TOWN OF AURORA
COMMUNITY ENERGY PLAN

'20

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DRAFT FOR CAC REVIEW -- November 2020

Stakeholder Working Group

The Town of Aurora would like to thank the following organizations for their participation in the Stakeholder Working Group (SWG). The SWG was involved throughout the project and shaped the development of this Community Energy Plan.

- Alectra Utilities
- Aurora Chamber of Commerce
- Counterpoint Engineering
- Desjardins
- Enbridge Gas
- Independent Electricity System Operator (IESO)
- Lake Simcoe Region Conservation Authority (LSRCA)
- Toronto Region Conservation Authority (TRCA)
- Town of Aurora Council
- Town of Aurora Community Advisory Committee
- Town of Aurora Staff – various divisions
- Windfall Ecology Centre
- York Catholic District School Board
- York Region
- York Region District School Board

Glossary

Key Terms

Term	Definition
Air-source heat pump	An air-source heat pump pulls heat from outdoor air to heat homes in the winter and releases heat into outdoor air to cool in summer. It functions similarly as an air conditioning unit but provides both cooling and heating for the home. It can be powered with electricity, natural gas, or renewable energy sources.
Baseline	Estimation of the current (2018) energy use, energy costs and greenhouse gas emissions.
Business-as-Planned	The Business-as-Planned (BAP) scenario is developed to understand future energy consumption, energy costs and emissions for the Town of Aurora-based on changes in population and employment. It takes into account the impacts of provincial and federal government commitments and assumes no action is taken locally to reduce energy or emissions.
District Energy System (DES)	District energy systems (DES) use pipes to supply heating, cooling and/or power to multiple connected buildings from a decentralized energy source. Buildings that produce excess energy (“anchor tenants”) can redistribute this energy to nearby buildings.
Gigajoule (GJ)	A gigajoule (GJ) is a derived unit of energy in the International System of Units. It equals one billion Joules. The amount of energy represented by one GJ is equivalent to 278 kWh.
Greenhouse gas emissions	A greenhouse gas absorbs and radiates heat in the lower atmosphere that otherwise would be lost in space. The main greenhouse gases are carbon dioxide (CO_2), methane (CH_4), chlorofluorocarbons (CFCs), and nitrous oxide (N_2O). The most abundant greenhouse gas is CO_2 – carbon dioxide. Measured in tonnes of carbon dioxide equivalent (tCO_2e).
Ground-mounted solar	Ground-mounted solar panels are anchored to the ground, rather than rooftop systems. They can be a single array or much larger to cover a field or parking lot.
Kilowatt-hour (kWh)	A kilowatt-hour is a unit of electrical energy used as the basic billing unit and equals the use of 1 thousand watts of electricity in one hour.

Term	Definition
Mode shift	Encouraging individuals to use active transportation (walking, rolling, cycling) or public transit instead of gasoline-powered vehicles.
Net-zero ready	Net Zero Ready provides building owners with an achievable first step towards a Net Zero building. Buildings that are Net Zero Ready, are built to a high energy efficient standard. This also allows the building owner to incorporate renewable energy generation at the building later and at a lower cost due to a reduced requirement for energy in the building. For example, a Passive House or Canadian Green Building Council Zero Carbon Building.
Offset	Through carbon offsetting, emission reductions are sold to the purchaser in the form of an "offset". Offsets (measured in tonnes of CO_2e) effectively reduce the purchaser's net emissions.
Sequestration	Long-term storage of carbon (carbon dioxide) from the atmosphere.
Solar thermal	Solar thermal energy is a form of energy that harnesses solar energy to heat water, air or other fluids, for use in industry, and in the residential and commercial sectors. Solar thermal technology uses from the sun for domestic hot water heaters and can be used year-round in Canada.
Stationary Energy	Stationary energy sources are those used in buildings – including homes, stores, offices and schools. Stationary energy is one of the largest sources of GHG emissions in many communities.
Traffic zone	Sections of the Town are broken down into manageable sizes for analysis. These sections are known as traffic zones. Traffic zones align with other planning exercises at the Town level.

Abbreviations

Abbreviation	Full reference
BAP	Business-as-Planned
CEP	Community Energy Plan
DES	District Energy System
DYEC	Durham York Energy Centre
ECDM	Energy and Conservation Demand Management
EV	Electric vehicle
EWRB	Energy and Water Reporting and Benchmarking
FCM	Federation of Canadian Municipalities
FIT	Feed-in-tariff
GFA	Gross floor area
GHG	Greenhouse gas
GJ	Gigajoule
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
IESO	Independent Electricity System Operator
IPCC	Intergovernmental Panel on Climate Change
IWG	Implementation Working Group
kW	Kilowatt
kWh	Kilowatt-hour
LEED	Leadership in Energy and Environmental Design
LIC	Local Improvement Charge
LSRCA	Lake Simcoe Region Conservation Authority
MEP	Municipal Energy Plan
MURB	Multi-use residential building
MW	Megawatt
NRCan	Natural Resources Canada
OBC	Ontario Building Code
PACE	Property Assessed Clean Energy
PCF	Pan-Canadian Framework
PCP	Partners in Climate Protection
PPS	Provincial Policy Statement
PV	Photovoltaic
SWG	Stakeholder Working Group
tCO_2e	Tonnes of Carbon-dioxide equivalent
TGS	Toronto Green Standard
TMP	Transportation Management Plan
YRT	York Region Transit

Executive Summary

Introduction

Energy powers our homes, schools and workplaces. Energy keeps our economy going, allows us to move around and supports our quality of life. At the same time, our energy use can have negative impacts on our natural environment and our financial health. Aurora has the opportunity to create a low carbon future that benefits the environment, the local economy, and all who use energy.

Reducing the amount of energy used by the Aurora community creates new economic growth, supports an active community, and supports a healthier atmosphere for people and the planet.

The Community Energy Plan (CEP) provides strategic direction to move towards a sustainable energy future. It takes a long-term view to 2050 and aims to improve energy efficiency, reduce energy consumption and greenhouse gas emissions, and foster a culture of conservation. It considers the impact of future growth and options for local clean energy generation. Supporting economic development by better meeting local energy needs is a key element within the overall Plan approach. **The Community Energy Plan provides us with a pathway towards our goal of reducing greenhouse gas emissions by 80% from 2018 levels by 2050.**

Aurora's Energy Future to 2050

The energy and GHG emissions for Aurora are anticipated to stay around the same level to 2050 despite the population growth expected. The minimal change in levels can be attributed to modest energy efficiency retrofits, energy performance of new buildings, the changing carbon content of electricity and natural gas, improved fuel economy as well as the provincial and federal efforts. However, these actions alone are not enough to **achieve an 80% reduction from 2018 levels by 2050. Action is needed at the community level to further reduce emissions.**

Energy Vision

Aurora is a leader in energy and emissions reduction, with a focus on improving quality of life in collaboration with residents, organizations and businesses.

Energy Goals

- Educate and communicate with the public about the impact of energy choices.
- Encourage healthy and complete communities for residents to live, work and play through land-use planning.
- Encourage homes and apartments to use energy consciously and increase efficiency.
- Encourage local businesses and industries to use energy consciously and increase efficiency.
- Increase access to clean and renewable energy in the community.
- Integrate nature-based solutions in land use to capture carbon.
- Support a range of low carbon transportation options that are accessible, including electric vehicles, public transit, walking and cycling.
- Support the local economy.
- Support waste reduction efforts at the local and regional level.

Energy Target

This Community Energy Plan outlines **a series of strategies that achieve 22% reduction by 2030 from 2018 levels and 65% by 2050. These put Aurora on a path towards an 80% emissions reduction by 2050**.

Strategies to Reduce Emissions

The plan includes a series of strategies, developed in collaboration with a Stakeholder Working Group – comprised of individuals from local utilities, businesses, residents and Town staff - and feedback from the public, to help reduce energy use and emissions in Aurora. Overall, the strategies aim to:

- Reduce the amount of energy used in new and existing buildings - this includes homes, businesses, offices, apartments, Town facilities, schools, and industry
- Consider cleaner ways of powering our Town (through district energy systems and solar power)
- Rely less on gasoline-powered cars and switch to electric vehicles
- Promote walking, cycling, rolling and transit use in Aurora
- Reduce the amount of waste generated in the Town and
- Pursue compact, mixed-use development.

Aurora's Energy, Emissions & Costs (2018)

- **6.8 million GJ of energy** to heat and power homes and buildings and for transportation fuel within the Town
- **Cost the community $178 million;** $2,900 per person annually
- the community of Aurora produced over **326,000 tonnes of carbon-dioxide equivalent**.
- Over half of our emissions are produced from **heating** homes and other buildings (such as offices, stores, and schools).
- Travel is also a large source of emissions – the majority of which comes from **personal cars, trucks and SUVs**.

Homes are responsible for 45% of all energy use in Aurora and 37% of total emissions. On average, residents in Aurora are spending about $910 to heat and power their homes each year.

Two strategies have been developed for homes. The first calls for the design and implementation of a tiered building code or green standard that encourages higher energy efficiency. Developers would be encouraged to meet higher levels of energy efficiency when building new homes. The second strategy outlines a voluntary deep energy retrofit program for existing homes. A deep energy retrofit looks at the entire home or building and aims for significant increases in energy efficiency. Saving energy means saving money to heat, cool and power homes.

Businesses and institutions are responsible for 16% of all energy used in the community and 14% of emissions. Similar to homes, the CEP includes strategies for new and existing businesses and institutions. These include a tiered building code or green standard for new buildings and a voluntary deep retrofit program for existing buildings. The CEP includes a strategy for increasing efficiency in multi-unit buildings.

In Aurora, **industrial buildings** and facilities are responsible for 13% of total energy. This represents 3% of total emissions. Industries already have a vested interest in managing their energy consumption to the best of their abilities. The CEP reflects ongoing energy efficiency improvements in industrial buildings using energy management systems.

Most trips made by residents of Aurora are completed in a car. The **transportation** sector is responsible for 26% of the total energy used and 37% of total emissions. Personal vehicle use is responsible for 99% of all transportation energy and emissions.

The first strategy aims to reduce the impacts of travel through "mode shift". This means encouraging other methods of travel (such as cycling, walking or taking transit) instead of driving. The second strategy aims to support the adoption of electric vehicles (EVs) by developing a plan to increase EV charging infrastructure.

Working with York Region, the Town of Aurora provides many programs and services to encourage **waste** reduction and diversion. Waste emissions account for 9% of the total in 2018. The CEP calls for implementing programs to reduce waste generation and to increase waste diversion from landfills.

District energy systems (DES) use pipes to supply heating, cooling and/or power to multiple connected buildings from a local, decentralized energy source. Buildings that produce excess energy ("anchor tenants") can redistribute this energy to other buildings nearby. While the opportunity for district energy exists, there is significant detailed planning involved in assessing district energy application for the Town. As a result, the CEP recommends conducting a feasibility study to further assess district energy solutions.

The CEP attributes some GHG emissions and energy reduction potential through renewable energy. The plan recommends identifying specific locations and applications for solar energy on Town properties while encouraging uptake amongst homes, businesses and the industrial sector.

These strategies are supported by **land use planning**, as well as the **carbon sequestration** activities of our natural habitats. How we plan and develop has a long-term impact on the environment. The CEP recommends building compact, mixed-use communities where residents can live, work and play. The plan recommends continued efforts to protect tree canopy, and green spaces, and to work with partner agencies to quantify the impacts of carbon sequestration on the Town's reduction target.

The strategies outlined will reduce annual emissions in Aurora by 72,361 tonnes CO_2e in 2030 and 212,364 tonnes CO_2e in 2050. This is a 22 percent reduction in emissions from 2018 levels and 65 percent reduction in emissions in 2050. A significant transformational effort will be required to meet these reductions by the Town, agencies, homeowners and businesses. While the CEP strategies are significant, there remains a gap in achieving an 80% emissions reduction by 2050. An additional effort by federal and provincial governments as well as advances in technologies will be needed. We have intentionally set a 30-year planning horizon, and we will continue to evaluate our progress over time and identify ways to close this gap. This CEP is intended to guide the Town of Aurora and the wider community to reduce energy and greenhouse gas emissions. A strong focus on implementation, governance and monitoring is essential to the Plan's success.

Table of Contents

Introduction

The Need for a Community Energy Plan

Energy powers our homes, schools and workplaces. Energy keeps our economy going, allows us to move around and supports our quality of life. At the same time, energy use can have negative impacts on the natural environment and our financial health. We have the opportunity to create a low carbon future that benefits the environment, the local economy, and all who use energy.

Reducing the amount of energy used by the Aurora community creates new economic growth, supports an active community, and supports a healthier atmosphere for people and the planet.

Today, towns and cities are experiencing the impacts of a changing climate. Greenhouse gas emissions – like carbon dioxide - are the primary cause of climate change. Greenhouse gas emissions (or GHGs) trap heat in the atmosphere, warming the surface of the earth. As we continue to produce GHGs, we are contributing to climate change. More severe storm events, flooding, and infrastructure damage are seen in local communities. As a result, scientists have declared an urgent need for action to limit global warming to 1.5 degrees.

Based on findings from the Lake Simcoe Region Conservation Authority's Climate Change Adaptation Strategy[1], as shown in Figure 1, by 2080, the Town will experience:

- Annual temperatures increase up to 5.5°C
- Increased daily temperatures in all seasons
- Many more days over 30°C and fewer under -10°C
- Increased intensity, duration, and frequency of heavy storms
- Higher annual precipitation, with winter and spring significantly wetter
- Longer grower season, more frost-free days

The changes to our climate, paired with the amount of energy we consume for the Town's municipal operations have impacts on municipal infrastructure, assets and budget. The amount of energy used in homes, businesses, schools, industry, and transportation represents a significant amount of investment. Reducing energy use, reducing GHG emissions and reducing the dollars leaving the community presents a dynamic opportunity for Aurora. The **Community Energy Plan (CEP)** is our response to addressing this opportunity. The CEP provides strategic direction to move towards a sustainable energy future. It takes a long-term view to 2050 and aims to improve energy efficiency, reduce energy consumption and GHG emissions, and foster a culture of conservation. It considers the impact of future growth and options for local clean energy generation. Supporting economic development by better meeting local energy needs is a key element within the overall Plan approach. **The Community Energy Plan provides us with a pathway towards our goal of reducing greenhouse gas emissions by 80% from 2018 levels by 2050.**

[1] LSRCA [Lake Simcoe Region Conservation Authority]. 2020. Climate Change Adaptation Strategy for the Lake Simcoe Region Conservation Authority. 258pp. https://www.lsrca.on.ca/Shared%20Documents/board/02-20-BOD%20-%20Attachment%20-%20Climate%20Change%20Adaptation%20Strategy_Final%20Draft.pdf

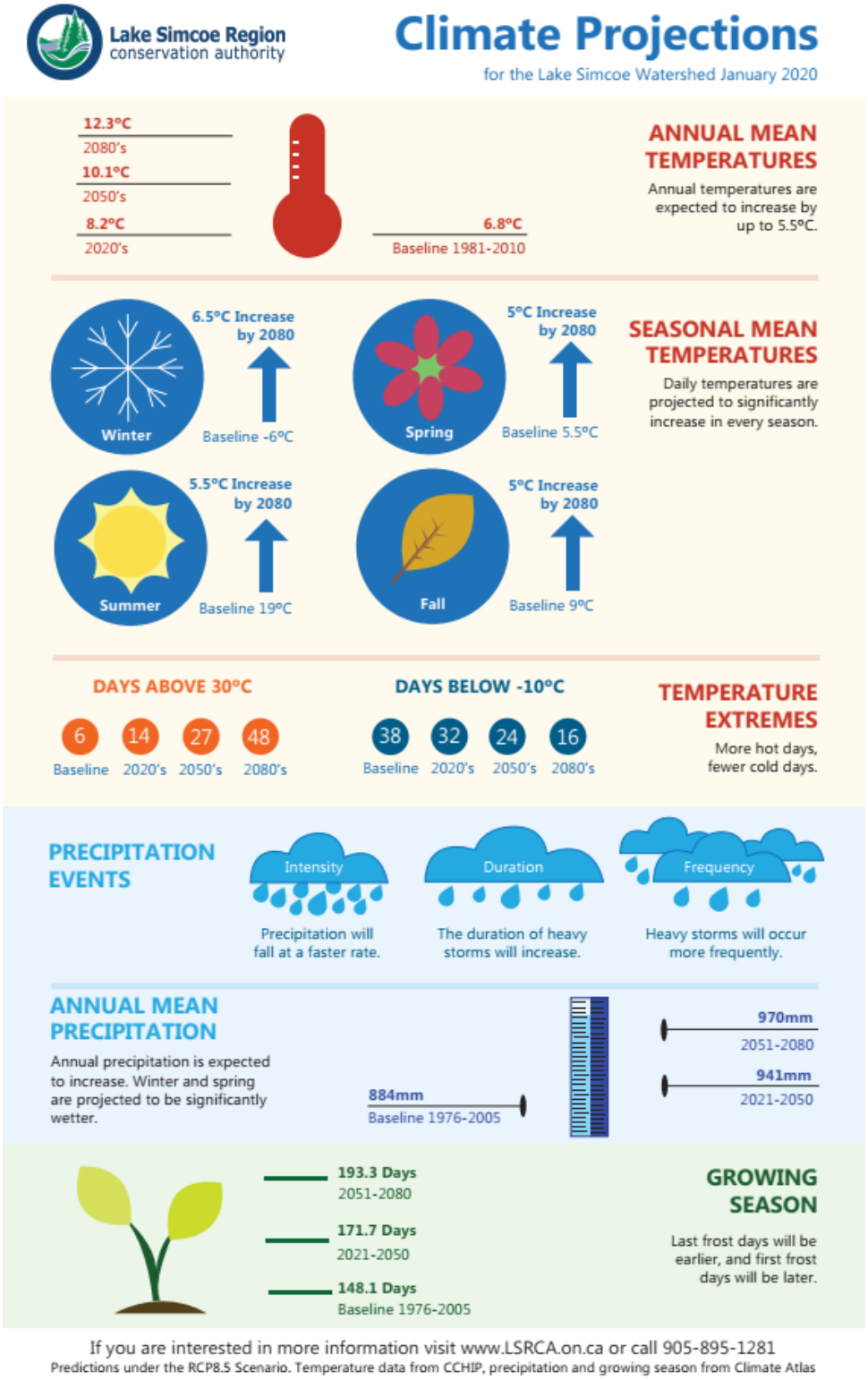
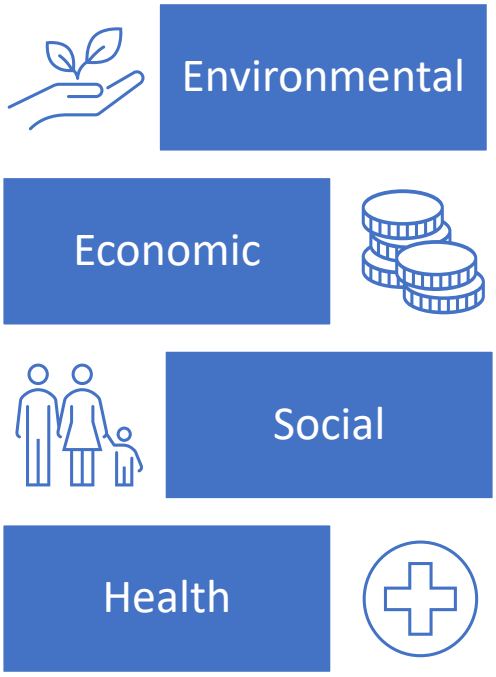


Figure 1: Lake Simcoe Watershed Climate Projections (Attributed to Lake Simcoe Region Conservation Authority)

Benefits of Energy Planning

Energy planning provides a myriad of benefits to the local community, ranging from environmental and climate benefits to economic and health benefits. These benefits are well-documented in research, which analyses the successful implementation of CEPs across the country[2]. The benefits of energy planning can be summarized in four main pillars: environmental, economic, social and health[3,4].



First, reducing local energy use results in a reduction of GHG emissions. Community energy planning helps to address our role in the global climate crisis – inline with the Town's 2019 climate emergency declaration[5]. By declaring a climate emergency, the Town deepened its commitment to reducing emissions and protecting the community from the impacts of climate change, per the Paris Accord.

Energy is a significant cost in Aurora, much of which leaves the local community. Rather than contributing to the local economy, our energy dollars go to producers and distributors elsewhere in Ontario, Canada and the USA. Local decisions around energy planning can reduce energy costs and keep those dollars in the community. Progressive energy planning (and reduced energy costs) can also attract and retain local businesses, particularly amongst those with eco-friendly mandates. Improving energy efficiency and conservation leads to reduced utility bills for residents, businesses and the Town as a whole. This is especially important for low and moderate-income households, which often spend a larger part of their income on energy costs – demonstrating that energy planning is a social equity issue[6].

Finally, energy planning has the potential to positively impact the health of residents. Reductions in energy use can lead to reduced local air pollution and improved air quality. A focus on active transportation (walking, rolling, cycling) promotes physical activity and exercise.

International and Federal Direction

The Paris Agreement –aims to keep the global average temperature rise well below two degrees Celsius and to drive efforts to limit the temperature increase to 1.5 degrees Celsius - entered into force in November 2016[7]. In 2018, the Intergovernmental Panel on Climate Change (IPCC) released a special report on the impacts of a

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[2] QUEST – Quality Urban Energy Systems of Tomorrow (2016). Community Energy Planning: The Value Proposition. Retrieved from: www.gettingtoimplementation.ca
[3] Ibid.
[4] Federation of Canadian Municipalities (2020). GMF Municipal Energy Roadmap. Retrieved from: https://fcm.ca/en/resources/gmf/gmfs-municipal-energy-roadmap
[5] Climate Emergency Declaration (2019). Town of Aurora. Retrieved from: https://www.aurora.ca/en/your-government/resources/Environment-and-Sustainability/2019-10-22-Council-Minutes.pdf
[6] Federation of Canadian Municipalities (2020). GMF Municipal Energy Roadmap. Retrieved from: https://fcm.ca/en/resources/gmf/gmfs-municipal-energy-roadmap
[7] The Paris Agreement (2016). Environment and Climate Change Canada. Retrieved 26 May 2020 from https://www.canada.ca/en/environment-climate-change/services/climate-change/paris-agreement.html

1.5-degree temperature rise – underscoring the need for "rapid and far-reaching" transitions in how we use our lands, energy, industry, buildings, transportation and design our cities[8].

In 2016, Canada adopted the Pan-Canadian Framework on Clean Growth and Climate Change (PCF). The PCF builds on four pillars – carbon pricing, emission reductions, adaptation and resilience, and clean technology and innovation – and aims to meet Canada's emissions reduction target of 30% below 2005 levels by 2030[9]. Beginning in 2019, a regulatory charge was placed on fuel[10]. About 90% of the proceeds from this charge are directed to individuals and families through the Climate Action Incentive. The purpose of the system is to raise awareness of the impacts and costs of pollution and incentivize consumers to pollute less[11].

Industries in Ontario originally fell under the federal carbon pricing system after the former cap and trade program was cancelled in 2018. However, in September 2020, the federal government indicated that Ontario's pollution pricing system for industrial facilities met the requirements outlined at the federal level. In the near future, industries in Ontario will no longer be subject to the federal system[12].

Provincial Direction

In November 2018, the provincial government released the Made-in-Ontario Environment Plan. The Plan aims to: protect air, land and water; reduce litter and waste; reduce Ontario's share of GHG emissions; and help communities prepare for climate change[13]. Ontario's target for emissions reduction (30% below 2005 levels by 2030) aligns with Canada's 2030 target. Climate-related efforts in 2019 included: creating an advisory panel for the development and implementation of climate action; finalizing emission performance standards for large industrial emitters; and, issuing green bonds ($1.7 billion) for climate-related projects such as public transit, resilient infrastructure and energy efficiency[14].

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[8] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

[9] Pan-Canadian Framework on Clean Growth and Climate Change (2019). Environment and Climate Change Canada. Retrieved from: https://www.canada.ca/en/environment-climate-change/services/climate-change/pan-canadian-framework-reports/second-annual-report/section-1.html

[10] Ontario and Pollution Pricing (2019). Environment and Climate Change Canada. Retrieved from: https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/ontario.html

[11] Ibid.

[12] Output-Based Pricing System (2020). Environment and Climate Change Canada. Retrieved from: https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system.html

[13] Made-in-Ontario Environment Plan (2018). Ministry of Environment, Conservation and Parks. Retrieved from: https://www.ontario.ca/page/madein-ontario-environment-plan

[14] Made-in-Ontario Environment Plan: Progress so far (2019). Ministry of Environment, Conservation and Parks. Retrieved from: http://files.news.ontario.ca.s3-website-us-east-1.amazonaws.com/ene/en/learnmore/ontario_appoints_advisory_panel_on_climate_change/EnviroPlan_Report_EN.pdf

Aurora's Environmental Commitment

In the future, Aurora's population will grow to about 70,200 by 2031[15]. The Town needs to understand how to grow while reducing our environmental impact. Towns and cities have a key role in meeting national and provincial GHG emissions reduction targets. Municipalities have direct or indirect control over 60% of Canada's total emissions[16]. This CEP builds on the Town's Strategic Plan[17] (2011 – 2031). Aurora's Strategic Plan is based on the three pillars of sustainability – environment, community, economy – and establishes a vision for Aurora as "an innovative and sustainable community where neighbours care and businesses thrive". The Strategic Plan includes several objectives that align well with the goals of the CEP, including:

- Improving transportation, mobility, and connectivity.
- Promoting and advancing green initiatives.
- Encouraging the stewardship of Aurora's natural resources.

Likewise, the Town's Economic Development Strategic Plan[18] (2019) includes several strategic actions that support the goals of the CEP, including:

- Working with the business community and York Region to examine and implement solutions aimed at providing transportation options to allow staff to easily commute to businesses located in employment areas currently not well serviced by public transit.
- Continuing to support residential intensification in the appropriate locations in the Aurora Promenade.
- Examining the feasibility of providing a bike share/e-bike program to downtown Aurora.

The Town of Aurora has taken several steps to promote positive environmental outcomes[19], including:

- In 2016, the Town joined the Blue Dot Initiative, a campaign that recognizes the right to a healthy environment[20].
- Developing a Corporate Environmental Action Plan (2018) and a series of progress reports, focusing on what the Town can do to protect and enhance the natural environment[21]. Action areas include water conservation, sustainable urban development, waste reduction and diversion, biodiversity and natural heritage, climate change and energy, and environmental awareness.

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[15] Forecasts to 2031 provided by the Town of Aurora. Forecast to 2041 were sourced from York Region's 2041 Preferred Growth Scenario where utilized in the Business as Planned analysis. York Region (2015). 2041 Preferred Growth Scenario. Retrieved: https://www.york.ca/wps/wcm/connect/yorkpublic/77c5e970-8020-4b89-a3d0-ff62c60403f1/nov+5+preferred+att+2.pdf?MOD=AJPERES

[16] QUEST – Quality Urban Energy Systems of Tomorrow (2016). Community Energy Planning: The Value Proposition. Retrieved from: www.gettingtoimplementation.ca

[17] 2031 Strategic Plan (2012). Town of Aurora. Retrieved from: https://www.aurora.ca/en/business-and-development/resources/Policy-Planning/1AURORA---2017-TOA-REPORT-JULY_16_18.pdf

[18] Town of Aurora (2019). Economic Development Strategic Plan. Retrieved from: https://investinaurora.ca/stratplan

[19] Climate Change (2020). Town of Aurora. Retrieved from: https://www.aurora.ca/en/your-government/climate-change.aspx#Mayors-Energy-Challenge-Ontarios-Energy-and-Water-Reporting-and-Benchmarking-EWRB-for-Aurora-Businesses

[20] About Us (2020). Blue Dot. Retrieved from: https://bluedot.ca/

[21] Corporate Environmental Action Plan (2018). Town of Aurora. Retrieved from: https://www.aurora.ca/en/your-government/resources/Environment-and-Sustainability/CEAP-Final-July-2018.pdf

- Developing an Energy Conservation and Demand Management Plan (2019) to reduce energy and emissions from facilities and vehicles owned by the Town[22]; monitoring corporate energy and emissions annually since 2011. The Town has a goal to reduce electricity usage in its operations by 10.5%, natural gas by 9.7% and total GHG emissions by 15.9% by 2023.
- Committing that all new Town-owned facilities will be built to LEED® standard. Aurora's Joint Operations Centre has achieved a LEED® Gold Standard[23].
- Joining the Federation of Canadian Municipalities' and ICLEI Canada's Partners for Climate Protection (PCP) program[24]. The Town will complete three of five community milestones through this CEP.
- Declaring a climate emergency, the Town deepened its commitment to reducing emissions and protecting the community from the impacts of climate change.

This CEP recognizes and builds upon the benefits associated with community energy planning, the higher-level direction from all levels of government and the progress seen in Aurora to date. The direction of this plan has been informed by members of the public, Town staff, elected officials and community stakeholders.

Vision, Goals and Targets

Our Vision

Aurora is a leader in energy and emissions reduction, with a focus on improving quality of life in collaboration with residents, organizations and businesses.

Our Goals

- Educate and communicate with the public about the impact of energy choices.
- Encourage healthy and complete communities for residents to live, work and play.
- Encourage homes and apartments to use energy consciously and increase efficiency.
- Encourage local businesses and industries to use energy consciously and increase efficiency.
- Increase access to clean and renewable energy in the community.
- Integrate nature-based solutions in land use to capture carbon.
- Support a range of low carbon transportation options that are accessible, including electric vehicles, public transit, walking and cycling.
- Support the local economy.
- Support waste reduction efforts at the local and regional level.

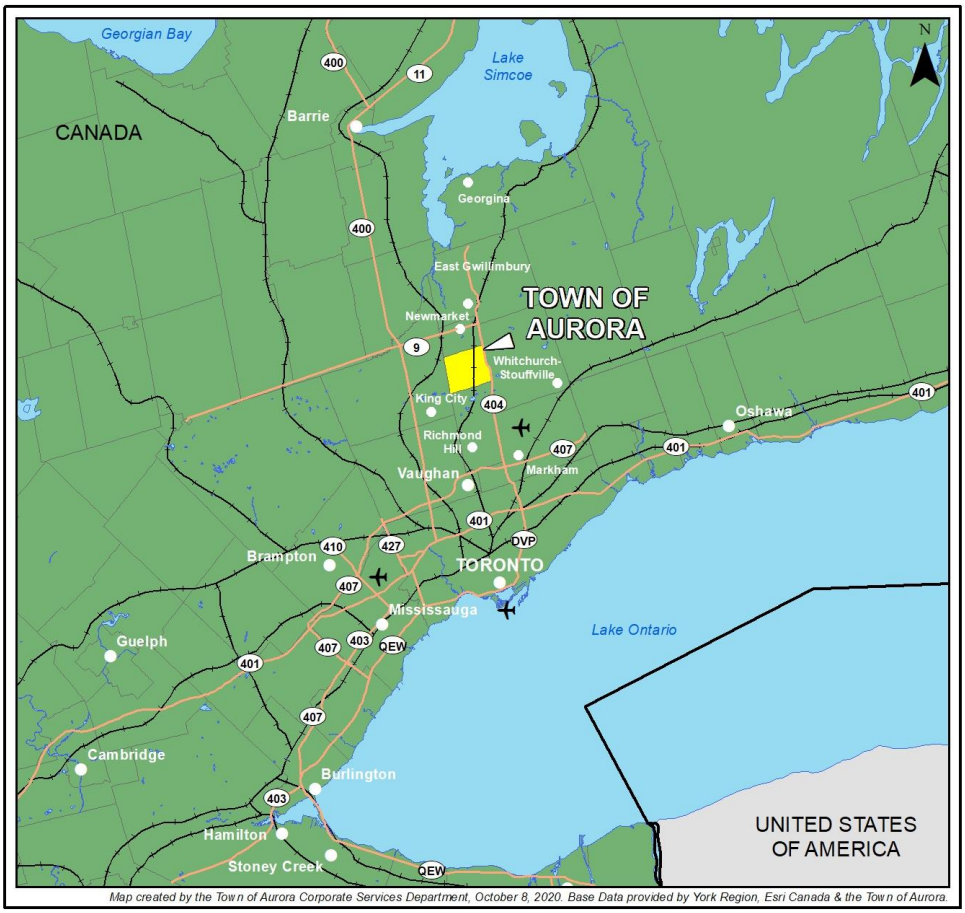
Our Targets

This Community Energy Plan outlines a **path towards 80% emissions reductions from 2018 levels by 2050** to align with the federal government's target and support the climate emergency declaration. The strategies identified below **achieve 22% reduction by 2030 from 2018 levels and 65% by 2050**. While the CEP strategies are significant, they do not fully reach the 80% emission reduction target for 2050. The Town, along with community partners, should look for ways to close this gap through activities such as quantification of

[22] Energy Conservation and Demand Management Plan (2019). Town of Aurora. Retrieved from: https://www.aurora.ca/en/your-government/resources/Environment-and-Sustainability/Aurora_ECDM_Plan_2019-2023_FINAL_with_Appendices.pdf
[23] Joint Operations Centre. Town of Aurora (2020). Retrieved from: https://www.aurora.ca/en/business-and-development/joint-operations-centre.aspx
[24] Partners for Climate Protection (2020). Federation of Canadian Municipalities. Retrieved from: https://fcm.ca/en/programs/partners-climate-protection

carbon sequestration in the natural environment and evaluating emerging technologies. Future changes in federal and provincial policies may help support energy and emissions reduction at the local level.

Aurora, Ontario



The Town of Aurora is a fast-growing centre within the Greater Toronto Area. It is located thirty minutes north of the City of Toronto. In 2018, the population was 61,845, and employment was 28,935. By 2031, Aurora is expected to be home to 70,200 . The Town offers a mix of urban amenities while maintaining a small-town lifestyle. The southeastern portion of the Town includes the Oak Ridges Moraine, an environmentally significant area. The Oak Ridges Moraine provides residents with access to green space and nature.

Reference: Population and employment data from the Town of Aurora's 2018 mid-year estimates.

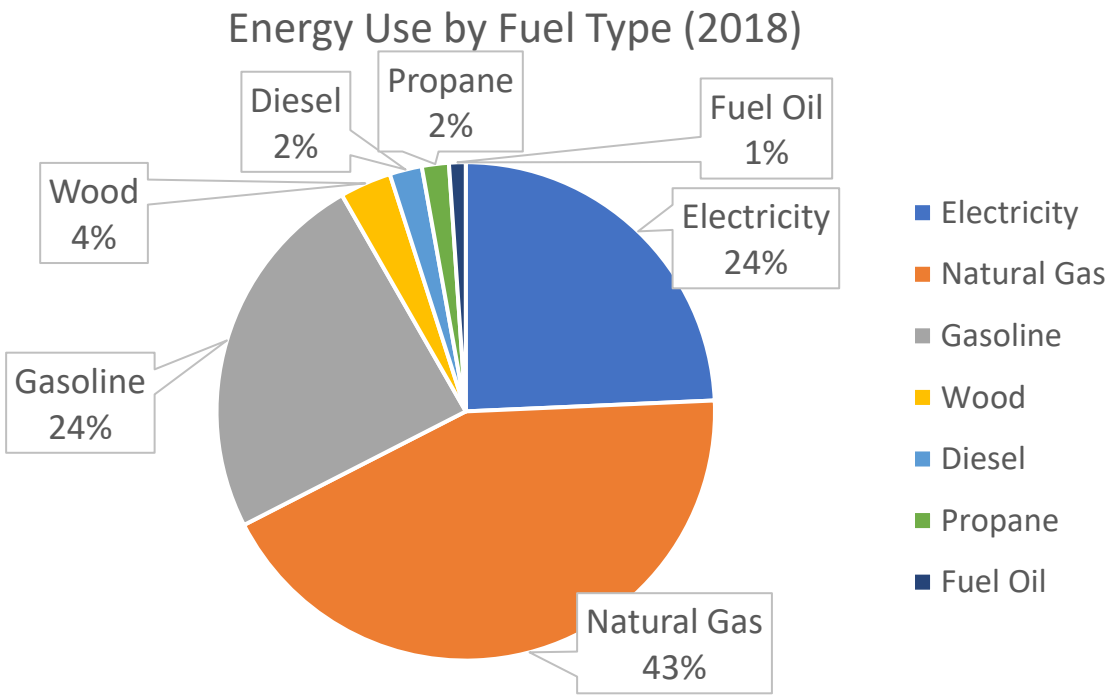
Energy and Emissions in Aurora

Baseline and Base Year

An energy and emissions baseline was developed to inform the Community Energy Plan. Please see Appendix 1 for a more detailed explanation of the methodology, data sources and CEP's development. Energy use in homes, businesses, industries, waste management and travel in the Town was reviewed to create a baseline for 2018. The baseline estimates the total amount of energy used, energy costs and emissions produced within the boundaries of a community in a given year as a basis for comparison going forward. The year 2018 was selected as it was the most recent year for which complete data was available. This analysis allows the Town to identify opportunities to reduce energy use. Moving forward, the baseline provides a benchmark to track overall progress on energy and emissions reduction.

Energy Use

In 2018, the Town of Aurora's residents and businesses used 6.8 million GJ of energy to heat and power their homes and buildings and for transportation fuel within the Town. The energy per person was 80.7 GJ, which represents $2,900 per person in annual energy costs. This is lower than the provincial and national averages of 120 GJ and 168 GJ, respectively[25]. Most of our community's energy use comes from natural gas, mostly from heating our homes and businesses. Electricity, natural gas and gasoline together make up almost all fuel types used in Aurora. Electricity and gasoline represent the largest cost for consumers.



[25] Natural Resources Canada (2017). Comprehensive Energy Use Database, Residential Sector – Ontario. Retrieved from https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=on&rn=2&page=0#footnotes

Figure 2: Energy use by fuel type in Aurora in 2018. Calculated from data provided by Alectra Utilities Corp., Enbridge Gas Distribution, Kent Group Ltd.

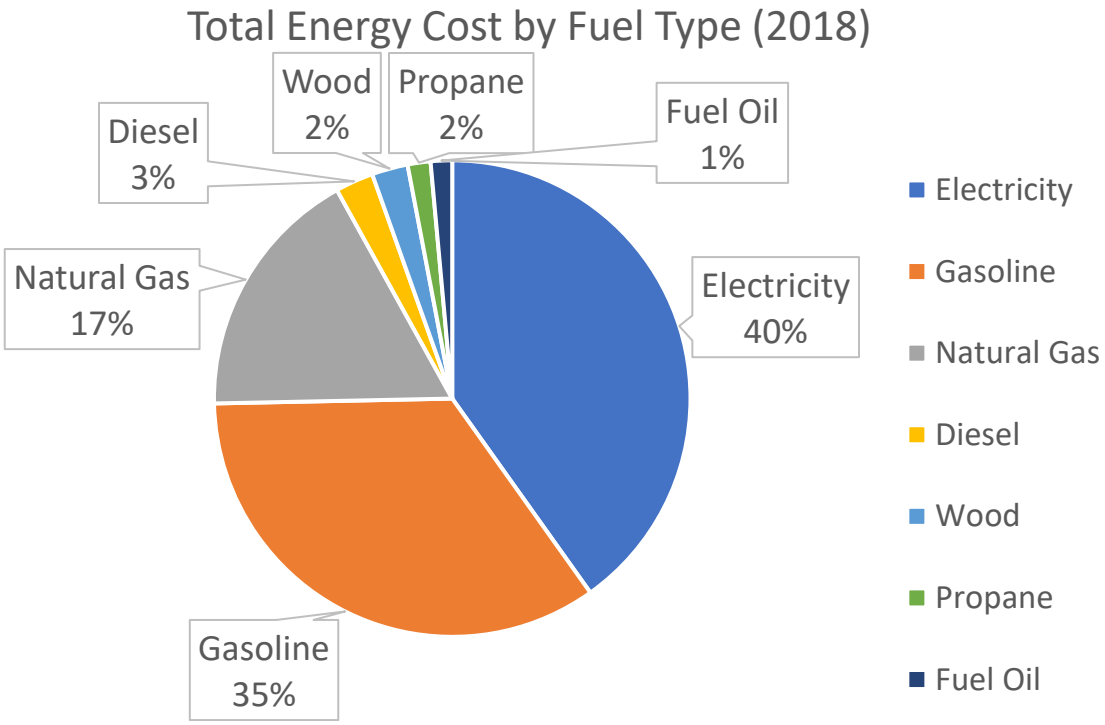


Figure 3: Energy expenditures by fuel type in Aurora in 2018. Calculated from data provided by Alectra Utilities Corp., Enbridge Gas Distribution, Kent Group Ltd.

Energy Costs

In terms of energy dollars, the community of Aurora spent $178 million on energy in 2018 alone. On an individual basis, the average person each consumed 49 GJ of energy and spent $910 to heat and power their homes.

Although residents and businesses spent $178 million on energy in 2018, most energy costs left the community. Over 80% of the money spent on energy left the local economy and ended up elsewhere in Ontario, Canada and in some cases in the United States (Figure 4).

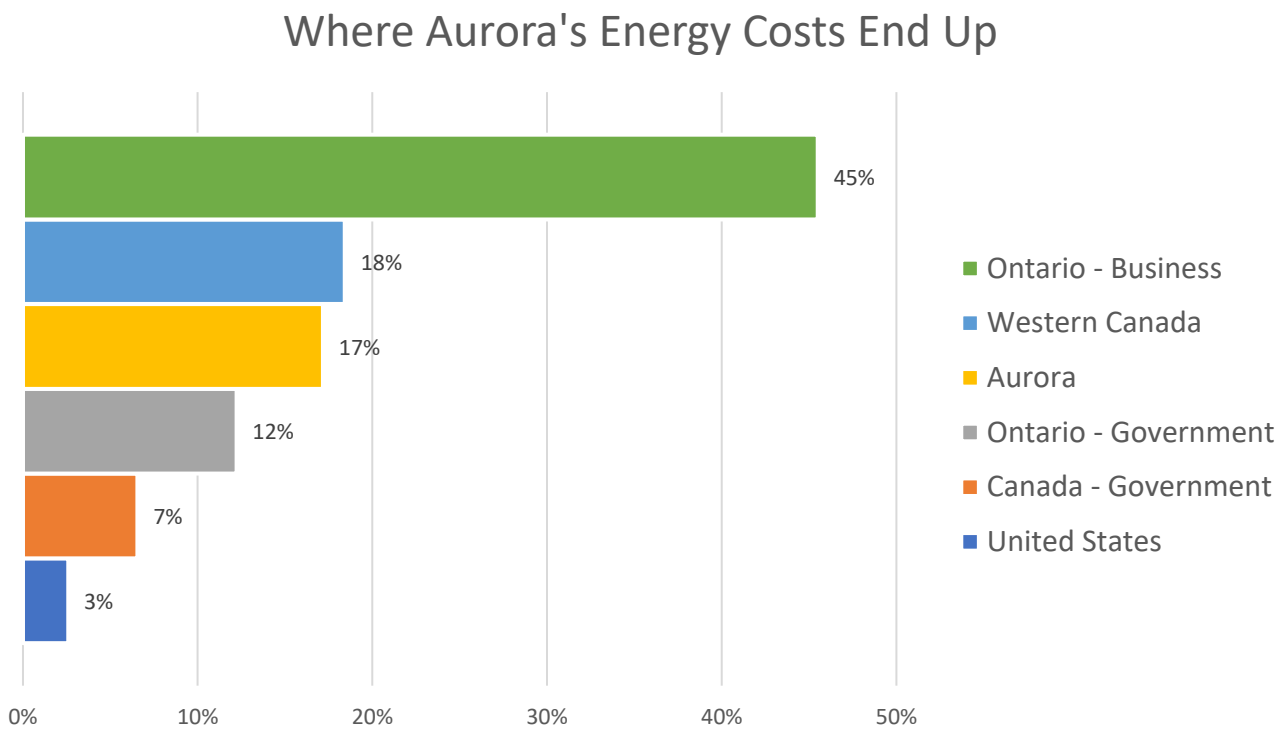


Figure 4: Distribution of Aurora's energy dollars in 2018. Data was obtained from the City of London's Energy Expenditure Tool.

For instance, 74% of electricity costs go to Ontario businesses outside of Aurora for energy generation and transmission. Likewise, 18% of natural gas costs go to Ontario businesses for distribution, while 34% go to Western Canada or the United States where it is mined and processed. 37% to 39% of prices for other petroleum fuels (gasoline, diesel, and fuel oil) go to the US for the same reason. Investing in locally generated sources of electricity, such as ground or roof-mounted solar arrays, provides an opportunity to keep energy dollars in Aurora through local employment and municipal tax revenue.

GHG Emissions

Overall, in 2018 the community produced over 326,000 tonnes of carbon-dioxide equivalent. This represents over 5 tonnes of CO_2e generated per person – enough to power 1.2 homes for one year or the same as using 2100 litres of gas. Over half of our emissions are produced in homes and other buildings (such as offices, stores, and schools). Travel is also a large source of emissions – the majority of which comes from personal cars, trucks and SUVs.

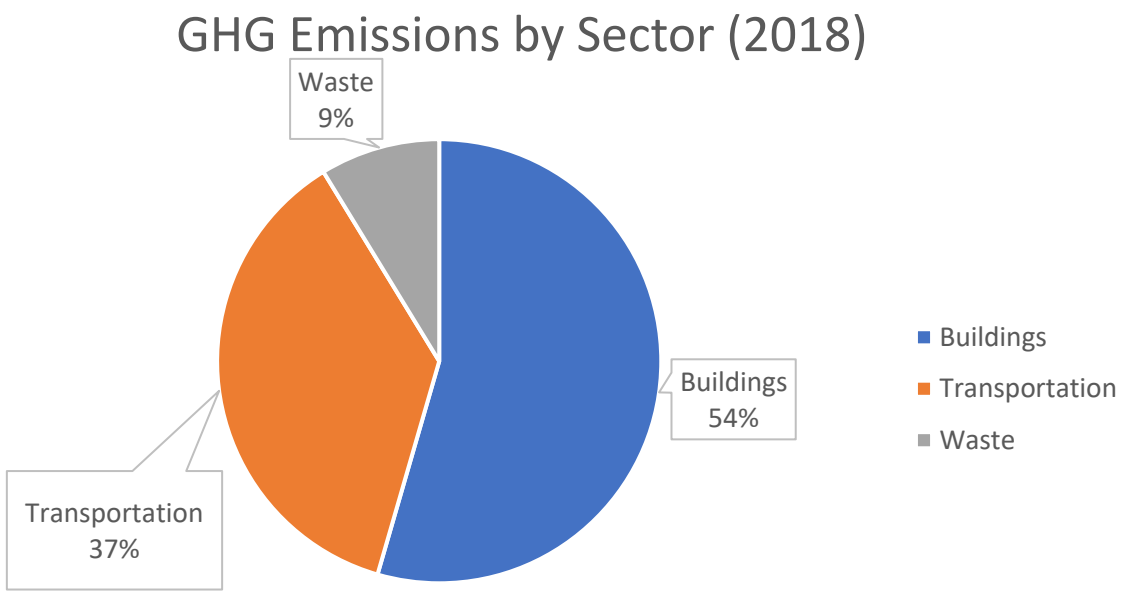


Figure 5: Greenhouse gas emissions by sector in 2018 in Aurora. Calculated from data provided by Alectra Utilities Corp., Enbridge Gas Distribution, Kent Group Ltd, and the Town of Aurora.

Town of Aurora Corporate Emissions

In 2019, the Town released its most recent five-year Energy Conservation and Demand Management Plan (ECDM Plan 2019-2023). Under Ontario Regulation 507/18, public agencies, such as the Town of Aurora, are required to report on energy consumption and GHG emissions annually from Town operations (i.e. from facilities, fleet and water/ wastewater facilities) and to develop and implement an ECDM Plan. The ECDM Plan must be reported on separately to the CEP and updated every 5 years. No such legislative requirement exists for the development of or reporting on community energy plans.

The baseline assessment completed for the CEP includes all energy uses in the Town, including those of the corporation. For consistency, both the CEP and ECDM plans use a baseline year of 2018. The ECDM Plan includes a baseline of energy use and GHG emissions for corporate facilities. Town facilities, corporate fleet and water/wastewater facilities used 9.4 million kWh of electricity and 1.2 million cubic metres of natural gas in 2018[26]. This represents over 3,000 tCO_2e of GHG emissions per year or 1% of the community's 2018 emissions. The largest emitters are indoor recreation facilities. The Town has a goal to reduce electricity use in its operations by 10.5%, natural gas by 9.7% and GHG emissions by 15.9% by 2023, representing a total investment of about $630,000[27]. The Town plans to complete energy audits, monitor electricity and natural gas use, implement energy conservation measures, implement a green fleet plan, anti-idling initiatives, and use

[26] Town of Aurora (2019). Energy Conservation and Demand Management Plan Update 2019-2023. Retrieved from https://www.aurora.ca/en/your-government/resources/Environment-and-Sustainability/Aurora_ECDM_Plan_2019-2023_FINAL_with_Appendices.pdf
[27] Ibid.

energy management software. Moving forward, the ECDM should be viewed as the corporation's contribution to the overall CEP. Any progress made within the ECDM should be reflected in the overall community plan.

Aurora's Energy Future to 2050

The Business-as-Planned (BAP) scenario is developed to understand future energy consumption, energy costs and emissions in Aurora, assuming no action is taken to reduce energy or emissions.

Increased population and employment growth will mean more houses, more businesses, more cars on the road, and more waste, and therefore greater energy consumption and emissions[28]. However, changes that occur outside the influence of the municipality, such as actions from higher levels of government and technology changes will also influence the energy consumption and emissions of Aurora in the future.

The energy and GHG emissions for Aurora are anticipated to stay around the same level to 2050 despite the population growth expected. The minimal change in levels can be attributed to modest energy efficiency retrofits, energy performance of new buildings, the changing carbon content of electricity and natural gas, improved fuel economy as well as the provincial and federal efforts. However, these actions alone are not enough to **achieve an 80% reduction from 2018 levels by 2050. Action is needed at the community level to further reduce emissions.**

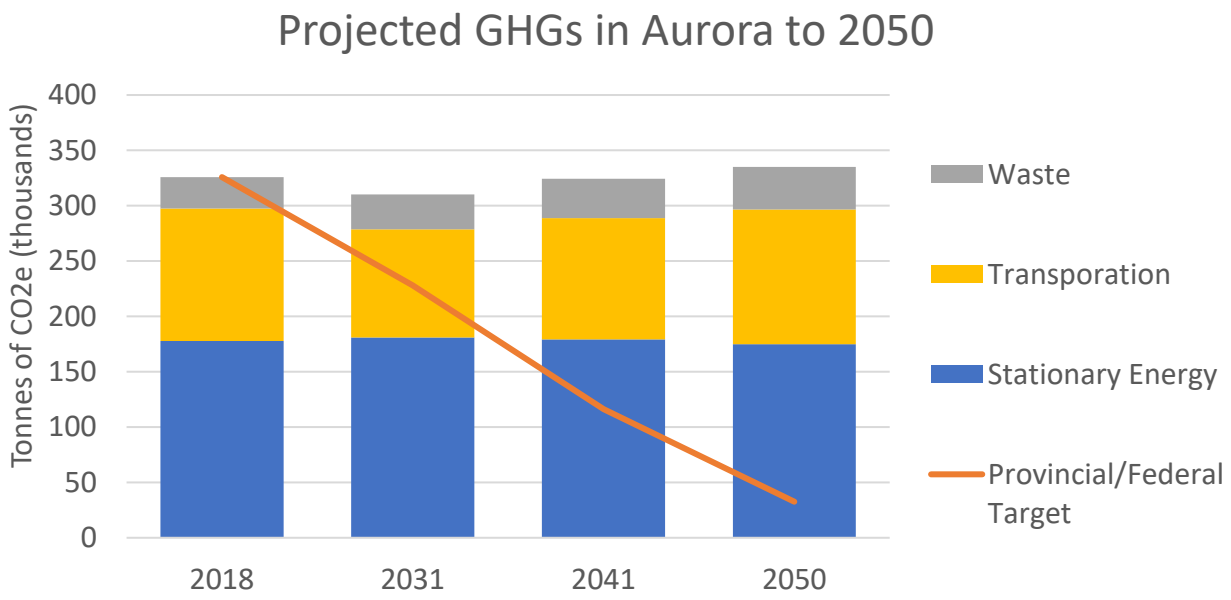


Figure 6: Projected greenhouse gas emissions to 2050 under the Business-as-Planned scenario in Aurora. Calculated from data provided by the Town of Aurora for population and employment growth projections.

[28] Population and employment forecasts to 2031 were provided by the Town of Aurora and forecasts to 2041 were sourced from York Region's 2041 Preferred Growth Scenario where utilized in the Business as Planned analysis, which were the most up-to-date at the time of analysis. York Region (2015). 2041 Preferred Growth Scenario. Retrieved: https://www.york.ca/wps/wcm/connect/yorkpublic/77c5e970-8020-4b89-a3d0-ff62c60403f1/nov+5+preferred+att+2.pdf?MOD=AJPERES

The BAP also includes a forecast of energy expenditures by Aurora residents and businesses. The Canada Energy Regulator projects what the energy prices look like in the future, under two scenarios, a “high cost” future where energy prices increase considerably, and a “low cost” future where energy prices increase by a smaller amount or decrease, depending on the fuel type and sector. Energy costs for Aurora are expected to rise in the future, creating further motivation for action.

Under the high-cost scenario, energy costs are expected to increase by 20%, 22% and 24% to 2031, 2041, and 2050, respectively, from the 2018 baseline (Figure 7, Table 1). Under the low-cost scenario, energy costs are expected to decrease by 1% by 2030 but then increase by 1% and 2% by 2041 and 2050, respectively. (Figure 7, Table 2). Cost projections are tied to the price of energy for each fuel source in the BAP analysis.

Table 1: 2018 energy expenditures and projected expenditures in 2031, 2041, and 2050 under the Canada Energy Regulator’s high-cost scenario.

Sector	2018 costs $	2031 costs $	2041 costs $	2050 costs $
Stationary Energy	$112,369,223	$149,298,432	$152,201,661	$150,461,916
Transportation	$65,246,489	$62,511,646	$68,179,989	$75,418,401
Total	**$177,615,713**	**$211,810,078**	**$220,381,650**	**$225,880,317**

Table 2: 2018 energy expenditures and projected expenditures in 2031, 2041, and 2050 under the Canada Energy Regulator’s low-cost scenario.

Sector	2018 costs $	2031 costs $	2041 costs $	2050 costs $
Stationary Energy	$112,369,223	$132,368,298	$138,737,709	$137,204,618
Transportation	$65,246,489	$40,329,738	$43,361,944	$47,965,518
Total	**$177,615,713**	**$172,698,036**	**$182,099,653**	**$185,170,136**

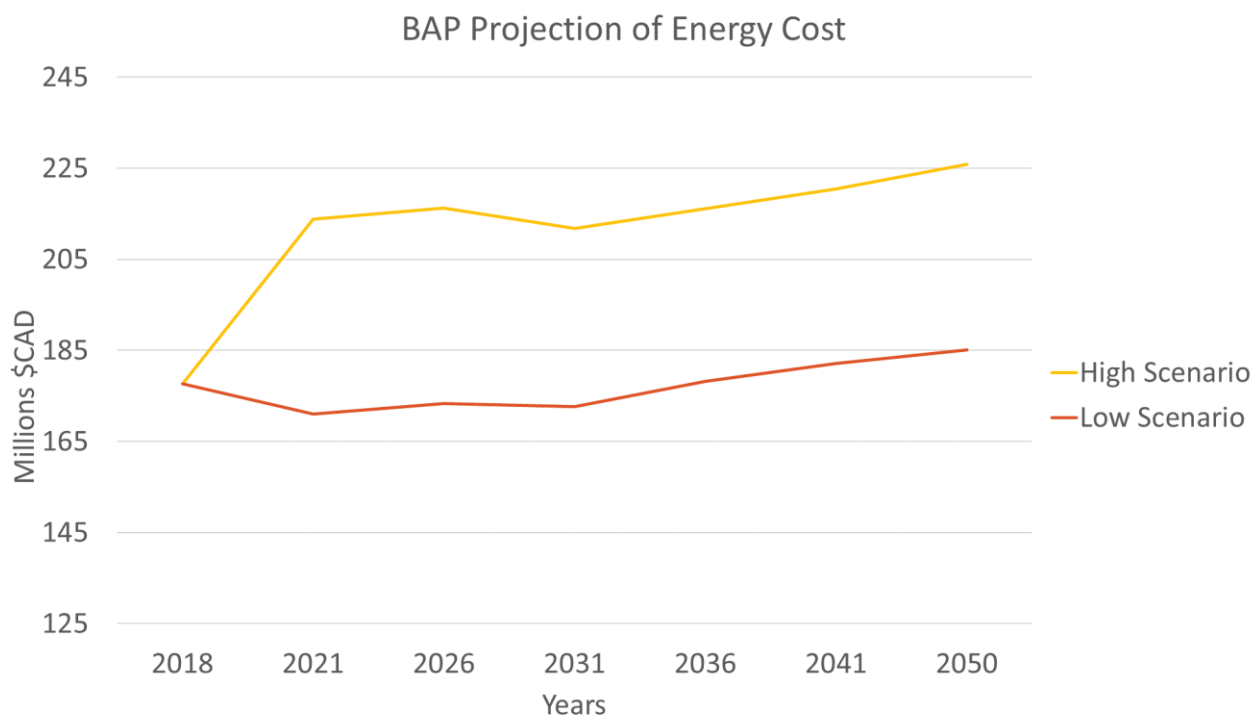


Figure 7. Projection of energy expenditures under a business-as-planned scenario, under the Canada Energy Regulator's a low and high-cost scenario.

Energy and Greenhouse Gas Reduction Strategies

The CEP identifies a series of strategies to reduce energy consumption across the Aurora community. There are strategies for homes, businesses and institutions, industry, district energy, travel, waste, renewable energy, land use and carbon sequestration. This section includes a snapshot of the current energy use, GHG emissions and costs, before defining the strategy.

Each strategy includes:

- a **description** that identifies the key elements of the strategy
- a **target participation rate** to indicate the scale of implementation needed to achieve the emissions reductions
- an estimate of the **energy** and **GHG emissions** reductions that can be achieved
- an estimate of the **energy cost savings**
- a **relative scale cost**[29] to implement the strategy
  The relative scale values are organized under the following categories:
  - N/A - Cost is covered by existing Town staff capacity or operating budgets
  - Low Cost - $ ($0-$100,000)
  - Medium Cost - $$ ($100,000 - $500,000)
  - High Cost - $$$ ($500,000+)
- the **timeframe** identified as short-, medium-, or long-term as follows:
  - short: 2 years
  - med: 2-5 years
  - long: 5+ years

The following strategies focus on community emissions. This includes those generated by homes, businesses, and transportation. Strategies to reduce emissions generated by the Town of Aurora's municipal operations are included in the Town's Energy Conservation and Demand Management Plan (ECDM).

The Town is encouraged to align its ECDM goals with the Community Energy Plan. ECDM goals and progress will need to be accelerated to meet the targets set out in this plan, despite a delayed start in implementation.

Homes

Context

As shown below, most (82%) homes in Aurora are single detached homes. New home construction continues to grow as the Town issued nearly 300 residential building permits in 2018[30]. Over 60% of contributing to a

[29] This provides a broad range of costs for implementation of the strategy in full. Detailed costing of the strategies has not been included at this time. Detailed costing for the strategies will occur during the business and budget planning processes of each strategy.
[30] Growth and Development Review (2018). York Region. Retrieved from https://www.york.ca/wps/wcm/connect/yorkpublic/bd00aa9c-745d-4a54-86f6-3a70d2298cea/19047_gdr2018accessible.pdf?MOD=AJPERES&CVID=mLVOz4X

more diversified housing mix in the community[31]. It is anticipated that new homes in 2019-2031 will be a mix of single and semi-detached homes (40%), townhouses and duplexes (22%) and apartments (38%). The proportion of higher density growth is projected to increase over [32][33].

Heating, cooling, and lighting of homes requires significant energy use. The age and size of the home, the local climate, fuel costs, and the number of occupants all impact a household's total energy use. Space heating (62%), water heating (20%) and appliances (12%) consume the most energy in homes[34]. According to Natural Resources Canada (NRCan)[35], single detached homes and older homes use the most energy. Table 3 below shows the average energy use of typical homes in 2017.

Table 3: Average energy use and energy intensity of homes by type in 2017 based on data from the Municipal Property Assessment Corporation.

Housing type	Average household energy use (GJ) [36]	Average energy intensity (GJ/m2) [37]
Single-detached homes	126	0.62
Single attached homes (townhouses, duplexes, etc.)	90	0.70
Apartments	57	0.56

In general, newer dwellings are more energy-efficient than older ones. According to Natural Resources Canada, homes built in 2017 used an average of 102 GJ (0.66 GJ/m^2). Homes built during 1990 and 2000 used 145 GJ (1.11 GJ/m^2) and 130 GJ (0.93 GJ/m^2)[38]. Increases in energy efficiency are largely due to improved building practices and building codes, despite increases in the average size of homes[39]. The 2017 Ontario Building Code update includes a 15% increase in energy efficiency over 2012 requirements[40]. Most of Aurora's housing stock is relatively new, single-family homes, with over 80% of homes being built after 1980.

[31] Ibid.
[32] Watson & Associates Economists Ltd (2019). Development Charges Background Study: Town of Aurora. Retrieved from https://www.aurora.ca/TownHall/Documents/Building%20Division/Draft%202019%20Aurora%20DC%20Background%20Study%20and%20By-Law.pdf
[33] Growth and Development Review (2018). York Region. Retrieved from https://www.york.ca/wps/wcm/connect/yorkpublic/bd00aa9c-745d-4a54-86f6-3a70d2298cea/19047_gdr2018accessible.pdf?MOD=AJPERES&CVID=mLVOz4X
[34] Natural Resources Canada (2017). Comprehensive Energy Use Database, Residential Sector – Ontario. Retrieved from https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=on&rn=2&page=0#footnotes
[35] Ibid.
[36] Ibid.
[37] Natural Resources Canada (2017). Comprehensive Energy Use Database, Residential Sector – Ontario. Retrieved from https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=on&rn=2&page=0#footnotes
[38] Ibid.
[39] Statistics Canada (2011). Households and the Environment: Energy Use. Retrieved from https://www150.statcan.gc.ca/n1/en/catalogue/11-526-S
[40] Ministry of Municipal Affairs and Housing (2016). Supplementary Standard SB-12 "Energy Efficiency for Housing". Retrieved from http://www.mah.gov.on.ca/Page15256.aspx

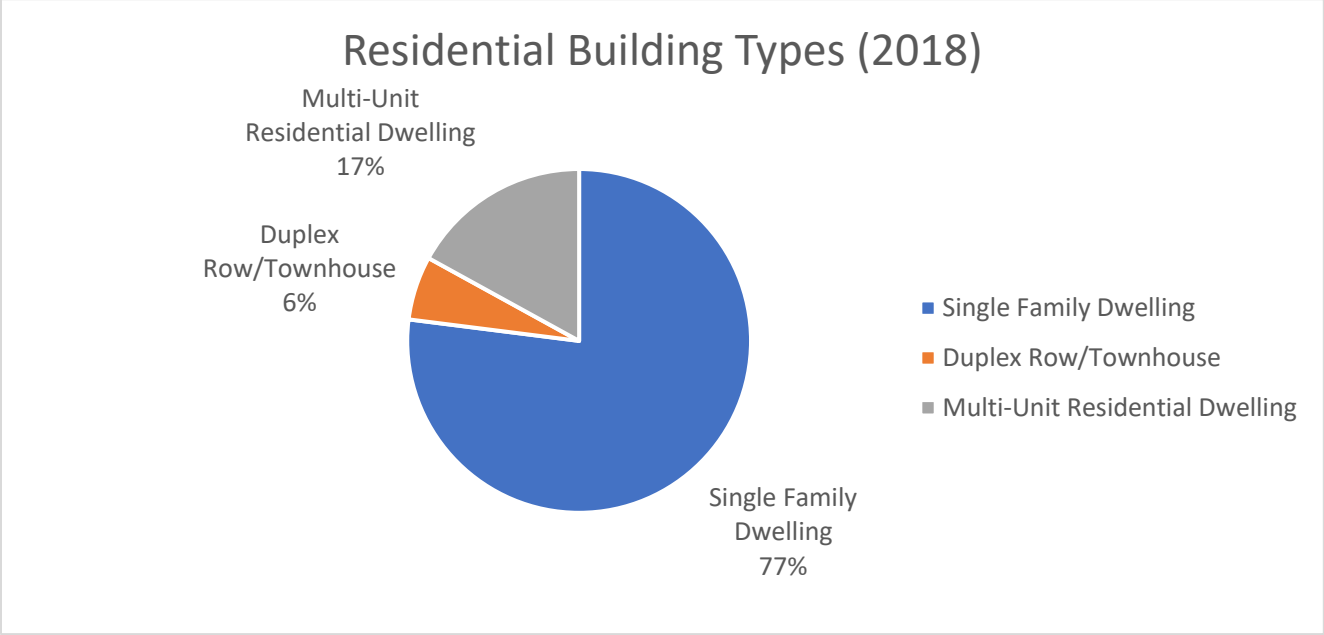


Figure 8: Type of residential dwellings in Aurora in 2018 based on data from the Municipal Property Assessment Corporation.

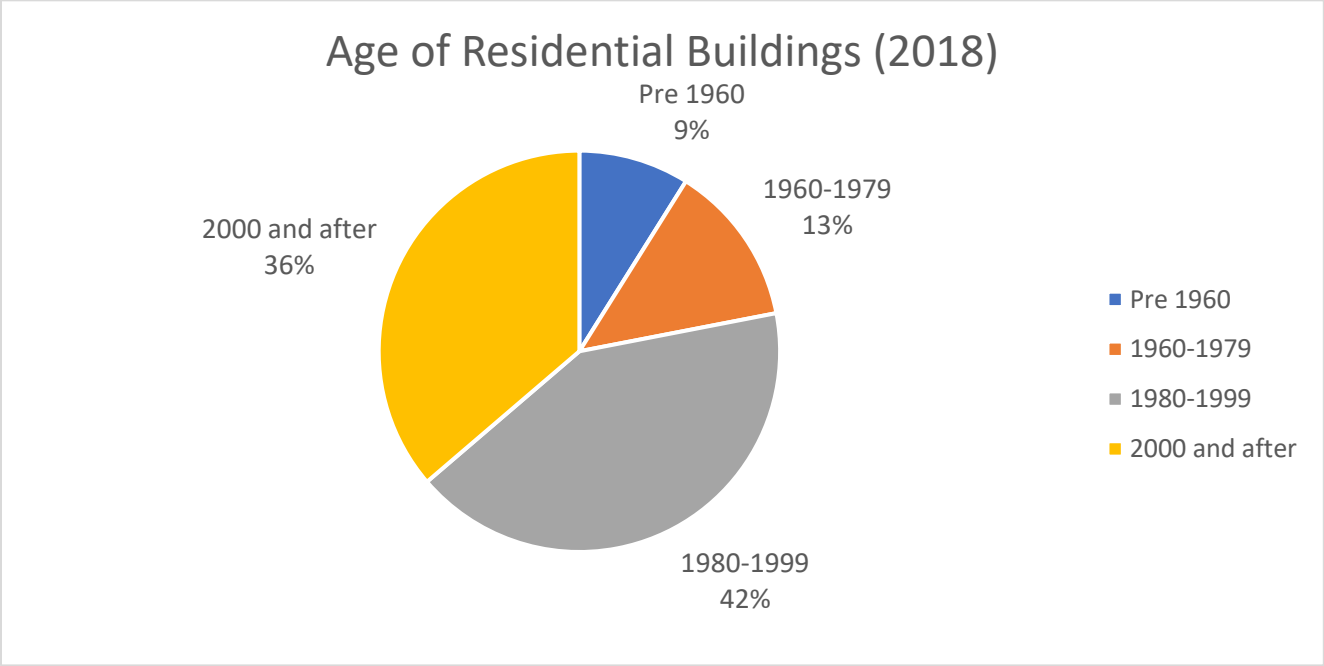


Figure 9: Age of residential homes in Aurora in 2018 based on data from the Municipal Property Assessment Corporation

Table 4: Housing types and sizes in Aurora 2018 based on data from the Municipal Property Assessment Corporation.

Construction Period	Number of units	Percent (%) of total units	Average GFA (square metres)	Average Number of Stories
Pre 1960	1,606	9%	140	1.3
1960-1979	2,350	13%	160	1.6
1980-1999	7,529	42%	211	1.9
2000 and after	6,536	36%	222	1.9

Energy, Emissions and Costs

Homes are responsible for 45% of all energy use and 37% of total emissions. Natural gas accounts for 67% of total energy consumed and 86% of emissions from homes in 2018. New homes (those built after 2018) are projected to account for 5% of energy and 4% of emissions by 2030 without local action. These values increase to 9% of energy and 7% of emissions by 2050. Existing homes are projected to account for 40% of energy and 35% of emissions by 2030. Existing buildings will account for 32% of energy and 27% of emissions by 2050. In 2018, residential energy costs were nearly $56.5 million.

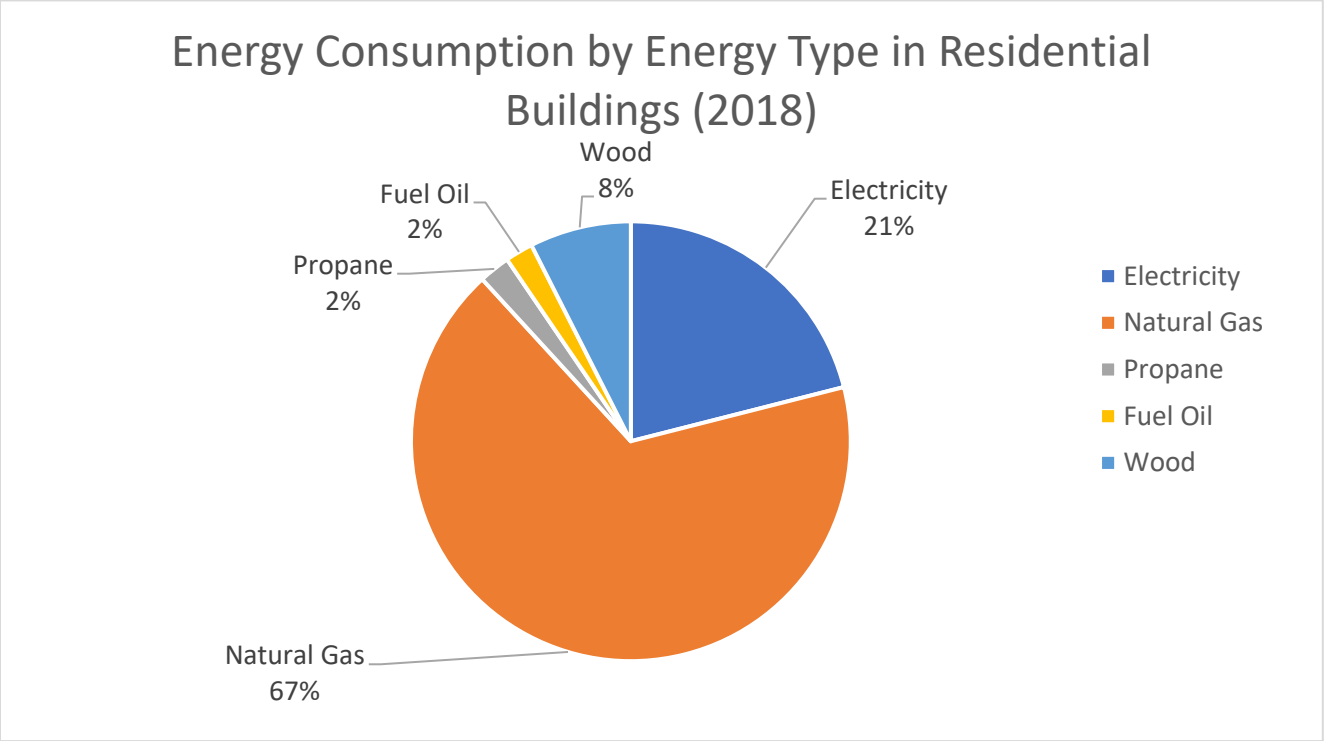


Figure 10: Total energy consumption by energy type in residential buildings in 2018 Calculated from data provided by Alectra Utilities Corp and Enbridge Gas Distribution.

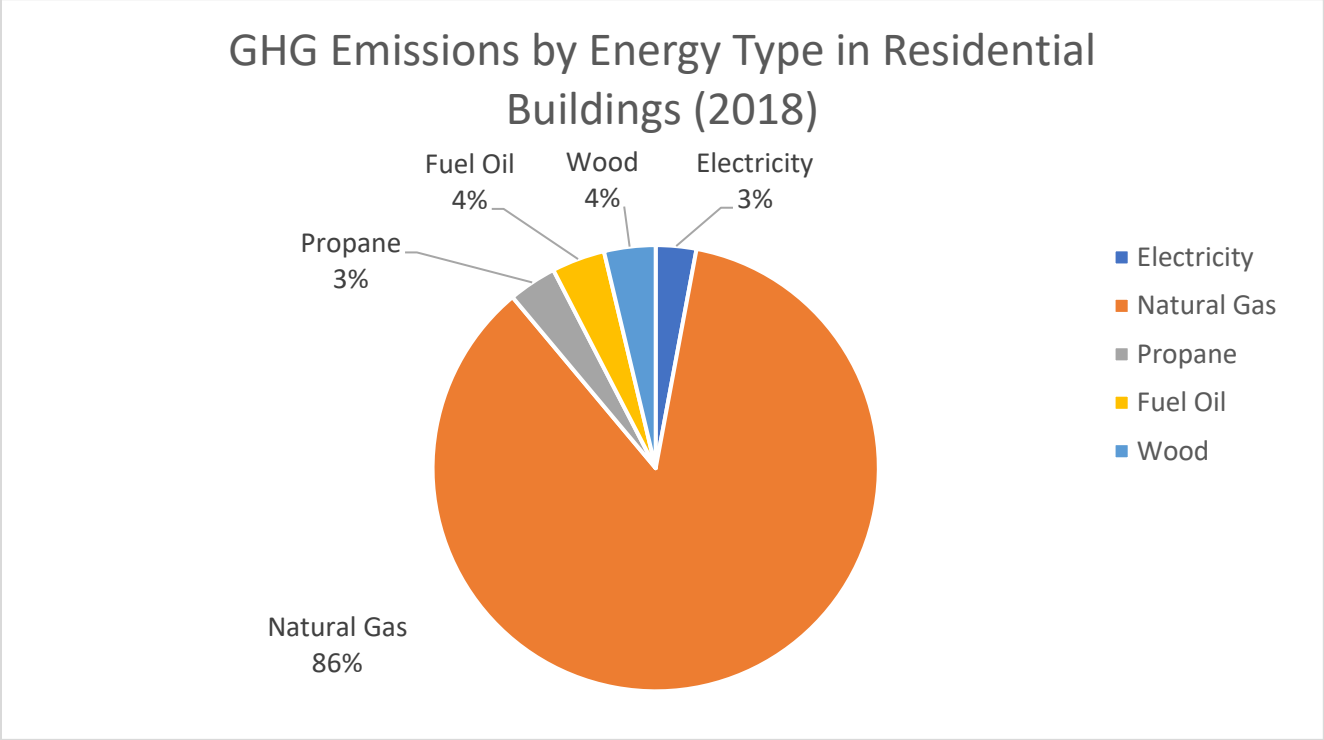


Figure 11: Total greenhouse gas emissions by energy type in residential buildings in 2018 Calculated from data provided by Alectra Utilities Corp and Enbridge Gas Distribution.

In 2018, the average resident consumed 49 GJ of energy and spent about $910 to heat and power their homes. This costs households – about $3,000 per year, which is slightly higher than other York Region municipalities. Energy costs tend to place the highest burden on those who can least afford it. Canada's stock of social and rental housing tends to be less efficient and older[41]. Nationally, individuals living in older homes (built-in or before 2005) can spend about $300 more per year on utility bills[42]. As such, low and moderate-income households must often spend a larger proportion of their income on energy[43].

[41] Federation of Canadian Municipalities (2020). GMF Municipal Energy Roadmap. Retrieved from: https://fcm.ca/en/resources/gmf/gmfs-municipal-energy-roadmap
[42] Ibid.
[43] Ibid.

Energy Mapping: Homes

Energy maps were created to better understand the energy use patterns of Aurora's homes. The residential energy maps help to identify areas where energy consumption can be reduced. The maps also show potential areas to target home energy efficiency programs. More details on the energy mapping process are provided in Appendix 1.

Figure 12 shows the total residential energy use at the traffic zone[44] level. Darker shades of red indicate higher energy use in an area. The two areas within the Town that have the highest total residential energy use are found within zones 2569 and 2553. Zone 2569 is in the northeast of the Wellington Street East – Bayview Avenue intersection. It is primarily low-medium density residential with pockets of medium-high residential. The concentration of low-medium density residential in this area (likely single-family and semi-detached) may explain the high energy use in this area. Zone 2553 is in the west section of the Town between Henderson Drive and Wellington Street West. It is comprised of single-detached and estate homes (low-density residential areas). Again, the concentration of single-family and larger homes may explain the high energy use in this residential area. Figure 13 shows total GHG emissions by residential area. Zones 2569 and 2553 also have higher levels of GHG emissions than surrounding areas.

[44] Sections of the Town are broken down into manageable sizes for analysis. These sections are known as traffic zones. Traffic zones align with other planning exercises at the Town level.

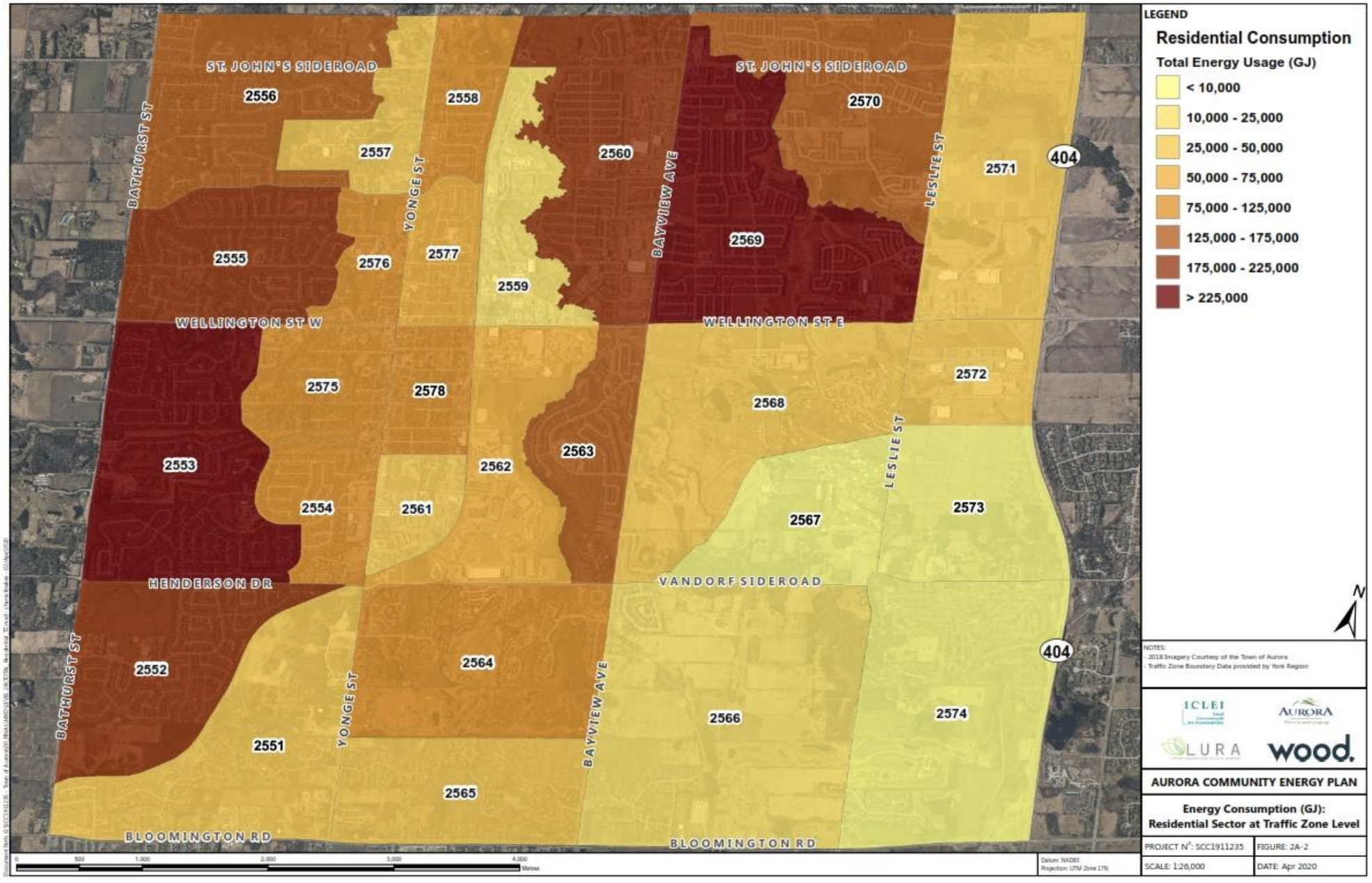


Figure 12 Map displaying the total residential energy use at the traffic zone level

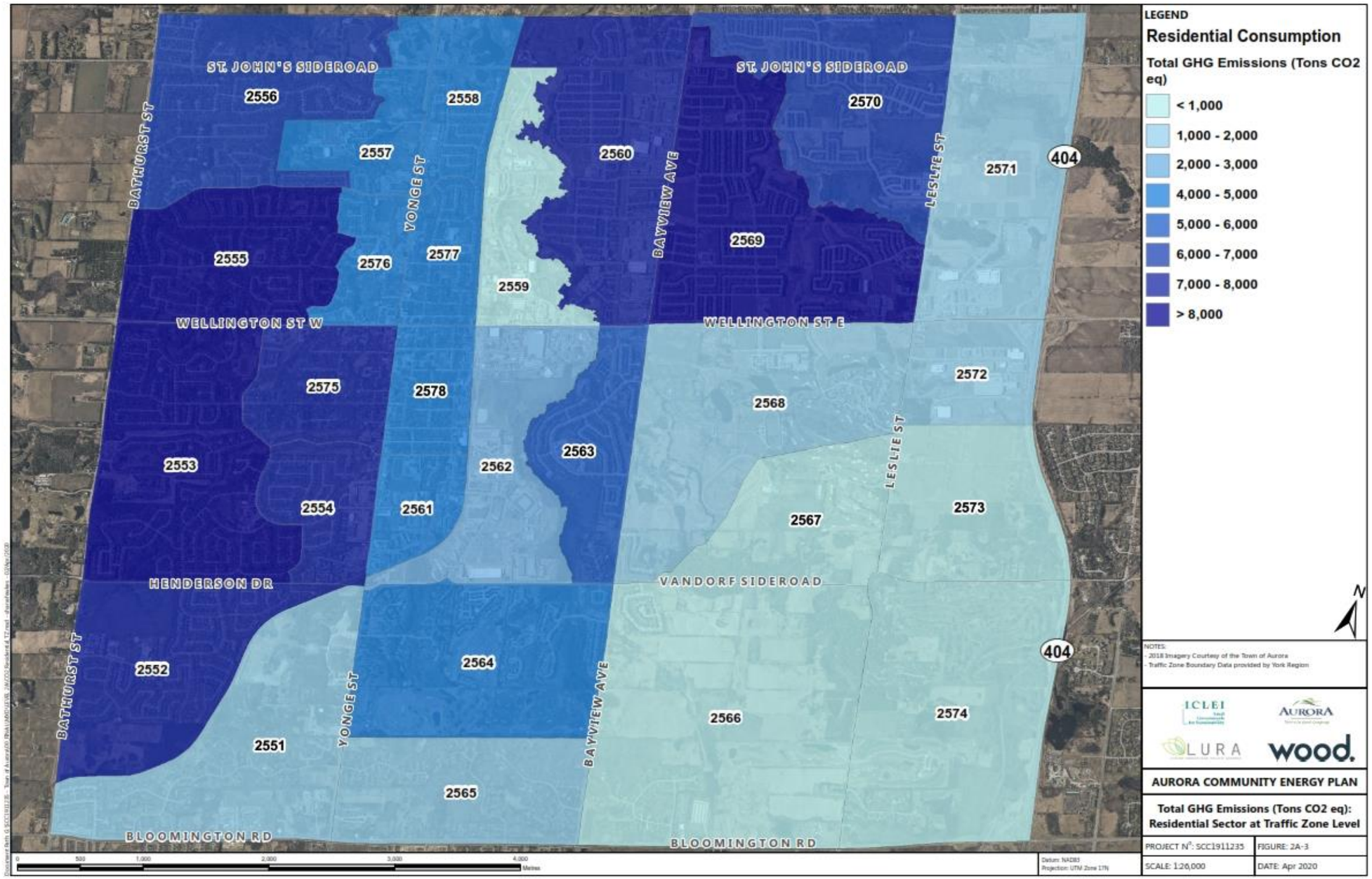


Figure 13 Map displaying the total GHG emissions by residential area

Strategy #1: Residential New Buildings: Energy & Thermal Efficiency

Description: Design and implement a tiered code/green standard that encourages higher energy efficiency.

- Consider adopting a regional 'net-zero standard by 2030' building code. A local example is the Toronto Green Standard (TGS) Version 3. The TGS outlines four tiers to near-zero energy and emissions in new construction by 2030 or sooner. The code includes absolute performance targets for Total Energy Use, Thermal Energy Demand, and GHG Intensity. It also includes prescriptive measures for MURBs (multi-use residential buildings) and commercial buildings. Other municipalities have adopted the TGS approach to residential buildings.
- Require new residential buildings to be net-zero ready by 2036 (a five-year lag from the Toronto Green Standard).
- Explore the passive house standard.
- Include standards for the use of air-sourced heat pumps and/or other low-carbon technologies as they become available.
- Include prescriptive measures to address the readiness for solar installation on roofs, connection to district energy (if applicable), and electric vehicle charging.
- Encourage development design that maximizes solar access in the Official Plan.

As part of the designing the green standard:

- Consult with key stakeholders (building inspectors, developers, builders, and building trades) to develop the standard.
- Review building permit processing for potential areas to streamline.
- Consider developing a points-based checklist for developers so they can show how they have included energy efficiency or sustainability measures into new buildings. Measures can include high-efficiency building envelope, heating and cooling, high-efficiency lighting, windows/doors, drain heat recovery, solar domestic hot water, efficient electrical equipment, solar-ready design, electric vehicle chargers, heat pumps, etc.
- Determine financial and/or non-financial incentives. This could include:
    - expedited permitting, reduced development charges, etc. for developers
    - offering equity-based incentives to low and moderate-income households and small businesses so that they may access efficient building spaces. Following green building requirements (such as a tiered code) may result in higher construction costs. These higher development prices end up costing consumers.
- Monitor updates in the provincial and national building and energy codes. These may guide the adoption of a tiered building code.

Target Participation Rate

- By 2036, all newly constructed buildings are net-zero ready. This equates to an improvement of 80% over the Ontario Building Code's (OBC) 2017 energy efficiency requirements but is similar to planned updates of a 13% efficiency increase every 5 years[45].
- By 2050, buildings are net-zero and 90% better than the 2017 OBC.

[45] Environmental Commissioner of Ontario. Conservation: Let´s Get Serious Annual Energy Conservation Progress Report – 2015/2016. Retrieved from: http://docs.assets.eco.on.ca/reports/energy/2015-2016/ECO_Conservation_Lets_Get_Serious.pdf

Heat Pumps

- By 2030: heat pumps provide space heating to 20% of new homes.
- By 2050: heat pumps provide space heating to 40% of new homes.
- Equates to installing 228 heat pumps per year in new builds.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

120,000 GJ reduced per year by 2030. 500,000 GJ is reduced per year by 2050.

Energy use is reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

Energy Cost

$2.3 million saved per year by 2030. $10 million saved per year by 2050.

Cost savings are associated with energy and thermal efficiency only and do not include heat pumps.

Emissions

5,000 tCO_2e reduced per year by 2030. 20,000 tCO_2e reduced per year by 2050.

Emissions are reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

Relative Scale of Implementation Costs
Low

Timeframe to Implementation
Short-term to develop a green standard.

Strategy #2: Residential Existing Buildings: Energy and Thermal Efficiency

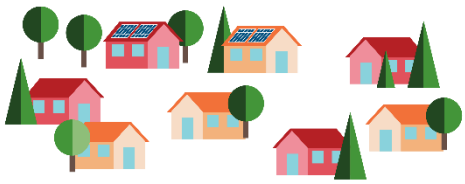
Description: Design a voluntary deep retrofit program that offers a holistic approach to energy efficiency for homes.

- The retrofit program should be designed to address the most common high energy uses in the home. This includes space heating, insulation, appliances, water heating, windows, etc. The program could include solar PV/thermal, use of air source heat pumps, where appropriate.
- Apply for funding to develop the detailed business plan (such as recently announced the FCM's Community Efficiency Financing).
- Deep retrofit programs are being explored in other neighbouring municipalities. Consider working with neighbouring municipalities, utilities or other key partners to adapt, co-design or deliver the program.

As part of developing the detailed business plan and program design:

- Identify a lead department/team or partner to administer the program.
- Identify financial model and funding sources for home retrofits. Funding could be from a third-party partner or the Town itself.
- Identify auditing requirements (based on NRCan's EnerGuide Energy Efficiency Home Evaluation) and eligible retrofit activities.

- Identify targeted building types includes single-family homes, townhouses or row houses, and multi-unit residential buildings. The Toronto Atmospheric Fund has designed the Towerwise program to fund and retrofit high-rise MURBs. Towerwise works with Energy Savings Performance Agreements)[46].
- Identify target neighbourhoods to prioritize first, starting with older (e.g. built before 1980) and less efficient homes. Locations may also consider targeted retrofits for affordable housing to promote equity and reduced utility costs for residents.
- Develop a financing package for home retrofits, this could consider using Local Improvement Charges (LIC) also known as Property-Assessed Clean Energy (PACE). Under these models, the interested homeowner and Town would agree to apply the loan, via the LIC, to their property tax bill. They would pay it back over an agreed-upon period with a fixed interest rate. The balance is attached to the property rather than the individual since it is paid through the property tax bill. With the sale of the property, the new owner will continue to pay off the bill. These new owners would receive the benefits of the energy-efficient retrofits.
    - LIC programs are not always accessible to low-income homeowners and low-income renters. Marginalized populations have been excluded from the housing market[47]. The program design process should consider additional monetary incentives for low and moderate-income homeowners and residential landlords to participate[48].
- Consider creating a centralized location - **'Retrofit Delivery Concierge' -** for buildings owners to access information about deep energy retrofits. The concierge offers guidance through stages of planning, financing, procurement, construction, quality assurance, and evaluation. The concierge supported access to available grants, incentives, and financing. This approach has been successful in other areas with a hub for sharing information and collaboration.



Target Participation Rate

- Retrofit approximately 3% of buildings, or 535 units, each year starting in 2023.
- By 2030: Retrofit 45% of all residential buildings and multi-unit residential buildings built before 1980, and 20% of all residential buildings built between 1980 and 2000.
    - A 35% increase in efficiency for older, less efficient homes. These homes should be targeted first.
- Between 2031 and 2050, retrofit 80% of the remaining residential building stock that existed in 2018.
    - A 20-30% increase in efficiency for younger, more efficient buildings.
- The average energy efficiency improvement across all retrofits is 30% from the 2018 baseline.

Heat Pumps

- By 2030: heat pumps provide space heating to 20% of retrofitted buildings.

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[46] Energy performance agreements provide capital for energy improvement projects that are paid back through utility savings.
[47] Clean Air Partnership (2020). Accelerating Home Energy Efficiency Retrofits through Local Improvement Charge Programs: A Toolkit for Municipalities. Retrieved from: https://www.cleanairpartnership.org/wp-content/uploads/2020/05/FINAL-LIC-TOOLKIT-Accelerating-Home-Energy-Efficiency-Retrofits-Through-LIC-Programs-2020-1.pdf
[48] Federation of Canadian Municipalities (2020). GMF Municipal Energy Roadmap. Retrieved from: https://fcm.ca/en/resources/gmf/gmfs-municipal-energy-roadmap

- By 2050: heat pumps provide space heating to 40% of retrofitted buildings.
- Equates to installing 552 heat pumps per year.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

135,000 GJ reduced per year by 2030. 210,000 GJ reduced per year by 2050.

Energy use is reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

Energy Cost

$2.6 million saved per year by 2030. $4.3 million saved per year by 2050.

Cost savings are associated with energy and thermal efficiency only and do not include heat pumps.

Emissions

18,900 tCO_2e reduced per year by 2030. 25,500 tCO_2e reduced per year by 2050.

Emissions are reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

Relative Scale of Implementation Costs
Medium to High

Timeframe to Implementation
Short-term to develop a business case, program design and funding model.

Businesses & Institutions

Context

Aurora is a growing community. It is home to over 1,700 businesses, including major industries and head offices. The Town is poised for economic growth with a supply of employment lands and a new business park. Two of York Region's highest value commercial building permits were in Aurora[49].

Major private-sector employers include Desjardins Insurance, TC Transcontinental Printing, Magna and St. Andrew's College. Major public sector employers include York Catholic District School Board, York Region District School Board, the Town of Aurora, and York Regional Police[50]. Small businesses of less than 20 people make up an important part of the local economy. According to the recent Economic Development Strategic Plan, emerging sectors include management, healthcare and social assistance, and professional, scientific, and technical services[51].

Research from the Canadian Green Business Council highlights several benefits of green buildings. Many of which may benefit building owners and developers, even though they may not be responsible for paying utility bills. Benefits may include higher overall return on investment, higher occupancy rates, higher rental rates and higher building value at the point of sale. Commercial tenants in "green" buildings report several benefits. Reported benefits include an improved corporate image, progress towards sustainability goals and improved employee satisfaction and engagement[52].

Energy, Emissions and Costs

Businesses and institutions are responsible for 16% of total energy and 14% of emissions. Between 2019 and 2031, commercial buildings are projected to grow by 25%. Institutional buildings are expected to grow by 7%[53]. New commercial and institutional buildings are projected to account for 1.7% of energy and 2% of emissions by 2030, and 3.3% of energy and 3% of emissions by 2050. Natural gas accounts for 76% of total energy consumed and 89% of emissions from commercial and institutional buildings in 2018. Existing commercial and institutional buildings are projected to account for 14% of energy and 13% of emissions by 2030, and 12% of energy and 11% of emissions by 2050. In 2018, commercial and institutional energy costs were over $18 million.

[49] Growth and Development Review (2018). York Region. Retrieved from https://www.york.ca/wps/wcm/connect/yorkpublic/bd00aa9c-745d-4a54-86f6-3a70d2298cea/19047_gdr2018accessible.pdf?MOD=AJPERES&CVID=mLVOz4X
[50] Invest in Aurora (2020). Town of Aurora. Retrieved from https://investinaurora.ca
[51] Ibid.
[52] Canada Green Building Trends Report (2014). Canada Green Building Council. Retrieved from: https://www.cagbc.org/cagbcdocs/resources/CaGBC%20McGraw%20Hill%20Cdn%20Market%20Study.pdf
[53] Watson & Associates Economists Ltd (2019). Development Charges Background Study. Town of Aurora. Retrieved from https://www.aurora.ca/TownHall/Documents/Building%20Division/Draft%202019%20Aurora%20DC%20Background%20Study%20and%20By-Law.pdf

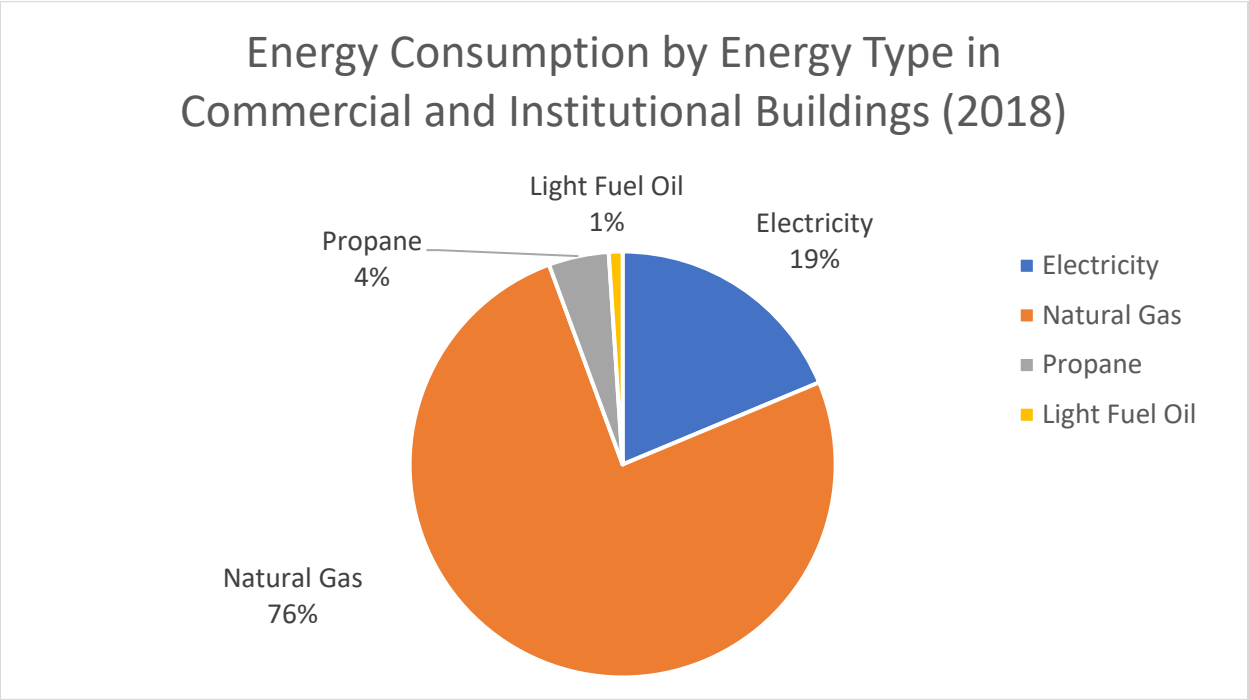

Figure 14: Total energy consumption by energy type in commercial and institutional buildings in 2018 Calculated from data provided by Alectra Utilities Corp and Enbridge Gas Distribution.

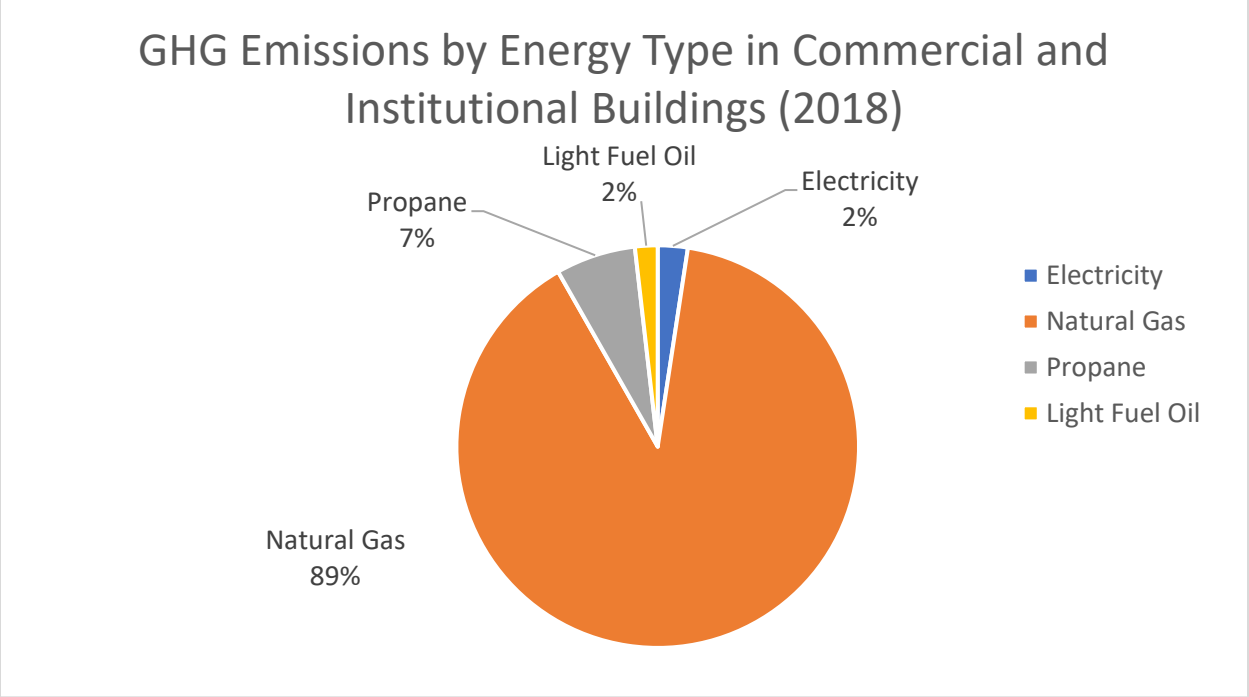

Figure 15: Total GHG emissions by energy type in commercial and institutional buildings in 2018 Calculated from data provided by Alectra Utilities Corp and Enbridge Gas Distribution.

Business and institutional energy use per person in Aurora (17 GJ) is similar to the averages in Ontario (30 GJ) and Canada (28 GJ)[54]. Commercial and institutional buildings in Aurora use about the same level of energy on a per square metre basis, 1.5 GJ/m2 as the provincial and federal averages of 1.4 GJ/m2 and 1.3 GJ/m2 respectively[55]. Business and institutional buildings use most of their energy for space heating (58%), equipment (13%) and lighting (13%)[56]. Within the Town, the largest number of people are employed in retail trade, educational services and finance and insurance (excluding manufacturing)[57]. In general, energy use in these buildings is typical of other business and institutional buildings[58].

Energy Mapping: Businesses & Institutions

Figure 16 shows the total energy use for non-residential buildings (commercial, institutional, and industrial) at the traffic zone level. The highest energy use is concentrated in traffic zones 2562, 2559, 2571, 2572 and 2560. Lands to the west of Leslie Street and north of Eric T. Smith Way (2571, 2572) represent the Town's Business Park. Lands located roughly between the GO Transit rail line, Industrial Parkway South and Bayview Avenue (2560, 2559, 2562, 2561) are comprised of industrial services, commercial and the Aurora Promenade (mixed-use downtown area).

[54] Natural Resources Canada (2017). Comprehensive Energy Use Database, Commercial/Institutional Sector - Ontario. Retrieved from https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive/trends_com_on.cfm
[55] Ibid.
[56] Ibid.
[57] Watson & Associates Economists Ltd (2019). Development Charges Background Study. Town of Aurora. Retrieved from https://www.aurora.ca/TownHall/Documents/Building%20Division/Draft%202019%20Aurora%20DC%20Background%20Study%20and%20By-Law.pdf
[58] Natural Resources Canada (2017). Comprehensive Energy Use Database, Commercial/Institutional Sector - Ontario. Retrieved from https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive/trends_com_on.cfm

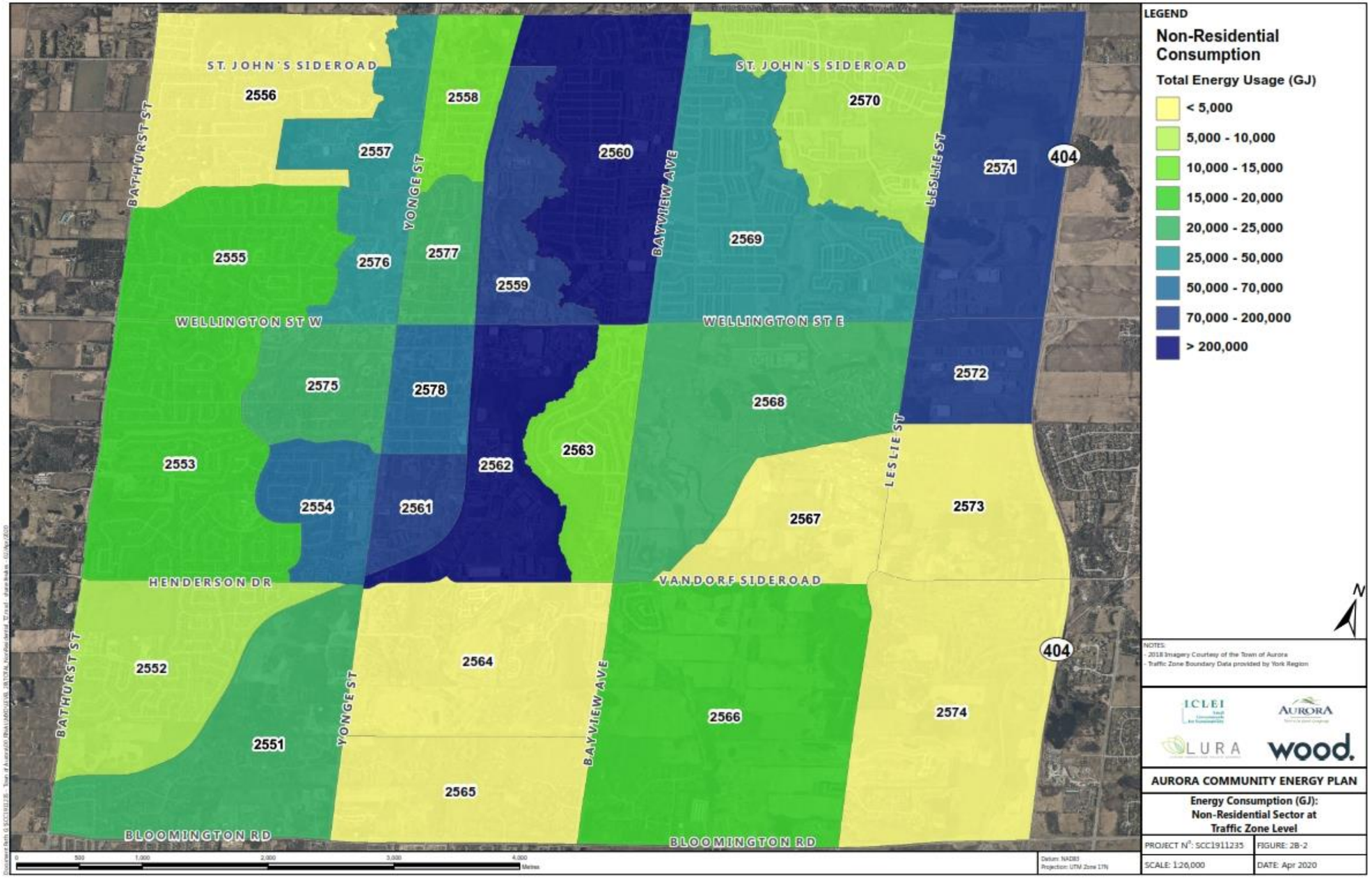

Figure 16 Map that displays total energy consumption for non-residential buildings (commercial, institutional, and industrial)

Strategy #3: Commercial New Buildings: Energy and Thermal Efficiency

Description: Design and implement a tiered code green standard that encourages higher energy efficiency in new businesses and institutional buildings.

- Consider adapting regional 'net-zero standard by 2030' building code. A local example is the Toronto Green Standard Version 3 (TGS). The TGS presents four tiers to net-zero energy and emissions in new buildings by 2030.
- Include in building step-code standards for the use of air-sourced heat pumps. Standards can include other low-carbon technologies as they become available.
- Include measures for low-carbon heating and energy systems, such as air source heat pumps.

As part of the designing the green standard:

- Consult with key stakeholders (building inspectors, developers, builders, and building trades).
- Review building permit processing for potential areas to streamline.
- Consider developing a points-based checklist for developers. The checklist should outline how they have included energy efficiency measures into new buildings. This might include efficient lighting, windows/doors, solar hot water, efficient electrical equipment, solar-ready design, electric vehicle chargers, etc.
- Determine financial or non-financial incentives to increase participation. This could include:
    - Offering expedited permitting or reduced development charges for developers.
    - Promoting existing incentive programs to encourage the adoption of high-efficiency appliances and equipment.
- Offering equity-based incentives to small businesses so that they may access efficient commercial space[59]. Following green building requirements may result in higher construction costs. Higher development prices may be passed on to consumers.

Target Participation Rate
Adopt the City of Toronto's energy efficiency building requirements from the Toronto Green Standards. Include a five-year lag, achieving net-zero buildings in 2036. The average energy use intensity, for mid-rise, office, retail and mixed-use buildings is:

- 2022: 170 kWh/m^2/year
- 2026: 129 kWh/m^2/year
- 2030: 98 kWh/m^2/year
- 2036: 70 kWh/m^2/year

Heat Pumps

- By 2030: heat pumps provide space heating to 20% of new commercial buildings.

[59] Federation of Canadian Municipalities (2020). GMF Municipal Energy Roadmap. Retrieved from: https://fcm.ca/en/resources/gmf/gmfs-municipal-energy-roadmap

- By 2050: heat pumps provide space heating to 40% of new commercial buildings.
- Equates to installing 50 heat pumps per year.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

75,000 GJ reduced per year by 2030. 145,000 GJ reduced per year by 2050.

Energy use is reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

Energy Cost

$1.4 million saved per year by 2030. $2.8 million saved per year by 2050.

Cost savings are associated with energy and thermal efficiency only and do not include heat pumps.

Emissions

3,400 tCO_2e reduced per year by 2030. 7,000 tCO_2e reduced per year by 2050.

Emissions are reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

Relative Scale of Implementation Costs
See Strategy 1

Timeframe to Implementation
Short-term to develop a green standard.

Strategy #4: Commercial Existing Buildings: Energy and Thermal Efficiency

Description: Design a voluntary deep retrofit program that offers a holistic approach to energy efficiency for businesses and institutions.

- The retrofit program should be designed to address the most common high energy uses in businesses and institutions. This includes space heating, insulation, water heating, windows, etc. The program could include solar PV/thermal, use of air source heat pumps, where appropriate.
- As identified in the residential retrofit strategy (Strategy 2), consider working with neighbouring municipalities, utilities or other key partners to co-design or deliver the program.
- In the meantime, continue to implement Ontario's Energy and Water Reporting and Benchmarking (EWRB) initiative with ClimateWise. Encourage businesses to participate through the Mayor's Energy Challenge[60].

As part of developing the detailed business plan and program design:

- Identify a lead department/team or partner to administer the program.
- Identify target areas to prioritize first. Start with existing commercial areas and business parks.

[60] Town of Aurora (2020). Mayor's Energy Challenge. Retrieved from https://www.aurora.ca/en/your-government/mayor-s-energy-challenge.aspx

- Identify financial model and funding sources for commercial retrofits loans. Funding could be from a third-party partner or the Town itself.
- Develop a financing package for commercial and institutional retrofits. This could consider using Local Improvement Charges (LIC) like the residential retrofit program. Small business owners may lack the capital, knowledge and capacity to pursue building retrofits. Consider providing monetary incentives for small businesses (or their landlords) to participate in retrofit programs[61].
- Offer energy efficiency audits as part of the program.
- Tailor the program to specific targeted building types (commercial, institutional) and different sectors (offices, retails, restaurants, etc.).

Target Participation Rate

- Approximately 3% of buildings are retrofitted each year.
- By 2030: Retrofit 45% of all commercial, institutional, and multi-unit residential buildings built before 1980. Focus on older, least efficient buildings first.
    - *The energy efficiency improves by 30% from the 2018 baseline, as older, less efficient buildings are retrofitted.*
- By 2050: 80% of the remaining buildings that existed in 2018 are retrofitted. Focus first on older, least efficient buildings.
    - *The energy efficiency improves by 20-25% from the 2018 baseline, as younger, more efficient buildings are being retrofitted and improvements are less substantial*
- The average energy efficiency improvement across all commercial retrofits is 26% from the 2018 baseline.

Heat Pumps

- By 2030: heat pumps provide space heating to 20% of retrofitted buildings.
- By 2050: heat pumps provide space heating to 40% of retrofitted buildings.
- Equates to installing 120 heat pumps per year.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

62,000 GJ reduced per year by 2030. 74,000 GJ reduced per year by 2050.

Energy use is reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

[61] Federation of Canadian Municipalities (2020). GMF Municipal Energy Roadmap. Retrieved from: https://fcm.ca/en/resources/gmf/gmfs-municipal-energy-roadmap

Energy Cost

$1.1 million saved per year by 2030. $1.4 million saved per year by 2050.

Cost savings are associated with energy and thermal efficiency only and do not include heat pumps.

Emissions

8,500 tCO_2e reduced per year by 2030. 11,500 tCO_2e reduced per year by 2050.

Emissions are reduced through more efficient buildings and heating systems. There is an increase in efficiency over standard gas furnaces and electric baseboard heating when using heat pumps.

Relative Scale of Implementation Costs
See Strategy 2

Timeframe to Implementation
Short-term to develop the retrofit program business case, design and financing model.

Strategy #5: Multi-Unit Residential, Commercial & Institutional Buildings: Commissioning & Recommissioning

Description: Develop and implement a commissioning and recommissioning program for businesses, institutions and apartment buildings.

- Recommissioning assesses a building's equipment and operating/maintenance systems. This normally occurs after it has been operating for some time. Work is then completed to optimize performance. All buildings should aim to be recommissioned every three to five years. Encourage targeted technology upgrades at the end of the lifecycle.
- Design or adopt a program that encourages recommissioning.
- Consider requiring buildings to be commissioned/recommissioned before the time of sale.
- Consider including commissioning/recommissioning into a voluntary deep retrofit program.
- Consider requiring building owners to submit a commissioning/ recommissioning plan. The plan would be submitted with building permit applications and/or during the retrofit program.

Target Participation Rate

- Assume all new buildings are commissioned and reach peak performance levels.
- Recommission roughly 5% of existing buildings each year. Reach energy savings of up to 16%.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

- 25,000 GJ reduced per year by 2030. 5,200 GJ reduced per year by 2050.

Energy Cost

- $575,000 saved per year by 2030. $160,000 saved per year by 2050.

Emissions

- 900 tCO_2e avoided per year by 2030. 170 tCO_2e avoided per year by 2050

Relative Scale of Implementation Costs

- Low

Timeframe to Implementation

- Ongoing.

Industry

Context

Aurora is home to many industrial manufacturers. Examples include Magna International, Kirchhoff Automotive, Genpak LP, Axiom Group, Bunn-O-Matic and Sinclair Technologies. Several are involved in motor vehicle part manufacturing[62]. Between 2019 and 2031, industrial buildings are projected to grow by 68%.[63]

Energy, Emissions and Costs

Industrial buildings and facilities are responsible for 13% of total energy. This represents 3% of total emissions. Industry energy use accounts for 19% and 20% of energy consumption in 2030 and 2050, respectively. This represents 7% of emissions by both 2030 and 2050. On a per-person basis, industrial energy use in Aurora (14 GJ). This is less than the averages for Ontario (52 GJ) and Canada (97 GJ)[64]. In 2018, Aurora's industrial energy costs were nearly $37.5 million.

Strategy #6: New & Existing Industrial Buildings: Energy Efficiency

Description: Facilitate energy efficiency improvements in industrial buildings

- Encourage the use of energy management systems to support energy savings. This includes promoting and leveraging existing programs and funding streams. Examples of energy management systems include:
  - **ENERGY STAR**: provides an approach to develop energy management programs. ENERGY STAR uses energy best practices and benchmarking tools.
  - **ISO 50001**: an internationally recognized standard. ISO 50001 provides a framework to implement energy management systems. It also provides a framework for continuous energy improvements for industry.
- **Superior Energy Performance**: builds on the ISO 50001 standard. Requires improvement targets and third-party confirmation of results.
- Encourage the adoption of combined heat and power systems at larger facilities. Promote and leverage existing capacity-building programs and funding streams.
- Support knowledge exchange and capacity building through existing best practice networks for industry.

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[62] Invest in Aurora (2020). Town of Aurora. Retrieved from https://investinaurora.ca
[63] Watson & Associates Economists Ltd (2019). Development Charges Background Study. Town of Aurora. Retrieved from https://www.aurora.ca/TownHall/Documents/Building%20Division/Draft%202019%20Aurora%20DC%20Background%20Study%20and%20By-Law.pdf
[64] Natural Resources Canada (2017). Comprehensive Energy Use Database, Industrial Sector - Ontario. Retrieved from https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive/trends_agg_on.cfm

Target Participation Rate

- Annual improvement of 3% in energy efficiency across all industries in Aurora. This is a direct result of energy management systems.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

185,000 GJ reduced per year by 2030. 600,000 GJ is reduced per year by 2050.

Energy Cost

$7.9 million saved per year by 2030. $27.4 million saved per year by 2050.

Emissions

2600 tCO2e avoided per year by 2030. 9200 tCO2e avoided per year by 2050***.***

Relative Scale of Implementation Costs
Low

Timeframe to Implementation
Ongoing, beginning in the medium-term.

District Energy

Context

District energy systems (DES) use pipes to supply heating, cooling and/or power to multiple connected buildings. Buildings that produce excess energy ("anchor tenants") can redistribute this energy to nearby buildings. The use of a DES can lead to increased efficiencies and reliability. At the same time operating costs and emissions are decreased. This is particularly true if a low-carbon (i.e. electricity) or renewable fuel is used[65].

The City of Markham has two DES within its borders. These are owned and operated by Markham District Energy - a City-owned utility. The first DES services seven million square feet of building space within Markham's downtown core. The second services one million square feet surrounding the Markham Stouffville Hospital (as the anchor tenant)[66]. A district geothermal system is being proposed for a 300-home development in Markham[67]. According to Markham District Energy, the City's efficient DES avoided the use of over 6.2 million cubic metres of natural gas in 2017. This is the same as the amount of natural gas used by 2,500 homes in Markham[68]. At present, no district energy infrastructure exists in the Town.

Strategy #7: District Energy System

Description: Conduct a feasibility study for implementing a low-carbon fuel district energy system (DES).

- Both new and existing developments should be explored.
- Investigate Aurora's Industrial Parkway area as a potential DES retrofit location.
- In general, a DES is more favourable in areas with:
- High development and heating needs.
- A stable and reliable energy demand.
- A mix of building types. This includes anchor client(s) which provide a consistent energy demand.

The feasibility of district energy is improved by:

- The favourable financial return on investment to the project owner.
- Favourable cost-saving opportunity to end clients.
- Policy support to actively encourage DES development and uptake.

As part of the feasibility study:

- Review zoning regulations to encourage density and energy requirements favourable to DES.

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[65] Natural Resources Canada (2003). Community Energy Systems. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/canmetenergy/files/pubs/Community%2BEnergy%2BSystems.pdf
[66] Markham District Energy (2020). Markham District Energy Facts. Retrieved from https://www.markhamdistrictenergy.com/
[67] Lee-Shanok, P. (2018). Markham community will use geothermal in all its homes, but some critics aren't hot on it. CBC News. Retrieved from https://www.cbc.ca/news/canada/toronto/geothermal-community-planned-in-markham-first-of-kind-in-canada-1.4909905
[68] Markham District Energy (2020). Markham District Energy Facts. Retrieved from https://www.markhamdistrictenergy.com/

- Consider mandating DES-readiness for buildings in new developments.
- Examine the feasibility of including DES in future affordable housing developments with Housing York.

Target Participation Rate

- **Greenfield developments:** 10% of the residential sector ground floor area (GFA). 50% of the non-residential sector GFA by 2050.
- **Existing developments:** 25% of non-residential sector GFA and multi-residential buildings by 2050.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

91,000 GJ annual reduction from completion to 2050 (includes new builds)

Emissions

4,600 tCO_2e avoided per year from completion to 2050.

Relative Scale of Implementation Costs
High

Timeframe to Implementation
Short-term to conduct a feasibility study.

Since the global outbreak of COVID-19, travel patterns have changed. Travel patterns have changed to accommodate for social distancing and in response to work-from-home directives. As municipalities re-open, it will be important to ensure safe public travel. This may include “rebalancing streets” to accommodate more space for active travel alongside cars. Providing additional space for these modes of travel will support Aurora’s emission targets. These forms of transportation also benefit the health and wellbeing of residents.

Public transit has been impacted by the global pandemic. A report on public transit in Toronto showed that 25% of participants who used transit switched to single-occupancy vehicles. Another 8% switched to active travel. Based on the different stages of re-opening, only 5% of respondents said they would return to transit during stage 1. That number increased to 63% for stage 3. The current situation provides a unique chance for the Town of Aurora to invest in active travel infrastructure sooner. Municipalities across the country are doing this by increasing their cycling networks.

References:

FCM (2020). COVID-19 Street Rebalancing Guide. Retrieved from: https://fcm.ca/en/resources/covid-19-street-rebalancing-guide

CBC News (2020). Public transit will be critical to Toronto's COVID-19 recovery, but will it be safe for riders? Retrieved from: https://www.cbc.ca/news/canada/toronto/toronto-transit-recovery-covid19-1.5578487

The Globe and Mail (2020). Coronavirus is reshaping the way we get around cities. Retrieved from: https://www.theglobeandmail.com/drive/mobility/article-coronavirus-is-reshaping-the-way-we-get-around-cities/

Travel

Context

Most trips made by residents of Aurora were completed in a car. Of all trips in 2016, 72% were made as a driver and 15% as a passenger. Local transit and GO Transit accounted for 3% each of the total trips. Walking and cycling accounted for 5% of overall trips[69]. Of Aurora's 18,900 households in 2016, more than two-thirds had two or more vehicles. The average household made six trips per day[70]. It is estimated that, by 2021, there will be over 58,000 daily inter-regional trips between Aurora (and Newmarket). The majority of these will be to Richmond Hill, Markham, and Vaughan[71]. High demand for internal trips (within Aurora) is projected, presenting an opportunity for transit growth[72]. There is an opportunity to explore sustainable travel options. This means shifting away from single occupancy, gasoline-powered vehicles.

In 2020, Town staff presented findings from the Transportation Master Plan (TMP)[73]. The TMP recommends developing policies and programs to encourage non-automobile travel within and surrounding the Town. The TMP recommends operational improvements to traffic signal timing, parking, and sidewalks. The TMP recommends a separate Town-wide Active Transportation Master Plan be developed. This is subject to funding in the 2021 capital budget process. Finally, the TMP recommends implementing the recommendations proposed within the 2011 Trails Master Plan[74]. Recommendations include new facilities, trail alignments, grade-separated trail crossings and new linkages.

Using active modes of travel (such as cycling, walking or rolling) promotes physical activity, improved air quality and mental health. In 2013, Aurora was the first York Region municipality to introduce a School Travel Planning Policy. The policy encourages students to choose active travel methods[75]. Aurora is home to 62 kilometres of multi-purpose trails, which connect local parks, Town facilities and green space[76].

[69] Malatest (2018). Transportation Tomorrow Survey 2016: Regional Municipality of York. http://dmg.utoronto.ca/transportation-tomorrow-survey/tts-reports
[70] Ibid.
[71] York Region Transit (2016). Moving to 2020: YRT/VIVA 2016-2020 Strategic Plan. Retrieved from https://www.yrt.ca/en/about-us/resources/YRT_5YSP_2016-2020-web.pdf
[72] Ibid.
[73] Town of Aurora 2020. General Committee Report No. PDS20-015: Master Transportation Study Update Final Report. Retrieved from https://aurora.primegov.com/meeting/attachment/2021.pdf?name=Item%20R3-PDS20-015-Master%20Transportation%20Study%20Update%20Final%20Report
[74] Town of Aurora (2011). Trails Master Plan. Retrieved from https://www.aurora.ca/en/home-and-property/resources/Images/Waste-and-Recycling/Parks-and-Trails/trails-master-plan-november-2011---january-16-2012-compressed.pdf
[75] Town of Aurora (2020). School Travel Planning. Retrieved from https://www.aurora.ca/en/town-services/school-travel-planning.aspx#What-is-School-Travel-Planning-STP-
[76] Town of Aurora (2020). Trail System. Retrieved from https://www.aurora.ca/en/recreation-arts-and-culture/trail-system.aspx#Respecting-Nature

Aurora is serviced by York Region Transit (YRT/Viva) and GO Transit. There are proposed plans for the Aurora GO Station to provide two-way, all-day service[77]. Regional rapid transit is expected to connect Aurora to other York Region Municipalities to the north and south in the future. In 2019, On-Request Transit Service was implemented in Aurora as a pilot. Within the pilot, passengers can receive direct service between their home address and the Aurora GO Station and/or select locations within the service area[7879]. Mobility-On-Request is available for paratransit riders.

Electric vehicles allow drivers to maintain the convenience of a personal vehicle. At the same time, emissions are reduced. The Bank of Canada predicted that 3.5% of vehicles will be electric by the year 2030. This number could be higher with increased charging infrastructure and improved battery capacity[80]. The Town currently provides two publicly accessible electric vehicle (EV) charging stations. Drivers can charge their vehicles free of charge at the Town Hall and Aurora Community Centre[81]. Funding has been secured from the Federal Government under its Zero Emission Vehicle Infrastructure Program. Under the program, the Town plans to install additional charging stations for the public to use (fees applicable), located at Town facilities.

Energy, Emissions and Costs

The transportation sector is responsible for 26% of the total energy consumed in the community. This represents 37% of total emissions. Personal vehicle use is responsible for 99% of all transportation energy and emissions. The transportation sector is projected to account for 22% of energy and 31% of emissions by 2030. In 2050, this accounts for 27% of energy and 36% of emissions. In 2018, the average person in Aurora consumed 29 GJ of gasoline and diesel, spent $1,070 on transportation fuel.

[77] York Region Transit (2016). Moving to 2020: YRT/VIVA 2016-2020 Strategic Plan. Retrieved from https://www.yrt.ca/en/about-us/resources/YRT_5YSP_2016-2020-web.pdf
[78] York Region Transit (2020). Mobility On-Request. Retrieved from https://www.yrt.ca/en/our-services/mobility-on-request.aspx
[79] York Region Transit (2019). 2020 Transit Initiatives. Retrieved from https://view.publitas.com/york-region-transportation-services/2020-transit-initiatives/page/106
[80] Latulippe, E, Mo, K. (2019). Outlook for Electric Vehicles and Implications for the Oil Market. Bank of Canada. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2019/06/san2019-19.pdf
[81] Town of Aurora (2020). Electric Vehicle Charging Stations. Retrieved from https://www.aurora.ca/en/your-government/climate-change.aspx#Electric-vehicle-charging-stations

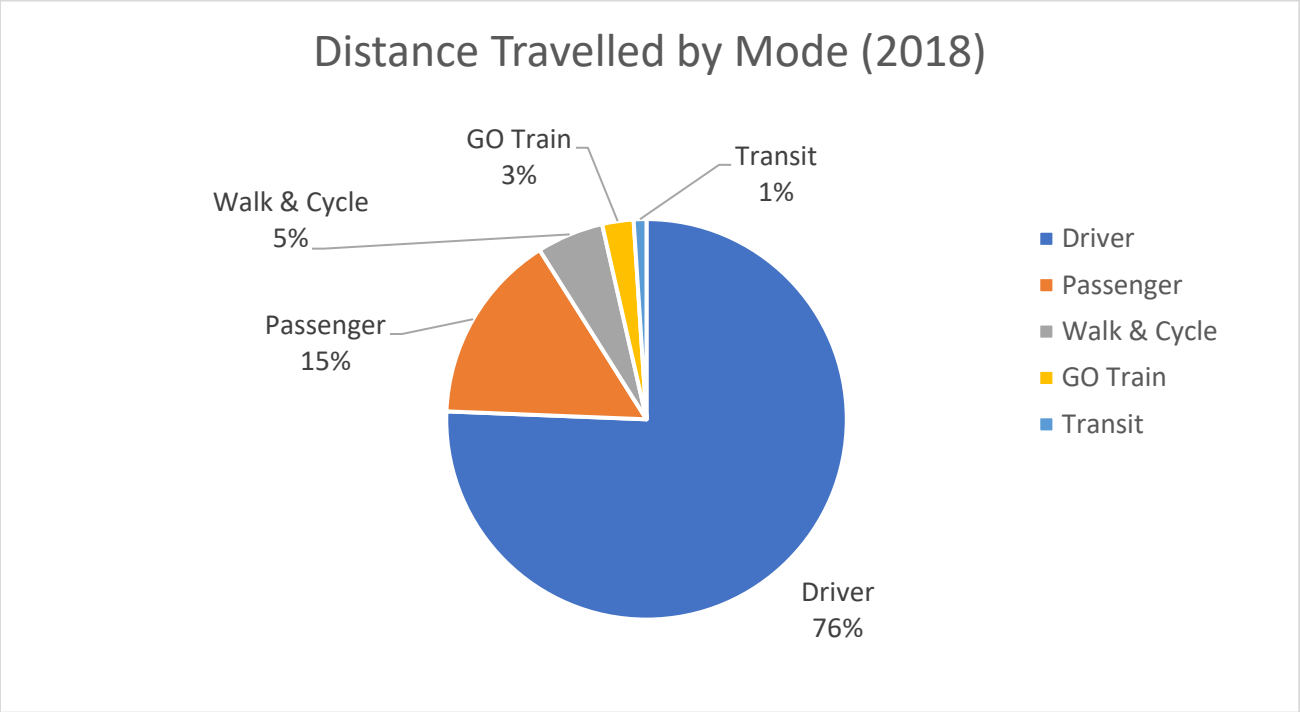


Figure 17: Transportation mode share in 2018 based on data from the Transportation of Tomorrow Survey.

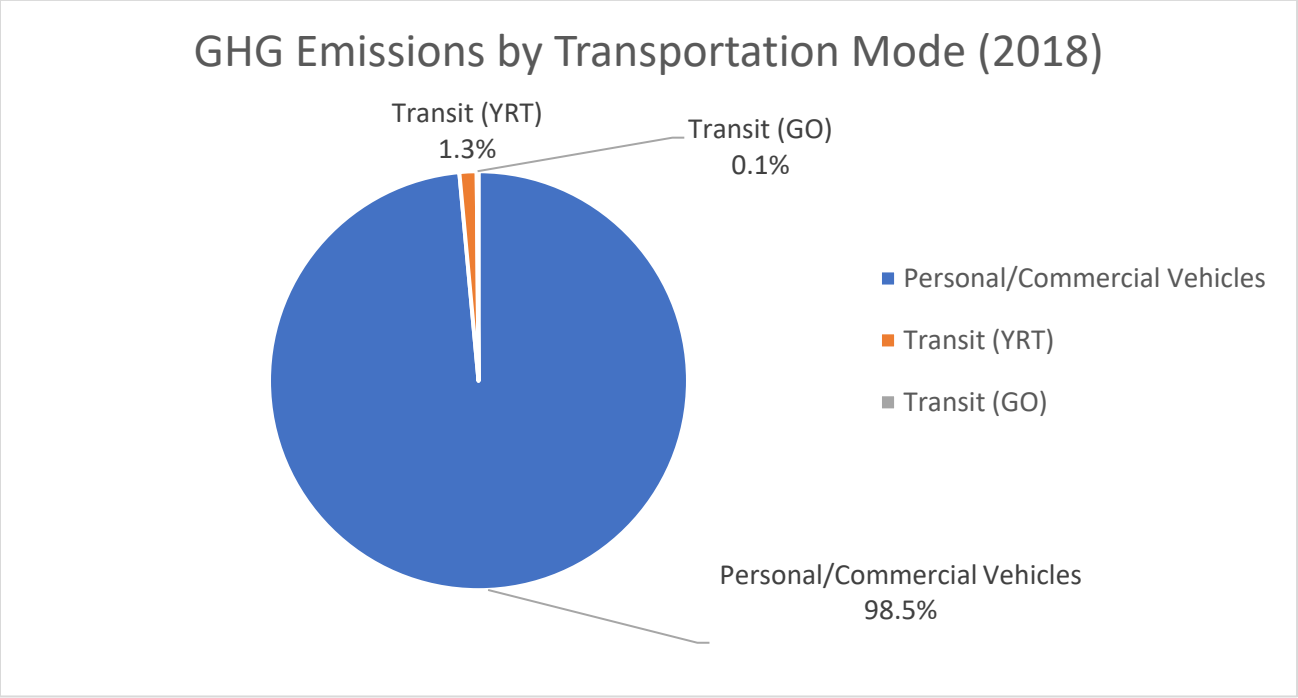


Figure 18: Share of greenhouse gas emissions by transportation mode in 2018 based on data from the Transportation of Tomorrow Survey

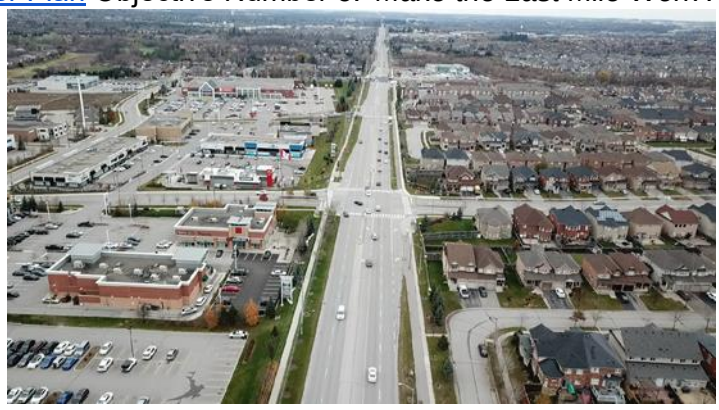
Strategy #8: Transportation: Mode Shift

Description: Encourage a shift from traditional vehicles to active travel (cycling, walking, rolling)

- Continue to implement Travel Demand Management policies and programs that are outlined in the Town's Transportation Master Plan 2020 Update. Such programs encourage non-automobile travel to and from key destinations within and surrounding the Town.
    - Implement the Sidewalk Priority Plan. The Plan outlines the best practices design guidelines identified for bike lanes and cycling infrastructure.
    - Develop an Active Transportation Master Plan, as recommended in the TMP Update.
    - Implement the recommendations of the 2011 Trails Master Plan.
    - Implement operational improvements beginning with high collision intersections.
    - Identify and address any challenges in implementing the recommended policies and programs outlined in the TMP 2020 Update.
    - Sustainable travel options should work for all members of the community. Transportation planning should account for the benefits and costs (e.g. road casualties, air quality) associated with decisions. From an equity lens, it is important to consider who gains benefits and who bears these costs[82]. Include diverse voices and perspectives in transportation planning initiatives to address financial and physical mobility barriers within the Town.

'First and Last Mile'

- Design and implement program(s) to encourage the convenient integration of alternative modes of transportation with Go Transit and YRT/Viva routes and infrastructure.
    - Support initiatives undertaken by Metrolinx outlined in the Go Rail Station Access Plan. Encourage Go Transit riders to walk, use transit, ride a bicycle, or carpool to Go Stations.
    - Support and promote programs in place with YRT such as the Bike n' Ride Program. Encourage the integration of cycling and transit in one trip.
    - Encourage YRT to promote carpooling and ride-sharing alongside their existing programs.
- Expand on the Mobility On-Request Aurora micro transit pilot project. Add additional service areas and service during off-peak hours.
- Align with York Region's Transportation Master Plan Objective Number 5: '*Make the Last Mile Work*'.
- Work with partner organizations and York Region to explore the feasibility of implementing a bike-share program. Such a program would connect commuters to transit hubs and urban centres.



Carpooling and ride-sharing

- Work with major employers to promote or incentivize alternative forms of travel among employees. This could include active travel, carpooling, telecommuting, work-from-

[82]Federation of Canadian Municipalities (2020). GMF Municipal Energy Roadmap. Retrieved from: https://fcm.ca/en/resources/gmf/gmfs-municipal-energy-roadmap

home, and compressed workweeks (e.g. through preferred parking spaces, secure bicycle parking, etc.).
- Promote existing ride-sharing programs, such as smartcommute.ca (for commuting to work and school).
- Investigate the feasibility of a local car-share program as an alternative to vehicle ownership.

Public Transit

- Work with York Region to design and implement a program(s) to encourage public transit ridership.
- Encourage and work with York Region to continue to enhance and expand public transit services.
- Create a working group to develop innovative solutions to increase ridership on public transit and/or active travel. Such a group should include diverse representation from the community.
- Leverage the forthcoming Active Transportation Master Plan to promote cycling to transit:
    - Connect cycling routes with bus stops.
    - Install bicycle racks at GO stations and public transit stops.
    - Advocate York Region to install bicycle racks on all buses.
    - Explore the potential for a community bicycle repair and re-use centre.
- Implement a "Slow Street" pilot, which prioritizes walking and cycling on select neighbourhood streets.

Target Participation Rate

- By 2030: 7% of distance travelled by on-road vehicles (from 2018 baseline) are replaced with other modes. Other modes include active travel, carpooling, and public and GO transit.
- By 2050: 15% of distance travelled by on-road vehicles (from 2018 baseline) are replaced with other modes.

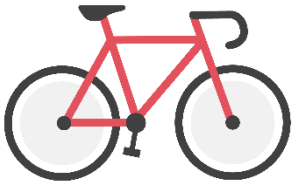
Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

114,000 GJ reduced per year by 2030. 115,000 GJ reduced per year by 2050.

Energy Cost

$3.5 million saved per year by 2030. $5.5 million saved per year by 2050.



Emissions

7,200 tCO_2e avoided per year by 2030. 1,600 tCO_2e avoided per year by 2050.

Relative Scale of Implementation Costs
Low

Timeframe to Implementation
Ongoing, beginning in the short-term.

Strategy #9: Transportation: EV Adoption

Description: Develop and implement a plan to become an electric vehicle-ready Town and support low-carbon travel.

- Provide adequate EV Charging Infrastructure to become an EV-ready municipality:

    - Expand charging infrastructure for public use at the Town's facilities and municipal parking lots. Prioritize Level 2 fast-charging stations.
    - Require all new residential and non-residential buildings to be EV-ready. This includes parking stalls equipped with proper outlets to support vehicle charging.
    - Consider financial incentives (e.g. reduced development charges) and/or non-financial incentives (e.g. expedited permitting).
    - Encourage property owners and managers to install charging stations on their property. This could serve both public use (e.g. at shopping centres and other public areas), as well as for private use (e.g. employee parking).
    - Continue to advocate for additional charging stations on major roadways and highways.
- Promote existing incentives, rebates, cost comparison tools, maps of charging stations, and other EV initiatives to citizens and businesses.

Target Participation Rate

- By 2030: 18% of vehicles are powered by electricity. This applies across all classes (cars, trucks, buses) and types (personal, commercial).
- By 2050: 99% of vehicles are powered by electricity, across all classes and types.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Use

130,000 GJ reduced per year by 2030. 1.2 million GJ reduced per year by 2050.

Energy Cost

$2.2 million saved per year by 2030. $19.0 million saved per year by 2050.

Emissions

13,000 tCO_2e avoided per year by 2030. 113,000 tCO_2e avoided per year by 2050.

Relative Scale of Implementation Costs
Medium

Timeframe to Implementation
Ongoing, beginning in the medium-term.

Waste

Overview

The Town manages residential waste through curbside collection. This includes garbage, recyclables (blue bin), organics (green bin) and yard waste. Waste is then delivered to Regional facilities[83]. Working with the Region, the Town of Aurora provides many programs and services to encourage waste reduction and diversion. Waste reduction involves producing less garbage that ultimately needs to be disposed of. Waste

[83] York Region (2020). The York Region Waste Management Master Plan. Retrieved from https://www.york.ca/wps/wcm/connect/yorkpublic/6f3f1734-1d45-4322-8903-ca7354a2db50/The+York+Region+Waste+Management+Master+Plan+2020.pdf?MOD=AJPERES&CVID=n50.7-p

diversion involves the reuse, composting, or recycling of materials that would typically be sent to a landfill. Waste diversion is often measured using a diversion rate. The higher the diversion rate, the more waste is recycled.

Local programs include E-Waste Collection Days, Curbside Giveaway Days, a Textile Recycling Program, and a Community Garage Sale[84]. At the Provincial level, changes are being proposed to municipal recycling programs to reduce the amount of waste sent to landfills (i.e. to increase diversion rates). Changes are also meant to encourage producers to consider product/package recycling in design. Traditionally, blue box programs are operated by Stewardship Ontario and overseen by local municipalities. Stewardship Ontario collects fees from "stewards" (brand owners, importers, franchisors) of packaging that ends up in the blue box. These fees are then used by the municipality to provide local recycling programs[85]. Under this model, responsibility is shared between the stewards and the municipality. As of 2025, the management of the blue box recycling program will be the sole responsibility of plastic and packaging producers [86].

When municipal waste (garbage that cannot be reused, recycled, or composted) is disposed of, it is traditionally sent to landfills. As this waste decomposes, methane is produced - a greenhouse gas 25 times more potent than carbon dioxide[87]. York Region sends most of the collected waste to energy-from-waste facilities, such as the Durham York Energy Centre (DYEC) in Clarington. The DYEC generates enough electricity to power 10,000 homes and reduces the volume of garbage sent to landfills by up to 90%[88].

Emissions

The waste sector includes emissions from solid waste, composted waste, and wastewater that is generated within Aurora. Waste emissions account for 9% of emissions in 2018. This equals 0.5 tonnes of GHGs per capita. Landfilled solid waste is responsible for 2% of total emissions. The majority of the 9% is attributed to wastewater emissions. Landfilled waste accounts for 3% of emissions by 2030 by 2050[89].

In 2018, residents and businesses produced 18,059 tonnes of waste, or 0.3 tonnes of waste per person, 34% of which was sent to landfill or energy-from-waste facilities and 39% of which was composted (source-separated organics and yard waste). The remainder largely went to blue box recycling. This generated 6,978 tonnes of emissions from landfilled waste and 1,341 tonnes from composting.

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[84] Town of Aurora (2020). Garbage, Recycling and Composting. Retrieved from https://www.aurora.ca/en/town-services/garbage-recycling-and-composting.aspx#Yard-Waste
[85] Stewardship Ontario (2020). About Us. Retrieved from https://stewardshipontario.ca/about-us/
[86] Government of Ontario (2019). Producer responsibility for Ontario's waste diversion programs. Retrieved from https://www.ontario.ca/page/producer-responsibility-ontarios-waste-diversion-programs
[87] Government of Canada (2017). Municipal solid waste and greenhouse gases. Retrieved from https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/municipal-solid/greenhouse-gases.html
[88] Durham York Energy Centre (2020). Frequently Asked Questions. Retrieved from https://www.durhamyorkwaste.ca/FAQ/FAQ.aspx#howmuchenergy
[89] Standard practice in developing a GHG baseline includes emissions from the disposal of waste, rather than the energy used in that waste disposal. As a result, energy values for waste are not included in the energy use and expenditures

Note: Wastewater treatment falls under the jurisdiction of York Region, and therefore has not been included below.

Strategy #10: Waste: Diversion & Reduction

Description: Implement programs to reduce waste generation by residents and businesses and to increase waste diversion from landfills

- Continue to implement existing measures to divert waste from landfills, such as E-Waste Collection Days, Curbside Giveaway Days, a Textile Recycling Program, and a Community Garage Sale.
- Continue to implement existing measures that reduce the generation of solid waste from citizens and businesses.
- Advocate for York Region to improve landfill gas capture, and the generation of renewable natural gas from waste streams.
- Explore options to improve industrial, commercial and institutional waste collection.

Target Participation Rate

- **By 2030:** Reduce garbage generation by 5% (in line with York Region's 2031 target). Divert 80% of all solid waste from landfills.
- **By 2050:** Reduce per capita waste generation by 10%. Divert 90% of all solid waste from landfills.

Energy Use, Energy Cost, and GHG Emission Reduction Potential
N/A

Emissions

- 4,500 tCO_2e avoided per year by 2030. 8,200 tCO_2e avoided per year by 2050.

Relative Scale of Implementation Costs

- N/A - Cost is covered by existing staff capacity or operating budgets.

Timeframe to Implementation

- Ongoing, beginning in the medium-term.

Renewable Energy Supply

Context

Renewable power is a cleaner way to power our economy. Renewable energy can be generated from the sun (solar PV), wind, water (hydroelectric), the earth (geothermal), and plants (biomass). In 2018, about 35% of Ontario's electricity was generated through renewable sources[90]. Ontario is home to 98% of Canada's solar PV capacity. This is largely due to the former Feed-in Tariff (FIT) incentive program[91].

Currently, the Town has four rooftop solar installations at Town facilities. Solar PV (panels) are located at the Public Library, Town Hall, Joint Operations Centre and Stronach Aurora Recreation Complex. Between 2014

[90] Ontario Energy Board (2019). Ontario's System-Wide Electricity Supply Mix: 2018 Data. Retrieved from https://www.oeb.ca/sites/default/files/2018-supply-mix-data-update.pdf
[91] Canada Energy Regulator (2019). Canada's Adoption of Renewable Power Sources – Energy Market Analysis. Retrieved from https://www.cer-rec.gc.ca/nrg/sttstc/lctrct/rprt/2017cnddptnrnwblpwr/slr-eng.html

and 2018, these sites generated over 1.5 million kilowatt-hours of electricity. The Public Library and Town Hall produce electricity, which is fed back into the grid, rather than being used on-site. This is part of the FIT program[92]. In recent years, Ontario has transitioned away from the FIT program to a "net metering" program (as in the Joint Operations Centre). Under this program, excess electricity generated from renewable sources helps to offset energy costs[93]. The roof of Stronach Aurora Recreation Complex, and related energy generation, is leased out to a third-party.

The transition to renewables can be further supported through energy storage. Ontario's Independent Electricity System Operator (IESO) has been working to integrate energy storage into Ontario's energy system. As part of the pilot program, 4 megawatts (MW) of storage capacity has been installed in Newmarket[94]. Through energy storage systems, excess electricity can be stored for use during times of high demand. This can increase the reliability of the local energy supply[95]. This is particularly beneficial, as renewable generation tends to be intermittent (i.e. produced when it is sunny or windy) and may not align with energy demand. Increased storage capacity allows communities to use renewable energy "as needed", in place of higher cost or higher emission energy sources. Due to energy losses from using batteries and the added emissions from battery manufacturing, this strategy would have to be well planned to support low-carbon energy sources.

Energy & Emissions

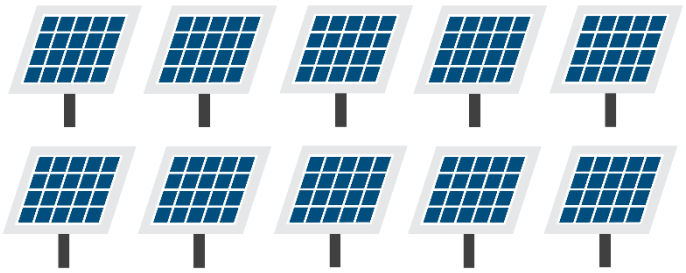
In comparison to fossil fuels, renewable energy has a much lower impact on the environment. Most renewable energy generation does not emit pollutants or GHG emissions[96]. Renewable energy generation has upstream (e.g. emissions produced during construction) and downstream (e.g. recycling and disposal at end-of-life) impacts[97]. These impacts are not within the scope of the plan. Despite these impacts, renewable generation in Canada is generally considered favourable[98].

[92] Town of Aurora (2019). Energy Conservation and Demand Management Plan Update 2019-2023. Retrieved from https://www.aurora.ca/en/your-government/resources/Environment-and-Sustainability/Aurora_ECDM_Plan_2019-2023_FINAL_with_Appendices.pdf
[93] Alectra Utilities (2020). Connecting Generation. Retrieved from https://alectrautilities.com/connecting-generation
[94] Newmarket Today (2019). Biggest battery energy storage facility in GTA now live in Newmarket. Retrieved from https://www.newmarkettoday.ca/local-news/biggest-battery-energy-storage-facility-in-gta-now-live-in-newmarket-1712059
[95] http://www.ieso.ca/en/Sector-Participants/Energy-Procurement-Programs-and-Contracts/Energy-Storage
[96] Canada Energy Regulator (2019). Canada's Adoption of Renewable Power Sources – Energy Market Analysis. Retrieved from https://www.cer-rec.gc.ca/nrg/sttstc/lctrct/rprt/2017cnddptnrnwblpwr/slr-eng.html
[97] Ibid.
[98] Ibid.

Strategy #11: Renewables: Solar Power[99]

Description: Develop a plan to increase the adoption of solar energy (rooftop solar PV systems, solar thermal systems, ground-mounted arrays).

- Promote existing incentive programs to expand the adoption of solar systems.
- Consider offering financial incentives or subsidies to expand solar adoption. Incentives could be offered either directly or in partnership with York Region and/or other partners.
- Provide additional support so that low and moderate-income households and small businesses can access renewable generation.
- Consider bundling solar systems into building retrofit programs (Strategy 2 and 4).
- Include solar-ready designs in the sustainability checklists for developers (see Strategies 1 and 3), as well as the Green Development Standards. This includes buildings that support the weight and connectivity requirements for rooftop solar so that construction costs to refurbish structures are avoided.
- Work with Housing York to examine the feasibility of including solar installations in future affordable housing developments.
- Build solar carports at municipal parking lots. Work with commercial facility owners/developers and public institutions to build solar carports. Minimize greenfield development.



Target Participation Rate

- **Ground-mounted solar:** Installation of 3 MW (7-10 acres) by 2030. Installation of 12 MW (30-40 acres) by 2050 of ground-mounted solar on municipal and private lands. Install 345 kW per year.
- **Rooftop solar, commercial/institutional** (200 kW systems, includes municipal buildings): 18% by 2030 and 50% by 2050 of new and existing commercial and institutional buildings have rooftop solar PV. Installation of 26 solar systems per year across the town (municipal and private lands).
- **Rooftop solar, industrial** (200 kW systems): 20% by 2030 and 60% by 2050 of new and existing commercial and institutional buildings have rooftop solar PV. Installation of 11 solar systems per year across the town (private lands).
- **Rooftop solar, residential** (5 kW systems): 4.6% by 2030 and 15% by 2050 of homes have rooftop solar PV. Installation of 117 solar systems per year across the town (private lands).
- **Solar thermal:** 5% by 2030 and 15% by 2050 of homes have solar thermal systems. Install 117 solar thermal panels per year.
- **Rooftop solar, multi-unit residential** (10 kW systems): 9% by 2030 and 40% by 2050 of multi-unit residential buildings have rooftop solar PV. Installation of 24 solar systems per year across the town.

[99] Note: Solar energy is recommended above other forms of renewable energy as it is more suitable for the Town's context. Though wind energy is as cost-competitive as solar, the functionality of wind energy is optimized in locations away from urban centres. Biomass energy requires either wood/wood by-products inputs or landfill gas capture which falls under York Region's operational control. Geothermal energy should be considered in the pre-feasibility/feasibility analysis undertaken with the District Energy project.

Energy Use, Energy Cost, and GHG Emission Reduction Potential

Energy Cost

$12.9 million saved per year by 2030. $47.9 million saved per year by 2050.

Solar thermal (domestic water heaters): $80,400 saved per year by 2030. $185,000 saved per year by 2050.

Rooftop solar, residential (5 kW systems): 630,000 saved per year by 2030. $2.7 million saved per year by 2050.

Rooftop solar, commercial/institutional and multi-unit residential (10-200 kW systems): $8.7 million saved per year by 2030. $31 million saved per year by 2050.

Rooftop solar, industrial (200 kW systems): $2.9 million saved per year by 2030. $11 million saved per year by 2050.

Ground-mounted solar: $450,000 million saved per year by 2030. $2.1 million saved per year by 2050.

Emissions

2,900 tCO_2e avoided per year by 2030, 11,300 tCO_2e avoided per year by 2050.

Solar thermal (water heaters): 300 tCO_2e avoided per year by 2030. 550 tCO_2e avoided per year by 2050.

Rooftop solar, residential (5-10 kW systems): 150 tCO_2e avoided per year by 2030. 700 tCO_2e avoided per year by 2050.

Rooftop solar, commercial/institutional and multi-unit residential (10-200 kW systems): 1,800 tCO_2e avoided per year by 2030. 6,900 tCO_2e avoided per year by 2050.

Rooftop solar, industrial (200 kW systems): 600 tCO_2e avoided per year by 2030. 2,500 tCO_2e per year by 2050.

Ground-mounted solar: 110 tCO_2e avoided per year by 2030. 540 tCO_2e avoided per year by 2050.

Relative Scale of Implementation Costs
High

Timeframe to Implementation
Medium-term to develop a solar adoption plan.

These strategies are also supported by land use planning that reduces GHG emissions, as well as carbon sequestration activities of our natural habitats that have not been quantified. These activities are not currently included in the GPC BASIC level reporting as measurement continues to involve.

Land Use

Context

Long-term growth and development within the Town are governed by the Official Plan (2010); the Plan is being updated in 2020. The Official Plan includes several principles, the following are the most relevant to this CEP[100].

- **Promoting Responsible Growth Management:** promoting higher density and intensification in appropriate areas
- **Building a Greener Community:** incorporating green building technologies and energy-efficient development approaches
- **Protecting Stable Neighbourhoods:** ensuring any infill is compatible with established community character
- **Developing Vibrant New Neighbourhoods:** ensuring sustainable residential neighbourhoods are developed in greenfield areas
- **Providing Sustainable Infrastructure:** supporting growth and sustainability through the provision of transportation and pedestrian networks, transit system, water and utilities

The development of Aurora's updated Official Plan will be governed by:

- **A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020):** The Growth Plan (2020) is the Ontario government's long-term plan to "promote economic growth, increase housing supply, create jobs and build communities that make life easier, healthier and more affordable for people of all ages"[101]. The Plan outlines many policies on how land is developed. Municipalities are required to incorporate these policies into their official plans. Examples include policies to reduce GHG emission (e.g. through complete communities, transit, active transportation); establish GHG inventories and reduction targets; conserve energy in existing buildings and new developments.
- **Provincial Policy Statement (PPS, 2020):** Under the *Planning Act*, the PPS provides direction on land use for municipalities. The PPS directs municipalities to "support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and preparing for the impacts of a changing climate through land use and development patterns"[102]. Examples of supportive land use and development patterns include those that: promote active transportation and transit; encourage transit-supportive development and intensification; and maximizes energy efficiency and conservation.
- **Oak Ridges Moraine Conservation Plan (2017):** The purpose of the Plan is to "provide land use and resource management planning direction… on how to protect the Moraine's ecological and hydrological features and functions"[103]. The southern and western portions of the Town fall under the Plan. Most of these lands are designated as "settlement areas", permitting urban development. Southeastern Aurora is designated as a mix of "countryside area" and "natural linkage area" with restrictions for

[100] Town of Aurora (2020). Official Plan. Retrieved from https://www.aurora.ca/en/business-and-development/official-plan.aspx#Fundamental-Principles-of-the-Plan
[101] Government of Ontario (2019). A Place to Grow: Growth plan for the Greater Golden Horseshoe. Retrieved from https://www.ontario.ca/document/place-grow-growth-plan-greater-golden-horseshoe
[102] Government of Ontario (2020). Provincial Policy Statement, 2020. Retrieved from https://www.ontario.ca/page/provincial-policy-statement-2020
[103] Government of Ontario (2017). Oak Ridges Moraine Conservation Plan. Retrieved from https://www.ontario.ca/page/oak-ridges-moraine-conservation-plan-2017

development. The Plan specifies that development in settlement areas should support complete low-carbon communities.

- **York Region Official Plan (2020):** As a lower-tier municipality, the Town of Aurora's Official Plan will need to conform with the Regional Plan (currently under review). As part of this review, the Town is working with the Region to delineate lands surrounding the Aurora GO station and the Aurora Promenade as areas for intensification and higher-density mixed-use development, as required by the Growth Plan[104]. The Regional Plan will inform the Town's planning of employment lands and environmental policies. This Plan fulfills York Region's Official Plan requirement that local municipalities develop Community Energy Plans.

Energy & Emissions

How we plan and develop our community has a long-term impact on the environment. Building compact, mixed-use communities where residents can live, work and play has several positive benefits. First, it reduces the need for trips by car and promotes active travel and transit. This reduces emissions and commuting distances. Mixed-use communities retain services and jobs within the Town. Compact and infill development reduces the environmental impacts of urban sprawl, promoting the protection of green space. Finally, mixed-use communities help eliminate the need for personal vehicle ownership in favour of lower-cost travel options. This allows residents to access recreation, services and employment with a reduced financial burden.

Policy direction at the municipal level can help advance the goals of this plan. Suggested approaches include:

- Reviewing and updating building design standards, development by-laws, and zoning. Implement supportive policies to encourage energy-efficient buildings, compact and mixed-use development.
- Conduct a review of municipal codes, policies, and legislation to identify barriers to renewable energy and DES. Develop strategies to overcome these barriers.

Carbon Sequestration & Offsets

Context

Natural spaces and the urban tree canopy have an important role in sequestering (or storing) carbon and offsetting GHG emissions locally. The plan recommends continued efforts to protect tree canopy, and green spaces, and to work with partner agencies to quantify the impacts of sequestration on the overall carbon budget for the Town.

Through carbon offsetting, emission reductions are sold to the purchaser in the form of an "offset". Offsets (measured in tonnes of CO_2e) effectively reduce the purchaser's net emissions. Examples of offset projects include landfill gas capture, destruction of methane from coal mines and manure storage facilities[105]. Within the Western Climate Initiative (active in Quebec and California) emissions reduced or avoided from these projects could be sold as carbon offsets. In 2019, the Government of Canada began developing a Federal GHG Offset

[104] Town of Aurora (2019). General Committee Report No. PDS19-098: Official Plan Review. Retrieved from https://aurora.primegov.com/meeting/attachment/1923.pdf?name=Item%20R3-PDS19-098-Town%20of%20Aurora%20OP%20Review
[105] Government of Quebec (2020). Offset Credits. Retrieved from http://www.environnement.gouv.qc.ca/changements/carbone/credits-compensatoires/index-en.htm#current-offset

System. The system aims to support the development of offset products and reduce emissions across the country[106].

Energy & Emissions

Preliminary analysis from LSRCA indicates that current landcover sequestration (forests and wetlands) within the Town of Aurora equates to a very small percentage of the community's annual emissions. Enhancing forest cover and natural heritage is important for many environmental, social and health reasons, however, it alone will not close the gap in meeting our emission reduction target.

Purchasing carbon offsets should a final option to reduce net emissions. This should only be done once all other strategies have been implemented to their fullest potential. Offsetting should be an interim step to achieving Aurora's long-term GHG reduction goals. It is important to note that most verifiable offset programs limit the amount an entity can buy to offset their emissions. As such, offsets cannot be used to make up the difference in achieving our targets.

If the Town decides to reduce net emissions via purchased offset, purchasers should seek projects that have been registered by standards. Examples include the Clean Development Mechanism or the Gold Standard. Important factors to consider include additionality (reduction beyond business-as-usual), uniqueness (to avoid double-counting), accurate quantification and verification of reductions[107].

Impacts of Action in Aurora

The graph below (Figure 19) shows the total reduction in GHG emissions to 2050 for the strategies outlined in the CEP. Each strategy is represented on the graph by a coloured stacked area. Each colour shows the total annual reduction of a specific strategy. Overall, the graph shows the contribution that each of the strategies will make to the overall reduction in emissions. This assumes that each strategy is actioned to its fullest potential, within the timelines outlined above. **The strategies outlined will reduce annual emissions in Aurora by 72,361 tonnes CO_2e in 2030 and 212,364 tonnes CO_2e in 2050. This is a 22 percent reduction of greenhouse gas emissions from 2018 level by 2030 and 65 percent reduction in emissions from 2018 levels by 2050.**

The Canadian federal emission reduction target has been added to the graph as a point of reference. The federal target stipulates a reduction of emissions from 2005 levels of 30 percent by 2030 and 80 percent by

[106] Government of Canada (2019). Carbon pollution pricing: options for a Federal Greenhouse Gas Offset System. Retrieved from https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/federal-offset-system.html
[107] Pembina Institute (2009). Purchasing Carbon Offsets. Retrieved from https://www.pembina.org/reports/offset-purchase-guide-v3.pdf

2050[108]. The emission reduction target recommended by the IPCC has also been applied to the graph. IPCC target stipulates a reduction below 2010 levels of 45 percent by 2030 and 95 percent by 2050[109].

A significant transformational effort will be required to achieve these reductions by the Town, agencies, homeowners and businesses. While the CEP strategies are significant, they do not fully reach the targets outlined above. **There remains a gap of 48,296 tCO_2e in achieving an 80% emissions reduction by 2050.** The cumulative impacts of the strategies are shown in Table 5, below. Accelerated and ambitious action across the community, as well as higher-level effort by federal and provincial governments, advances in technologies or novel approached to reduce emissions will be needed to meet the targets set out by the federal government, the Paris agreement and the Town's emergency declaration.

The CEP is on the path to a reduction of 80% from 2018 levels by 2050, acknowledging that there is a gap. Over time, the Town will look for ways to close this gap through activities such as quantification of carbon sequestration in the natural environment and evaluating emerging technologies. We have intentionally set a 30-year planning horizon, and we will continue to evaluate our progress over time and identify ways to close this gap.

Table 5 Cumulative impacts of all strategies

GHG emission reduction Strategy	Cumulative Annual Reduction (tCO_2e) in 2050	Annual Energy Cost Savings in 2050
#1: Residential New Buildings: Energy & Thermal Efficiency	20,129	$ 10,086,587
#2: Residential Existing Buildings: Energy and Thermal Efficiency	25,505	$ 4,261,852
#3: Commercial New Buildings: Energy and Thermal Efficiency	7,070	$ 2,813,411
#4: Commercial Existing Buildings: Energy and Thermal Efficiency	11,547	$ 1,436,807
#5: Multi-Unit Residential Commercial & Institutional Buildings: Commissioning & Recommissioning	171	$ 159,730
#6: New & Existing Industrial Buildings: Energy Efficiency	9,268	$ 27,404,467
#7: District Energy System	4,654	N/A
#8: Transportation: Mode Shift	1,583	$ 5,509,419
#9: Transportation: EV Adoption	112,936	$19,084,347
#10: Waste: Diversion & Reduction	8,199	N/A
#11: Renewables: Solar Power	11,301	$ 47,946,566
TOTAL	**212,363**	**$118,703,186**

[108] The Government of Canada. (2020). Progress towards Canada's greenhouse gas emissions reduction target. Retrieved from https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/progress-towards-canada-greenhouse-gas-emissions-reduction-target.html

[109] IPCC, 2018: Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. *World Meteorological Organization, Geneva, Switzerland, 32 pp.*

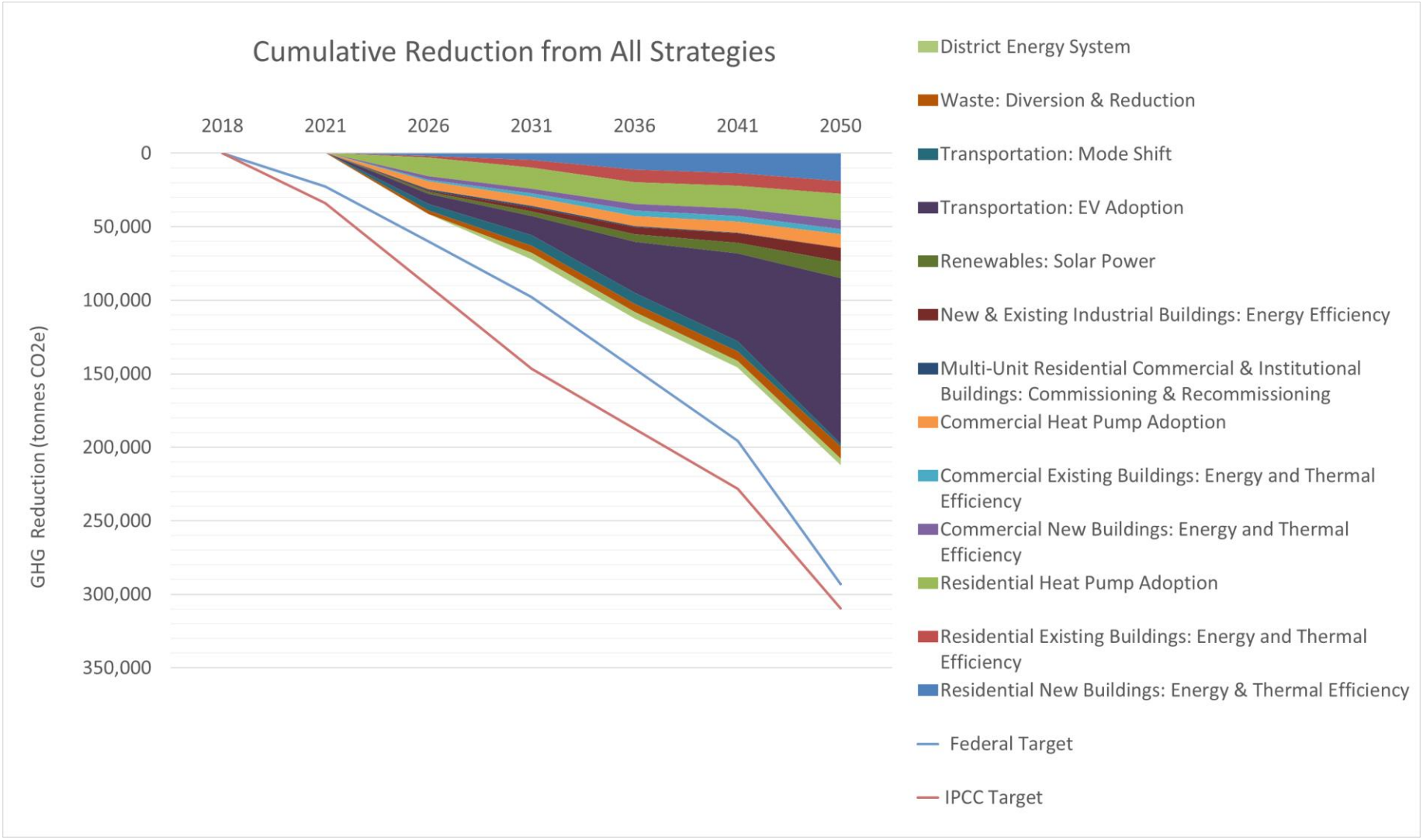


Figure 19 Cumulative annual GHG reductions from all strategies to 2050 based on internal analysis.

Implementation

This CEP is intended to guide the Town of Aurora and the wider community to reduce energy and GHG emissions. A strong focus on implementation, governance and monitoring is essential to the Plan's success. The implementation framework includes guidance for:

- Governance
- Financing
- Engagement & Communications
- Reporting & Renewal
- Enabling Components
- Potential Partners

Governance

To support and guide the implementation of the CEP, the Town of Aurora will be developing an Implementation Working Group (IWG). The Town's Energy and Climate Change Analyst will be the ultimate staff member responsible for plan implementation coordination. The Energy and Climate Change Analyst will be supported by the IWG. The IWG will be municipally led and housed within the Planning and Development Services Department. The IWG will be comprised of municipal staff from various departments, who will be responsible for overseeing the implementation of strategies related to their discipline. The IWG will meet regularly to discuss and report on implementation within their respective strategic areas. Internal and external partners will be brought into the process as needed for sector-specific implementation. A proposed governance structure is provided in Figure 20, below.

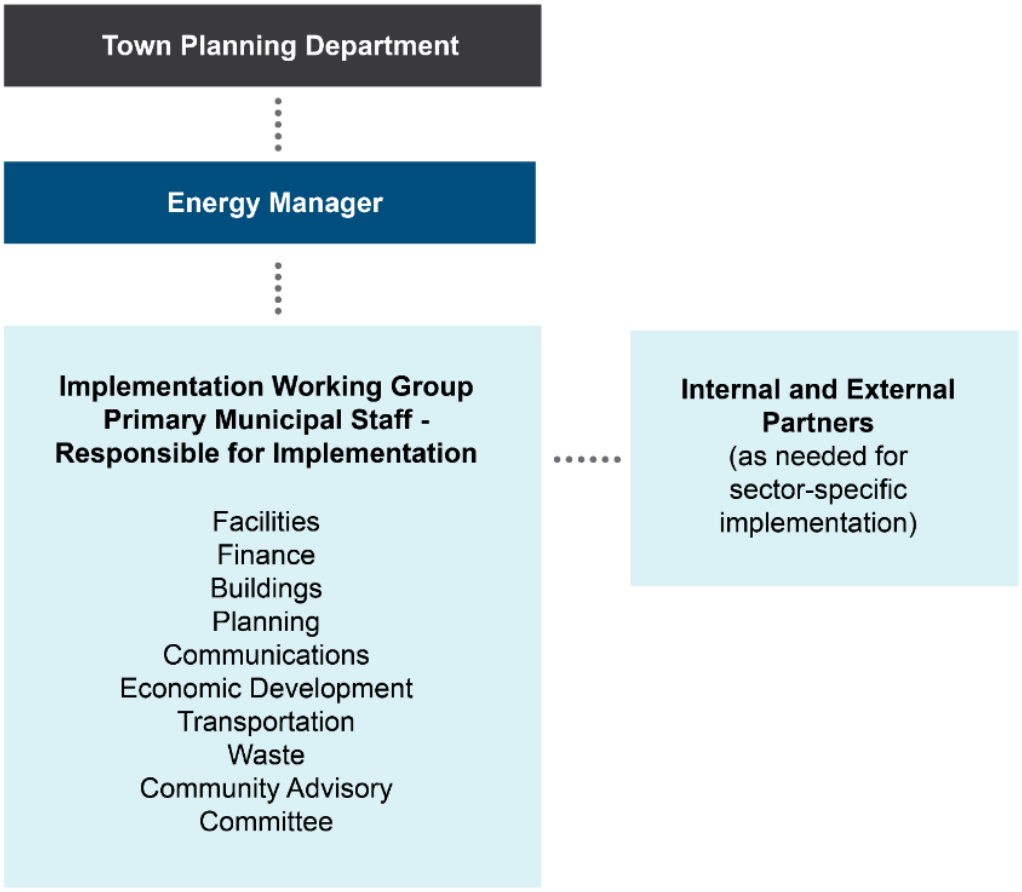


Figure 20: Implementation Working Group, proposed structure Investment Needs

It is recommended that Town staff continue to monitor key funding streams for implementation funding, directed at particular strategy areas. For example, the recently announced Community Efficiency Financing program offered through the Federation of Canadian Municipalities for residential energy projects. Potential funding opportunities may be made available as part of the federal government's COVID-19 recovery program.

Table 6 outlines the estimated costs for the Town as well as potential sources of funding associated with important next steps to spur momentum in the early implementation of the plan and the strategies identified in the CEP. Each strategy identifies a magnitude of scale cost for the full implementation of the strategy by all parties. Detailed implementation costing will be defined through a business plan and program design stages. The costs outlined below are subject to the Town's regular capital budgeting process.

Table 6: Near-term budget implications (Town action items only)

CEP Strategy #	CEP Strategy Name	Town Action Item	Action Description	Lead Town Division / Staff	Potential External Funding Opportunity	Estimated Cost
Previously Requested Capital Budget Request - Approved						
1 & 3	Residential & Commercial New Buildings: Energy & Thermal Efficiency	Research and Design a tiered code/green standard that encourages high energy efficiency.	Retain consultant for the research and design of a GDS, based on best practices.	Policy Planning & Economic Development		$50,000
					TOTAL	**$50,000**
2021 Capital Budget Request - Awaiting Approval						
8	Transportation Mode Shift	Develop an Active Transportation Master Plan for Aurora	Retain a consultant for the Plan development. Aurora's Transportation Master Plan recommends that an Active Transportation Master Plan be developed.	Engineering (Traffic Transportation Analyst)	Sustainable Neighbourhood Action Plan funding available through Green Municipal Fund.	$150,000
					TOTAL	**$150,000**
Future Capital Budget Request						
2 & 4	Residential & Commercial Existing Buildings: Energy and Thermal Efficiency	Develop a Business Case and program for the Energy Retrofit Program	Retain a consultant for the development of a business case and investment-ready design for the deep-retrofit program. Program financing structures should be determined during the design phase.	Engineering (Energy and Climate Change Analyst)	Community Retrofit Projects Study funding available through the Green Municipal Fund.	$100,000
7	District Energy System	Prepare a business case for the development of district energy in Aurora.	Retain a consultant for the development of a business plan that would identify an ownership structure, partnerships and business analysis for a District Energy System.	Engineering (Energy and Climate Change Analyst)	District Energy pilot project though Green Municipal Fund	$85,000
7	District Energy System	Develop a Pre-feasibility & Feasibility Study	Based on the outcomes of the District Energy System business case, retain a consultant for the development of a technical and economical feasibility study for a low carbon district energy system for Aurora.	Engineering (Energy and Climate Change Analyst)	District Energy study through Green Municipal Fund	$75,000-$150,000
11	Renewables: Solar Power	Develop business case for a residential and a commercial/institutional solar energy program	Retain a consultant to develop a business case and investment-ready design for residential and commercial solar program that identifies energy options, pay backs, ROI and program implementation models for Aurora.	Engineering (Energy and Climate Change Analyst)	Brownfield Renewable Energy study through Green Municipal Fund	$100,000
					TOTAL	**$360,000-$435,000**

CEP Strategy #	CEP Strategy Name	Town Action Item	Action Description	Lead Town Division / Staff	Potential External Funding Opportunity	Estimated Cost
Potential Operating Budget Implications						
9	Transportation: EV Adoption	Install EV charging infrastructure at Town Facilities for public use	Expand EV charging station at Town facilities with a user-fee system. NRCAN funding is available for small municipalities through a service agreement with the Ivy Charging Network's (owned by Ontario Power Generation and Hydro One) "Charging-as-a-service" program. Estimated costs based on a maximum of 20 stations installed, and a cost range of $1,100-$2,000 per station per year (as per initial OPG discussions). Excludes potential revenue from user fee system.	Facilities		$22,000-40,000/year
					TOTAL	**$22,000-40,000/year**
Potential Current Staff Resources Implications						
5	Multi-Unit Residential, Commercial & Institutional Buildings: Commissioning & Recommissioning	Seek external partner to lead a commissioning recommissioning program.	Identify external partner to develop and implement a commissioning and recommissioning program for commercial, institutional, and multi-residential buildings	Engineering (Energy and Climate Change Analyst)		0
6	New & Existing Industrial Buildings: Energy Efficiency	Promote Existing Programs	Promote and leverage existing programs and funding streams to encourage increases in industrial energy efficiency	Economic Development/ Communications		0
8	Transportation: Mode Shift		Work with external partners to promote and expand existing programs as well as explore new partnerships to develop novel programs such as Bike Share and Ride Share, to encourage active transportation.	Engineering (Energy and Climate Change Analyst and Traffic/Transportation Analyst)		0
10	Waste: Diversion & Reduction	Expand existing waste reduction and waste diversion programs and research opportunities for new programs	Support the expansion of existing programs and advocacy with York Region.	Waste		0
					TOTAL	**0**
Potential Additional Consulting Resources						
1 & 3	Residential & Commercial New Buildings: Energy & Thermal Efficiency	Implementation of the Green Development Standard	Based on the outcomes of the green development standard, allocate staff hours for the implementation of the GDS, such as application reviews, site visits etc.	Policy Planning & Economic Development/ Buildings		TBD

CEP Strategy #	CEP Strategy Name	Town Action Item	Action Description	Lead Town Division / Staff	Potential External Funding Opportunity	Estimated Cost
2 & 4	Residential & Commercial Existing Buildings: Energy and Thermal Efficiency	Support the research and design for the program.	Based on the outcomes of the business case and program development: there are potential administrative and promotional costs associated with the program implementation. Implementation could be executed via partners or third-party agencies.	Policy Planning & Economic Development / Engineering / Buildings		TBD
					TOTAL	**TBD**

TOTAL CEP Implications (including previously approved requests and potential future requests):

Operating Costs	$22,000-40,000/year
Capital Project Costs	$560,000-$635,000
Consulting Resources Costs	TBD

Enabling Components

A series of enabling components have been identified for each strategy (Appendix 2). These activities, while not quantifiable, support the successful implementation of each strategy. Enabling components include:

- **Advocacy** - To encourage higher levels of government to implement funding, programs and policies that support the goals and objectives of this CEP.
- **Capacity Building** - To ensure that there is local expertise to support green building construction and retrofits.
- **Education and Awareness** - To lead by example, demonstrating why and how the general public can support the goals of this plan.
- **Enabling Technologies** - To ensure that renewable energy sources and/or DES are compatible with the local energy system.
- **Energy Benchmarking** - To encourage building managers and operators to implement standardized energy benchmarking programs.
- **Energy Labelling** - To help occupants and building owners understand the relative energy efficiency of a building.
- **Integration with Other Programs** - To build on the momentum that exists within Aurora and prevent the duplication of efforts.
- **Policy Framework and Tools** - To enshrine the goals of the CEP in existing Town policies.
- **Planning for Accessibility and Equity** - To ensure that all members of the community benefit from the CEP.
- **Training and Guidance** - To ensure that residents, businesses and industry can meaningfully participate in the implementation of the CEP.

Engagement and Communications

Ongoing engagement and communications relating to the CEP and key actions and successes will be conducted through the Town's Corporate Communications Division. Specific campaigns will be required as specific actions and programs are implemented. For example, the development of a home retrofit program would require additional consultation and promotions.

Potential Partners

The CEP is a community plan and will require the support of partners across the Town. Appendix 3 identifies a list of potential partners by strategy. Town Divisions have been identified to lead each of the strategies, as per the governance structure outlined above. A key next step for the Town will be to confirm partnerships to ensure that implementation moves forward. It should be noted that respective roles will need to be confirmed with each potential partner before implementation.

Partners can help support plan implementation through:

- Sharing best practices, resources and expertise.
- Building support for implementation within their sectors and amongst the public.
- Providing funding support for the implementation of strategies.
- Aligning the strategies identified with their organization's mandates, priorities and targets.
- Assisting with the implementation, monitoring and reporting of strategies.
- Participating in the Implementation Working Group, as needed.

The implementation of the CEP will require assistance from a wide range of stakeholders. This includes:

- **Local energy utilities & IESO** - To provide expertise, support and funding opportunities for new and existing buildings, renewable energy and DES and ensure alignment with broader energy system planning.
- **Conservation authorities** - To provide expertise and support in the quantification of carbon sequestration efforts and promote the protection of Aurora's natural heritage.
- **Business and industry organizations** - To educate their members/employees on the benefits of energy conservation.
- **Developers and builders** - To provide the expertise and capacity to build and retrofit energy-efficient buildings.
- **Schools and institutions** - To educate members of the public – particularly youth – on the benefits of energy conservation, leading by example.
- **Transportation agencies** - To support an integrated, multi-modal transportation system in Aurora.
- **York Region** - To support the goals of the CEP, particularly around waste and transit.
- **Other levels of government** - To implement policies, programs and funding that support the goals of the CEP.

Reporting & Renewal

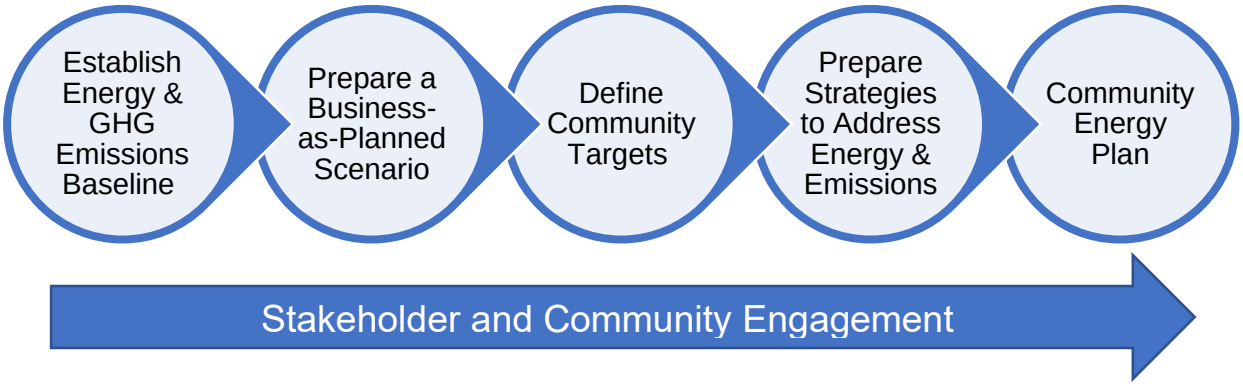
On an annual basis, the Town's Energy and Climate Change Analyst will produce a progress report on key actions and successes. This qualitative report will be presented to Town Council and shared publicly.

Plan renewal, including updating the baseline, should occur every five (5) years. To align with the Town's Energy Conservation and Demand Management Plan, the next baseline year should be 2023.

Appendix 1: Developing the Plan

Developing the Plan

This Plan was developed following the Ministry of Energy's Municipal Energy Plan (MEP) Program Guidelines[110]. The development of the CEP began in 2019 and has followed a step-by-step process. The approach follows the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) BASIC level of reporting, considered the international best-in-class approach for quantifying emissions at the local level[111].



The first step was creating an energy and emissions baseline. Energy use in homes, businesses, industries and travel in the Town was reviewed to create a baseline for 2018. The "baseline" estimates the total amount of energy used and emissions produced within the community in a given year. 2018 was selected as the baseline year, as it is the most recent year with a complete dataset. Natural gas consumption data for the inventory year was provided by Enbridge Gas Distribution with data separated by residential, apartment and commercial, and industrial rate classes. For residential customers, the price of natural gas was sourced from the Ontario Energy Board and for non-residential prices from Union Gas, a subsidiary of Enbridge. Electricity consumption for 2018 was provided by Alectra Utilities Corporation and was separated by residential, commercial, industrial, and unmetered rate classes. The price of electricity was provided by Alectra Utilities and an average price across the year was utilized to estimate the total cost for 2018. Consumption data for other fuels were not available and so had to be modelled for the Town of Aurora, this was calculated based on the per capita consumption for Ontario.

The GHG inventory includes carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), the three most common greenhouse gases. The report converted methane and nitrous oxide to carbon dioxide equivalents to compare and analyze the global warming potential (GWP) from sources emitting these gases. The conversion factors for GWP were sourced from the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report. Conversion of energy sources and fuel types to greenhouse gas intensity were calculated using

[110] Municipal Energy Plan Program (2019). Ministry of Energy, Northern Development and Mines. Retrieved from: https://www.ontario.ca/page/municipal-energy-plan-program#section-0

[111] World Resources Institute, C40 Cities, ICLE. Global Protocol for Community-Scale Greenhouse Gas Emission Inventories https://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf

emission factors from Environment and Climate Change Canada's *National Inventory Report: 1990-2017*, the most recent federal report on Canadian emissions.

Energy consumption for private vehicle use was calculated based on the fuel sales method as outlined in the GPC Protocol. Data was provided for the inventory year by Kent Group Ltd for gasoline and diesel. Based on the provincial requirements, gasoline was assumed to have 5% ethanol content and diesel 4% biodiesel content. The fuel sales were apportioned to the type of vehicle based on the National Inventory Report "Trends in Vehicle Populations" as well as the Natural Resources Comprehensive Energy Use Database. The emission factors based on fuel type and technology were then used to calculated emissions for private vehicle use.

The energy analysis allowed the project team to identify ways to reduce energy use. Energy mapping was also completed to determine how energy use and emissions was distributed across the Town. Maps were produced for: home energy use and GHG emissions, and energy consumption for commercial, institutional and industrial buildings.

Next, a Business-as Planned (BAP) Scenario was developed. The BAP tells us what Aurora's energy use and GHG emissions will be like if we do not take any action at the local level. The BAP was modelled based on population and employment projections from York Region's 2041 Preferred Growth Scenario. After the BAP was developed, the project team began to set a GHG emissions reduction target. Through discussions with a Stakeholder Working Group – comprised of individuals from local utilities, businesses, residents and Town staff - an aspirational target was set to define a path towards 80% emissions reductions by 2050.

Using the aspirational target as a guide, a series of strategies were developed. The SWG helped to refine and tailor the strategies to best suit the Aurora context. They provided advice and guidance on all components of the plan. In addition to significant input from SWG members, Town staff and Council have provided their insight and expertise to help shape the CEP.

Energy Mapping

The analysis used different approaches for residential and non-residential maps.

For the creation of the residential maps, electricity and natural gas data were sorted based on where it was used using postal code information[112]. Data within each postal code was summed. Totals were converted to present energy consumption (in gigajoules, GJ) and emissions (in tonnes of carbon dioxide equivalent, CO_2e). Next, data was rolled up to "Energy Planning Districts", summing the data within the corresponding postal codes. Energy Planning Districts were identified within the Town, based on existing traffic zones using in planning.

A different approach was used to create the non-residential maps. A different approach was required due to the nature of the available data. All businesses in Aurora were assigned energy consumption values based on their size (building footprint) and business type.

Community Engagement

The public has been engaged throughout the plan's development. In the summer of 2019, the public was invited to share what was important to them about energy and emissions at the Aurora farmer's market.

[112] In order to protect privacy, only the first 5 digits of postal codes were used.

Appendix 1: Developing the Plan

In the summer of 2020, an online survey was available through the Town's engagement website, which invited residents to tell us their priorities for action on climate change and energy efficiency.

Finally, members of the public were invited to participate in a "virtual open house" during the fall of 2020. This self-guided experience included a slide show, pre-recorded presentation and opportunities for feedback. Participants were asked their opinion of the proposed strategies and suggestions to support the implementation of the CEP. At each touchpoint, feedback from the public was reviewed by the project team and considered within the plan as appropriate.

Appendix 2: Enabling Components

Enabling Component	Description	Town	External partners	1: Residential New Buildings: Energy & Thermal Efficiency	2: Residential Existing Buildings: Energy and Thermal Efficiency	3: Commercial New Buildings: Energy and Thermal Efficiency	4: Commercial Existing Buildings: Energy and Thermal Efficiency	5: Multi-Unit Residential, Commercial & Institutional Buildings: Commissioning & Recommissioning	6: New and Existing Industrial Buildings: Energy Efficiency	7: District Energy System	8: Transportation: Mode Shift	9: Transportation: EV Adoption	10: Waste: Diversion & Reduction	11: Renewables: Solar Power
Advocacy	Advocate for provincial and federal governments to offer funding, programs, and policies that support and advance smart energy solutions (i.e.: deep energy retrofits)	X	X		X		X							
Advocacy	Work with utilities and the province to provide an affordable model for public EV charging stations. Encourage the provincial government to offer a rebate program for EVs and charging stations.	X	X									X		
Capacity Building	Connect builders and contractors with capacity building programs, such as NRCan's LEEP (Local Energy Efficiency Partnerships) program. LEEP facilitates workshops and forums where builders share in-depth expertise. Topics include the technical aspects of technologies, costs, and regionally applicability of innovative energy efficiency technologies.		X	X										
Education and Awareness	Use municipally-owned solar panels to educate the public.	X												
Education and Awareness	Encourage the use of existing programs offered through utilities.	X		X	X	X	X	X		X				
Education and Awareness	Increase consumer awareness of heat pump technology, which has been identified as a gap in uptake.	X		X	X									
Education and Awareness	Direct building owners to existing resources, which guide commissioning and recommissioning. Resources also include benefits and "how-to's". Encourage the use of existing programs offered through utilities.	X						X						
Education and Awareness	Promote and leverage existing capacity-building programs and funding streams.		X						X					

Appendix 2: Enabling Components

Enabling Component	Description	Town	External partners	1: Residential New Buildings: Energy & Thermal Efficiency	2: Residential Existing Buildings: Energy and Thermal Efficiency	3: Commercial New Buildings: Energy and Thermal Efficiency	4: Commercial Existing Buildings: Energy and Thermal Efficiency	5: Multi-Unit Residential, Commercial & Institutional Buildings: Commissioning & Recommissioning	6: New and Existing Industrial Buildings: Energy Efficiency	7: District Energy System	8: Transportation: Mode Shift	9: Transportation: EV Adoption	10: Waste: Diversion & Reduction	11: Renewables: Solar Power
Education and Awareness	Educate residents on sustainable travel options and benefits. Educate residents about sharing the road and respecting all modes of travel. Leverage existing resources such as those from Share the Road and The Centre for Active Transportation.	X									X			
Education and Awareness	Continue to provide guidance and resources to citizens, businesses and landlords/building operators to properly sort and divert waste (e.g. “Recycle Coach,” “Green Bin Usage Tips”, “Aurora’s Recycling Tips”, and others). Continue behaviour change campaigns, to encourage waste reduction and reuse. Educate on the importance of avoiding waste, rather than just recycling.	X	X									X		
Education and Awareness	Work with local groups to support education and awareness about waste reduction. Raising awareness might include information on the benefits of EVs, how to access rebates, and technical information related to batteries and charging. Events offering test drives and showcasing EV owners are popular.	X										X		
Enabling Technologies	Work with local utilities and IESO to ensure the integration of technology.	X	X							X – of DES.				X- microgrids and other technologies required for distributed energy sources.

Appendix 2: Enabling Components

Enabling Component	Description	Town	External partners	1: Residential New Buildings: Energy & Thermal Efficiency	2: Residential Existing Buildings: Energy and Thermal Efficiency	3: Commercial New Buildings: Energy and Thermal Efficiency	4: Commercial Existing Buildings: Energy and Thermal Efficiency	5: Multi-Unit Residential, Commercial & Institutional Buildings: Commissioning & Recommissioning	6: New and Existing Industrial Buildings: Energy Efficiency	7: District Energy System	8: Transportation: Mode Shift	9: Transportation: EV Adoption	10: Waste: Diversion & Reduction	11: Renewables: Solar Power
Energy Benchmarking	Encourage building managers and operators to use energy benchmarking programs. One example is the ENERGY STAR Portfolio Manager offered through Natural Resources Canada.		X			X	X	X						
Energy Labelling	Encourage the adoption of a performance labelling program (i.e.: NRCan EnerGuide Rating System). Energy labelling helps occupants and building owners understand the relative energy efficiency of the building before agreeing to buy or rent the property.	X		X	X	X	X							
Integration with other programs	Continuous to monitor utilities and government programs to integrate into CEP strategy design and implementation.	X		X	X	X	X	X	X	X	X	X	X	X
Policy framework and tools	Review and update building design standards, development by-laws, and zoning.	X		Based on the GDS to promote efficient new construction	As part of the business plan to facilitate retrofits.									
Policy framework and tools	Conduct a review of municipal codes, policies, and legislation to identify barriers. Develop strategies to overcome these barriers.	X								X – related to DE adoption				X - related to renewable energy adoption

Appendix 2: Enabling Components

Enabling Component	Description	Town	External partners	1: Residential New Buildings: Energy & Thermal Efficiency	2: Residential Existing Buildings: Energy and Thermal Efficiency	3: Commercial New Buildings: Energy and Thermal Efficiency	4: Commercial Existing Buildings: Energy and Thermal Efficiency	5: Multi-Unit Residential, Commercial & Institutional Buildings: Commissioning & Recommissioning	6: New and Existing Industrial Buildings: Energy Efficiency	7: District Energy System	8: Transportation: Mode Shift	9: Transportation: EV Adoption	10: Waste: Diversion & Reduction	11: Renewables: Solar Power
Planning for Accessibility & Equity	Sustainable travel options should work for all members of the community. Transportation planning should account for the benefits and costs (e.g. road casualties, air quality) associated with decisions. From an equity lens, it is important to consider who gains benefits and who bears these costs. Include diverse voices and perspectives in transportation planning initiatives to address financial and physical mobility barriers within the Town.	X									X			
Training and Guidance	Provide guidance, resources and programs for builders, developers, inspectors, and contractors to increase capacity for energy-efficient development or for trades and sub-trades (e.g. inspectors) to increase capacity for energy-efficient retrofits.		X	X	X	X				X				
Training and Guidance	Provide programs and resources to homeowners and building owners/developers on the benefits of solar. Benefits include low maintenance, prolonged roof life, the effect on property value, cost savings, etc. Connect homeowners/building owners with financing options and solar leasing companies.		X											
Training and Guidance	Build the capacity of the local industry to reduce energy use.		X						X					

Appendix 2: Enabling Components

Enabling Component	Description	Town	External partners	1: Residential New Buildings: Energy & Thermal Efficiency	2: Residential Existing Buildings: Energy and Thermal Efficiency	3: Commercial New Buildings: Energy and Thermal Efficiency	4: Commercial Existing Buildings: Energy and Thermal Efficiency	5: Multi-Unit Residential, Commercial & Institutional Buildings: Commissioning & Recommissioning	6: New and Existing Industrial Buildings: Energy Efficiency	7: District Energy System	8: Transportation: Mode Shift	9: Transportation: EV Adoption	10: Waste: Diversion & Reduction	11: Renewables: Solar Power
Training and Guidance	Promote existing industry funding and programs including but not limited to: • Natural Resource Canada's ecoENERGY Efficiency for Industry program • Natural Resource Canada's Dollars to $ense workshops • Ontario's SaveONEnergy Programs • IESO's Industrial Accelerator Program • Enbridge's Industrial Energy Solutions • The Canadian Industry Program for Energy Conservation (CIPEC)	X	X						X					

Appendix 3: Potential Partners

Potential Partner	1: Residential New Buildings: Energy & Thermal Efficiency	2: Residential Existing Buildings: Energy and Thermal Efficiency	3: Commercial New Buildings: Energy and Thermal Efficiency	4: Commercial Existing Buildings: Energy and Thermal Efficiency	5: Multi-Unit Residential, Commercial & Institutional Buildings:	6: New and Existing Industrial Buildings: Energy Efficiency	7: District Energy System	8: Transportation: Mode Shift	9: Transportation: EV Adoption	10: Waste: Diversion & Reduction	11: Renewables: Solar Power	12. Land Use	13. Carbon Sequestration & Offsets
Town of Aurora Planning and Development Division	L	P	P	P	P	P	P				P	P	
Town of Aurora Engineering Division	P	L	L	L	L	L	L	L			L		P
Town of Aurora Facilities Division									L		P		
Town of Aurora Parks Division											P	P	P
Town of Aurora Waste Division										L			
Town of Aurora Communications Division	P	P	P	P	P	P	P	P	P	P	P	P	P
Alectra	P	P	P	P			P		P		P		
Building Owners and Managers Association (BOMA)					P	P							
Canadian Industry Program for Energy Conservation (CIPEC)						P							
Car share providers								P					
Chamber of Commerce			P	P	P	P	P			P			
Clean Air Council	P												
Contractor & Builders	P	P											
Developers	P		P				P						
Economic Development Corporation			P	P	P	P	P			P			
Enbridge Gas	P	P	P	P	P	P	P						
Enwave							P						
Housing York									P		P		
IESO		P		P	P	P	P		P		P		
Industry associations					P	P							
Institutional sector			P			P				P			
Lake Simcoe Region Conservation Authority													P
Local School Boards			P	P				P		P			
Major employers						P	P						
Metrolinx								P					
Natural Resources Canada						P							

Appendix 3: Potential Partners

Potential Partner	1: Residential New Buildings: Energy & Thermal Efficiency	2: Residential Existing Buildings: Energy and Thermal Efficiency	3: Commercial New Buildings: Energy and Thermal Efficiency	4: Commercial Existing Buildings: Energy and Thermal Efficiency	5: Multi-Unit Residential, Commercial & Institutional Buildings:	6: New and Existing Industrial Buildings: Energy Efficiency	7: District Energy System	8: Transportation: Mode Shift	9: Transportation: EV Adoption	10: Waste: Diversion & Reduction	11: Renewables: Solar Power	12. Land Use	13. Carbon Sequestration & Offsets
New entity (retrofits)		L - potentially based on the business plan		L - potentially based on the business plan									
Ontario Home Builders Association	P		P			P							
Ontario Waste Management Association										P			
Plug'n Drive									P				
Property owners & building managers					P								
Province of Ontario						P						P	
Real estate industry	P	P	P	P	P	P							
Recycling Council of Ontario										P			
Resource Productivity and Recovery Authority										P			
SmartCommute Central York								P					
Town of Newmarket		P											
Toronto Region Conservation Authority		P							P				P
Windfall Ecology Centre		P		P	L	L						P	
York Region	P	P	P	P		P		P	P	L			
York Region Transit								P					

L= Lead Organization

P= Potential Partner