Meeting Date: June 30, 2020

Subject: Climate Change Emergency Modelling Results

Submitted By: Alexandra Service, Specialist, Climate Change, Energy and Environment, Finance and Infrastructure Services

RECOMMENDATION

That the Town adopt a community greenhouse gas (GHG) emissions reduction target of net zero by 2050 as part of the ongoing Community Climate Change Action Plan (CCCAP) update; and

That an interim 2030 community emissions reduction target be developed.

REPORT HIGHLIGHTS

- Council Resolution 2020-10 declared a climate emergency in Caledon and directed staff to report back on the actions required by the Town and community to reduce local GHG emissions in line with the 1.5°C warming scenario, as recommended by the Intergovernmental Panel on Climate Change (IPCC). This report summarizes the results of GHG emissions modelling to determine how Caledon can achieve a target of net zero emissions by 2050, which aligns with the 1.5°C warming scenario.
- Caledon's (Town and community's) GHG emissions for the baseline year of 2016 were 507 kilotonnes (kt), with transportation being the largest source of emissions, followed by residential building energy.
- If no further action is taken to mitigate GHG emissions (a business-as-planned scenario), they are expected to rise by 133% to 1,185 kt by the year 2050. Globally, this would result in close to 4°C average warming.
- Climate mitigation actions were modelled based on their potential to reduce GHG emissions to net zero by 2050, which will require an estimated $2.98 billion community investment to implement. An initial estimation of the costs to implement the low carbon actions for Town assets (i.e. buildings and fleet) was estimated at $84 million (of the $2.98 billion) over the next 30 years. The balance of the $2.98 billion represents community investments required to reduce GHG emissions to target levels.
- Even with a $2.98 billion investment, the modelled low carbon scenario resulted in an 83% reduction in GHG emissions relative to 2016 baseline emissions, which is in line with 2°C average warming. It is expected that the remaining gap to get to 1.5°C will be filled through emerging technologies and innovation, increased carbon sequestration, and carbon offsets.
- The Town is in the process of updating the Community Climate Change Action Plan. The updated plan, Resilient Caledon, will be brought to Council for approval in December 2020 and will address both climate change mitigation and adaptation.

DISCUSSION

On January 28, 2020 Council declared a climate emergency in Caledon recognizing climate change as an immediate threat to local residents, the environment and the economy. Council Resolution 2020-10 directed staff to report back on the following:

- Report back on the actions that are required by the Town and community to reduce local GHG emissions, aligned with the 1.5°C warming scenario as recommended by the IPCC;
- Eliminate the use of single-use plastics from Council Chambers no later than February 29, 2020; and,
- Report back with a strategy to ban all single-use plastics at all Town facilities.

The purpose of Staff Report 2020-0175 is to report back to Council on the staff directed action items.

Council Resolution 2020-10 Staff Action 1: Report back on the actions required to align with the 1.5℃ warming scenario

Emissions Modelling Methodology

The Town is in the process of updating the 2011 Community Climate Change Action Plan (CCCAP), which will include actions to both mitigate (reduce GHG emissions) and adapt (prepare and respond) to climate change in Caledon. The Town hired a consultant, Sustainability Solutions Group (SSG), to model Caledon's current and future emissions, recommend locally relevant actions, and support public and stakeholder engagement activities.

Modelling for the current and future scenarios was completed using CityInSight, a comprehensive energy, emissions and finance model developed by SSG and whatIf? Technologies Inc. CityInSight uses the Global Protocol for Community-Scale GHG Emission Inventories framework, which is an international standard for GHG emissions accounting. Table 1 provides a summary of the four main steps in the emissions modelling process.

Table 1: Summary of the CCCAP Emissions Modelling Process

Scenario	Description	Data Used
Baseline GHG Emissions (2016)	The CCCAP update has applied a rigorous data collection approach to understand Caledon's baseline GHG emissions and project future emissions to 2050. A baseline year of 2016 was used to coincide with the latest census data.	Caledon-specific data on: • Population and employment • Building stock • Natural gas and electricity usage • Transportation trends and fuel usage • Vehicle registrations • Waste and waste diversion rates • Land cover

Business-as-Planned (BAP) to 2050	A BAP scenario was modelled to understand what Caledon's emissions would likely be in 2050 if no new actions are taken at various levels of government to reduce GHG emissions, beyond those that are currently underway.	• Region of Peel population and employment projections for 2041, then extrapolated to 2050 based on the same growth rate • Existing climate change actions at the municipal, regional, provincial and federal level (e.g. federal carbon levy and electric vehicle incentive)
Low Carbon Scenario	The next step was to model a number of low carbon actions that could help the Town and community reach an emissions reduction target of net zero by 2050. A full description of the modelled mitigation actions is provided in Schedule A.	• Best practice scan of mitigation actions from other jurisdictions • Public and stakeholder input from online survey, stakeholder workshops, community events, and a DIY Climate Workshop for community members
Financial Analysis	Finally, the consultant modelled the overall community investment that would be required to implement the low carbon scenario actions, as well as the savings that could accrue over time. This analysis was done at the broader community scale and presents aggregated capital costs and potential savings.	• Equipment costs (e.g. electric vehicle, energy efficient furnace, heat pump, solar installation) • Energy costs (e.g. current energy dollars leaving the community) • Energy savings (e.g. from greater efficiency, and energy dollars remaining in the community) • Energy generation revenue

<u>Emissions Modelling Results</u>

Baseline GHG Emissions (2016)

Caledon's baseline (community) GHG emissions in 2016 were 507 kilotonnes (1,000 tonnes = 1 kilotonne) of carbon dioxide equivalent (CO_2e), or 8 tonnes of CO_2e per person (Figure 1). By comparison, average per capita emissions throughout the Greater Toronto and Hamilton area are 6.9 tonnes, Peel Region's per capita emissions are on average 7.5 tonnes, and the City of Toronto's are 5 tonnes. In general, Caledon's per capita emissions are higher than other jurisdictions in the GTHA due to its more rural, low density land base, reliance on personal use vehicles, and greater prevalence of single family homes relative to denser urban centres.

The largest sources of community emissions in Caledon are personal and commercial vehicle transportation (55%). This number captures all vehicle trips within Caledon's boundaries, including trips within Caledon, trips in and out of Caledon to work, school, etc., and through trips that neither start nor end in Caledon. The next highest sources of emissions are from energy consumed in residential buildings (20%) followed by commercial buildings (10%), predominantly from the use of natural gas for space and

water heating. The remaining emissions are from agriculture (6%), waste (6%), and industrial processes (2%).

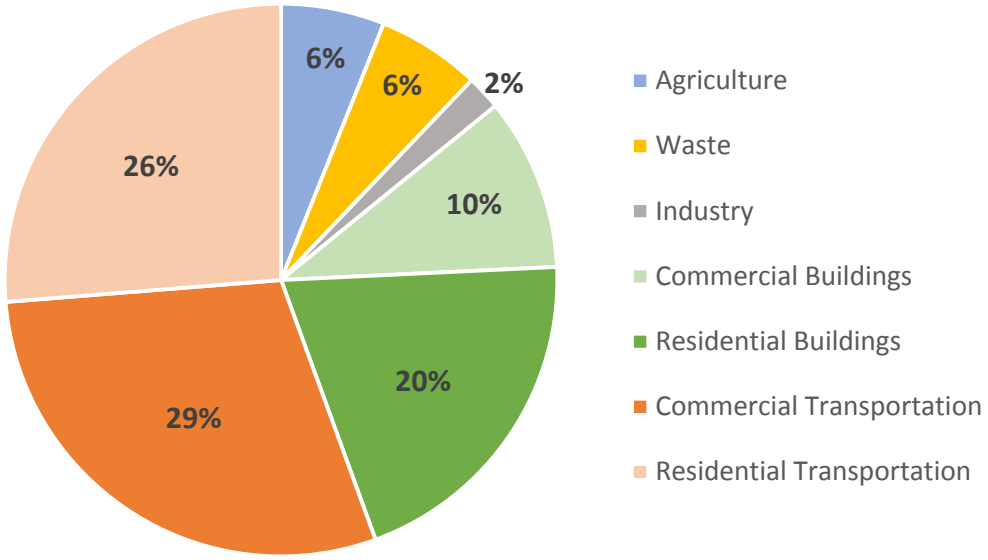

Figure 1: Caledon baseline greenhouse gas emissions by sector (2016)

Business-as-Planned Scenario to 2050

If no new actions are taken to reduce Caledon's GHG emissions, they are likely to rise by 133% to 1,185 kilotonnes by 2050. This scenario aligns with a global average temperature increase of about 3.7°C. As shown in Figure 2, this growth is largely driven by transportation emissions, which are expected to double by 2050, and by commercial building emissions, which are projected to see a 120% increase over the same time period. The residential building sector is expected to see a 47% increase in emissions, which is not as steep compared to commercial buildings due to increased efficiency in building code and regulations on appliances.

The growth of emissions in these sectors are driven by an increase in population and employment, and the travel associated with each, as well as the planned GTA West corridor highway through the south of Caledon. For this reason, the Town has taken the unique step of aligning the CCCAP update with the ongoing Official Plan review, to ensure that growth and development do not exacerbate climate impacts.

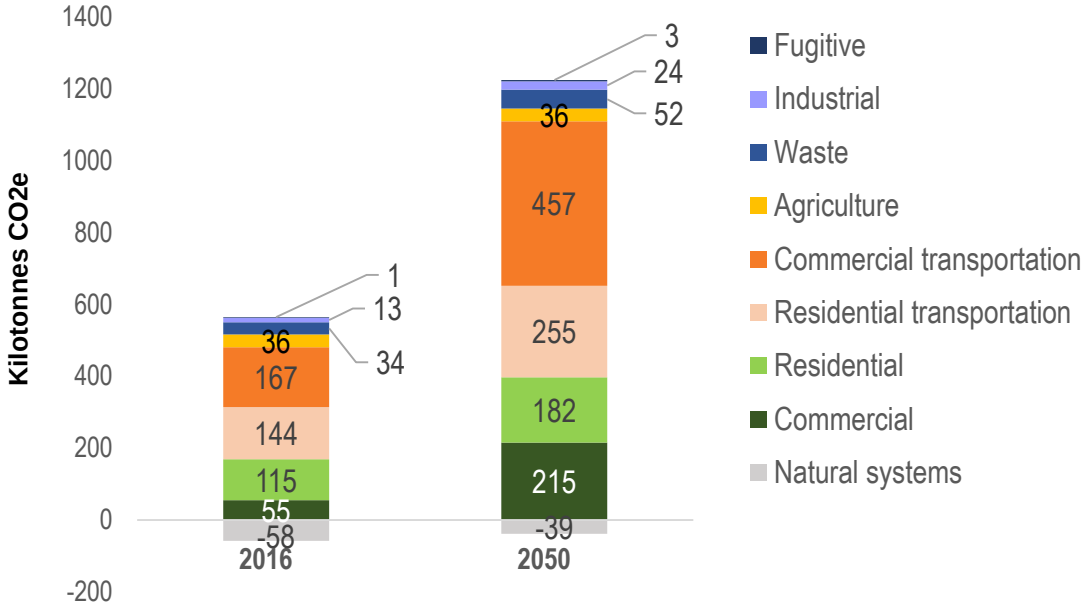

Figure 2: Projected growth in Caledon's GHG emissions 2016-2050

Low Carbon Scenario

The low carbon scenario modelled a number of climate mitigation actions across various sectors (for the detailed list of actions and their associated targets, see Schedule A). Figure 3 shows the relative scale of actions that could reduce GHG emissions to net zero by 2050 (net zero means that total annual GHG emissions entering the atmosphere from human activities is equivalent to the total sequestration from carbon sinks like vegetation). The model shows that the most significant emissions reductions are achieved through the adoption of zero emissions personal and commercial vehicles; followed by deep energy retrofits to existing homes, commercial and industrial buildings, and municipal facilities; net zero new residential and commercial buildings; waste reduction and diversion; and alternative energy generation.

It is important to note that the low carbon scenario includes actions required by the entire community, including residents, businesses, farmers, etc., not only the Corporation of the Town of Caledon. Any programs or initiatives the Town adopts to help enable these actions will be developed as part of the next phase of the CCCAP project, focusing on plan implementation.

The sum total of all the mitigation actions modelled for Caledon achieved an 83% reduction in GHG emissions relative to 2016 baseline emissions, which is in line with a 2°C warming scenario. The gap left remaining between emissions reductions and the net zero target is referred to as the "carbon liability". SSG also factored in Caledon's ecological land classification data, including forests, wetlands, and other natural systems. Using accepted international methodology, SSG calculated an estimate of the carbon sequestration potential of Caledon's natural systems (as they currently are today).

To address the carbon liability, Caledon has significant potential to increase carbon sequestration through the restoration of natural systems. Additionally, with new technology and innovation emerging over the coming decades, the Town's carbon liability or remaining emissions may be reduced. It is recommended that Caledon's emissions are re-modelled by 2030 to gauge progress and account for new policies and technologies.

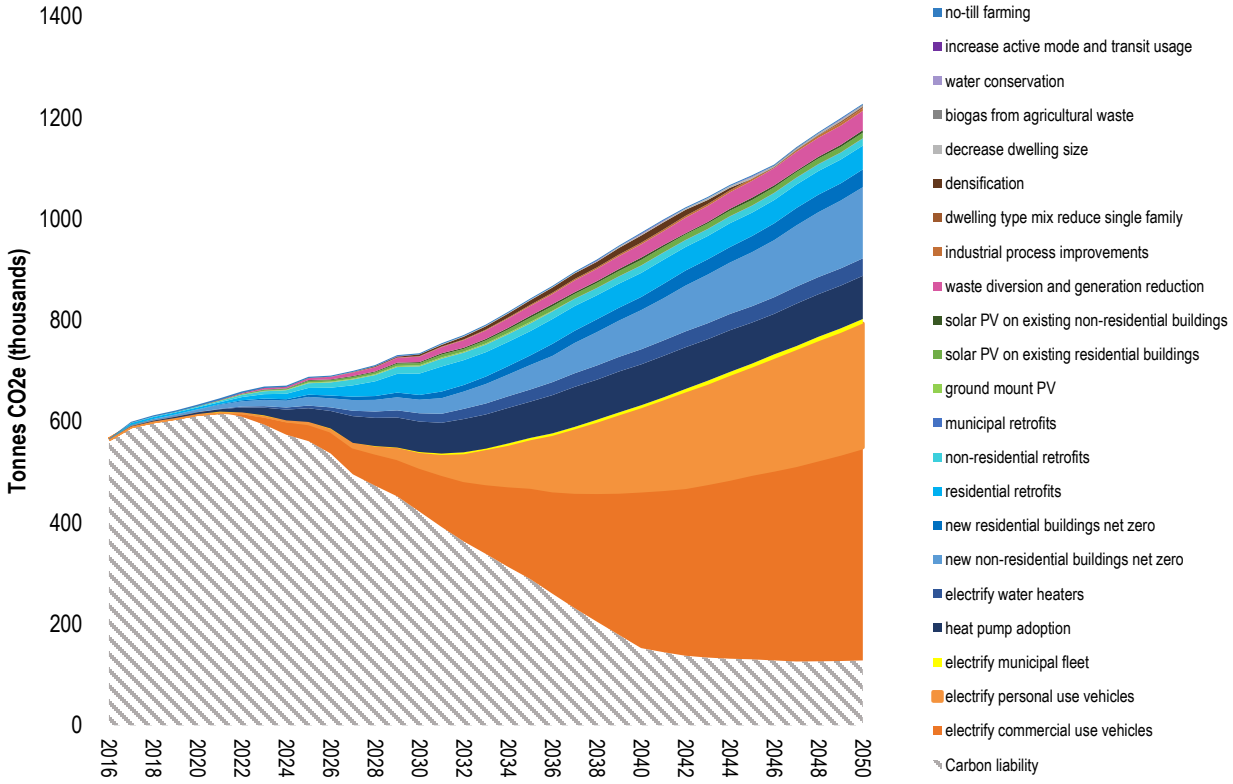

Figure 3: Caledon low carbon actions scenario to reach net zero by 2050

Financial Analysis

The financial analysis was based on the capital investment required to deploy low carbon equipment and technologies such as electric vehicles, alternative home heating sources (e.g. heat pumps), renewable energy installations, etc. The objective was to provide the aggregated cost of implementing the actions that are necessary for Caledon as a community to reach a net zero by 2050 target. It is important to note that, at this point, the analysis does not include how these actions would be achieved through mechanisms such as programs, policy change, or financial incentives, which could help enable the adoption of low carbon technologies. It is expected that the costs of implementing the low carbon scenario actions will be borne by a number of entities, including the Town and other sectors such as: federal and provincial governments (e.g. changes to the building code, financial incentives for homeowners and businesses, etc.), residents (e.g. making the

decision to buy an electric vehicle or undertaking home energy retrofits), businesses (e.g. improving their process efficiency, reducing waste, etc.), and others.

The results showed overall costs to the community of implementing the low carbon scenario is an estimated $2.98 billion, which could in turn achieve net savings of $5.48 billion from savings on energy expenditures, operating and maintenance (O&M) costs, carbon price credit, and acquiring revenue from local energy generation (Figure 4).

Figure 4: Total community-wide investment and returns to reach net zero by 2050 target

The majority of investments are expected to be made over the first 10-12 years of the plan, with an average annual investment of $282 million until 2032. The bulk of these initial expenses are for retrofits of existing buildings and zero emissions vehicle purchases. Based on the financial modelling, the earlier that investments are made into low carbon technologies and initiatives, the sooner energy savings start to accrue, and the greater the returns are to 2050 (Figure 5).

An initial calculation was made of the anticipated capital investment required by the Town to 2050. The costs of low carbon scenario actions for Town assets such as its fleet and municipal buildings is an estimated $83,947,781 (or $84 million rounded) over the next 30 years, with an average annual investment of approximately $2.7 million. This preliminary estimate includes costs for energy efficiency retrofits to Town buildings and fleet vehicle replacements, of which the Town already dedicates annual capital budget for, as well as additional costs for projects like renewable energy installations. The anticipated costs of implementing the low carbon actions by the Town will be better defined as the CCCAP update nears completion and is brought forward to Council in December 2020.

As the CCCAP is implemented, staff will assess actions each year to determine the required costs and make the necessary annual budget requests. External funding and grant opportunities will also be pursued to offset some of the Town's costs.

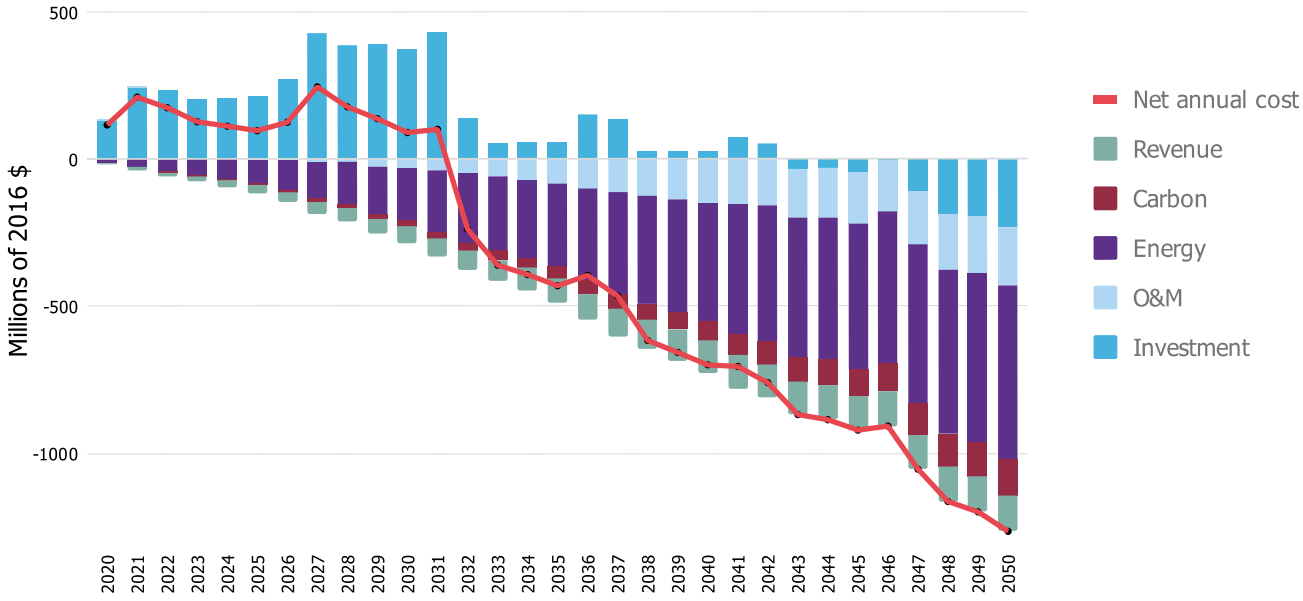

Figure 5: Year over year community-wide investment and returns

At this stage in the project, the financial analysis only includes costs and returns of actions to reduce GHG emissions, not the costs of increasing extreme weather due to climate change or measures to adapt. According to the Insurance Bureau of Canada, climate change is already costing Canadians, with insured damages in 2019 reaching $1.3 billion, up from an average of $450 million per year 10 years ago. Efforts will be made in the next phase of the CCCAP project to estimate these costs for the Town and community.

Implementation and Next Steps

Setting an emissions reduction target

In order to keep warming to no more than 1.5°C, the IPCC estimates that global greenhouse gas (GHG) emissions must reach net zero by 2050 (which means total annual GHG emissions entering the atmosphere from human activities is equivalent to the total sequestration from carbon sinks like vegetation).

Municipalities have direct or indirect control over at least half of the GHG emission in their jurisdiction, through land use planning, development oversight, transportation planning, waste services, and economic development. The way a town or city is developed can "lock-in" emissions patterns for decades or centuries, with more sprawling, low-density urban form necessitating the use of a vehicle for most daily trips.

Many Canadian municipalities have adopted ambitious GHG emissions reduction targets and have developed or are in the process of developing community-wide climate change plans to meet them, as described in Table 2 below.

Table 2: Municipal GHG Emissions Targets	
Municipality	**Target***
Brampton	80% by 2050
Mississauga	80% by 2050 and a long-term goal of becoming net zero
Region of Peel	80% by 2050
Halton Hills	Net zero by 2030
Burlington	Carbon neutral (net zero) by 2050
Toronto	Net zero by 2050 or sooner
London	Net zero by 2050
Guelph	Net zero by 2050
King Township	45% by 2030

*Note: each municipal emissions target has a unique baseline year

Although this is interim reporting of the CCCAP update project, having Council endorsement of a GHG emissions reduction target will help guide the balance of the project to the end of 2020. It is recommended that the Town adopt an ambitious target of net zero emissions by 2050 to align with the current scientific evidence of climate change and warming scenarios described by the IPCC. Due to the extensive, immediate level of effort that is needed, it is also recommended that the Town adopt an interim target for 2030 that is aligned with the most up to date recommendations of the IPCC to follow a carbon budget approach. The interim target will be developed through the next phase of the project and will be presented in the final plan.

CCCAP Update and Implementation Plan

The goal of a community climate change plan is to capture the current state across the community, both in terms of overall GHG emissions produced by different sectors, and climate impacts that are likely to affect community-members; and to develop actions for the community to become low carbon and resilient. The municipality is generally a convener in the development of the plan, bringing together stakeholders from various sectors to develop actions and assign roles and responsibilities for implementing them. Although there are numerous actions that the municipality itself can lead in supporting a community plan, it is meant to be a collective effort, with actions among individuals, businesses, community groups, and other levels of government.

The scope of the analysis for Staff Report 2020-0175 was to develop a detailed understanding of Caledon's GHG emissions and the overall scale of actions required for the Town and community to reach a target aligned with the climate emergency declaration. The next phase of work for the CCCAP update will be to develop a detailed implementation plan for the low carbon scenario actions. Recommendations for programs and initiatives (e.g. policies, financial incentives, public-private partnerships, etc.) that the Town can develop to help enable these actions will be made in close consultation with Town staff and external stakeholders.

Table 3 identifies early proposed mitigation actions that the Town could lead to support the implementation of the CCCAP. This is not an exhaustive list but represents some of the most important areas that would benefit from leadership by the Town. The list also does not include proposed adaptation-specific actions, which will be presented as part of the final CCCAP draft.

It is expected that each of these actions would be refined in consultation with staff, subject to additional studies where needed, and implemented over a number of years, in some cases in partnership with other municipalities or organizations. The implementation plan will include consideration of roles and responsibilities, cost, timelines, performance metrics, and monitoring and evaluation.

Table 3: Proposed Mitigation Actions specific to the Town

Action Area	Program/Initiative	Description
Planning	Prioritize compact urban form, intensification and infill development with appropriate densities and a mix of residential, commercial, and employment uses	Compact development can help: • Enable active transportation and transit use, reduce reliance on personal vehicles, and preserve farmland and natural systems • Increase feasibility of rail or other rapid commuter transit hubs • Increase feasibility of district energy systems in urban areas • Preserve Caledon's distinctive rural and natural character
New Development	Adopt a Green Development Standard to encourage low carbon, resilient new residential development	• Standards could include going above code in building energy efficiency, consideration for alternative energy sources, increased lot-level stormwater retention, green infrastructure measures, etc. • Potential to explore aligning the standard with other partners in Peel Region
Building Retrofits	Develop a financing mechanism (e.g. Local Improvement Charges) to finance home retrofits through municipal property tax bills	• Help homeowners cover up front capital costs of home energy and resiliency retrofits, to be paid off over time through regular billing • A number of funding streams have recently opened (through FCM and others) to support municipal delivery of these types of programs • There are opportunities to work with other municipalities on joint program delivery
Alternative Energy	Work with partners to explore the development of a Renewable Energy Cooperative in Caledon to facilitate renewable energy installations and/or district energy	• Town could support the initial establishment of such an organization (i.e. through seed funding and/or staff time), then gradually reduce support, similar to how the City of Guelph developed a non-profit entity, 'Our Energy Guelph', to facilitate renewable energy and other climate change projects in Guelph.

		• Potential to explore this initiative with Peel Region partners (e.g. through the Peel Climate Change Partnership)
Corporate Energy	Update Caledon's Corporate Green Building Standard and develop a Green Fleet Strategy to move towards zero carbon municipal buildings and fleet	• Lead by example by moving towards net zero carbon in municipal operations including buildings and fleet, and continuing waste reduction efforts
Community Investments	Review and enhance the Community and School Green Funds to support community implementation of the CCCAP	• Support community organizations to work with residents, business, and farmers on projects that reduce emissions and enhance community resiliency • Opportunity to expand the fund by exploring unique financing methods
Natural and Agriculture Systems	Create a tree protection by-law, enhance the Town's tree seedling program, and support low carbon best management practices for agriculture	• Protect existing tree canopy by requiring a permit for tree removal, and increase tree planting and other restoration efforts in the Town by partnering with Conservation Authorities and others. • Support soil health and other best management practices in the agriculture sector, and local food production
Business Supports	Review and enhance the development charge rebate program for ICI sector new buildings, and the Community Improvement Plan program for retrofits	• Encourage and incent new commercial and industrial buildings to improve efficiency and consider opportunities for district energy, adopting zero emissions fleet vehicles • Support businesses to retrofit their buildings and improve efficiency in their operations, for example through the GreenBiz Caledon program, in partnership with Partners in Project Green and the Economic Development division
Council Decision-Making	Add a 'Climate Change Implications' section to all Council reports to assess GHG emissions impacts of and climate risks to Town business. Advocate to other levels of government to support local climate action through legislation, policy, and investments	• Integrate climate change considerations into all Town business and support Town staff with training and guidelines to undertake these analyses • Robust federal and provincial climate change legislation, policy and municipal investments will be critical to Caledon meeting its climate change targets

A draft of the Resilient Caledon climate change plan will be released in September 2020 for public comment and will go to Council for approval in December 2020. Work is also ongoing to ensure alignment between the results of the GHG emissions modelling analysis and the Official Plan Climate Change Discussion Paper. Staff are continuing to collaborate to ensure the Official Plan is informed by climate change considerations.

Council Resolution 2020-10 Staff Actions 2 & 3 regarding Single-Use Plastics

Staff have eliminated the use of single-use plastics from Council Chambers in advance of February 29, 2020. This was led by the Town's Facilities staff and included the elimination of plastic water cups, which were replaced with biodegradable paper water cups. The Facilities Division has also made significant efforts to limit single-use plastics in the Town Hall cafeteria, including transitioning to biodegradable cutlery, biodegradable coffee cups and biodegradable to-go food containers.

The Energy and Environment Division will be leading the development of a strategy to ban the use of all single-use plastics at all Town facilities and are planning to report back to Council with a strategy in 2021. This timeline is aligned with the Government of Canada's Strategy on Zero Plastic Waste which seeks to ban single-use plastics (such as plastic bags, straws, cutlery, plates and stir sticks) as early as 2021.

Energy and Environment's workplan in 2020 has been prioritized based on the Town's 2017 corporate GHG emissions inventory and the Council-endorsed Corporate Greenhouse Gas Reduction Framework (2019-2024). This workplan has been provided in Schedule B.

FINANCIAL IMPLICATIONS

There are no immediate financial implications associated with this report. Cost estimates for the Town will be developed through implementation phase and presented when the final plan is brought to Council. As the plan is implemented Staff will be assessing actions on a project by project basis each year to determine the required costs and make any necessary budget requests.

COUNCIL WORK PLAN

Sustainable Growth – ensure that Caledon grows in a balanced and sustainable manner that does not exacerbate the problem of climate change.

ATTACHMENTS

Schedule A: Modelled Mitigation Actions

Schedule B: Energy and Environment 2020 Corporate Projects Workplan