, retrofit all residential buildings built before 1980 (30% of residential buildings)
- By 2050, retrofit 80% of existing residential buildings

Residential Heat Pumps:

- By 2030, heat pumps will provide heating to 40% of residential buildings
- By 2050, heat pumps will provide heating to 60% of residential buildings

ICI Deep Energy Retrofit Program:

- Retrofit 30% of existing ICI buildings by 2030
- Retrofit 80% of existing ICI buildings by 2050

ICI Heat Pumps

- By 2030, heat pumps will provide heating to 30% of ICI buildings
- BY 2050, heat pumps will provide heating to 80% of ICI buildings

Did You Know?

Heat pumps are versatile home appliances that can heat and cool a residence using electricity rather than fossil fuels, replacing traditional heating systems and acting as air conditioners. Heat pumps are highly efficient and can reduce the monthly energy costs of the average home by up to 65%. Heat pumps result in significant environmental benefits as they reduce reliance on fossil fuels and subsequently reduce GHG emissions.

Heat pumps transfer heat, using electricity, from one location to another. They remove heat inside a home in cooling mode, like how refrigerators and air conditioners work. They reverse the process in heating mode by extracting heat energy from the outside air or ground, even in cold conditions. Heat pumps can conveniently use existing ductwork and furnace fans to move air throughout your home.

There are ground-source (or geo-thermal) and air-source heat pumps. The ground-source heat pumps and cold-climate air-source heat pump models operate efficiently even in temperatures as low as -30 C. In some cases, heat pumps can be combined with a furnace, boiler, or electric baseboards to ensure adequate heating on the cold Muskoka winter days. Even with a hybrid system, significant cost savings and environmental benefits exist.

Heat pumps typically cost more than a standard furnace, air-source heat pumps cost between $6,000 and $15,000, and ground-source heat pumps cost between $20,000 and $40,000, including the appliance and installation. Although this is a large upfront cost, the monthly savings are significant, and many grants are available.

GHG Emissions Reduction Potential

Residential Deep Retrofit and Heat Pump Adoption GHG Emissions Reduction Potential:

- By 2030, avoiding close to 50,000 tC02e of GHG emissions per year
- By 2050, avoiding close to 65,000 tC02e of GHG emissions per year

ICI Deep Retrofit and Heat Pump Adoption GHG Emissions Reduction Potential:

- By 2030, avoiding close to 44,300 tC02e of GHG emissions per year
- By 2050, avoiding close to 78,000 tC02e of GHG emissions per year

Actions

5.1 Support a coordinated approach to establish a Deep Energy Retrofit one-stop-shop and education program for Muskoka, which includes:

- Sharing resources and information about available grants and funding opportunities.
- Step-by-step instructions and advice to guide residents and businesses through the retrofit process.
- Sharing experiences (FAQs, case studies, property tours, etc.) to demonstrate benefits and lessons learned through partnership with CAM's Electrify Muskoka group.
- Prioritizing and promoting heat pump adoption.
- Promoting specific resources for low-income households, such as the Energy Affordability Program, Enbridge Home Winterproofing Program (HWP), Muskoka Ontario Renovates, and reducing barriers or any future grant programs created by the District or other organizations/governments to create equitable benefits.
- Promoting specific programs and technologies for seasonal homes or renters (e.g. weatherization kits).



5.2	Support permanent and seasonal homeowners, developers, builders, and others to participate in deep retrofit programs by providing information developed through the education program (action 5.1). This should include communications related to permitting major renovations and new construction. Once educational materials are developed, ensure municipal planning and building staff have resources for developers or homeowners upon the first point of contact for permitting major renovations or new construction.	
5.3	Increase the efficiency of the District's social and affordable housing units by completing energy retrofits. Use best practices from other communities to encourage adoption (e.g., company-wide or neighbourhood carpool challenge).	
5.4	Explore opportunities to allocate preferential parking spots, as appropriate, for zero-emission vehicles, carpools, and/or car-share to help incentivize sustainable transportation modes.	

#6: Green Development Standard

Green Development Standards (GDS) are building standards for new construction that seek to encourage, incentivize and reduce barriers to environmentally, socially and economically sustainable design. Muskoka's GDS should include standards for energy efficiency performance, energy mix, electric vehicle charging infrastructure, renewable energy-ready and District energy-ready design on a tiered system, with increasing standards over time. The goal is that by 2030, all new buildings will be constructed to be net-zero-ready (80% more energy efficient), and electric heat pumps will replace fossil fuels such as natural gas, propane, fuel oil, and wood for space heating.

Preparing a green development standard aligns with the District's Official Plan, which outlines what (at a minimum) should be included in the GDS and calls for Area Municipalities to develop their respective GDS. The Regional Climate Adaptation Plan (ReCAP) also recommends the development of a GDS to encourage Low Impact Development (LID) features in new development and redevelopment projects.

GHG Emissions Reduction Potential

Residential Green Development Standard GHG Emission Reduction Potential:

- By 2030, avoiding close to 4,800 tC02e of GHG emissions per year
- By 2050, avoiding close to 7,100 tC02e of GHG emissions per year

ICI Green Development Standard GHG Emission Reduction Potential:

- By 2030, avoiding close to 5,400 tC02e of GHG emissions per year
- By 2050, avoiding close to 2,700 tC02e of GHG emissions per year

Actions

6.1 Implement a Green Development Standard (GDS) pilot program in the District of Muskoka. This includes reviewing best practices from other municipalities and implementing a pilot program GDS in Muskoka to incorporate climate change mitigation and adaptation measures. Partner and collaborate with Area Municipalities to do so.

The outcome of the pilot program should be reviewed upon its completion. At that time, investigate opportunities to incorporate GDS into Municipal Official Plans.



6.2 Develop and execute an education program on construction waste management. The program should include reviewing best practices from other municipalities that support construction waste management through policies, by-laws, programs, or inclusion into the Green Development Standards.



6.3 Promote Green Building Standards through an education campaign to explain their importance and how they work. Create and share resources within networks through multiple formats.

Educate and train municipal staff, building officials, developers, and the broader community on GDS and their implementation.





#7: Renewables

Increasing renewable energy capacity that provides a clean source of electricity is a key part of the net-zero transition, particularly as electricity demand increases as a result of the electrification of the heating and transportation sectors and the economy as a whole. Local renewable energy generation has many benefits, including reducing household or business electricity costs, providing zero-emission energy, diversifying the energy supply, creating energy independence, and creating local economic opportunities for manufacturers and installers. This action area seeks to increase the proportion of buildings across all sectors that use solar photovoltaic (PV), energy storage and other renewable energy technologies as they become feasible in Ontario due to economic, regulatory and policy developments. While the deep energy retrofit program and GDS will include considerations for implementing renewables, a specific program with targeted incentives to promote renewable energy installations can help accelerate adoption.

The District's Official Plan (see Section D19) calls for energy generation, transmission, and distribution networks in Muskoka to increasingly emphasize renewable energy sources. The actions below support the adoption of renewables.

Residential renewables integration targets:

- By 2030, 10% of existing residential buildings and 25% of new residential buildings will have rooftop solar PV
- By 2035, 50% of new residential buildings will have rooftop solar PV
- By 2050, 30% of existing buildings will have rooftop solar PV
- By 2050, 80% of new residential buildings will have rooftop solar

ICI renewables integration targets:

- By 2030, 25% of existing and all new institutional buildings[46] will have rooftop solar PV and 5MW of ground-mounted solar installed where feasible
- By 2050, 45% of existing and all new institutional buildings will have rooftop solar PV and 15 MW of ground-mounted solar installed where feasible

GHG Emissions Reduction Potential

Residential Renewables GHG Emission Reduction Potential:

- By 2030, avoiding close to 2,500 tC02e of GHG emissions per year
- By 2050, avoiding close to 11,800 tC02e of GHG emissions per year

ICI Renewables GHG Emission Reduction Potential:

- By 2030, avoiding close to 800 tC02e of GHG emissions per year
- By 2050, avoiding close to 2,200 tC02e of GHG emissions per year

Actions

7.1	Apply for funding to develop a solar rebate program for homeowners, businesses, and institutions.	
7.2	Install solar PV at schools, institutions, businesses, and households, and explore partnerships that support the adoption. Rooftop solar can generate both energy and cost savings for building owners.	
7.3	Explore partnerships to develop community microgrids using battery storage solutions and investigate available funding opportunities.	

[46] Note: Data on the number of commercial and industrial buildings in Muskoka was unavailable. Therefore, solar potential is only estimated for institutional buildings (school district, healthcare and municipal buildings).

7.4	Install solar PV and other renewable energy technologies as they become available in buildings, facilities, and homes. Share lessons learned and best practices to encourage additional uptake.	
7.5	Advocate to the provincial government and utilities to support net-metering policies that allow metering excess energy or leveraging excess energy for others.	
7.6	Monitor developments in renewable energy and storage technologies and assess the feasibility of implementation in Muskoka as technologies become economically viable.	
7.7	Crowdfund the installation of solar PV and heat pump in community spaces.	

#8: Energy Management and Benchmarking

Energy management and benchmarking are common among businesses, industries, and institutions. There is an opportunity to promote and support participation in existing programs and share best practices amongst these audiences to increase further energy savings. Energy management and benchmarking programs use engineering and economic principles to manage how buildings use energy in their building processes. The CEERP includes actions to promote the commissioning and recommissioning of ICI buildings to assess equipment and operating/maintenance systems and optimize energy performance. These upgrades can generate cost savings for building owners and operators to support Muskoka's economy.



Icon 1: District of Muskoka | *Icon 2: Area Municipalities of Muskoka* | *Icon 3: Businesses and Industries* | *Icon 4: Institutions* | *Icon 5: Community Groups* | *Icon 6: Residents* | *Icon 7: Utilities* | *Icon 8: All Sectors*

GHG Emissions Reduction Potential

Recommissioning buildings can result in energy savings of up to 16%. The CEERP aims to recommission 5% of existing ICI buildings per year, avoiding close to 1,400 tC02e and 100 tC02e of GHG emissions per year by 2030 and 2050, respectively[47].

Actions

8.1	Partner with local community organizations (e.g., reThink Green) to support Muskoka organizations and businesses in implementing energy management and benchmarking best practices. This includes establishing a GHG baseline inventory and participating in commissioning or recommissioning projects through programs such as Enbridge's Savings by Design, SaveONEnergy, ENERGY Star Portfolio Manager program, and IS0 5001.	
8.2	Partner with community organizations (e.g., reThink Green) to create a one-stop shop or industry working group to encourage increases in industrial energy efficiency.	
8.3	Complete energy management and benchmarking and use available resources to do so.	

[47] Avoided emission reduction potential of recommissioning decreases as the ICI building stock is retrofitted, as retrofitted buildings are assumed to have been recently commissioned.

Cumulative Impact of Buildings Areas for Action

As shown in Figure 13, these four Areas for Action will support the goal of reducing the building sector GHG emissions by 109,300 tC02e and 180,200 tC02e per year by 2030 and 2050, respectively. Each wedge in the graph below represents the avoided emissions due to the actions implemented in the Buildings Pillar.

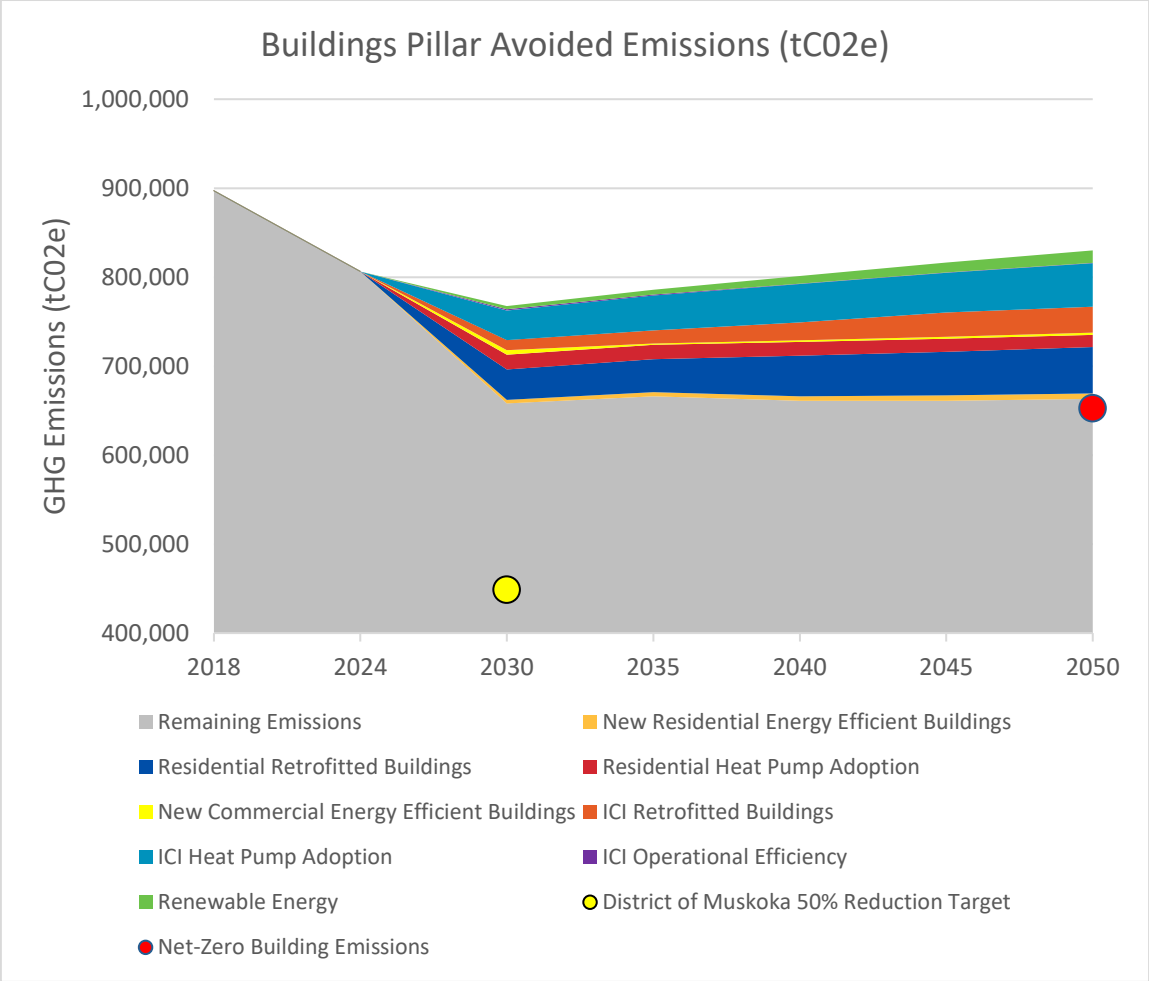


Figure 13: Avoided GHG emission reductions from the buildings pillar to 2050.

Pillar 3: Community Systems



Waste and Wastewater

Solid waste is managed in Muskoka through curbside garbage collection, blue bin recyclables and green bin composting. Urban areas have curbside leaf and yard waste collection, and non-urban residents can drop off green bin organics and leaf and yard waste at the District's transfer stations. The District currently diverts 35% of its waste through recycling, composting and reuse programs but is working to meet its 60% waste diversion goal through a variety of waste strategies, including reducing garbage bag limits, expanding curbside organics collections, and making recycling easier by allowing mixing of recyclable containers and paper products in the blue bin.

Solid waste that cannot be diverted is sent to the landfill, where the organic matter decomposes into methane – a greenhouse gas 25 times more potent than carbon dioxide[48] in terms of its global warming potential over 100 years. In 2018, residents of Muskoka produced 27,012 tonnes of solid waste. Fourteen thousand seven hundred twenty-six tonnes (14,726), or 55% of this waste, went to landfill, or 0.10 tonnes per person[49], which is lower than the provincial and national averages of 0.70 and 0.69, respectively[50]. The remaining 12,286 tonnes (45%) of solid waste was diverted primarily through blue box recycling and organics collection. This generated 23,644 tonnes of GHG emissions from landfilled waste and 700 tonnes from composting.

The District owns and operates eight wastewater facilities, nine drinking water systems, and nine septage lagoons. GHG emissions are generated directly by the wastewater treatment process at these facilities due to anaerobic treatment and indirectly through effluent discharge.

In Muskoka, waste GHG emissions accounted for 6% of the total in 2018 or 0.39 tC02e per capita. Wastewater treatment was the largest source of GHG emissions in the waste sector, generating 3.5 % of total GHG emissions, followed by solid waste disposal at 2.6%. Composting is responsible for less than 1% of total GHG emissions.

[48] Government of Canada, "Reducing Methane Emissions," (2023), https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/reducing-methane-emissions.html accessed August 2023.
[49] Including permanent and seasonal population.
[50] Statistics Canada, "Disposal of Waste, by Source," (2020), https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810003201.

#9: Waste Reduction and Diversion

Reducing waste and improving waste diversion will prolong the lifespan of Muskoka's landfill and reduce GHG emissions associated with methane release. Waste reduction initiatives aim to reduce the total waste collected in Muskoka while increasing the amount collected in the blue box and green bin programs.

- By 2030, reduce garbage generation by 10% and divert 60% of all solid waste from landfill
- By 2050, reduce garbage generation by 25% and divert 80% of solid waste from landfill

Reducing waste is the focus of the District's new Waste Strategy, No Time to Waste, which aims to increase waste diversion to 60%.

GHG Emissions Reduction Potential

Solid waste reduction and landfill diversion have the potential:

- By 2030, avoiding 8,000 tC02e of GHG emissions per year
- By 2050, avoiding 20,700 tC02e of GHG emissions per year

Actions

9.1	Continue to expand green bin curbside collection in Muskoka and investigate incentive programs for at-home composters for those who do not have access to municipal green bin programs.	
9.2	Promote circular economy initiatives and a culture of reduction and reuse in Muskoka by encouraging local share, repair, and reuse events. Consider partnering with circular economy champions (e.g., Habitat for Humanity).	
9.3	Investigate the feasibility of methane capture technology to minimize GHG emissions and recover energy from waste management activities.	
9.4	Support programs to transition away from single-use plastics and food ware, including creating reusable takeout container programs and other opportunities to reduce and eliminate single-use plastics.	

9.5	Deliver and promote community initiatives and events to increase awareness of proper waste sorting and foster a culture of reducing waste.	
9.6	Continue to expand waste education through an education campaign. Create and share resources within networks through multiple formats.	

#10: Water and Wastewater

Wastewater treatment is critical for reducing water pollution and maintaining general environmental and human health; however, it produces direct GHG emissions from the biological processes involved in the treatment and from the energy used to operate the facilities. Emissions from wastewater treatment can be reduced through enhanced monitoring and optimization of the treatment process or by implementing new processes where feasible. In addition, leftover organic matter from the wastewater treatment process can be used in anaerobic digesters to produce biogas, which can be used as a low-carbon renewable energy source to create electricity or produce renewable natural gas.

Water conservation does not result in direct GHG emission reductions but can indirectly reduce emissions by reducing the amount of water processed at treatment facilities. Conserving water saves the energy needed to heat, pump and treat water, reducing energy costs and GHG emissions. Furthermore, fresh water is a limited resource, and water conservation will help prevent water scarcity, reduce environmental pressures, preserve aquatic ecosystems, maintain water quality, and ensure water availability for future generations. The water and wastewater actions below target a 3% and 5% reduction in GHG emissions by 2030 and 2050, respectively.

GHG Emissions Reduction Potential

- By 2030, avoiding 850 tC02e of GHG emissions per year
- By 2050, avoiding 1,700 tC02e of GHG emissions per year



Icon 1: District of Muskoka | *Icon 2: Area Municipalities of Muskoka* | *Icon 3: Businesses and Industries* | *Icon 4: Institutions* | *Icon 5: Community Groups* | *Icon 6: Residents* | *Icon 7: Utilities* | *Icon 8: All Sectors*

Actions

10.1	Continue to explore anaerobic digestion technology applications and opportunities for biogas generation at wastewater treatment facilities where applicable.	
10.2	Continue to support residents and businesses learning about water conservation practices. Promote the implementation of water-saving appliances and systems such as rain gardens, rain barrels, drip irrigation and on-demand water heaters. Partner with community groups to execute an education campaign.	
10.3	Reinstate and participate in the residential rain barrel program to support residents in reducing water consumption.	
10.4	Deliver and promote community initiatives and events to increase awareness of the best practices of water conservation and wastewater management.	

Cumulative Impact of Waste-related Actions

As shown in Figure 14, these Areas for Action will support the goal of reducing emissions associated with waste by close to 9,300 tC02e per year by 2030 and close to 22,400 tC02e by 2050.

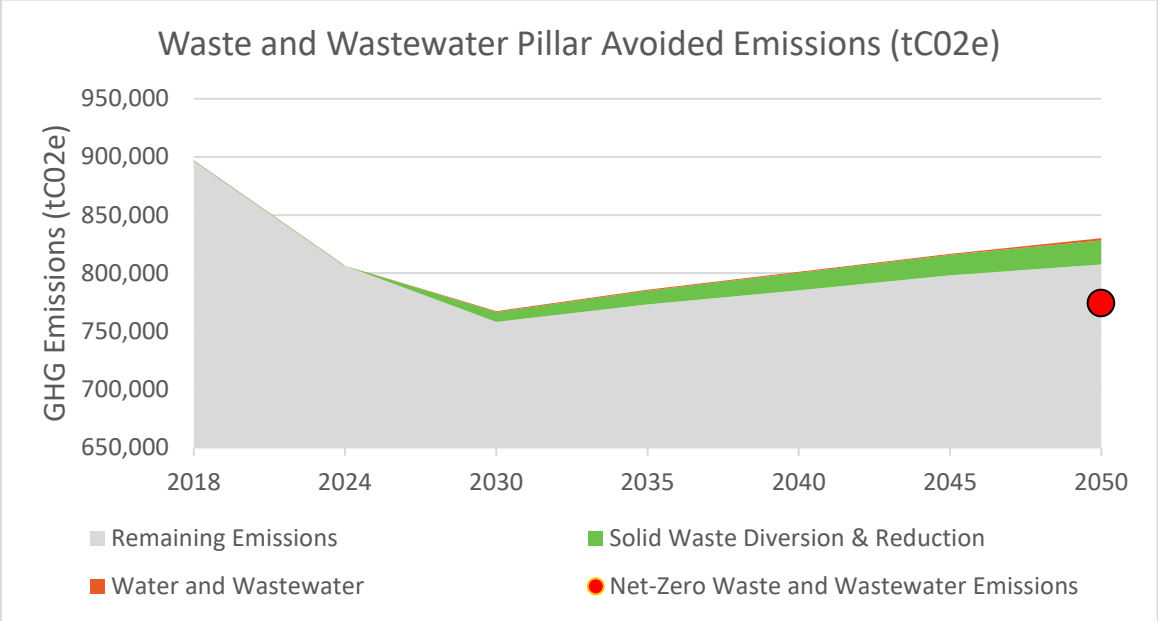


Figure 14: Avoided GHG emission reductions from the Waste-related Areas for Action to 2050.

#11: Nature-based Solutions

Nature-based solutions (NBS) are projects or actions that work with and leverage the power of natural ecosystems to achieve environmental and societal benefits, including restoration and protection of ecosystems and biodiversity. NBS are increasingly being turned to as a climate solution for their potential to avoid GHG emissions through protecting natural areas, enhancing and restoring natural carbon sinks, and improving land management practices to increase carbon sequestration. Muskoka has many natural heritage assets, including 16 sub-watersheds and over 2,000 lakes. Land cover in the Muskoka River watershed is predominately forest (63%), wetland (15%) and aquatic (15%)[51], which provide a multitude of ecosystem services and supports the multi-million-dollar tourism and recreation economy. Muskoka's interconnected system of forests and wetlands also provides significant carbon sequestration and will play an essential role in meeting our net-zero targets.

[51] Dougan & Associates, "Muskoka River Watershed IWM Natural Capital Inventory, Phase 2 Final Report," (2022), https://www.muskoka.on.ca/en/Environment/Documents-and-Forms/Natural_Capital_Inventory_(NCI)_-_Final_Report.pdf.

Protecting Muskoka's natural environment, such as wetland areas, forests, and water bodies, while expanding the community's tree cover, vegetation and green infrastructure will safeguard the local ecosystems' health and contribute to reducing GHG emissions through carbon sequestration. These solutions will be key in supporting Muskoka's net-zero GHG reduction targets and reducing the 15% remaining emissions.

GHG Emissions Reduction Potential

Natural carbon sinks are terrestrial, wetland and aquatic ecosystems and their components (e.g., soils, plants, sediments) that absorb more carbon than they release[52]. In forests, major carbon pools are found aboveground and belowground in live biomass, standing, and fallen dead wood, and soil organic carbon[53]. Visible biomass such as trees is commonly seen as the primary means of carbon sequestration; however, in managed boreal forests, soil accounts for most of the total carbon per hectare (40%)[54]. Less is known about carbon sequestration rates in unmanaged forests due to difficulties in monitoring and data gaps. Taking all three forest carbon pools into account, managed forests in Canada store approximately 208 tonnes of carbon per hectare, although due to variability across Canada, local and regional estimates will provide more accuracy[55]. Muskoka lies in the Great Lakes-St. Lawrence Forest region which is a transitional zone between southern deciduous forests and northern boreal coniferous. Research from the Great Lakes Forestry Centre indicates that boreal forests' mean carbon content is 193 t carbon/ha, while mixedwood stands ranged from 192 to 224 t carbon/ha[56].

While the forest carbon content numbers above paint a promising picture, forests are not static and carbon flux, or transfers of GHGs between the atmosphere, vegetation, and soils, is not well understood, particularly in boreal forests where there is limited understanding of the impact of changes in environmental conditions and disturbances[57]. In recent years, factors such as wildfires, insect outbreaks, decreased precipitation and shifting annual harvest rates have contributed to Canada's managed forests becoming carbon sources instead of sinks[58].

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[52] Council of Canadian Academies, "Nature-Based Climate Solutions, Expert Panel on Canada's Carbon Sink Potential," (2022), https://cca-reports.ca/reports/canadas-carbon-sink-potential/.
[53] NASEM (National Academies of Sciences, Engineering, and Medicine), "Negative Emissions Technologies and Reliable Sequestration: A Research Agenda," *The National Academies Press*, (2019).
[54] FAO (Food and Agriculture Organization of the United Nations), "Global Forest Resources Assessment Report - Canada," *United Nations*, (2020).
[55] Ibid.
[56] NRCan, "Boreal Mixedwood Forest Potential for Carbon Uptake and Storage," (2019), https://cfs.nrcan.gc.ca/pubwarehouse/pdfs/39935.pdf.
[57] Council of Canadian Academies, "Nature-Based Climate Solutions, Expert Panel on Canada's Carbon Sink Potential," (2022), https://cca-reports.ca/reports/canadas-carbon-sink-potential/.
[58] Ibid.

NBS practices in forests vary depending on their timing and impact on different carbon pools. Short- to medium-term actions that will produce immediate GHG mitigation potential include forest conservation, increasing the use of harvest residues and products, avoiding conversion and changing management practices such as reducing the area of slash burning, leaving harvest residue to decay, reducing harvesting limits, thinning, improving forest productivity through stocking and extending timber harvest rotation, forest management practices that accelerate forest regeneration, and prescribed burning. Longer-term practices, such as restoration of forest cover, will produce more fulsome impacts than short-term practices[59]. Wetlands, especially peatlands, can sequester significant amounts of carbon over long time scales. Lakes and rivers represent important carbon sinks that are closely linked to terrestrial carbon sinks as they transport carbon among various ecosystems. Conservation of lakes and rivers is crucial as lakes sequester carbon in sediments, making them effective long-term carbon sinks, while rivers act as channels between oceanic and terrestrial carbon cycles[6061]. Anthropogenic disturbances to watersheds can increase GHG emissions to the atmosphere from both sediments and the water column[62]. There are many uncertainties around current carbon stocks and fluxes in lakes and rivers, with no single estimate of carbon storage in Canadian lakes and rivers available. However, estimates from lakes in Quebec give an average carbon stock of 230t C/ha[63].

Key freshwater ecosystem NBS practices include avoiding wetland conversion, restoration, enhanced water-level management strategies, and conservation of lake systems[64].

Quantifying the GHG reduction potential of NBS is an emerging area, and quantifying the carbon sequestration potential of ecosystems is subject to large uncertainties, variability, modelling limitations and knowledge gaps[65]. Quantifying the carbon storage potential of Muskoka's vast natural assets is beyond the scope of the modelling in the CEERP. Understanding the carbon sequestration potential in Muskoka is an important study for Muskoka's net-zero transition. As a result, the following Areas of Action do not have quantifiable GHG reduction potential but will indirectly support GHG reductions in Muskoka.

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[59] Ibid.
[60] Cole, J. J., Prairie, Y. T., Caraco, N. F., McDowell, W. H., Tranvik, L. J., Striegl, R. G., Melack, J., "Plumbing the Global Carbon Cycle: Integrating the Inland Waters into the Terrestrial Carbon Budget," *Ecosystems* 10, (2007), 171-184.
[61] Maavara, T., Lauerwald, R., Regnier, P., & Van Cappellen, P., "Global Perturbation of Organic Carbon Cycling by River Damming," *Nature Communications* 8, (2017), 1-10.
[62] Huttunen, J. T., Alm, J., Liikanen, A., Juutinen, S., Larmola, T., Hammar, T., Martikainen, P. J., "Fluxes of Methane, Carbon Dioxide and Nitrous Oxide in Boreal Lakes and Potential Anthropogenic Effects on the Aquatic Greenhouse Gas Emissions," *Chemosphere* 52, (2003), 609-621.
[63] Ferland, M.-E., del Giorgio, P. A., Teodoru, C., & Prairie, Y. T., "Long-Term C Accumulation and Total C Stocks in Boreal Lakes in Northern Quebec," *Global Biogeochemical Cycles* 26, (2012), 1-10.
[64] Council of Canadian Academies, "Nature-Based Climate Solutions, Expert Panel on Canada's Carbon Sink Potential," (2022), https://cca-reports.ca/reports/canadas-carbon-sink-potential/.
[65] Ibid.

Actions

11.1 Build on the District's recently completed Natural Capital Inventory to incorporate, where possible, the results into asset management planning, including carbon quantification and cost valuation of Muskoka's natural assets.

As part of this process, consider establishing equitable tree canopy targets, developing policies to strengthen the protection of trees and wetlands, and acknowledging them as significant carbon sequestration assets.



11.2 Train District and Area Municipality staff on policy tools and best practices for protecting forests and urban canopy (i.e., tree-cutting by-law).



11.3 Support the development of local tree planting, native species, community gardens, and pollinator gardens (restoration of soil quality and forest health by ash addition).



11.4 Review processes and frameworks for identifying and protecting conservation lands and investigate ways to identify and protect conservation lands through municipal policy.



11.5 Develop and promote community initiatives and events that support the protection and expansion of nature-based solutions (e.g., events to add ash to local trails and forests, shoreline re-naturalization events, etc.).



#12: Sustainable Tourism

Sustainable tourism minimizes negative impacts on the environment, culture, and economy so that these systems can thrive long-term. Tourism in Muskoka attracts roughly 3.2 million visitors annually, significantly contributing to private vehicle trips within Muskoka and other activities that contribute to GHG emissions. By working with tourism sector partners, Muskoka can encourage the expansion of sustainable practices and behaviours in tourism activities that specifically reduce these emissions. There is an opportunity to leverage successful campaigns such as Leave No Trace, which focuses on properly disposing of waste, recycling wherever possible, and refraining from littering to address climate impacts while visiting district areas of Muskoka.

GHG Emissions Reduction Potential

While tourism in Muskoka has many social and economic benefits, an increased number of people visiting the area increases GHG emissions across all sectors. Improving and enabling sustainable tourism options can significantly impact GHG emissions, particularly from tourism transportation and accommodations.

Actions

12.1 Promote Muskoka's brand as a sustainable tourism destination, including:

- Supporting regional tourism organizations and operators in adopting sustainable business practices, including energy management and waste reduction.
- Supporting regional tourism organizations and operators in developing targeted messaging to encourage sustainable behaviours with diverse types of visitors, such as seasonal tourists, short-term tourists, and workers.
- Leveraging existing sustainable tourism certifications to recognize model tourism operations.





Icon 1: District of Muskoka | *Icon 2: Area Municipalities of Muskoka* | *Icon 3: Businesses and Industries* | *Icon 4: Institutions* | *Icon 5: Community Groups* | *Icon 6: Residents* | *Icon 7: Utilities* | *Icon 8: All Sectors*

#13: Education and Awareness

Education and awareness are critical to advancing climate action at the community level. Education should share the urgent need for climate action, encourage people to adopt energy-efficient behaviours in their daily lives and ensure residents and visitors understand their choices in decision-making. For example, there are numerous opportunities to educate students about climate change through existing environmental education programs. For adults, there are fewer concentrated systems to share messaging. Education must include creative ways to educate residents and build excitement and momentum toward change. Much of this work will focus on providing actionable information and facts to inform choices and continue creating space for climate advocacy. Climate action in Muskoka will also look different for seasonal residents and require education on realistic ways to reduce their environmental impact. Community groups like the lake associations will be instrumental in delivering this messaging. Visitors to Muskoka will need to understand sustainable tourism options and ways to reduce their environmental footprint while travelling. The CEERP will require a strategic focus on communications, education and engagement that brings together diverse community groups, advocates, and municipal governments to build a sense of ownership from the entire community. Investment in targeted education and awareness initiatives will help encourage community members to get involved. It will be necessary for communications to use language that is accessible and welcoming to a broad audience. Where possible, it will be important to share success stories.

Muskoka's Regional Climate Adaptation Plan (ReCAP) includes recommendations for communications with community members about climate change that can inform communications for the CEERP.

Actions

13.1	Develop and support the sharing of a comprehensive climate action education and awareness campaign addressing basic climate literacy, common myths and misconceptions, ongoing climate initiatives and opportunities for residents, businesses, industry and institutions, public health, economic and resilience co-benefits.	
13.2	Identify opportunities and approaches to require applicants for planning applications to provide an assessment of climate change and related health impact considerations as part of the application submissions.	
13.3	Support Climate Action Muskoka's Community Carbon Challenge to increase climate awareness and literacy and improve community ownership.	
13.4	Consider climate change and/or health impacts or benefits associated with any project, program, or initiative. Municipalities should include these considerations in all staff reports.	
13.5	Develop and deliver curriculum-based education materials to local schools related to specific climate impacts related to the subject area.	
13.6	Create and maintain an information package for homeowners (existing and new residents) and developers with information about home retrofits, building greener homes, public transit, low emission vehicles, EV chargers, blue/green bins, overall development process (GeoHub + PlanHub) and available grants.	

13.7 Continue to educate yourself and your network about climate change and actions that individuals can take. Share resources and start conversations to increase Muskoka's collective will to act. Advocate to the government to encourage a higher level of action.



#14: Community Design

Community design addresses the underlying built form and design elements that influence our daily behaviour, such as how we move, produce and consume energy in Muskoka. Much of the GHG emissions produced today result from car-dependent community design that limits feasible options for transportation to private vehicles. The environments in which we live, work and play are closely linked to our health and carbon footprint. Due to the long-term nature of the built form, planning and infrastructure decisions made today will have a major impact on emissions, resilience, social equity and quality of life tomorrow, making community planning and design some of the most effective tools for climate mitigation and adaptation. The community design actions encourage denser, healthier, safer and more equitable and connected communities with more green spaces, bicycle and pedestrian infrastructure, street connectivity, and access to public transportation, among others, which in turn contribute to achieving greater GHG emission reductions within other Areas for Action.

GHG Emissions Reduction Potential

The actions implemented as part of community design directly support and enable GHG emissions reductions from reduced private vehicle use, particularly for shorter-duration trips within urban town centres.



Icon 1: District of Muskoka | *Icon 2: Area Municipalities of Muskoka* | *Icon 3: Businesses and Industries* | *Icon 4: Institutions* | *Icon 5: Community Groups* | *Icon 6: Residents* | *Icon 7: Utilities* | *Icon 8: All Sectors*

Actions

14.1 Engage the community to establish community design guidelines that:

- Develop a transit-oriented development vision, targets, and guidelines; update regulations; integrate across District policies, design standards, and plans.
- Encourage community design that reduces dependence on private vehicles, provides connection across communities, and encourages accessible active transportation for all residents.
- Encourage the development of 'neighbourhood garages' that facilitate EV charging, rooftop solar and serve as a community hub for car sharing in Multi Unit Residential Buildings.
- Continue to encourage mixed-use development to support attainable, adequate, and safe housing.
- Educate and support initiatives to reduce Muskoka's dependence on fossil fuel-based heating and cooling systems and prioritize the shift towards clean energy.
- Implement a policy to ensure development provides equitable access to green spaces and community spaces that provide health co-benefits (e.g., Simcoe Muskoka District Health Unit's policy recommendations for community design).



14.2 Advocate to the Province for increased municipal role and tools for community design and higher-density and mixed-use developments.



Cumulative Impact of All Areas for Action on GHG Emission Reductions

Achieving net-zero emissions means balancing GHG emissions with GHG removals from the atmosphere. According to best practices, most of a net-zero target needs to be met through GHG reductions; however, it is recognized that the remaining emissions will need to be met by drawing down GHG emissions from the atmosphere through carbon sequestration methods such as those offered by nature-based solutions. As shown in Figure 15, the cumulative GHG reduction potential of all quantifiable areas for action in the CEERP will result in an 85% reduction in GHG emissions from the baseline. The remaining fifteen percent or 137,300 tC02e of emissions reductions required to meet net-zero emissions by 2050 will come from a combination of carbon sequestration, offsets and developments in GHG mitigation. Developments such as nature-based solutions that continue to increase and protect Muskoka's forests, wetlands, watersheds and other natural areas, and further advancements in renewable technology, green infrastructure, and sustainable community design that reduce dependence on fossil fuels and energy-intensive activities will all be important in achieving the 2050 target.

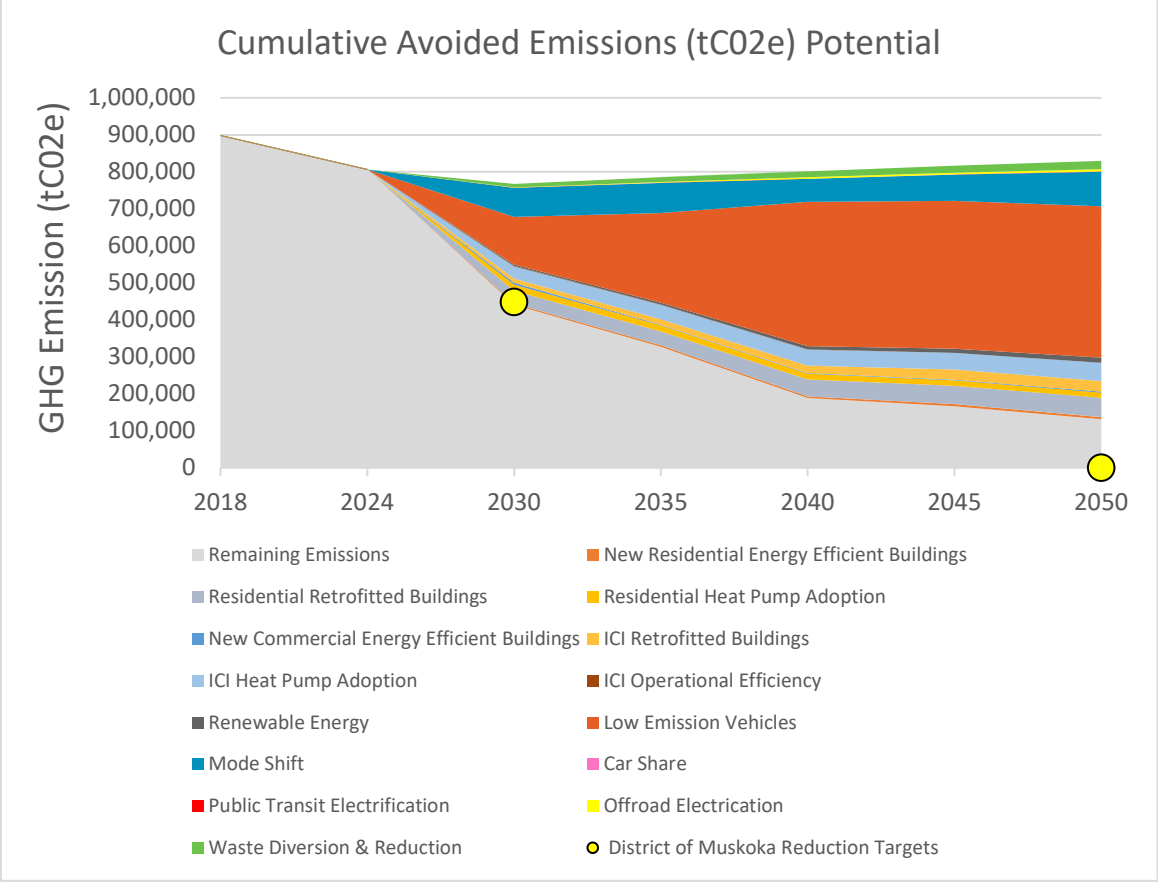

Figure 15: Potential GHG emission reductions from all Areas for Action to 2050.

Implementation



#15: Implementation Coordination and Collaboration

As a community plan, the CEERP will require effort and resources from various sources to reduce energy use, energy costs to the community, and GHG emissions. Communities that work collaboratively to implement climate plans achieve twice as many actions and are more likely to reach long-term goals[66].

Beyond corporate action, the District and Area Municipalities can influence as much as half of the emissions within the community through policy direction[67]. Community groups and individuals have key roles in advancing programming, educating the community, sharing information, advocating for urgent climate action, and equitably building community support. The CEERP encourages all residents, businesses, institutions, community groups, and municipal governments to participate in this collective action.

Immediate actions to support CEERP implementation are outlined below.

Actions

15.1	Investigate and adjust or re-organize the District's corporate climate change reporting strategy as needed to ensure corporate alignment, collaboration and prioritization of climate action. New roles within the District related to project management and implementation may be required.	
15.2	Establish a dedicated climate outreach and education position at the District of Muskoka. This role is key in advancing the depth of community outreach, education and action needed to achieve the CEERP goals[68].	
15.3	Create and/or support action tables or working groups to action-specific items from the CEERP. These action tables or working groups could include community groups, District / Area Municipal staff, members of the public, elected officials, etc., as suitable for each project.	

[66] UN Climate Change, "Race to Zero Campaign," (2021), https://climatechampions.unfccc.int/system/race-to-zero/.
[67] Linton, S., Clarke, A., & Tozer, L., "Strategies and Governance for Implementing Deep Decarbonization Plans at the Local Level," (2020), https://www.mdpi.com/2071-1050/13/1/154.
[68] Actions that could be supported by a dedicated climate outreach and education position include 1.2, 1.4, 1.7, 2.3, 2.6, 2.6, 2.9, 2.10, 3.2, 3.3, 4.2, 4.6, 5.1, 5.2, 5.5, 6.2, 6.3, 7.4, 7.5, 7.7, 8.1, 8.2, 9.2, 9.4, 9.5, 9.6, 10.2, 10.3, 10.4, 11.3, 11.5, 12.1, 13.2, 12.4, 13.5, 13.6, 13.7, 14.1, 14.2.

15.4	Implement a "Climate Hero" program to support community adoption and ownership of the actions in the CEERP. The program details could be defined through a working group, but a program to encourage engagement through recognition is recommended.	
15.5	Host an annual reporting workshop that brings together those organizations working on emissions reduction actions to share outcomes and report on progress. The annual workshop also provides an opportunity to collectively discuss and coordinate projects and initiatives in the coming year. Outcomes from the session will help inform the annual progress reports by the District.	

Facilitation and Coordination

It is recommended that the District's Climate Initiatives Coordinator facilitate the initial implementation of the CEERP. This role will provide support to implement the CEERP's vision, support aligned activities with prospective community partners and across municipalities, document and periodically report efforts on actions to District Council/Committees, build public will, advance policy, and mobilize resources.

Education and Outreach

Education, communication, and outreach are recurring themes throughout the actions in the CEERP. The CCMT emphasized a need to ensure that residents learn about the urgent need for climate action, see opportunities for action at the individual level, and learn about the CEERP and Areas for Action to inform decision-making. The District will continue its outreach and educational programs that support climate adaptation and mitigation efforts and seek opportunities to expand them where possible. Since outreach is a key part of raising awareness on climate change issues, these areas will be crucial moving forward.

As recommended in action 15.2, a dedicated climate change education and outreach resource would support the implementation of over half of the actions in the CEERP. This role would encourage community involvement and ownership of the CEERP actions and would work to generate the community will be required to make meaningful changes in climate action.

Inter-district Communication and Collaboration

A key component of implementing the CEERP is the need for continued inter-district communications and collaboration. This will include District staff, as guided by District Council, and supported by Area Municipal staff as required, to ensure that climate change

considerations are embedded in District decision-making and annual business planning processes and actions identified in the CEERP are considered. Information about best practices will be exchanged across the District Municipality and beyond to all sectors participating in the development of the CEERP. A continued effort to strengthen streams of communication and collaboration among all CEERP participants is encouraged. Similarly, successful implementation will require continued, collaborative, communicative partnerships between the local governments and all CEERP participants to fully implement and advance initiatives.

Community Action

The CEERP is a community plan which requires the support of partners across Muskoka. Any partners can initiate action and ideally advance in a collaborated and coordinated fashion. Action tables or working groups are an effective way to drive specific actions when comprised of community groups, municipal staff, elected officials, members of the public, businesses, utilities, institutions, students, etc. Depending on the CEERP action, specific action tables or working groups could be led by any members, with support from the District's Climate Initiatives Coordinator.

Numerous potential partners bring knowledge, expertise, skills, and interests to act on climate change. While not exhaustive, the list below provides a starting point for action, drawing on the expertise of those on the CCMT. The list is intended to evolve and change as implementation moves forward. Each potential partner will need to confirm their role before the implementation of each action:

- **District of Muskoka** – To implement policies and programs that support CEERP goals
- **Area Municipalities** – To implement policies and programs that support CEERP goals
- **Community Organizations** – To advance and promote programs, inform the public about climate change impacts and opportunities to participate, advocate for change, and collaborate on program delivery and monitoring as appropriate.
- **Local energy utilities** – To provide expertise, support and funding opportunities for new and existing buildings, renewable energy solutions and ensure alignment with broader energy system planning.
- **Business and industry organizations** – To educate their customers and employees on the benefits of energy conservation and participate in relevant programs
- **Developers and builders** – To provide the expertise and capacity to build and retrofit energy-efficient buildings
- **Schools and institutions** – To inform members of the public on the benefits of energy conservation, leading by example

Muskoka is home to several organizations focused on environmental and climate-related issues. During the development of the CEERP, considerable input was provided from these groups and engaged residents, businesses, and organizations. As the community turns its focus to implementing the actions outlined in the CEERP, several local organizations

indicated during the development of this plan that they are resources that can support those working to address climate change in Muskoka. Table 2 lists organizations involved in the Climate Change Mitigation Taskforce (CCMT) and the associated Areas for Action they could support. This list is not exhaustive, as other potential partners exist across the District and are encouraged to participate in implementing actions.

Table 2: CCMT Organizations that Expressed Interested in Areas for Action

		rethink Green	Climate Action Muskoka	Friends of the Muskoka Watershed	Simcoe Muskoka District Health Unit	EV Society	Gravenhurst Environmental Advisory Committee
1	Low Emission and Electric Vehicle Adoption	✓	✓	✓	✓	✓	
2	Local Transit	✓	✓		✓		
3	Car Sharing and Transportation Demand Management		✓				
4	Active Transportation		✓		✓		✓
5	Deep Energy Efficiency Retrofit	✓	✓		✓		
6	Green Development Standard	✓	✓			✓	
7	Renewable Energy	✓	✓				
8	Energy Management and Benchmarking	✓					
9	Solid Waste		✓		✓		
10	Water and Wastewater	✓	✓				
11	Nature-based Solutions		✓	✓	✓		
12	Sustainable Tourism		✓		✓		
13	Education and Awareness	✓	✓	✓	✓	✓	
14	Community Design		✓		✓		

Supporting Climate Action Through Community

There are many opportunities for those interested in reducing greenhouse gas emissions and reducing energy costs for the community to support implementation. Community partners can support the plan implementation by:

- sharing best practices, resources, and expertise
- building support for implementation within their sectors and amongst the public
- providing funding support for the implementation of actions
- aligning the areas for action identified with their organization's mandates, priorities, and targets
- assisting with the implementation, monitoring, and reporting of actions
- advocating for climate action within your network and publicly

Climate Heroes

Collective action towards climate change mitigation in Muskoka will require a concerted effort by the District and Area Municipalities, community groups, businesses, industry, institutions and residents. To foster community participation and a sense of community ownership and momentum, the District can develop a "Climate Hero" program to recognize citizens or groups undertaking projects or initiatives that advance the activities identified in the CEERP. The "Climate Hero" program would encourage individual action through a recognition program. This would also support the District in quantifying local action to measure and report on progress more accurately.

Funding and Financing

The actions outlined in the CEERP range in cost and will require community investment to adopt low-carbon technologies in homes and businesses. However, most activities in this Plan provide significant societal and economic benefits, including improved public health, new economic opportunities and energy savings that can provide returns on investment. Several actions are already in the works that require little to no external funding, while others require additional funding and resources. Many of the actions have significant financial and staffing implications for the District, the extent of which depends on the extent of execution of the actions. The CEERP targets will not be achievable without significant funding from the local, lower and upper-tier governments and, more significantly, the Provincial and Federal government bodies.

ICLEI Local Governments for Sustainability and the Federation of Canadian Municipalities (FCM) have identified typical financial tools to help move local climate action forward[69]. Securing long-term financing for local climate action is a long-standing key challenge for communities across Canada. These stable, scalable options are intended as a starting point to help overcome the uncertainty of grants and incentives. A summary of the tools is provided in Table 3 below. It is recommended that all prospective participants investigate these tools and any other suitable options as part of implementing the CEERP.

[69] Partners for Climate Protection, "On the Money: Financing Tools for Local Climate Action," (2018), https://www.pcp-ppc.ca/resources/financing-tools-for-local-climate-action.

Table 3: Potential Financial Tools to Support Climate Action

Financial Tool	What is it?	How does it support local climate action?
Group purchasing	• Purchasing large quantities of a good or service to receive a discount by a municipality, group of municipalities, or community groups • It could be used on a variety of technologies, such as solar panels or electric vehicles	• Municipality or community group negotiates a discounted price and passes on savings to consumers • Reduces upfront and transaction costs • Increases acceptance of new technologies
Community-owned renewable power	• Renewable energy project owned by a group of community members • A cooperative or other entity manages procurement and maintenance	• Provides residents with access to clean energy in a more affordable way • Reduces dependence on carbon-intensive fuels
Energy performance contracts	• A contract between any large-scale building owners and energy service companies • Guarantees energy savings will cover the initial capital cost of a retrofit over the life of the contract	• Multi-unit residential, industrial, commercial and institutional building owners/managers can complete energy retrofits with reduced upfront costs and guaranteed savings
Green revolving funds	• Pools of funding that finance climate action projects that produce operational savings such as energy efficiency or operations and maintenance upgrades and renewable energy Savings are reinvested back into the fund and used to help finance additional projects in the future	• Only requires one-time funding to support a variety of projects over the long term • It can be used for various projects, from municipal infrastructure improvements to community-led activities
Community bonds	• Social finance tools used by small-scale, non-accredited investors that can only be issued by non-profit • They are interest-bearing loans from an investor with a set rate of return and a fixed term	• Allows community members to invest in projects that benefit communities through debt or equity instruments • In addition to a financial return, investors receive a social or environmental return

Reporting on Progress

District staff will provide periodic reporting on actions to District Council/Committees. Annual reporting will focus on efforts and achievements towards **Areas for Action** in Muskoka. All information about progress will be shared in an accessible format. The community plays a key role in reporting by updating District staff. The District of Muskoka is recommended to host an annual planning and reporting workshop to bring together organizations working on emissions reduction actions in the community to share outcomes and report on progress. The annual workshop can also provide an opportunity to collectively discuss and coordinate projects and initiatives in the coming year. Outcomes from the session will help inform the annual progress reports prepared by the District.

Table 5 includes potential metrics for consideration. Additional or alternative metrics may be identified as the CEERP is implemented.

Table 5: Potential Metrics

Area for Action	Potential Metric
Transportation	
Low Emission and Electric Vehicle Adoption	Number and proportion of low emission and electric vehicle sales and registrations Number of charging stations installed Proportion of trips taken using low emission or electric vehicles kWh charged at EV charging stations
Local Transit	Proportion of trips taken using local transit Vehicle kilometers travelled by transit Number and proportion of electric vehicles in local transit fleet Transit ridership rates
Car-sharing and Transportation Demand Management	Proportion of trips taken with more than one occupant Number of car-share cars within the District
Active Transportation and Complete Streets	Proportion of trips taken using active modes Number of kilometers travelled by walking or cycling Kilometers of active transportation infrastructure Number of bike racks installed Number of complete street upgrades
Buildings	
Deep Retrofit Programs	Proportion of residential buildings retrofitted Number of heat pumps installed in residential buildings Proportion of residential buildings retrofitted Proportion of industrial, commercial and institutional buildings retrofitted Number of heat pumps installed in ICI buildings Energy saved through retrofits Money saved through retrofits

Area for Action	Potential Metric
Green Development Standards	Proportion of new buildings adhering to the standard Energy and/or emissions intensity of new buildings (G/m^2, tC02e/m^2)
Renewables	Number of renewable energy installations per year Proportion of buildings with rooftop PV Number of ground mount solar installations Total solar capacity Amount of energy generated by solar Emissions reduced from avoided use of grid electricity
Energy Management and Benchmarking	Proportion of industrial facilities participating in energy management programs Energy saved through energy management Money saved through energy management
Community Systems	
Waste	Percentage of garbage generated from residential, commercial and industrial sectors Percentage of garbage diverted
Water and Wastewater	GHG and energy intensity per inflow/outflow
Nature-based solutions	Increase in canopy cover Number of trees planted Hectares of greenspace added Carbon sequestered from tree planting Hectares of forest and wetland protected
Sustainable Tourism	Number of sustainable tourism certification recipients Number of tourism operators with sustainable offerings
Education and Awareness Community Design	Number of participants in energy and GHG programs Number of people aware of GHG programs offered Proportion of units approved and built that are compact and/or mixed-use Population density in new developments Number of new mixed-use, complete street developments Amount of brownfield sites revitalized

Upcoming implementation plans will further clarify and refine the metrics and reporting mechanisms for the District-led actions.

Reviewing and renewing the CEERP, including completing another GHG inventory to measure progress, should occur every five (5) years by the District of Muskoka and Area Municipalities.

Conclusion

The CEERP outlines a pathway to reduce energy use from over 14 million GJ to 4.5 million GJ. The CEERP identifies action to avoid the nearly 900,000 tonnes of carbon dioxide equivalent of community GHG emissions to 150,000 and bring the energy cost down from over $541 million to close to $131 million.

The CEERP development process included a cross-section of community representatives, Area Municipalities and District staff, students, businesses and elected officials to build support and buy-in for the big-picture directions and actions.

The CEERP provides a pathway for hope and an actionable approach to address the urgent need to address climate impacts locally.

Finally, the actions outlined in this Plan are for everyone in the community, including individuals, families, governments, businesses, institutions, and industries. Successful implementation will require active participation amongst community partners to advance initiatives. There are many programs and opportunities to support both climate change mitigation and adaptation, as shared through this Plan and the ReCAP. The CEERP is intended to serve as a living document that can be reviewed, updated, and modified as needed.



Acronyms and Terms

- CEERP: Community Energy and Emissions Reduction Plan
- GHG: Greenhouse Gas
- BAU/ BAP: Business as Usual / Business as Planned
- EV: Electric Vehicle
- CTP: Community Transportation Plan
- MOP: Muskoka Official Plan
- ReCAP: Regional Climate Adaptation Plan
- MCCAP: Muskoka's Climate Change Action Plan
- GJ: Gigajoules (unit of energy)
- SFD: Single family dwelling
- MURB: Multi unit residential building
- CCMT: Climate Change Mitigation Taskforce
- tCO2e: Tonnes of Carbon Dioxide Equivalent (measurement of GHG emissions)
- ICI: Institutions, Commercial and Industrial sector
- GDS: Green Development Standards
- LID: Low Impact Development
- Solar PV: Solar Photovoltaic
- NBS: Nature Based Solutions