

## CHAPTER 5

# Brampton's Community Energy & Emissions Reduction Plan

## Securing Our Future

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### KEY TAKEAWAYS

- Community Energy Planning is an evidence-based approach to understanding where and how energy is used and emissions released in a community to identify local opportunities and priorities for increasing energy efficiency, reducing GHG emissions, and lowering energy costs.
- The CEERP Framework is endorsed and recommended by the Community Task Force.
- The CEERP Energy Goal is to reduce community-wide energy end use by at least 50% from 2016 levels by 2041.
- The CEERP Emissions Goal is to reduce community-wide emissions by 50% from 2016 levels by 2041, and to establish a pathway to reduce emissions by at least 80% in 2050 to meet or exceed federal and provincial targets.
- The CEERP Economic Goal is to retain at least \$26 billion in cumulative energy costs within the community by 2041.
- Twenty-four objectives organized around seven strategic directions are identified that, if realized, will lead to the successful achievement of the three CEERP Goals.
- Six priority projects were identified as critical projects for the next five years.
- Each sector of the community (i.e. municipal governments, utilities, industry, businesses, institutions, development, community organizations, and residents) have a role to play in the successful implementation of the CEERP.
- To ensure that the CEERP does not “sit on a shelf” and implementation of the 2020-2025 priority projects are achieved and sustained, dedicated resources are needed to coordinate, oversee, and report on overall progress. These resources range from political, regional, municipal, and community stakeholders to individuals.
- A full glossary of terms is available at the beginning of this report. Some of the key terms used in this chapter include: Latest Energy Transition, and Carbon Neutrality.



## 5.0 Community Energy and Emissions Reduction Plan

Community energy planning is an evidence-based approach for understanding where and how energy is used and emissions released in a community to identify local opportunities and priorities for increasing energy efficiency, reducing GHG emissions, and lowering energy costs.

The CEERP is driven by the following energy and data realities and context:

- an urgent response to climate change is needed now (Chapter 1);
- a global energy transition is currently underway (Chapter 2);
- major energy transitions have happened before, resulting in vast societal improvements (Chapter 2);
- there are significant economic and social opportunities in the modern energy transition (Chapter 3);
- community energy planning helps take advantage of opportunities during this energy transition and mitigate present and future risks (Chapter 3);
- there are multiple benefits to robust community energy planning and climate mitigation actions (Chapters 1-3);
- currently, Brampton's largest GHG emitter, energy user, and community cost is transportation, followed by the residential, industrial, commercial, and institutional sectors (Chapter 4);
- in the Base Case (i.e. if no coordinated action is taken), it is estimated that Brampton's emissions will continue to be twice that of global best practice, energy use will increase by almost 30%, and energy costs will increase more than 200% by 2041 (Chapter 4); and
- it will take the combined effort of all community sectors in Brampton to successfully undertake this energy transition and mitigate climate risks (Chapters 1-5).

An energy and emissions reduction strategy allows Brampton to address the above, and create a roadmap to achieve a clean, sustainable, and resilient energy future.

The Plan was developed for Brampton based on:

- knowledge of Brampton’s Baseline and Base Case;
- an understanding of Brampton’s population and employment growth;
- community engagement;
- the results of simulations employing several efficiency measures (refer to the 2019 Analytical Report for more details);
- global best practice, and
- an assessment of local opportunities.

The Community Task Force was instrumental in the development of the Plan, and endorsed the final framework. As part of the development of the CEERP, the Community Task Force:

1. met monthly over a course of eight months;
2. identified key opportunities in the city;
3. shaped and vetted the CEERP framework;
4. communicated to their respective communities about the CEERP and provided input from them;
5. reviewed and provided input in the actions; and
6. reviewed and endorsed the final CEERP document.

Successful implementation of the Plan will require all parts of Brampton to undertake dozens of activities aligned with the priority projects. The primary aim of the CEERP is to shape Brampton’s energy future by creating the right conditions for public and private sector community action.

Activities required to support the implementation of the Priority Projects are in the Action Plan (see Section 5.7).

Energy and climate policies are changing rapidly, as governments respond to international pressure to reduce GHG emissions. Therefore, the market will continue to innovate, and more cost-effective technologies will emerge to accelerate the uptake of low-carbon local energy supply and distribution technologies designed for rapidly urbanizing communities like Brampton. Therefore, the strategy should be reviewed and updated, as appropriate, every five years. The Community Task Force developed and endorsed the following framework.



**Brampton's energy future is  
clean, sustainable, resilient,  
and supports the  
Brampton 2040 Vision.**



## 5.1 Vision

The CEERP is driven by the following vision statement:

Brampton's energy future is clean, sustainable, resilient, and supports the Brampton 2040 Vision.

## 5.2 Guiding Principles

Guiding principles are a set of core values that guide decision-making. They ensure decisions are made in a responsible and sustainable manner that do not deviate from the long-term vision of the CEERP. They direct the formation of goals, objectives, and targets and help prioritize actions. Guiding principles should be followed in every step of the Plan and its implementation and be a lens through which all decisions are made.

A sustainable community energy system balances opportunities to benefit the economic, social, and environmental future of Brampton. The following principles were used to develop the CEERP goals and will be used to guide the implementation of the Community Energy and Emissions Reduction Plan.

### *Environmental*

- Work towards climate neutrality.

### *Energy*

- Benchmark energy performance against global best practices.

### *Economic*

- All energy-related public and private sector investments will meet acceptable risk-adjusted returns.
- Energy costs will be competitive compared to comparable North American communities.
- Local employment will be generated.

### *Reliability*

- Energy systems will be designed to meet the challenges of changing user expectations, climate uncertainty, and new technology options.

## 5.3 Goals

The CEERP will shape Brampton's energy future by creating the right conditions for public and private sector community action. Three goals were established based on the assessment of local energy and emissions data (where Brampton is today) relative to global best practice (where Brampton could be). The Community Task Force chose realistic goals over aspirational goals, recognizing that the Plan will need to be updated regularly to adapt to changes in climate policy, energy policy, and global best practice. The CEERP goals are based on:

### *Energy*

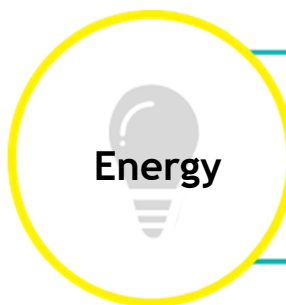
Energy is a vital component of our society. Its use has and continues to shape our communities, providing us many benefits but also current and future challenges. Through energy efficiency programs, consumers will realize substantial energy savings. These energy efficiency programs will identify opportunities for savings in the entire energy system, from supply, through distribution, and to end use. Rather than going to upstream energy suppliers, these energy dollars will remain in the community benefiting local consumers, improving housing affordability, and creating jobs.

Improving our energy efficiency can also increase energy security and improve our quality of life through more comfortable homes and buildings, cleaner air and more options and access to an active and connected lifestyle.

As we move through this energy transition, reducing energy use through energy efficiency will mitigate the risks and disadvantages while improving the opportunities and benefits for the local community.

### *Emissions*

As we move into the future, our energy needs will only increase. However, GHG emissions have become a dangerous byproduct of our energy needs. One of the driving forces of the global energy transition is the need to reduce and transition away from energy sources that produce GHG emissions. Reducing Brampton's GHG emissions not only ensures that Brampton is doing its part in the fight against climate change, it also ensures we are keeping up with the current opportunities, expectations, and needs of local and global economies.



Based on global best-practices, reduce community-wide energy end use by at least 50% from 2016 levels by 2041.



Reduce community-wide emissions by 50% from 2016 levels by 2041, and establish a pathway to reduce emissions by at least 80% by 2050 to meet or exceed federal and provincial targets.



Retain at least \$26 billion in cumulative energy costs within the community by 2041.

In Brampton, transportation and the residential sector account for the majority of emissions (60% and 21% respectively). The City of Brampton, in collaboration with the Region of Peel, has the ability to align policies and programs to plan, design, and develop green communities and encourage the adoption of low carbon transportation. This would help to achieve the objectives of reducing the average trip length and increasing the number of trips taken by walking, cycling, and transit, which will reduce GHG emissions emitted through transportation. Reducing emissions from the built environment will require retrofitting homes and buildings and consideration toward how local supply and distribution can improve the efficiency of neighbourhoods.

By working to meet the emission reduction goal of 50%, a pathway towards reducing emissions by at least 80% by 2050 is also being established. As new breakthroughs in technologies, policies, and tools arise, an 80% reduction within the next several decades will become more achievable. Regular updates of the CEERP will provide opportunities to continue to highlight policies, procedures, and initiatives that can reach a more aspiring goal. The actions outlined in the CEERP should be considered a minimum. When opportunities arise, additional and more ambitious actions should be pursued to stay true to the first CEERP principle of working towards climate neutrality.

### ***Economy***

Economic health has strong ties to community health and quality of life. This modern energy transition provides opportunities to improve both economic health and quality of life within Brampton. Incorporating an economic goal ensures that Brampton fully makes use of all the economic benefits available, and also creates further opportunities that will lead the city to an economically robust future.

The economic goal is based on implementation beginning in 2020 and on a more conservative low-price range of projected energy cost increases (see the 2019 Analytical Report for more detail). Should energy costs rise more quickly, the potential return to the community would be greater. Given the unpredictability of energy costs, this goal should be reviewed every five years and adjusted, if necessary, to reflect actual costs and more current forecasts.



## What is Meant by Net-zero Emissions?

Attaining net-zero emissions means achieving a balance between GHG emissions released and GHG emissions removed from the atmosphere<sup>1</sup>. Human-caused emissions, like those from vehicles that run on fossil fuels, are reduced as close to zero as possible, and any remaining emissions are balanced with an equivalent amount of GHG emission removal, for example, by restoring forests or by carbon capture technologies.

### Challenges with Net-zero

Of the UN's 195 member nations, 67 have a net-zero emissions ambition in place. Of these countries, only 16 have developed roadmaps and intermediate targets, and only seven have instituted policy frameworks that could realistically support reaching the net-zero emissions goal.<sup>2</sup>

Nordic countries have been among the few to take truly decisive steps to achieve net-zero GHG emissions, which have been supported by favourable public opinion and social contexts.

Challenges associated with net-zero include<sup>3</sup>:

- demand for energy continues to increase due to population growth, and much of this demand is being met by high emission producing methods;
- growth in emissions-intensive industry sectors is projected to continue, such as cement (30% increase by 2040) and steel (10-15% increase by 2040). These sectors have few low-carbon alternatives, and those that exist are costly;
- transportation sectors are growing considerably, for example, freight demand is expected to triple by 2050, while aviation demand will likely double;
- consensus/cooperation among governments;
- resistance to undertake change in behavior; and
- required investment in Research & Development for low carbon technology.

The Community Task Force considered setting net-zero emissions as a goal in the CEERP. It was felt that at this time, a realistic roadmap could not be simulated to achieve this target. However, consensus was reached to include a goal to "reduce community-wide emissions by 50% in 2040 and to establish a pathway to reduce emissions by at least 80% in 2050 to meet or exceed federal and provincial targets." It is expected that as new opportunities appear, and new technologies become more widely available, this CEERP will evolve to support net-zero emissions. While the CEERP is not a net-zero plan, it does set targets that will contribute to the global climate change goals committed to by the Canadian federal government. Dealing with climate change will ultimately require net-zero GHG emissions over the course of this century, and Canada will need to transform all economic sectors, especially patterns of energy production and consumption, and make improvements to the way people live, work, play, and consume.<sup>4</sup>



## 5.4 Strategic Directions

The Strategic Directions are informed by the CEERP vision, principles, and goals and help structure the objectives, targets, and actions. They reflect Brampton's urban and energy transition, as well as the Brampton 2040 Vision. The seven strategic directions of the CEERP are:

### 5.4.1 Green Communities

Communities make up 60% of energy consumption and over half of all GHGs in Canada. The shape, structure, and form of a community greatly influences how and when energy is used. A green community focuses on improving the quality of life for residents and enabling more sustainable living through the application of environmentally-friendly strategies in every way feasible. Green communities incorporate features such as buildings constructed and insulated with recycled and/or biodegradable materials, transit-oriented development, mixed-use design, more housing choice, design that promotes active-living, circular economies, community gardens, and composting. They also provide general attention to using earth-friendly materials, products, and energy efficient appliances.

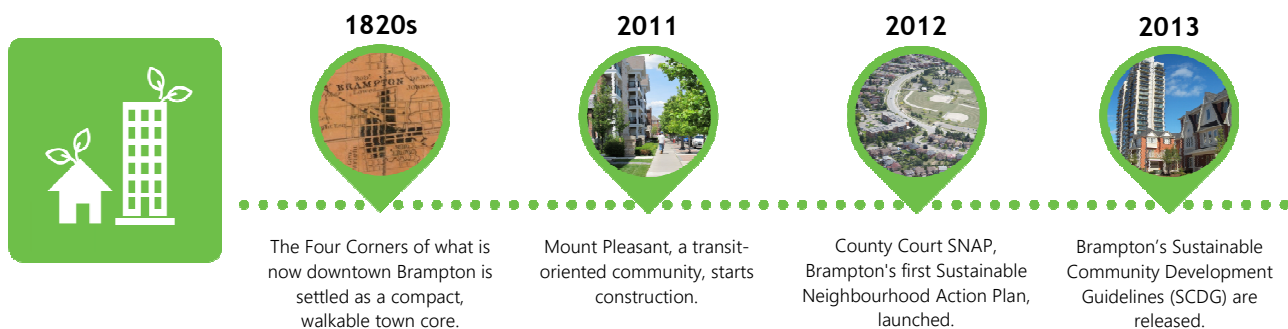
Green communities result in many co-benefits. For example, green communities improve air and water quality, and provide aesthetic, economic, and health benefits associated with incorporating more natural features and systems in our neighbourhoods. They also encourage a healthier lifestyle and provide more economical and equitable living, through focusing on improving transit and active transportation options, providing more affordable and varied types of housing, and creating accessible communities that allow residents to meet most of their needs within walkable distance from home.

This type of community design closely aligns with the Brampton 2040 Vision, which highlights the need for more sustainable and "green"<sup>5</sup> communities, transit-oriented neighbourhoods, and a move towards compact, decentralized, accessible landscapes revolving around Urban and Town Centres. The 2040 Vision provides the foundation upon which the city can evolve in this global energy transition through the progression towards green communities.

The features and benefits of green communities all tie into optimizing a community's energy demand, increasing system efficiencies and savings, and improving energy resilience. More walkable and transit-oriented communities means less cars on the road and reliance on gasoline. Circular economies can reduce energy waste and streamline production to be more energy efficient. More housing variety can also provide more energy efficient housing choices. For example, typical single detached dwellings are less energy efficient than denser forms of housing, like townhouses, row houses and mid-rise residential buildings. Providing a range of housing choices allow residents to pursue a dwelling suited to their individual needs and energy use and efficiency preferences.

A significant advantage of green communities is the potential for savings on energy from heating and cooling and transportation.

Municipalities and the development industry have a significant role to play within the Green Communities strategic direction. As a municipal government, the City of Brampton is responsible for local land use decisions that drive green communities. As previously mentioned, the 2040 Vision is one foundational document that can guide



Brampton towards becoming a greener community. The City of Brampton can further encourage green communities by ensuring that its Official Plan policies champion transit-oriented, mixed-use, complete communities.

The existing Sustainable Neighbourhood Action Plan (SNAP) program is another avenue for green community implementation at a neighborhood scale. It provides opportunities to tie together home and building retrofits, green community planning, and other on-the-ground actions to achieve community-level retrofits.

The Development Industry role in creating Green Communities involves planning, designing, and constructing mixed-use, compact communities with high efficiency homes and building serviced by alternative energy sources. Brampton's Sustainable Community Program for New Development provides a menu of sustainable options developers can choose from to implement in their development plans. In addition, developers will need to keep themselves informed on how to most effectively incorporate the latest green community design practices and include these energy efficient and sustainable features in their designs. Furthermore, both the municipality and development industry should strive to work together to implement net-zero communities.



## 5.4.2 Transportation Efficiency

Transportation in Brampton accounts for about 60% of community-wide GHG emissions and 50% of the total dollars spent on energy in the community, reflecting how Brampton is largely an automobile-dependent community. In 2015, active transportation (cycling and walking) accounted for approximately only 3% of trips in the city, while transit accounted for 8%.<sup>6</sup>

Increasing transportation efficiency can lead to cost savings for Bramptonians and healthier and more equitable communities. Providing various options for and investing in safe, reliable, and accessible sustainable transportation options, like transit, cycling infrastructure, and safe and walkable streets, allow residents to meet their daily needs while maintaining a more affordable, connected, and active life. Sustainable transportation provides all residents with affordable access to all the facilities, services, and opportunities the city has to offer.

In order to keep up with the modern energy transition, a significant shift in how we move around our community is needed. By addressing Brampton's unique needs, learning from global best practice, and adapting from local municipalities' mistakes and successes, this city can become a leader in transportation. The Brampton 2040 Vision has already started us on this path. Vision 4 states, "In 2040, Brampton will be a mosaic of safe, integrated transportation choices and new modes, contributing to civic sustainability, and emphasizing walking, cycling, and transit".

How we approach our transportation networks will need to be rethought. Different modes of transportation (e.g. car, transit, cycling, walking) should not be viewed and planned as separate isolated systems, rather as an interconnected system in which people and goods move between one mode to the other to get to their destination. Furthermore, road planning, design, and construction need to take into consideration more than just the car, and move towards a more integrated and holistic approach within Brampton.

Increased investment in sustainable transportation infrastructure is key to keeping pace with the modern energy and transportation shift and meeting the 2040 Vision goals. The growing demand in both personal and commercial electric vehicle use will require significant

expansion and upgrades in electric vehicle infrastructure. The Brampton 2040 Vision's shift towards Urban and Town Centres will require increased transit investment between and within these nodes, and the more widespread incorporation of complete streets and active transportation networks in our communities.

Brampton's strong dependence on automobiles poses one of the city's greatest energy challenges. Automobile-dependence shapes the physical and social fabric of our communities. Higher automobile dependence increases a community's energy use and emissions through increased vehicle trips, requires large amounts of land within our communities, and influences our daily decisions and life choices that in turn effect our carbon footprint and well-being.

The space requirement to accommodate vehicles (e.g. larger roads, major highways, and parking) leads to more sprawl. This increases the resources, infrastructure, and energy requirements needed per person to service this larger, sprawled area. Larger roads and highways also tend to discourage the use of alternative modes of transportation due to the increased safety risks and the general inconvenient and unpleasant experience of a pedestrian-unfriendly environment. The impacts of automobile-dependence also leads to other concerns. Larger roads and more sprawled cities can sever social networks and service support, increase social disparity, reduce community cohesion, decrease local community and economic vibrancy, and impact the health of residents and the environment.

Brampton faces many unique aspects in the transportation efficiency strategy. This will require the City to more deeply explore the relationship between built form and transportation systems - not only how transportation systems and buildings overlap, but also how built form and land use shapes transportation needs and vice versa. For example, moving towards more compact, mixed-use, and walkable neighbourhoods can significantly reduce the number of car trips taken by residents. Creating more local jobs also makes transit and cycling a more feasible commuting option.

Brampton's history and reputation of being a suburban/bedroom community with neighbourhoods built around single family dwellings and residents commuting daily out

to other cities has led to spread out and car centric neighbourhoods with wide roads and large big-box retail. Additionally, as a neighbour of Toronto and member of the GTA, there are several major highways bisecting the city, a large amount of goods and products movement through the city, and significant presence of warehousing and storage facilities within Brampton's borders. These are all factors that need to be considered in this transportation shift.

To address the impacts of transportation on climate change, the City's transportation planning efforts will need to include quantifiable emissions targets and develop ways to measure and forecast these. To that end, the City's transportation modeling and planning efforts will need to use a measure based on the percentage share of each mode of the total number of Passenger Kilometres Travelled (PKT) arising from travel choices in addition to the typical measure based on the percentages of the total number of trips made by each mode. The PKT-based approach more directly links transportation emissions and energy usage and efficiency to the mode of travel chosen. It should be noted that the two approaches are not directly comparable.

The City of Brampton will need to investigate the incorporation of PKT-based measures into transportation plans and transportation forecasting activities, in addition to maintaining the typical measure based on the percentages of the total number of trips made by each mode.

The City of Brampton and the Region of Peel are responsible for the planning, design, and construction of the transportation infrastructure in the City of Brampton, thus will have the most responsibility for achieving the actions under this strategic direction. However, the development industry, businesses, and residents play an important supporting role. The development industry can work towards designing more walkable and pedestrian-friendly communities oriented towards encouraging carpooling, transit, and active transportation. Businesses can encourage employees to work from home, take more sustainable transportation by providing amenities (e.g. EV charging stations, secure bicycle parking, showers, etc.) or by providing incentives to carpool, take transit, bicycle or walk.

Individuals can strive to develop sustainable transportation habits by:

- walking to do daily errands;
- cycling to work and for daily errands;
- taking transit more;
- carpooling to work;
- purchasing fuel efficient vehicles; and
- purchasing low carbon vehicles.

Furthermore, residents can contribute by staying informed on their transportation choices and communicating their sustainable transportation needs to their place of work, schools, and local governments.

Currently, the urban transition described in the Brampton 2040 Vision will support greater transportation efficiency, transit use, and active transportation. Further transportation policy, by-laws and street guidelines updates at both the City of Brampton and Region of Peel will be needed. Updating and aligning Brampton's Transportation Master Plan (TMP) with the CEERP goals and targets will be a significant milestone since the TMP is a driver of transportation decisions and projects within the City. Both the Region and the City of Brampton will need to invest in sustainable transportation infrastructure, taking into consideration the growing demand for electric vehicles, the move towards more complete streets, and need for more accessible transportation alternatives to single occupancy vehicles.

## What is Modal Split?

Modal split is the main monitoring and performance measure in the City of Brampton's current Transportation Master Plan. Modal split is the percentage share of travellers using a particular method of transportation (e.g. auto, transit, cycling, walking). The factors that inform what method of transportation a person will choose for a trip include cost (monetary and time), convenience, and comfort. Trips can be comprised of one or more modes of transportation (e.g. cycling to a station, then riding a train and then walking to the final destination). Energy usage and the resulting emissions vary widely for the different methods of transportation; therefore, cumulative energy usage and emissions produced must also be factored into assessments of the impacts of transportation on climate.

## What is Vehicle Kilometers Travelled (VKT)?

Vehicle Kilometers Traveled (VKT) is the total kilometers travelled by motor vehicles on the road network during a given period of time. VKT is directly linked to fuel consumption, vehicle emissions, environmental quality, and road network congestion and safety. The current TMP includes VKT in the comparison of alternative scenarios and as an indicator for road network congestion. VKT per capita is emerging as an important transportation performance measure. Reducing per capita VKT can help achieve air quality, climate change, and congestion reduction goals without penalizing for population growth and its addition in the TMP will be considered in the next update.

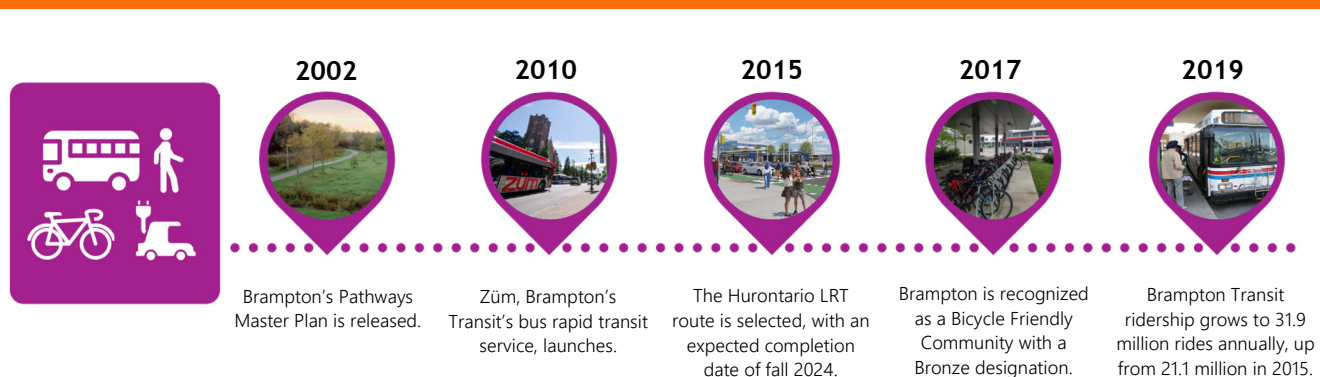
## What is Passenger Kilometers Travelled (PKT)?

Passenger Kilometres Travelled (PKT) is the product of multiplying the number of passengers in a vehicle by the distance travelled. Compared to Vehicle Kilometres Travelled (VKT), PKT provides a measure of transportation efficiency. For example, a bus with 20 passengers that travels 10 kilometres results in 200 PKT of service for 10 VKT. If those 20 bus passengers each used their own car, the same 200 PKT would result in 200 VKT, which would require significantly more energy and result in higher emissions. PKT is derived for all modes of transportation. For walking, cycling, and commercial vehicle trips, PKT is assumed to be the same as VKT.

## Why Passenger Kilometers Travelled (PKT)?

PKT reflects the basic goal of any mode of transportation: to move a person or goods to a desired destination. The factors that inform what mode of transportation to use for a trip include cost (monetary and time), convenience, and comfort. Trips can be comprised of one or more modes of transportation (e.g. cycling to a station, then riding a train, then walking to the final destination). Energy usage and the resulting emissions vary widely depending for the different modes of transportation. The cumulative energy usage and emissions produced must be factored into assessments of the impacts of transportation on the climate.

As noted previously, the City's transportation planning efforts will need to include quantifiable energy and emissions targets. The CEERP's PKT-based analytical approach supports this.



### 5.4.3 Home and Building Efficiency

Energy efficiency is the “first fuel” of a sustainable global energy system.<sup>7</sup> Homes and buildings are the third-largest emitting sector in both Brampton and Canada, and most existing buildings will still be in operation in 30 years’ time. It is less costly to construct energy efficient homes and buildings than to retrofit them to be more energy efficient once they are already built. Buildings account for 44% of Brampton’s energy use and 28% of its GHG emissions.

Building energy efficiency has historically been left to be addressed by the Province through the Ontario Building Code (OBC). However, this plan has shed light on the significant role buildings play in Brampton’s energy use and on the many opportunities available to significantly improve energy efficiency at the community level.

Retrofitting existing homes and buildings and ensuring new construction is delivered to the highest energy standards will be foundational to achieving the targets of the CEERP. On average, buildings in Brampton are approximately half as efficient as global benchmarks, a consequence of historically lower energy costs, less stringent building codes, and less action on climate change. Brampton residential buildings are the source of 21% of GHG emissions and almost three-quarters of Brampton’s water consumption.

As the construction requirements of buildings have been under the jurisdiction of the Provincial government through the Ontario Building Code, addressing building energy efficiency is a new field for municipalities and many aspects are currently beyond the City’s capabilities to address adequately. Therefore, this strategic direction will require significant community leadership and collaboration. Construction, trades, and the development industry will all need to have a strong leadership presence to achieve the targets under this strategic direction.

Residents also need to be educated on and stay informed about their energy efficiency options. A community organization that focuses on large scale community energy projects, such as a home retrofit program, can create a framework in which different community sectors can collaborate and mobilize under to successfully implement the actions under the CEERP that may be outside municipal jurisdiction or capacity.

The City of Brampton can advocate for Ontario Building Code enhancements, ensure buildings are built to code, provide incentives for builders to exceed the Ontario Building Code, and/or be open to new technologies. Furthermore, there is opportunity to expand the City’s SNAPs to include community energy retrofits.



#### 5.4.4 Local Energy Supply and Distribution

Local energy supply and distribution, also referred to as Distributed Energy Systems (DES), is the local operation and generation of energy close or next to its point of use. DES includes power generation (e.g. roof top solar panels), energy storage (e.g. batteries), and distributed energy management (e.g. building energy management systems, micro grids, district energy etc.). This is compared to the traditional centralized energy supply utilized today, where energy is sourced from larger generator facilities outside the community (e.g. in Ontario: Bruce Nuclear Power Plant or Niagara Falls Hydro-electric generation plant) and is sent through large transmission and distribution grids before reaching the end user.

Distributed Energy Systems offer communities the following benefits:

- lowering the carbon impact of meeting the heating, cooling, and hot water needs of buildings through the distribution of heating and cooling;
- reducing system losses associated with the current centralized energy system; and
- increasing the security, resiliency, and flexibility of local energy supply.

The use of natural gas to heat buildings contributes 38% of Brampton's GHG emissions, which underscores the need to identify measures that address the heating, cooling, and hot water needs of buildings. Opportunities are available to incorporate district heating and cooling in major growth and intensification areas, such as the Urban Centres and Town Centres described in the Brampton 2040 Vision. Using waste heat from large facilities (e.g. manufacturing, industrial facilities, waste facilities) is another opportunity to supply heating and cooling to buildings through waste heat power or combined heat and power district systems.

Modern district energy systems facilitate the use of many kinds of low carbon heat sources, including:

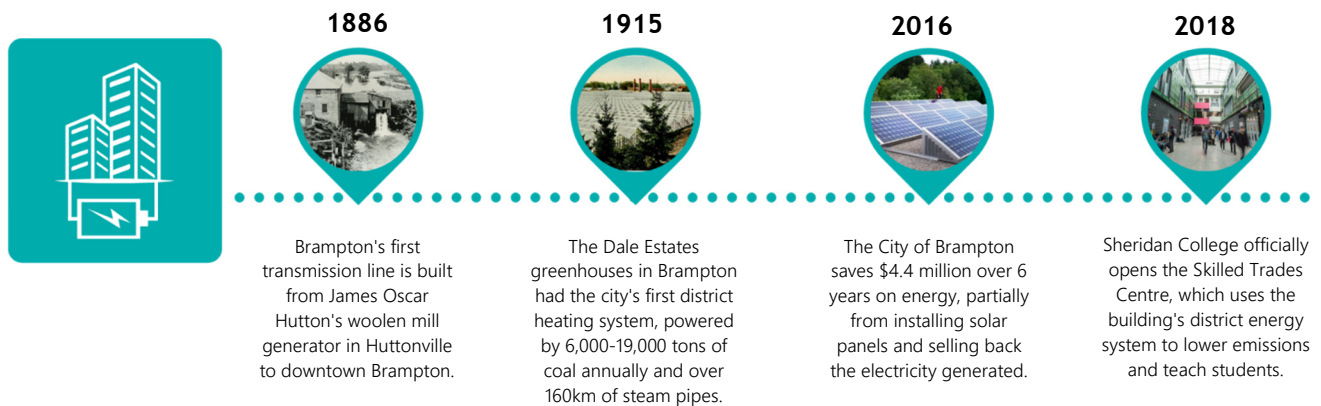
- large solar-thermal arrays;
- biofuel boilers and combined heat and power (CHP);
- sewage waste heat recovery;
- geothermal arrays; and
- boilers using renewable electricity.

Of the five district energy systems noted above, only Combined Heat and Power (CHP) was considered in the CEERP's efficiency simulation, so any opportunities to include the other low carbon heat sources will further reduce the GHG impacts of heating and cooling.



In Brampton, the highest energy system losses were associated with electricity use. Increasing local electricity generation would reduce the economic impact of these losses on the community. In 2016, locally-generated solar power supplied less than 0.5% of Brampton’s electricity needs. Traditionally, municipalities have had a limited role in solar supply. There is opportunity for the City of Brampton, Region of Peel, and local community to play a bigger role in encouraging and building solar infrastructure through advocacy and other direct means. The Community Organization and the retrofit program are vehicles in which solar power can be advanced in Brampton.

Local utilities will play a major role in managing the migration of energy supply to a more decentralized system. Partnerships with and between local industry will also be needed to capitalize on the best opportunities within the city for Distributed Energy Systems. Individual residents and property owners will also play an important role as the option to generate energy off grid becomes more feasible.





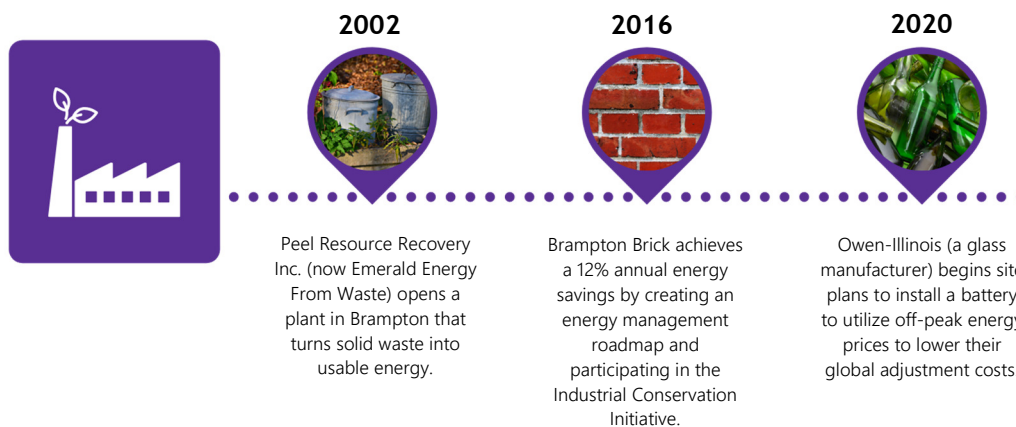
### 5.4.5 Industrial Efficiency

Industrial activity is most often regulated and guided by broader global best practices and standards because industry is driven to reduce their bottom line with continuous improvement in energy and water management. In addition, many larger multi-national companies have challenging corporate-wide emissions standards that are a direct response to both customer pressure and public opinion in many different countries.

Brampton’s industrial sector consumes 21% of total source energy, although it only contributes 13% of emissions. The city’s industrial sector demonstrates higher energy, emissions, and water performance relative to global best practice than other sectors, such as residential dwellings. As such, there is an opportunity for local industry leaders to share their energy and water management expertise with the community to help achieve world-class energy and water performance.

The Brampton 2040 Vision and Brampton’s Economic Master Plan highlight the critical need to attract and retain local businesses and investment in the city. Retaining and attracting investment in the community through energy advantages is a key tool in which municipalities can utilize as part of the CEERP.

Brampton’s Economic Master Plan highlights innovation through originality as one of its goals. Many industries are currently moving towards innovative ways to reduce energy costs to gain energy savings that will help their bottom line. Local municipalities can play a role in this by assisting industries that are exploring and pursuing opportunities to reduce their energy use and emissions. This could include providing additional assistance in advocating to other levels of government, navigating the planning processes, and promoting and facilitating joint opportunities with other agencies to achieve their energy use and emissions reduction targets.



## 5.4.6 Green Infrastructure

Green infrastructure can reduce a community’s energy and infrastructure costs, improve residents’ quality of life, promote economic growth, and create construction jobs. Green infrastructure is a strategically planned network of natural and semi-natural features and spaces managed to deliver a wide range of ecosystem services to the community. Examples of green infrastructure include features and spaces such as parks, wetlands, trees, community gardens, green roofs, rain gardens, and bioswales.

Green infrastructure can play a role in reducing community energy demand by mitigating heat island effects, reducing energy requirements for cleaning drinking water and managing stormwater, or reducing heat loss in buildings from cold winds.

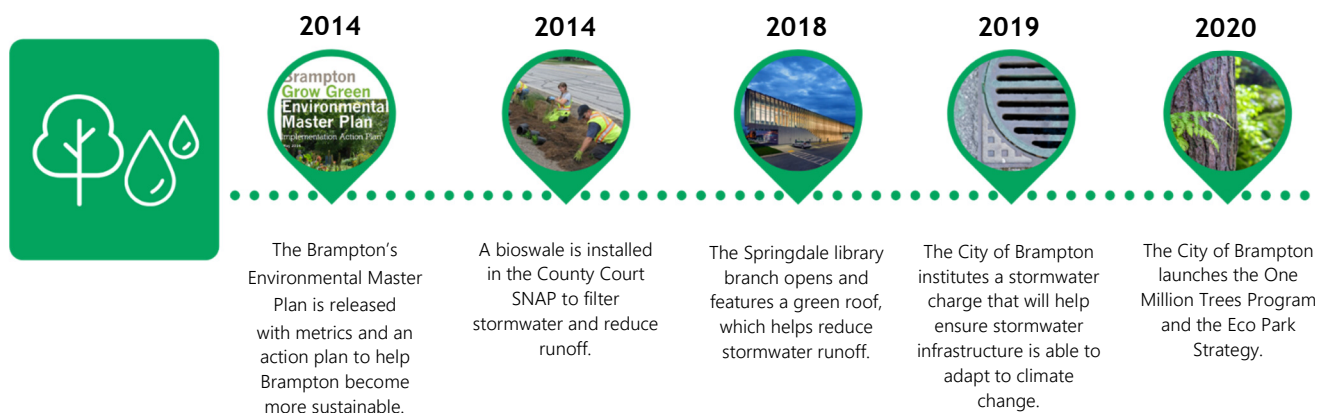
A unique contribution of green infrastructure to the CEERP is its ability to directly remove CO<sub>2</sub> from the atmosphere by sequestering carbon. For example in 2008, Brampton’s urban forest was sequestering approximately 7,700 tonnes of carbon per year as trees grew – equivalent to the amount of carbon that was being emitted at that time in the city in 1.2 days.<sup>8</sup> Over 175,000 tonnes of carbon was stored in the urban forest – equivalent to 27 days of the city’s carbon emissions. The largest trees store proportionately more carbon – for example, trees greater than 68.6 cm diameter at breast height (dbh) make up less than 1 percent of the total tree population but store more than 30 percent of the total stored carbon. Average sequestration rates are also positively correlated with tree size – larger trees sequester more carbon on an average annual basis than smaller trees.

Carbon sequestration strategies are outside of the scope of the CEERP, however, this additional benefit of green infrastructure can still be a tool within the City’s larger comprehensive climate action strategy and be layered into other City strategies such as the City’s Urban Forest Management Plan.

Through the Brampton 2040 Vision and the Brampton Grow Green Environmental Master Plan, the City of Brampton has already established the groundwork for meeting the Green Infrastructure goals and targets of the CEERP. The first Vision statement of the 2040 Vision is that of the “Environment and Sustainability”. It includes growing our green infrastructure and protecting our natural systems within the city. Meanwhile, the City’s Environmental Master Plan, as well as the One Million Trees Program and the Eco Park Strategy, encourage the integrated use of green infrastructure within Brampton’s green and urban spaces.

The local municipalities (City of Brampton and Region of Peel) and conservation authorities (Toronto and Region Conservation Authority and Credit Valley Conservation) will all have a leading role to play in implementing actions under this strategic direction. Municipal policy, development guidelines, and capital projects should be updated to include green infrastructure where appropriate, and the City of Brampton, often in partnership with the conservation authorities, will continue to implement its green infrastructure programs.

Local community organizations/not-for-profits and local residents can also play a supporting role by partnering with, or participating in, the many green infrastructure and environmental programs provided by the municipality.



### 5.4.7 Communication, Engagement, and Monitoring

Communicating the CEERP’s priority projects and Action Plan will increase alignment among partners, empower stakeholders and the community to actively implement the priority projects, and help maintain the focus on what’s important. It will be important to clearly communicate to the public and City staff, the importance and benefits of the CEERP, how they can play a role in achieving its goals and targets, and how they can take advantage of this modern energy transition.

The scale of action required to address the climate emergency necessitates a coordinated and collective effort to speed up change. Engaging and working with partners across the community will increase the successful implementation of the CEERP. Indeed, the first two key lenses used to guide the implementation of the Brampton 2040 Vision is that of Engagement (Lens 1) and Collaboration (Lens 2). These two lenses will be vital in the successful implementation of the many of the CEERP Priority Projects. The Community Organization proposed in this Plan and the 2040 Vision (i.e. CCET- see Section 5.7.8), will be a critical component to achieving the objectives of this Strategic Direction.

Finally, ongoing data collection and monitoring, as well as the refinement of the Priority Projects over time, is required to ensure project effectiveness and to gauge the impact of the CEERP. Though some monitoring is currently underway (e.g. EMP indicators, utility data, etc.), data sources are uncoordinated and there are still many large gaps in the type of data needed. Additionally, there will need to be a standardized system to collect, analyze, and report energy and emissions data.





## 5.5 Objectives and 2041 Targets

Each Strategic Direction has associated objectives (what is hoped to be achieved to support the Strategic Direction) and targets (indicators to determine how successfully each objective is being achieved).

Objectives and targets under Transportation Efficiency, Home & Building Efficiency, Local Energy Supply & Distribution, and Industrial Efficiency reflect the preferred scenario and the measures considered in the Plan's energy efficiency simulations.

Objectives and targets for Green Communities, Green Infrastructure, and Communication, Engagement & Monitoring were not included in the energy simulations. Instead, these Strategic Directions help achieve the objectives, targets and actions under the other Strategic Directions.

Achieving these strategic objectives and targets requires collaboration and the alignment of government, business, the community, and individual activities.

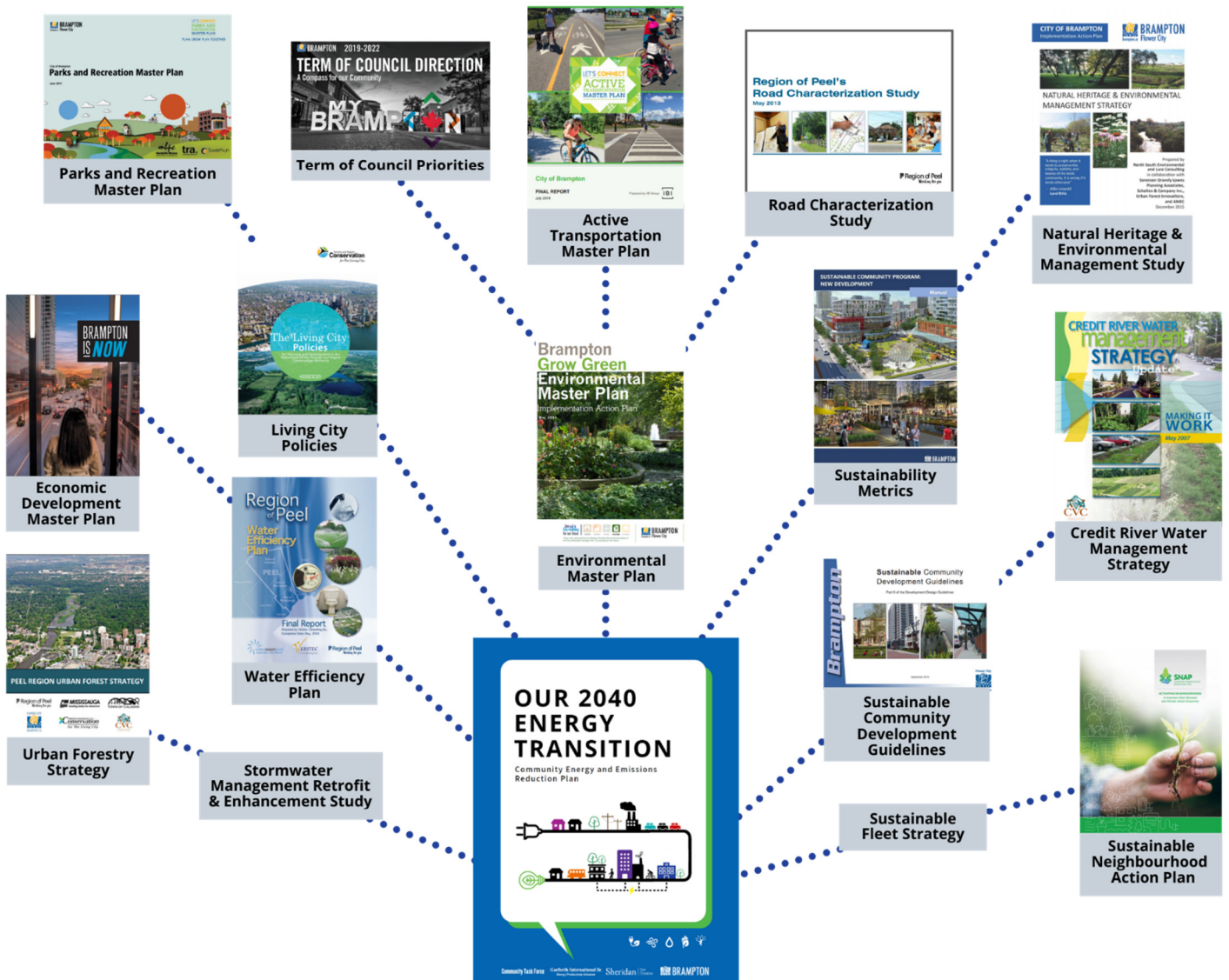
## Objectives and Targets by Strategic Direction

Strategic Direction	#	Objective	2041 Target
Green Communities	1A	Achieve near net-zero communities	Attain near net-zero GHG emissions for new communities in Heritage Heights and new buildings in Town Centres and Major Urban Growth Areas
	1B	Policy is aligned	Complete all policy updates as identified in the Action Plan and its subsequent updates
	1C	Establish Major Growth Areas and Town Centres	Meet the Brampton 2040 Major Growth Areas and Town Centres density and job targets (to be revised through the OP Review process)
Transportation Efficiency	2A	Reduce average trip length	Reduce average trip length by 3.75% for light-duty vehicles from 2016 levels
	2B	Increase trips by walking and cycling	Increase the share of passenger kilometres travelled walking and cycling to 7%
	2C	Increase trips by Brampton Transit	Increase the share of passenger kilometres travelled by Brampton Transit to 9.0%
	2D	Increase trips by GO Transit	Increase the share of passenger kilometres travelled by GO Train to 8.5%
	2D	Increase use of electric vehicles	Increase electric share of light-duty vehicles to 22% and heavy-duty vehicles to 7%
	2E	Increase efficiency of vehicles	Increase efficiency of gas/diesel vehicles by 36% and electric vehicles by 20% from 2016 levels
Home and Building Efficiency	3A	Increase efficiency of existing homes	Achieve a 35% residential sector efficiency gain from 2016 levels by retrofitting 80% of existing homes
	3B	Increase efficiency of other existing buildings	Achieve a 22% commercial and institutional sector efficiency gain from 2016 levels by retrofitting 60% of existing buildings
	3C	Increase delivered efficiency of new property	Achieve a 17% Ontario Building Code efficiency gain from 2016 levels
	3D	Increase water efficiency of existing homes and buildings	Achieve a 34% water efficiency gain from 2016 levels

Local Energy Supply and Distribution	4A	Implement district energy in high growth districts with a mix of combined heat and power and other low-carbon heating and cooling sources	Serve 70% of existing high growth Energy Planning Districts and 80% of new high growth Energy Planning Districts with district energy
	4B	Install solar hot water in stable residential areas (low growth districts)	Serve 10% of hot water and heating needs in homes not served by district energy with solar hot water
	4C	Generate significant amounts of solar power installed on suitable rooftops and other locations	Supply 8% of Brampton's electricity needs with locally generated solar power
Industrial Efficiency	5A	Proliferate best practice to all local industry	Achieve a 20% industrial sector efficiency gain from 2016 levels
Green Infrastructure	6A	Expand the Urban forest	Plant 1 million trees by 2040
	6B	Increase restoration of natural heritage system	Increase restoration and enhancement management to 45ha/year
	6C	Integrate natural assets into the City's asset management program	Determine a dollar value for the City's natural assets
Communications, Engagement, and Monitoring	7A	Increase awareness of the importance of energy planning among residents and businesses	Establish a Community Organization (e.g. CCET) to engage in ongoing outreach and education
	7B	Engage with businesses, non-profits, institutions, residents, utilities	At minimum, engage with large energy users, Brampton Board of Trade, Sheridan College, Ryerson University, Algoma University, BILD, Enbridge Gas, and Alectra Utilities
	7C	Partner with other municipalities and levels of government	At minimum, partner with neighbouring municipalities and the Region of Peel
	7D	Integrate with corporate performance metrics (KPI)	Establish a community GHG emissions and energy efficiency target on the Corporate Performance Dashboard and update regularly
	7E	Establishment of self-supporting Community Organization (e.g. CCET) that is focused on delivering community energy planning excellence	Attain recognition as a regional centre for energy excellence

# CEERP as a Foundational Document

Guided by the Brampton 2040 Vision, the CEERP is foundational document that will guide and support decision making within the City of Brampton. It provides direction for climate change mitigation and energy considerations for all City plans, policies, and programs. Current and future City documents and decisions will need to consider how they impact and work towards achieving the CEERP goals and its actions. All departments within the City have a role to help the community of Brampton achieve its energy and emissions goals.



## 5.6 Priority Projects: 2020 - 2025

Priority Projects are identified as critical projects that need to be started within the next five years to put Brampton on the path to achieving its energy and GHG targets and objectives. Priority Projects help prioritize investments and efforts.

Priority Projects were identified through the CEERP planning process and were based on the research of industry best practices and broad municipality experience, expert advice from all City departments and environmental partners, and input from conservation agencies and community stakeholders. The final list of Priority Projects were approved by the Project Working Team and Community Task Force.

The following six projects were identified as a priority for the next five years:

1. ensure the City of Brampton policies and programs are aligned with supporting the CEERP objectives and targets;
2. establish a system to deliver standardized retrofits to Brampton homes;
3. update the Transportation Master Plan (TMP) to reflect complete streets and the integrated nature of mobility and built form;
4. integrate District Energy Systems in appropriate locations within Brampton;
5. develop Integrated Energy Master Plans for public facilities and private development; and
6. establish a Community Organization to lead the development and implementation of select priority projects.

The Priority Projects are primarily focused on transforming the market for:

- energy efficient homes and buildings;
- energy efficiency retrofits;
- near-net-zero neighbourhoods;
- district energy; and
- active transportation and transit.

The rationale for these priority projects is provided below. Actions associated with these Priority Projects are identified in the CEERP Action Plan (see Section 5.7).

### *Priority Project 1: Municipal Policy and Program Alignment*

Regional and local municipal governments approve policies and by-laws that guide the growth and development of the community. Consequently, they have the responsibility of ensuring their policies and by-laws are aligned with the vision and goals of the CEERP. By doing so, they can establish a policy and program framework that enables local stakeholders, businesses, residents, and developers to take action to initiate Brampton energy transition.

### *Priority Project 2: Home Energy Retrofits*

Homes and buildings account for 44% of Brampton's energy use, 17% of energy cost, and 28% of GHG emissions. While energy efficiency gains in new construction has resulted in more energy efficient homes, older homes can be significantly less energy efficient. Considering 52% of Brampton's residential building stock was built prior to 1989, reducing energy use in homes through energy retrofits provides a high return in decreasing the city's overall energy use.

### *Priority Project 3: Transportation Master Plan Update*

The transportation sector makes the largest contribution to source energy use and GHG emissions in Brampton. The City of Brampton and Region of Peel have a critical role and responsibility to align their policies and programs. They should work to reduce the average length of regular trips taken by residents and visitors and increase the number of trips taken via walking, cycling, carpooling, and transit. This includes decisions on urban design, complete streets, and investment in transit and cycling infrastructure.

The City's Transportation Master Plan provides a blueprint for sustainable transportation planning within Brampton. It provides a framework for how the City of Brampton will continue to move forward to serve its growing population through its investments in its transportation networks. The TMP directs future transportation investment decisions, priorities, and projects, making this a critical document for the achievement of the community's energy and emissions targets and actions for transportation. Aligning the TMP with the CEERP's objective and targets will provide significant movement towards achieving Brampton's energy and emissions goals.



As the TMP is updated, it must further explore the role transportation can take in achieving our energy and emission targets. The TMP update will need to provide direction in the city's transition towards the increasing use of sustainable modes of transportation, including transit and active transportation within Brampton, which will reduce energy demands and total emissions as the city continues to grow. Additionally, it will need to address the integration of mobility and built form to create more economical and energy efficient networks and services.

The City's current Transportation Master Plan (TMP), dating from 2015, includes a rudimentary analysis of transportation-related emissions based on forecasts of Vehicle Kilometres Travelled (VKT). The next version of the TMP will need to include quantifiable emissions targets and reflect more refined analysis based on Passenger Kilometres Travelled (PKT) in order to more fully support the CEERP and address the transportation-related targets included in it. As noted previously, a PKT-based approach more directly links transportation emissions and energy usage to the mode of travel chosen than a VKT-based approach does. The updated TMP will also supplement the existing mode share targets based on the percentage of the total number of trips made by each mode with targets based on the percentage of total PKT made by each mode. The TMP, and other transportation planning initiatives, will integrate and support the achievement of the directions of the CEERP.

#### ***Priority Project 4: Integration of District Energy Systems***

A significant portion of energy use in Brampton goes towards the heating and cooling of homes and buildings. Some of this energy is lost through waste heat. District Energy Systems can provide a more efficient and flexible option for heating and cooling.

A district energy network is typically run as a thermal utility by a company that operates all the energy plants and networks, ensures high service quality, and manages the metering and billing of the heating and cooling services. The network allows for economies of scale, since the generation of heat in a few larger plants is more efficient than having thousands of boilers each heating their individual building. It also enables valuable energy currently

wasted in electricity generation, industrial, and other processes to be cheaply captured and delivered to other consumers. By aligning Energy Planning Districts with Brampton's Urban and Town Centres and growth plans, Energy Planning Districts were identified as candidates for district energy (see Appendix A).

#### ***Priority Project 5: Public and Private Sector Integrated Energy Master Plans***

Integrated Energy Master Plans are the equivalent of a CEERP, but developed at the site, portfolio, neighbourhood, or community scale. In addition to identifying opportunities to improve the energy efficiency of the built form, they also identify options for integrating local supply and distribution at a neighbourhood or community scale.

#### ***Priority Project 6: Development of a Community Organization***

It is recognized that to achieve the CERRP key objectives and actions must be completed that are outside the control, influence, or capacity of the municipality. As such, the achievement of these objectives, targets, and priority projects can be accelerated through the establishment of a Community Organization that will engage in and drive the required changes within the community.

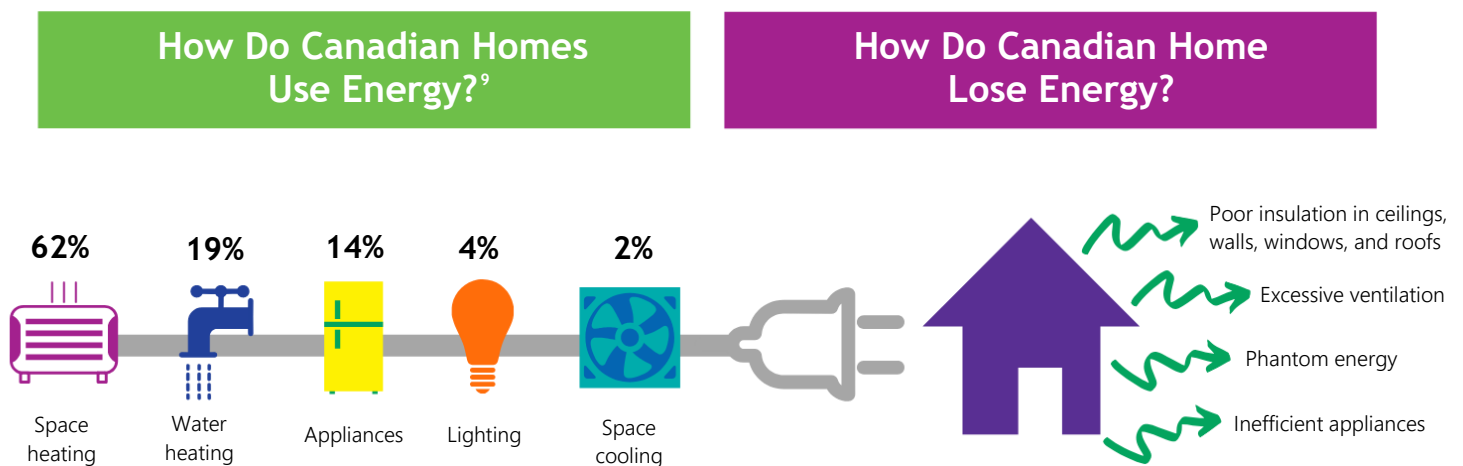
## Home Retrofits

The current energy efficiency retrofit market for home and building owners and contractors is not very successful. Historically, market uptake of retrofit programs has been low. From the perspective of the contractor, the effort to prepare customized proposals is high and the closing rate is low. Low volumes and the fact that every project is specific to each household means that material costs are expensive and performance guarantees are risky. From the home and building owners' perspective, obtaining understandable bids from various contractors is time consuming. They are responsible for finding their own sources of funding based on their individual credit rating. Finally, the low volumes result in retrofit costs that typically exceed the value of the energy saving, even over many years.

To address these challenges, the Community Task Force and the Project Working Team recommend that an entity be established to offer standardized energy retrofits to homes, commercial, and institutional buildings at high volumes. Contractors benefit from increased project predictability, improved margins, and vastly higher project volumes. Homeowners benefit from a simplified transaction, guaranteed pricing, lower cost pre-financed retrofits, and a simple billing and payment mechanism.

In addition, property-assessed financing has the distinct advantage of tying the efficiency investment to the property, mitigating the risk to home and building owners that their payback period is longer than the time they remain (or intend to remain) in the home or building.

To address the objective for water efficiency, a water efficiency package should be included in the standard energy retrofit package. While the initial program would focus on delivering retrofits to the residential sector, the program would be well positioned to offer retrofits to the non-residential sector in the future.



## 5.7 CEERP Actions

The following table contains identified actions for each strategic direction that need to be accomplished in order to help achieve the twenty-four objective and targets. This table will be revised and updated every five years.

Short Term = 1-2 years    Medium Term = 3-5 years    Long Term = 5-10 years    \* = Priority Project Action

Accronyms					
City of Brampton	COB	Community Organization	COMM	School Boards	SB
Region of Peel	ROP	The Atmospheric Fund	TAF	Brampton Board of Trade	BBOT
Development Industry	DEV	Clean Air Council	CAC	Official Plan	OP
Sheridan College	SH	Ryerson University	RY	Algoma University	AL
Utilities	UT	Businesses/Industry	BUS	Partners in Project Green	PPG
Conservation Authorities	CA	Non-Profits/NGOs	NP	Community Task Force	CTF

## Accelerating the Transition Internally

#	Action	Lead	Partner(s)	Timeline
<b>Municipal Resources</b>				
1.1.1	Assign CEERP implementation to a specific department/division/section that will administer responsibility for each municipal priority project and facilitate interdepartmental collaboration, funding, communication, education, and reporting on the City's performance.	COB	-	Short-Term
1.1.2	Identify staff resourcing gaps and allocate resources (e.g. staff and funding) to ensure that the CEERP municipal priority projects are completed.	COB	-	Short-Term
<b>Build Awareness and Move Projects Forward</b>				
1.2.1	Assign department/division/section to act as an internal resource for CEERP education and outreach.	COB	-	Short-Term
1.2.2	Establish a Community Organization to lead the development and implementation of select priority projects and champion the CEERP to Brampton residents, businesses, and stakeholders.*	COB	COMM, ROP, SH, CTF	Short-Term
1.2.3	Develop a comprehensive communication strategy that highlights the benefits of implementing the CEERP, like economic or community resilience benefits.	COB	-	Short-Term
1.2.4	Host an annual CEERP event in partnership with Brampton's Environment Advisory Committee to share and learn about best practices being implemented.	COB	-	Medium-Term
1.2.5	Develop an annual environmental recognition program for businesses, institutions, and citizens.	COB	-	Short-Term
<b>Establishing Performance Monitoring</b>				
1.3.1	Identify and assign responsibilities for monitoring of Corporate and Community CEERP targets, including data management and reporting.	COB	-	Short-Term

1.3.1.1	Identify corporate resources/expertise to collect data and monitor energy usage/emissions.	COB	-	Short-Term
1.3.1.2	Establish protocols for data collection, analysis, and reporting for each CEERP priority project.	COB	-	Short-Term
1.3.3	Provide a CEERP progress snapshot to Council biennially.	COB	COMM	Medium-term
1.3.4	Provide a comprehensive CEERP Implementation Progress Report to Council every five years.	COB	COMM	Medium-Term
1.3.4.1	Align CEERP reporting with the Environmental Master Plan reporting process.	COB	-	Short-Term
1.3.5	Investigate opportunities to update the Council report templates to incorporate climate change/environmental implications of development applications.	COB	DEV	Short-Term
<b>Budgeting and Decision-making Framework</b>				
1.4.1	Allocate a portion of the City's Environmental Reserve Fund to implement the CEERP's recommended priority projects.	COB	-	Short-Term
1.4.2	Incorporate CEERP framework into decision making process for all program and projects.	COB	-	Short-Term
1.4.3	Ensure annual City budget report addresses how it contributes to achieving CEERP goals and targets.	COB	-	Short-Term
1.4.4	Explore opportunities for disclosing clear, comparable, and consistent information within the City's annual financial reports about the opportunities and risks presented by climate change.	COB	-	Medium-Term
1.4.5	Develop a strategy to secure external funding opportunities and partners to help supplement municipal resources for environmental initiatives.	COB	-	Short-Term
1.4.6	Require all City strategies and master plans to align with the CEERP.*	COB	-	Ongoing
<b>Municipal Operations and Procurement</b>				
1.5.1	Develop a Green Purchasing Strategy and by-law to require climate change considerations for procurement of goods and services.	COB	-	Short-Term
1.5.2	Develop a Sustainable Fleet Strategy to lower emissions of municipal fleet.	COB	-	Short-term
1.5.3	Develop operational procedures to minimize the emissions of City practices (e.g. anti-idling policy for Fleet users).	COB	-	Short-Term
1.5.4	Establish a training program for the responsible use of equipment to minimize energy consumption and GHG emissions.	COB	-	Short-Term

## Green Communities

#	Action	Lead	Partner(s)	Timeline
Community Design				
2.1.1	Design new communities to facilitate future distributed energy systems.	COB	DEV	Ongoing
2.1.2	Design new communities to achieve sustainable transportation targets as defined by the Transportation Master Plan.	COB	DEV	Ongoing
2.1.3	Design new communities to expand Brampton's tree canopy cover.	COB	DEV	Ongoing
2.1.4	Design new communities to improve building energy efficiency.	DEV	COB	Ongoing
2.1.5	Promote local employment opportunities in new communities, support retention of local employment in existing communities, and work to increase diversity of employment, especially in green economy sector.	COB	DEV	Ongoing
2.1.6	Design communities for higher density in appropriate locations.	COB	DEV	Ongoing
2.1.7	Partner with landowners and/or developers to create Integrated Energy Master Plans for Urban Centres, Town Centres, Corridors, and large infill opportunities.*	COB	DEV	Ongoing
2.1.8	Design new, infill, and intensification developments to support trips using sustainable modes of transportation.	DEV	COB	Ongoing
2.1.9	Ensure new neighbourhoods establish cycling and pedestrian networks to complement the Active Transportation Master Plan, and includes: <ul style="list-style-type: none"> <li>• strong connectivity;</li> <li>• an appropriate variety of route types;</li> <li>• separated bike paths; and</li> <li>• end-of-trip facilities for key commercial, institutional, and transit destinations.</li> </ul>	COB	DEV	Ongoing
2.1.10	Develop and implement a strategy to require finer grain road and active transportation networks in large redevelopment areas.	COB	DEV	Ongoing
Policy				
2.2.1	Complete the Official Plan update to implement the Brampton 2040 Vision and the CEERP.*	COB	OP Consultant	Short-term
2.2.1.1	Update the Official Plan to include Transportation Demand Management requirements for new development.	COB	DEV	Short-term
2.2.1.2	Update the Official Plan to require the establishment of Integrated Energy Master Plans for greenfield and larger redevelopment sites and other specific types of development (government buildings, other institutional, mid-rise and high rise, large commercial, warehouses, and industry).*	COB	DEV	Short-term
2.2.1.3	Ensure City policies and programs are aligned with supporting district energy and low carbon energy systems.*	COB	DEV	Short-term

2.2.1.4	Build on existing policies and plans to direct residential and commercial growth to high growth areas/hubs to encourage the success of rapid transit infrastructure investment.	COB	DEV	Short-term
2.2.1.5	Update the Official Plan to encourage the planning, design and development of near-net zero buildings and neighbourhoods.	COB	DEV	Short-term
2.2.1.6	Update Official Plan, including Secondary Plan, policies to emphasize mixed use, higher density development in Urban Centres, Town Centres, Mobility Hubs, and along intensification corridors to support future district energy options.*	COB	DEV	Short-term
2.2.1.7	Require all new developments in Urban Centres to achieve a Sustainability Score within at least a Silver Threshold.	COB	DEV	Short-term
2.2.2	Establish an Activity Rate (ratio of jobs to population) target for the city.	COB	-	Short-term
2.2.3	Explore the opportunity to establish an incentive program for development applications that undertake and implement Integrated Energy Master Planning.*	COB	DEV	Short-term
2.2.4	Develop district energy policies, guidelines, and technical requirements for Urban Centres, Town Centres, Mobility Hubs, and along intensification corridors (e.g. ensure home and buildings are district energy ready in high growth areas).*	COB	DEV	Short-term
2.2.5	Plan the Heritage Heights Secondary Plan as a near net zero community.	COB	DEV	Short-term
2.2.6	Update the Sustainable Community Program: New Development (i.e. Development Design Guidelines, Sustainability Metrics) to align with the goals and targets of the CEERP.*	COB	DEV	Short-term
2.2.7	Update the complete submission requirements for development applications to align with the goals and targets of the CEERP.*	COB	DEV	Medium-term
2.2.8	Identify opportunities to introduce new legislative, policy, and/or programs, including by-laws and incentive programs, to require implementation of climate resilience measures (e.g. green roof by-law) in new buildings.	COB	DEV	Medium-term

## Transportation Efficiency

#	Action	Lead	Partner(s)	Timeline
Transit				
3.1.1	Advocate to Provincial and Federal governments for service, infrastructure, and policy improvements to interregional transit services that serve Brampton (e.g. schedule improvements, fare integration, etc.).	COB	ROP	Ongoing
3.1.2	Implement network improvements and undertake planning to increase transit service within Brampton (e.g. new routes, increased headways, higher order transit, transit priority measures, advanced technology, etc.).	COB	-	Ongoing
3.1.3	Prioritize transit as the preferred mode of travel in the City's Transportation Master Plan.	COB	-	Medium-term

3.1.4	Develop a Sustainable Fleet Strategy for Brampton Transit's revenue service vehicles (buses) based on the outcomes of 3.1.4.1.	COB	-	Short-term
3.1.4.1	Undertake a Network Electrification Feasibility Analysis for Brampton Transit's fleet (modelling both battery-electric and hydrogen fuel cell electric bus technologies).	COB	-	Short-term
3.1.5	Complete the Pan-Canadian Battery Electric Bus Demonstration & Integration Trial in partnership with Canadian Urban Transit Research & Innovation Consortium (CUTRIC).	COB	CUTRIC, BUS	Medium-term
3.1.6	Construct and electrify the new Third Transit Facility to support a zero tailpipe emission fleet from this new location.	COB	-	Medium-term
3.1.7	Continue to promote car-sharing and facilitate discussions around the uptake of car sharing within the city.	COB	ROP	Ongoing
3.1.8	Embed transportation-related emissions and energy targets in the City's transportation and land use planning documents.	COB	DEV	Medium-term
3.1.9	Launch a pilot project for electric vehicle shuttles between Light Rail Transit and large employment and/or residential areas.	COB	-	Long-term
Sustainable Transportation				
3.2.1	Embed Multimodal Level of Service (LOS) analysis in all transportation studies, including identifying target service levels for each transportation mode in the location and context of specific areas and transportation projects.	COB	DEV	Medium-term
3.2.2	Foster the development of services or platforms that facilitate the seamless use of multiple modes; for example, an app that allows users to seamlessly plan, pay, and manage an entire trip across multi-modes and transportations service providers.	COB	-	Long-term
3.2.3	Elevate the priority of sustainable transportation measures, such as active transportation, in the City's Transportation Master Plan.	COB	-	Medium-term
3.2.4	Explore and/or support micro mobility initiatives (e.g. bike share, etc.).	COB	-	Medium-term
3.2.5	Develop, support, and/or promote Transportation Demand Management initiatives (e.g. car pooling, teleworking) to reduce the number of trips made and/or increase trips made by sustainable modes of transportation.	COB	ROP	Medium-term
3.2.6	Develop and incorporate Sustainable Transportation targets in the Transportation Master Plan.*	COB	-	Medium-term
3.2.7	Investigate work from home program to examine reducing peak traffic time periods.	COB	-	Medium-term
3.2.8	Investigate opportunities to offer staff City fleet vehicles for work related purposes to help reduce the need to drive work and encourage the use of transit and active transportation.	COB	-	Medium-term
3.2.9	Examine free transit as per the Brampton 2040 Vision.	COB	-	Medium-term
3.2.10	Explore and implement efforts to incorporate new technology in the transportation system.	COB	-	Medium-term
3.2.11	Identify and implement strategies to reduce GHG emissions resulting from goods movement.	ROP	COB	Medium-term

Active Transportation				
3.3.1	Implement projects in the Active Transportation Master Plan to enhance/complete the Active Transportation network and support a walking and cycling culture.	COB	ROP	Ongoing
3.3.2	Encourage school-oriented programs to increase active transportation initiatives, such as Peel Safe and Active Routes to School (PSARTS) Committee, and the Peel Public Health (PPH) School Health Team and Active Living Team.	COB	ROP, SB	Medium-term
3.3.3	Improve safe cycling and walking access to schools and end-of-trip facilities for students and school staff, such as Peel Vision Zero initiative.	COB	SB	Medium-term
3.3.4	Advocate to the Province to include active transportation infrastructure as standard practice for infrastructure projects, including an active transportation corridor as part of the Hwy 413/GTA West Corridor and within MTO bridge crossings.	COB	ROP	Medium-term
3.3.5	Improve integration of land use and transportation planning such that new development generates fewer or shorter trips.	COB	-	Short-term
3.3.6	Explore and support micro mobility initiatives (e.g. bike share, etc.).	COB	-	Medium-term
Zero Emissions Fleet				
3.4.1	Explore opportunities through business licensing to promote sustainable/green fleets.	COB	BBOT	Medium-term
3.4.2	Explore opportunities to provide incentives for low and zero emission vehicles (e.g. priority parking spots).	COB	-	Medium-term
3.4.3	Increase the number of EV charging stations at municipal facilities.	COB	-	Ongoing
3.4.4	Update Zoning By-law to set a minimum number of EV charging stations at private facilities.	COB	-	Medium-term
3.4.5	Provide incentives to encourage new construction to be EV-ready.	COB	DEV	Medium-term
3.4.6	Advocate the Federal government for higher vehicle efficiency standards.	COB	ROP	Ongoing
Complete Streets				
3.5.1	Embed the Complete Street Guidelines in transportation planning, infrastructure planning, and urban design plans and processes.	COB	ROP, DEV	Medium-term
3.5.2	Incorporate complete streets design standards for all new and reconstructed arterial and collector roads unless demonstrated that it is not feasible to do so.	COB	ROP	Medium-term
3.5.3	Implement recommendations identified in the Complete Streets Guidelines.	COB	-	Medium-term
Policy and Plans				
3.6.1	Collaborate with Provincial, Regional, and municipal partners on sustainable transportation land use policy and infrastructure implementation initiatives.	COB	ROP	Ongoing



3.6.2	Update the Official Plan to require new development to be transit friendly by requiring applicant so submit Transit Feasibility Studies.	COB	DEV	Short-term
3.6.3	Increase local employment opportunities for residents and reduce outbound commuting.	COB	DEV	Long-term
3.6.4	Ensure City policies and programs support transportation efficiency and CEERP goals and targets.*	COB	ROP	Medium-term
3.6.4.1	Update the Transportation Master Plan to align with the CEERP targets.*	COB	-	Medium-term
3.6.4.2	Update Transportation Master Plan to include Passenger Kilometres Travelled performance indices and targets.*	COB	-	Medium-term
3.6.5	Embed transportation-related direction from the Brampton Vision 2040 into the City's transportation and land use plans, such as priority of modes, providing travel choices, and ensuring safety.	COB	-	Medium-term
3.6.6	Explore the feasibility of implementing a road pricing program alongside Regional and Provincial partners.	COB	ROP	Medium-term
3.6.7	Advocate the Provincial government for high occupancy vehicle (HOV) lanes on all 400 series Highways.	COB	ROP	Medium-term
3.6.8	Undertake a feasibility study for HOV lanes on regional and municipal roads.	COB	ROP	Medium-term
3.6.9	Undertake, with Regional partners, a feasibility study of implementing a parking spot pricing program	COB	ROP	Medium-term
3.6.10	Participate in the Region of Peel's Goods Movement Task Force and Smart Freight Centre program.	COB	ROP	Short-term

## Home & Building Efficiency

#	Action	Lead	Partner(s)	Timeline
<b>Home Efficiency</b>				
4.1.1	Develop a Home Retrofit Program (HRP) to achieve deep energy efficiency savings.*	COMM	COB, TAF, CAC, DEV	Short-term
4.1.1.1	Develop a targeted program based on energy mapping, community GHG emissions, age of community.	COMM	COB, TAF, CAC	Short-term
4.1.1.2	Update energy and GHG emissions data on regular cycles (e.g. annually, every five years).	COMM	COB, TAF, CAC	Ongoing
4.1.1.3	Investigate the establishment of a home energy efficient retrofit company to offer standardized energy efficient retrofits and other energy technologies (e.g. solar hot water) to homes and other buildings.	COMM	COB, TAF, CAC, DEV, ROP	Short-term
4.1.1.4	Investigate partnership opportunities (e.g. The Atmospheric Fund and Clean Air Council) to deliver comprehensive home retrofit program, including the use of property assessed financing (i.e. Local Improvement Charges), to assist homeowners with financing standardized energy and water retrofits.	COMM	COB, TAF, CAC, DEV	Medium-term

4.1.1.5	Explore a Home Retrofit Program focused on a Property Assessed Clean Energy (PACE) program approach.	COMM	COB, TAF, CAC, DEV	Short-term
4.1.1.6	Investigate impacts of a Home Retrofit Program on the City's Building Permit review process.	COMM	COB	Medium-term
4.1.1.7	Identify opportunities within SNAPs to implement community retrofit programs and/or related projects.	COB	DEV	Short-term
4.1.2	Investigate multi-municipal collaboration on delivering a regional Home Retrofit Program.	COMM	COB, ROP, TAF, CAC, DEV	Medium-term
4.1.3	Develop an energy efficient retrofit program/strategy for high-density residential buildings.	COMM	COB, ROP, TAF, CAC, DEV	Medium-term
4.1.4	Develop an energy efficient retrofit program/strategy affordable housing buildings.	COMM	COB, ROP, TAF, CAC, DEV	Medium-term
4.1.5	Encourage the Region of Peel to integrate water efficiency programs into the Home Retrofit Program.	COMM	ROP	Medium-term
<b>Building Efficiency</b>				
4.2.1	Develop an energy efficient retrofit strategy/program for the Institution, Commercial, and Industrial (ICI) sector.	COMM	COB, ROP, TAF, CAC, DEV	Medium-term
4.2.2	Develop minimum Energy Performance Targets for all new municipal buildings.	COB	COMM	Short-term
4.2.3	Explore land-use tools and incentives to help property owners and managers undertake deep energy and GHG emissions retrofits of existing buildings.	COB	COMM	Medium-term
4.2.3.1	Investigate the use of business licenses to promote a business retrofit program for more energy intensive sectors (e.g. grocery stores, small industry, food services).	COB	COMM	Short-term
4.2.3.2	Investigate the opportunity to provide density bonusing for energy efficiency in appropriate zones and for specific building types.	COB	COMM	Mid-term
4.2.4	Investigate the opportunity to develop a Community Improvement Plan (CIP) to promote energy efficiency and GHG emissions reduction in buildings.	COB	COMM	Medium-term
4.2.5	Work with the development industry to continually improve energy performance of new construction.	COB	DEV, COMM	Ongoing
4.2.6	Complete a business case for establishing a new or adopting an existing Energy Performance Label program for homes and buildings.	COB	DEV, COMM	Medium-term
4.2.7	Promote skilled training in retrofits in high schools and post-secondary institutions.	COB	SB, SH, RY, AL, COMM	Medium-term
<b>Policy</b>				
4.3.1	Ensure City policies and programs are aligned with supporting the objectives for Home and Building Efficiency.* <ul style="list-style-type: none"> <li>• Update Official Plan Policies</li> <li>• Update Design Guidelines and Sustainability Metrics</li> </ul>	COB	COMM	Short-term

- Update Secondary Plan Policies

## Local Energy Supply and Distribution

#	Action	Lead	Partner(s)	Timeline
<b>Corporate</b>				
5.1.1	Complete Integrated Energy Management Plans for priority municipal facilities to align with the targets of the Corporate Energy and Emissions Management Plan 2019-2024: A Zero Carbon Transition and the CEERP.*	COB	COMM, DEV	Medium-term
5.1.2	Investigate distributed energy options for City facilities, including solar, geothermal, and waste heat recovery.	COB	COMM	Medium-term
<b>District Energy</b>				
5.2.1	Develop business cases for District Energy System, including but not limited to, low carbon fuel options (e.g. geothermal, heat recovery, wastewater heat recovery, solar PVT, and hybrid of PV and thermal) in areas identified the CEERP energy district mapping. *	COMM	COB, DEV, ROP, BUS	Short-term
5.2.2	Investigate the requirements for the use of City road right of ways for the purposes of installing district energy infrastructure.*	COB	ROP	Medium-term
5.2.3	Develop a Business Case for establishing a district energy company to distribute thermal energy to homes and buildings.*	COM	COB, ROP, UT	Short-term
5.2.4	Identify and pursue opportunities for combined heat and power (CHP) partnerships for district energy.*	COB	COMM	Medium-term
<b>Low Carbon Energy Sources</b>				
5.3.1	Investigate opportunities to streamline the Building Permit process for zero GHG emissions technologies, such as electric vehicle charging, heat pumps, solar panels, etc.	COB	COMM	Medium-term
5.3.2	Advocate for national and provincial Building Code amendments that require buildings of a certain size, location and use to be built compatible for future low carbon district energy connections and solar PV.*	COMM	COB, ROP	Medium-term
5.3.3	Establish policies and plans to guide the City and private sector to transition to renewables to reduce the carbon intensity of buildings on low carbon district energy systems.*	COB	COMM, ROP	Long-term
5.3.4	Develop a Waste Heat Strategy that identifies reliable sources and has a clear set of planning and design objectives to support district energy.*	COMM	COB, ROP	Medium-term
5.3.5	Investigate municipal tools to facilitate uptake of rooftop solar hot water systems and solar photovoltaic installations.	COB	COMM, ROP	Medium-term

5.3.6	Identify and designate potential large-scale solar photovoltaic installation locations, such as car parking structures, commercial rooftops, etc.	COMM	COB, ROP	Medium-term
Policy				
5.4.1	Ensure City policies and programs are aligned with supporting the objectives for Local Energy Supply and Distribution.*	COB	-	Short-term
5.4.2	Identify policies to support local power generation options, including off-grid and distributed grid options.*	COB	COMM	Medium-term

## Industrial Efficiency

#	Action	Lead	Partner(s)	Timeline
Corporate				
6.1.1	Implement an Economic Development marketing campaign highlighting Brampton energy advantages as an incentive to locate business in this city.	COB	COMM	Medium-term
6.1.2	Establish or join an existing community of practice for facility energy managers from public and private sectors to share local industrial energy management expertise.	COMM	BBOT, DEV, PPG	Short-term
6.1.3	Develop a comprehensive inventory of large energy users in Brampton.	COMM	COB	Medium-term
6.1.4	Develop a comprehensive inventory of “green” employers in Brampton.	COMM	COB	Medium-term

## Green Infrastructure

#	Action	Lead	Partner(s)	Timeline
Green Infrastructure				
7.1.1	Implement the City’s One Million Trees Program.	COB	ROP, DEV, CA, NP	Ongoing
7.1.2	Develop and implement an Urban Forest Management Plan.	COB	CA	Short-term
7.1.3	Investigate opportunities to encourage the use of green roofs and white roofs on large buildings.	COB	-	Medium-term
7.1.4	Implement the City’s Natural Heritage Restoration Program.	COB	CA	Ongoing
7.1.5	Continue to collaborate on the restoration and expansion of Brampton’s natural heritage system.	COB	CA	Ongoing
7.1.6	Continue to expand the Community Garden Program.	COB	-	Short-term
7.1.7	Develop a mechanism to value green infrastructure assets and the benefits of these assets to the community.	COB	CA	Medium-term

7.1.7.1	Partner with the Credit Valley Conservation on the development of a business case for natural assets.	COB	CA, ROP	Ongoing
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## Communication, Engagement, and Monitoring

#	Action	Lead	Partner(s)	Timeline
Communication, Engagement, and Monitoring				
8.1.1	Develop a communication strategy to increase public awareness of energy planning and climate mitigation.	COB	COMM, ROP	Short-term
8.1.2	Develop an engagement strategy to raise the awareness of energy saving opportunities.	COB	COMM	Medium-term
8.1.3	Pursue collaborations with community groups and other organizations to build awareness of the CEERP.	COMM	COB	Ongoing
8.1.4	Expand the mandate of the Grow Green Team to include CEERP implementation.	COB	COMM	Short-term
8.1.5	Create targeted outreach programs based on energy use in residential, commercial, and industrial sectors.	COMM	COB	Medium-term
8.1.6	Develop data collection and monitoring protocol for measuring and reporting on community and corporate GHG emissions.	COB	COMM	Short-term
8.1.7	Coordinate the monitoring protocol with the monitoring and reporting for the Environmental Master Plan.	COB	COMM	Short-term
8.1.8	Commence the update of the CEERP every 5 years.	COB	COMM	Long-term
8.1.9	Explore a rewards based program to encourage individual and business behavioral changes.	COB	COMM	Medium-term

## 5.8 Roles: Working Together

The success of the CEERP depends on the combined efforts of the municipality, local utilities, industry, businesses, residents, and community stakeholders.

Consequently, a wide variety of local stakeholders were engaged in its development to:

- earn community buy-in for the vision and goals;
- grow the capacity of the community to implement the plan; and
- motivate the public and community stakeholders to act.

Guided by an extensive Engagement Plan (see CEERP Engagement Plan, 2019), various channels were developed to engage the appropriate stakeholders and community-at-large in the development of the CEERP.

The sub-section below provides an overview of the roles of different community sectors and stakeholders. Further discussion and details can be found under each Strategic Direction of the CEERP (see Section 5.4) as well as in the Action Plan Table (see Section 5.7).

### 5.8.1 What is the City of Brampton's Role?

While implementation is a community-wide effort, the City of Brampton is a key stakeholder and has five essential roles, which include community facilitation, municipal policy alignment, economic development, corporate leadership, and education.

#### *Community facilitator*

The City of Brampton is able to organize stakeholders to establish a vision and goals for its community. An important success factor in the implementation of broad, system-wide change is municipal endorsement and support of the vision and goals. The initiation and completion of the CEERP is a demonstration of this role.

#### *Municipal policy alignment*

The City of Brampton approves policies and by-laws that guide the growth and development of the community, including housing and transportation systems.

Consequently, the City has an important role in ensuring its policies and by-laws are aligned with the vision and goals of the Plan. By doing so, the City can establish a policy framework that supports and activates local stakeholders and product and service providers in the transitioning energy market.

#### *Economic development*

The City of Brampton, through their Economic Development department and partners, can play a key role in retaining and supporting existing businesses and attracting new businesses through the value-added opportunities identified by the Plan. An excellent example was the City of Brampton facilitating two Nordic Urban Labs to identify investment opportunities in Bramalea and Uptown during the development of the CEERP.

#### *Corporate leadership and role model*

The City has an important role in demonstrating corporate leadership in the community. The City can update its own internal policies and processes and apply standards in its capital projects and municipal operations (i.e. facilities, fleet, and transit) that reflect the CEERP objectives. The City of Brampton's Corporate Energy and Emissions Management Plan (2019 – 2024): A Zero Carbon Transition is an example of the commitment to the minimizing of energy use and emissions in existing and new facilities.

#### *Education*

The City of Brampton has many opportunities to engage with residents and business owners to promote the benefits of community energy planning and raise energy literacy. The City is in a position to be a reliable and trusted source of information and guidance during this energy transition and to communicate expectations and community benefits resulting from the CEERP, particularly its Priority Projects.

### 5.8.2 What is the Role of the Region of Peel?

The City of Brampton is a lower-tier municipality located in the Regional (upper-tier) Municipality of Peel. The Region of Peel works with residents and partners to create a healthy, safe and connected community for more than 1.5 million people and 175,000 businesses in the Cities of Brampton and Mississauga and the Town of Caledon. The Region provides daily and vital services, including water supply, wastewater and waste management, Regional roads and transportation, affordable housing support, long term care, and public health (chronic and infectious disease prevention), as well as Regional land use planning and growth management.

The Region of Peel provides a wide range of programs and services to those living and working in Peel, on the basis of cooperation with the local municipalities. The Region can lead and support, where appropriate, the identified actions that are in alignment with the Region's established long-term strategic framework and policies, which provides the foundation and basis for the delivery of Regional programs and services.

The Region of Peel, in solidarity with its local municipalities, declared a climate emergency in October 2019. At the same time, Regional Council approved its Climate Change Master Plan (CCMP) that has a corporate GHG reduction target of 45% below 2010 levels by 2030. Similar to Brampton's municipal operations, the Region's corporate emissions are a small percentage of community emissions, making "leading by example" a consistent theme of the two levels of government. To help strengthen the Region's position and support for community energy planning, the CCMP includes actions such as "enable alignment of Regional actions with transition towards diversified and decentralized energy systems".

With the seven strategic directions of the CEERP, there is clear alignment with Regional services and priorities, for example:

- Green Communities align with the Region's Official Plan policy amendments and growth management planning that will look to incorporate district energy planning and climate change considerations as part of achieving complete communities.

- Home and Building Efficiency relates to the state of good repair and building improvements that target energy efficiency and GHG reductions for Regionally-owned affordable housing complexes and other Regional facilities.
- Local Energy Supply and Distribution as an enabling action in the Region's Climate Change Master Plan and emerging direction in Region's Official Plan policy.
- Transportation Efficiency corresponds with the Region's Sustainable Transportation Strategy and opportunities with the Region's Goods Movement Task Force.
- Green Infrastructure relates to the direction in the Climate Change Master Plan to protect and increase green infrastructure throughout Peel, which includes implementing green infrastructure elements contained in the Region's future Stormwater Servicing Master Plan for Regional road infrastructure. It also supports the Region's investment in developing best practice urban forestry guidelines through the Peel Climate Change Partnership.

The Region's Office of Climate Change and Energy Management (OCCEM) builds upon climate change and energy management initiatives happening across Peel and integrates that work towards achieving climate change outcomes.

Working with Regional departments and community partners, OCCEM is:

- developing solutions to reduce GHG emissions;
- setting actions in place that will prepare Peel for changes in our weather and seasons;
- ensuring that the Region of Peel is positioned to respond to climate change; and
- ensuring climate change and energy management measures are effectively integrated and implemented into policy design and decision-making.

The installation of Electric Vehicle charging stations is just one way that the Region has taken action on climate change by reducing GHG emissions and helping build a greener, healthier, low-carbon community. There are

currently 43 EV charging stations across 11 Regional sites with two locations offering public charging during the daytime.

Ongoing consultation with the Region of Peel will continue to further define roles, service outcome alignment, and identify opportunities for collaboration with the City of Brampton as the CEERP moves into implementation phase.

### 5.8.3 What is the Role of Utilities?

Brampton's utilities play an integral role in the successful implementation of the CEERP and its near and mid-term Priority Projects. In Brampton, there are currently two energy utilities. Enbridge provides natural gas heating and Alectra provides electricity to Brampton homes and businesses.

Utilities provide energy conservation programs to better manage customers' energy consumption, and consequently, their carbon emissions. Their residential, municipal, institutional, commercial, and industrial customers benefit from advice on efficient and cost-effective energy use, incentives to help cover energy project costs, and enabling programs that promote lasting behaviour changes that lead to a culture of conservation and environmental sustainability.

Since 1995, energy efficiency and conservation programs from Enbridge Gas have saved their customers about 20 billion cubic metres of natural gas and reduced CO<sub>2</sub> emissions by about 40 million tonnes, lowering energy costs at the same time.

Collaborative utility and municipal-led energy efficiency programs have made significant contributions towards the advancement of municipal (and higher-level government) policy goals and energy efficiency and GHG reduction targets.

In relation to the Priority Projects, Enbridge's Home Retrofit Program promotes deep energy retrofits through a multitude of channels, such as HVAC contractors, residential energy auditors, and other product and service providers. Leveraging this program as a foundation for Brampton's Home and Building Efficiency Strategy will minimize

program duplication, optimize resources/program networks and process efficiencies, create new funding opportunities for customers, and gain higher participation and engagement from the community. Similarly, experiences with implementing their energy management program for small to very large industrial customers can be valuable in establishing the community of practice as part of the Industrial Efficiency project.

Alectra is also a key player as it distributes locally generated electricity. As an innovation hub for green technology solutions, their Green Energy and Technology Centre identifies, evaluates, develops, and accelerates emerging and clean energy solutions. Through grid innovation, Alectra will leverage grid modernization technologies to enable a more sustainable grid.

In 2015, Alectra launched a residential solar storage pilot, POWER.HOUSE. This is a fully integrated, digitally controlled solution that is providing key insights about the potential to deploy residential solar at scale, as well as determining consumers' readiness to take an active role in managing their homes' energy efficiency. The pilot evaluates the economic and grid benefits of residential solar storage for consumers and Ontario's electricity system.

Alectra's POWER.HOUSE Hybrid pilot shifts energy generation from large centralized GHG emission-intensive sources to decentralized, clean generation using solar panels, in-home EV charging stations, battery storage, dispatchable hybrid heating (dual fuels, gas and electric), and combined heat and power (CHP).

Alectra has demonstrated further energy innovation through its Alectra Drive for the Workplace program. The goal of Alectra Drive for the Workplace is to demonstrate the value of a smart EV charging system that manages the flow of electricity needed to serve the building and EV charging stations. This ensures that electricity costs are minimized while EV drivers have an easy and accessible charging solution. This program aims to encourage the adoption of EV technology while helping businesses to manage their energy costs.



Collaboration between Brampton and its utilities to develop well-designed programs is crucial to achieving CEERP's goals.

#### 5.8.4 What is the Development Industry Role?

Since Brampton's largest users of energy are transportation and residential uses, with the transportation sector representing 35% of source energy use and the residential sector representing 26% of source energy use, the design and construction of our communities and homes is an important aspect of reducing energy use and emissions.

Through responsible planning and management of environmental resources, the development industry can be a key driver in building green communities. They can plan for communities that strive for responsible construction and promote sustainable living, including elements such as green development standards (e.g. LEED, PassiveHouse), energy efficient community design, mixed uses, trails to promote active transportation, natural heritage conservation, urban infill projects, green rooftops, and alternative energy systems.

#### *Building Industry and Land Development Association*

The Building Industry and Land Development Association (BILD) is a leading voice of the home building, land development, and professional renovation industry in the Greater Toronto Area. BILD has more than 1,500 member companies from all corners of the industry. In addition to home builders, land developers, and professional RenoMark™ renovators, BILD members include financial and professional service organizations, trade contractors, and manufacturers and suppliers of all types of home-oriented products.

BILD's mission is to enhance the health, vitality and reputation of the home building, residential and non-residential land development, and professional renovation industry. It encourages innovations and excellence in the planning and building of sustainable communities and in the redevelopment and renovation of existing communities.



### 5.8.5 What is the Role of Business?

For a variety of reasons (consumer interest, high and volatile energy prices, and brand image/public relations) many businesses have taken actions to reduce their energy consumption and GHG emissions. Companies can reduce embedded emissions of their products by working with their suppliers to help reduce GHG emissions in the product's manufacturing, support and adopt circular economy business models, and lower emissions from transportation and logistics. Companies can also offer reusable or low emission products and services to customers and educate consumers through product labelling and tips that customers can take to reduce their carbon footprints.

### 5.8.6 What is the Role of Industry?

Industry contributes directly and indirectly (through consumption of electricity) to Brampton's GHG emissions. However, industries are continuously improving their energy efficiency through their corporate energy management standards. Companies of all sizes use energy audits to identify opportunities for reducing energy use. Companies can use benchmarking programs developed through trade associations to compare their operations with others, to the industry average, or to best practice, in order to improve energy efficiency. When industries improve energy efficiency, they are saving money as well as emissions.

Industries may consider energy recovery techniques such as heat, power, and fuel recovery. They can re-use the discarded heat in other processes on-site, or it can be used by other nearby industries in their processes. Cogeneration involves using energy losses in power production to generate heat and/or cold for industrial processes and district heating, which provides higher system efficiencies. Co-siting of industries can achieve GHG mitigation by integrating energy systems and allowing the use of byproducts as useful energy. Industries may also consider the use of new technologies which increases competitiveness while reducing GHG emissions and improving energy efficiency.

The City of Brampton can assist industries that are exploring opportunities to reduce their energy use and emissions by providing additional assistance when navigating the

planning process in order to achieve their energy and emissions reduction targets. The City can also advocate to other levels of government and promote joint outreach opportunities with other agencies to advise on the resources available to support them.

### 5.8.7 What is the Role of Institutions and Non-Profits?

Institutions and non-profit organizations within the GTA offer partnership opportunities and vital information to assist Brampton in achieving its CEERP objectives and targets. Below is just a snapshot of some of the leading institutions and non-profits working in the energy sector.

#### *Sheridan College*

Sheridan College is a primary partner in the development of the CEERP by providing funding and staff resources towards the completion of the plan. Sheridan will play an important role in assisting the City and the community in implementing many of the CEERP actions.

Founded in 1967, Sheridan has grown from a local college of 400 students to one of Ontario's leading postsecondary institutions, educating approximately 24,500 full-time and 18,500 continuing and part-time studies students every year on three campuses – Oakville, Brampton, and Mississauga. As an academic institution, employer, investor, and community partner, Sheridan strives to become the institutional model for how a 21st century organization embraces sustainability. It also aims to foster an institutional culture defined by informed and responsible decision making that reflects the crucial balance between economic, social, and environmental priorities, and has built its leadership and reputation by using their campuses as 'living laboratories' for sustainability transition, curricular innovation, and interdisciplinary teaching and learning.

The Davis Campus in Brampton is Sheridan's largest campus, home to more than 12,000 students. This campus is home to the applied health, community services, and engineering and technology programs. In 2017, Davis officially opened its new Skilled Trades Centre. That same year Sheridan completed its Energy Centre that showcases modern systems for the simultaneous production of thermal and electrical energy, and will also be used as an

educational tool for engineering technology programs, as well as a training facility for the numerous trades programs.

In 2016, Sheridan received federal and provincial funding to build on its established district energy expertise and infrastructure by reaching beyond its campus boundaries to collaborate with municipal and public partners in Brampton and Oakville. The goal of the project is to extend Sheridan's networks into community district energy nodes, establish appropriate governance, and validate a replicable and scalable model for academic-municipal collaboration on district energy.

### *Clean Air Council*

The Clean Air Council (CAC) is a network of over 30 municipalities and health units from across Ontario. Since 2000, CAC members have been working collaboratively on the development and implementation of clean air, sustainability, and resilience actions. The Clean Air Council is based on the premise that municipalities benefit from actions that reduce energy use, reduce emissions, make the movement of people and goods more efficient, and make communities more livable, competitive, and resilient.

CAC recently launched a new program called Collaboration on Home Energy Efficiency Retrofits in Ontario. The overall goal of this project is to collaboratively design a high-quality, multi-municipality pilot that will: a) assess the effectiveness of the Local Improvement Charge (LIC) financing powers in accelerating deep residential energy retrofits and b) provide insights and guidance regarding full-scale implementation. The priority focus will be on the residential sector in Ontario, both single-family and multi-unit.

### *The Atmospheric Fund*

The Atmospheric Fund (TAF) is a regional climate agency that invests in low-carbon solutions for the Greater Toronto and Hamilton Area and helps scale them up for broad implementation. TAF is experienced in collaborating with stakeholders in the private, public, and non-profit sectors who have ideas and opportunities for reducing carbon emissions. It advances the most promising concepts by investing, providing grants, influencing policies, and running programs. TAF is primarily focused on programs/projects that offer benefits beyond carbon reduction such as improving people's health, creating new green jobs, boosting urban resiliency, and contributing to a fair society.

### *Partners in Project Green*

The development of Partners in Project Green (PPG) was the culmination of more than a decade of partnership between the Greater Toronto Airports Authority (GTAA) and Toronto and Region Conservation Authority (TRCA). In 2008, after extensive consultation with businesses and various levels of government, Partners in Project Green: A Pearson Eco-Business Zone was officially launched with the goal of creating a Pearson Eco-Business Zone known for its competitive, high-performance, and eco-friendly business climate.

PPG is committed to helping businesses turn sustainable practices into bottom-line success. It brings like-minded organizations together to talk about sustainability issues, share creative ideas and success stories, and collaborate on green business initiatives. PPG's unique peer-to-peer learning and collaboration opportunities help businesses to achieve breakthrough results in energy performance, waste management, water stewardship, and stakeholder engagement.

### **5.8.8 What is the Role of Citizens?**

The CEERP requires buy-in from citizens since many of the changes to achieve energy efficiency and GHG emission reductions will need to be championed and implemented by residents. Through the 2040 Vision engagement process, Bramptonians expressed their support for the environment. Vision 1: Sustainability and the Environment states that in 2040, "Brampton will be a mosaic of sustainable urban places, sitting within an interconnected green park network, with its people as environmental stewards – targeting 'one-planet' living."

Achieving the CEERP targets and the Vision's "one-planet" living will require all Brampton residents to make behavioural changes to their everyday lives, including walking instead of driving to the corner store, carpooling, taking transit to work, or buying "green" products. It will also require larger decisions such as to purchase energy efficient appliances, undertaking home energy retrofits, and investing in an electric vehicle. Finally, it means getting more involved in the community, by planting trees, organizing a green event, and supporting the actions of leaders who strive to address climate change.

### 5.8.8 What is the Role of the Community Organization?

One of the CEERP's priority projects involves the establishment of a Community Organization to lead the development and implementation of select priority projects. As noted above, a number of CEERP objectives, targets, and priority projects will be achieved through actions taken by the City of Brampton, Region of Peel, utilities, business, developers, and residents. However, there is a gap in the capacity within the city to achieve some objectives, targets and priority projects. This includes the following priority projects:

1. Establish a system to deliver standardized retrofits to Brampton homeowners.
2. Develop Integrated Energy Master Plans for public facilities and private development.
3. Integrate District Energy Systems in appropriate locations within Brampton

The need for this type of Community Organization was first described in the Brampton 2040 Vision as the "Institute for Sustainable Brampton" (i.e. ISB).<sup>10</sup> The Vision described an entity intended to mobilize a massive, community-wide effort to shift the trajectory of the whole city by marshalling financial and social capital to secure the practical capacity for sustainability.

Recognizing the importance of the CEERP and the gaps in implementing some of the priority projects, a framework for a Community Organization based on the initial ISB vision was formed around energy and emissions action. This Community Organization, now renamed by the Community Taskforce as the Centre for Community Energy Transformation (CCET), will be an action oriented arms-length organization focused on creating a sustainable energy future with a mission to lead an inclusive suburban energy transformation.

The Community Organization will make it easier to develop those good ideas and one-off pilots that often get stuck, allowing them to be implemented more broadly and scaled up more quickly. For example, funding might support training for trades development in order to implement building retrofits.

The role of the Community Organization in implementing the CEERP is outlined on the following page.

Additional details and the framework of the Community Organization are provided in the City of Brampton's CCET report: Establishing a Centre for Community Energy Transformation: Report with Recommendations, 2020.



## Role of the Community Organization in Implementing the CEERP

- Program Planning and Delivery
  - Plan, coordinate, and deliver select 2020-2025 priority projects with partners
  - Specific projects are included in the Action Plan (attached to the CEERP), and include projects related to:
    - Home efficiency
    - Building efficiency
    - District energy
    - Low carbon energy sources
    - Industrial efficiency
    - Community outreach
    - Ensure program governance, funding, and resources align with the strategic objectives and priority projects
    - Provide strategic oversight and technical advisory services for project delivery
    - Access global knowledge base and subject matter experts
- Community Engagement and Communications
  - Build a network of cross-sector stakeholders and partners
  - Provide direction as well as strategic, promotional, and funding support to delivery partners
  - Secure funding opportunities from the private and public sector
  - Communicate and engage regularly with stakeholders, the public, and funding partners
  - Develop a brand and virtual presence
- Transparency and Accountability
  - Identify key performance metrics related to management and administration of priority projects
  - Validate business cases and verify results
  - Link and coordinate priority projects to identify resource efficiencies and accelerate implementation where possible
  - Report on progress to the public, investors, and funders
- Management
  - Anticipate and plan for future resourcing on an as-needed basis
  - Write and partner to submit grant applications
  - Develop a budget and medium to long-term revenue model

## 5.9 Getting There

### 5.9.1 Accelerating the Transition

The City of Brampton has been doing well with its actions as a corporation and now needs to accelerate the urban and energy transition envisioned in the Brampton 2040 Vision and the CEERP. To do so, the City needs to take certain actions (as identified in the above Action Plan) to prepare itself for the acceleration needed to achieve the goals of the CEERP.

These corporate actions will focus on five areas:

#### **1. Municipal resources (define and assign municipal resources)**

Successful implementation of the CEERP requires a city champion, resources, and support from staff and leadership.

The CEERP must be embedded in the organizational configuration and composition of City departments and their associated divisions. A City department is typically responsible for specific goals, responsibilities, and tasks relevant to its departmental mandate/function. The way the CEERP is positioned within the City structure will influence collaboration between departments, promote corporate awareness of environmental/energy initiatives and performance, and enhance public messaging about the priority of environmental and energy sustainability within the City.

It is recommended in the CEERP Action Plan that the City take the following actions to help the CEERP succeed in the long term:

- assign CEERP implementation to a specific department/division/section that will administer responsibility for each municipal priority project and facilitate interdepartmental collaboration, funding, communication, education, and reporting on the City's performance.
- identify staff resourcing gaps and allocate resources (e.g. staff and funding) to ensure that the CEERP municipal priority projects are completed.

#### **2. Build Awareness and Move Projects Forward (build awareness and move projects forward within and beyond the Corporation)**

Communication of CEERP goals, principles, and priority projects within the Corporation and to the community will be an important element of the CEERP's success.

Internal and external education must focus on engaging stakeholders and building support to undertake the CEERP's priority projects. The public and City staff must understand what they are expected to do, what supports are in place to assist them, and what benefits are expected from their actions.

It is recommended in the CEERP Action Plan that the City take the following actions to expand awareness and initiate action amongst its departments and staff and the community at large about the CEERP:

- assign department/division/section to act as an internal resource for CEERP education and outreach;
- establish a Community Organization to lead the development and implementation of select priority projects and champion the CEERP to Brampton residents, businesses, and stakeholders;
- develop a comprehensive communication strategy that highlights the benefits of implementing the CEERP, like economic or community resilience benefits;
- host an annual CEERP event in partnership with Brampton's Environment Advisory Committee to share and learn about best practices being implemented; and
- develop an annual environmental recognition program for businesses, institutions, and citizens.

### **3. Performance Monitoring (establish data collection and performance monitoring methods)**

Ongoing data collection, monitoring, and refinement of the priority projects over time is required to ensure effectiveness and to gauge the impact of the CEERP.

Quantitative tracking of Baseline data will demonstrate whether the city is making progress towards its 2041 targets and provide evidence to support additional initiatives.

It is recommended in the CEERP Action Plan that City take the following actions to establish the basis for successful long-term monitoring of progress:

- identify and assign responsibilities for monitoring of Corporate and Community CEERP targets, including data management and reporting;
- identify if there are corporate resources/ expertise to collect data and monitor energy usage/emissions;
- establish protocols for data collection, analysis, and reporting for each CEERP priority project;
- provide a CEERP progress snapshot to Council biennially;
- provide a comprehensive CEERP implementation progress report to Council every five years;
- align CEERP reporting with the Environmental Master Plan reporting process; and
- investigate opportunities to update the Council report template to incorporate climate change/environmental implications of development applications.

### **4. Budgeting and Decision-making Framework (detail a budgeting and decision-making framework)**

How Brampton budgets for and makes decisions about energy performance and emissions reduction initiatives and programs is fundamental to the implementation of the CEERP. Successful implementation of the CEERP will require a commitment of capital, staff, and institutional resources. The decision-making framework of each City department needs to closely consider the CEERP, as well as the cost of its action and inactions. The CEERP will also open up access to external funding resources such as provincial and federal funding programs, staff internships, and partnerships.

It is recommended in the CEERP Action Plan that the City take the following actions in order to provide support to the CEERP to assist with its long-term success:

- allocate a portion of the City's Environmental Reserve Fund to implement the CEERP's recommended priority projects;
- incorporate CEERP framework into the decision making process for all programs and projects.
- ensure annual City Budget report addresses how it contributes to achieving CEERP goals and targets;
- develop a strategy to secure external funding opportunities and partners to help supplement municipal resources for environmental initiatives; and
- require all City strategies and master plans to align with the CEERP.

## 5. Municipal Operations and Procurement (manage municipal operations and procurement standards)

The City of Brampton's corporate operations (e.g. facilities, fleet, and transit) contributes a small portion of Brampton's community energy use, approximately 2%. Nevertheless, the City has an important role to demonstrate leadership in the community.

In regards to its facilities, the City of Brampton has a Corporate Energy and Emissions Management Plan (2019 – 2024): A Zero Carbon Transition. This is an example of the City's commitment to reducing its energy use and emissions as it aims to achieve a zero-carbon transition for new and existing corporate facilities. It focuses on minimizing emissions and energy intensity, while maximizing cost recovery within its facilities construction, management, and operations. Through the Corporate Energy and Emissions Management Plan, the City will continue to work to reduce its own emissions and increase its energy efficiency as well as lead by example to help ease the community through the necessary energy transformation.

The City fleet is an important component of the services the City provides to the local community. The majority of vehicles in the fleet and many types of equipment (e.g. lawn mowers, leaf blowers) within the fleet currently rely on gasoline or diesel as its main source of energy. There is opportunity to improve emissions and energy use within the fleet. Internal actions recommended in the CEERP Action Plan include:

- develop a Green Purchasing Strategy and by-law to require climate change considerations;
- update the Fleet Strategy to reflect CEERP targets;
- develop operational procedures to minimize climate change, i.e. anti-idling bylaw for fleet; and
- develop a training program in the best practices and use of equipment that minimizes energy use and GHG emissions.

Transit services currently operates over 400 buses, including 120 diesel-electric hybrid Züm rapid transit buses.

Brampton's transit is still predominately fueled by diesel, however, in 2019 the City of Brampton launched its electric bus pilot project that will include eight electric busses and four high-powered overhead on route charging stations. CEERP's Transportation Efficiency targets emphasizes the importance of transitioning towards an electric transit system, as the combined measures of increasing transit use and the electrification of the transit system can make significant headway towards reducing Brampton Transit emissions and meeting the CEERP goals. It is recommended that the City work towards transitioning to a fully electric transit system, starting with updating the Transportation Master Plan to include a pathway to achieve this.

In addition to increasing the energy efficiency and reducing the GHG emission of facilities, fleet, and transit, the City will need to apply the CEERP goals and objectives to its policies and plans. The CEERP supports and builds on the intent of many other strategic City plans and studies. Other City plans, in their updates or in their implementation, will need to reference the CEERP, particularly recognizing 2041 targets and priority projects. Cross-referencing and supporting the CEERP through the implementation of other plans will ensure that the targets and priority projects of the CEERP are entrenched in the City's decision and policy-making across its departments.



## 5.10 Monitoring and Evaluating to 2025

Individual and independent action on climate change has been and will continue to be important. However, a primary message of the CEERP is that the scale of action required to address the climate emergency requires coordinated and combined effort by the entire city.

To ensure that the CEERP does not “sit on a shelf” and implementation of the 2020-2025 priority projects are achieved and sustained, it is necessary to dedicate resources to oversee, coordinate, and report on overall progress. These resources range from political, regional, municipal, and community stakeholders to individuals. As well, there is a need for monitoring, measuring processes, providing regular updates, and implementation tools.

### 5.10.1 Staff Time

The majority of priority projects outlined in this plan will require staff time to implement. This time could be spent implementing the action, overseeing its implementation by another group, or working in partnership with other organizations to complete the project. Each action has been assigned a Lead at the City, the Region or within the community that will be responsible for its implementation. Additional staff resources may be required for items that cannot be integrated into annual work plans.

### 5.10.2 Monitoring and Measuring Progress

The City is committed to tangible results. It will monitor progress towards its 2041 objectives and targets by integrating the CEERP reporting process with that of the Environmental Master Plan to share the status of performance at regular intervals, including:

- an update of progress towards targets, with direct reference to priority projects;
- sharing success stories;
- sharing areas for improvement or future study; and
- reporting on collaboration/partnerships.

To measure Brampton’s progress over time, the City has developed a set of objectives, targets, and priority projects for each of the strategic directions:

- Green Communities
- Transportation Efficiency
- Home and Building Efficiency
- Local Energy Supply & Distribution
- Industrial Efficiency
- Green Infrastructure
- Communications, Engagement, and Monitoring



### 5.9.3 Updates

The City will review/update the CEERP every five years to:

- demonstrate achievement/progress towards the objectives and targets and revise as appropriate;
- integrate new climate science and risks;
- include ideas and work from partners and the community; and
- align with other important policy and guidance documents at the City, including:
  - Official Plan,
  - Term of Council Priorities, and
  - Other Master Plans.

### 5.9.4 Implementation

According to the National Report on Community Energy Plan Implementation<sup>11</sup>, the majority of communities with a Community Energy Plan are successfully implementing planning and policy measures (e.g. land-use policies such as an infill strategy, complete streets policies, design standards). Communities have less success implementing local financial incentives, renewable energy, district energy, and combined heat and power projects. The CCET (i.e. Community Organization) will play an important role in delivering these projects.

The study found other success factors that support the implementation of plans include:

- a champion or support from staff and leadership;
- close alignment with other planning documents; and
- plans that highlight co-benefits of actions (i.e. economic benefits, community resilience).

In moving forward, the City, the Community Organization, and other partners will ensure each department, utility, industry, business, resident, and community stakeholder clearly understand its responsibility for data collection and how that data should be organized and maintained for monitoring purposes to be used for annual and long-term reporting.

In reporting on energy and emissions reduction performance and progress, the City will ensure that the information provided is easily understood and relates to tangible outcomes. Where appropriate, the data will be stated in absolutes and will be extrapolated to reference information as percentages of the total population to ensure it remains relevant as the city grows.

## 5.11 Conclusion

In 2014, the Brampton Grow Green Environmental Master Plan set the stage for a more healthy, resilient and environmentally sustainable Brampton.

While much remains to be accomplished, progress has been made in implementing Brampton Grow Green, moving us closer to achieving our ambitious targets. With this CEERP, Brampton is much closer to achieving our Grow Green vision of “a community that will conserve, enhance and balance our natural and built environments to create a healthy, sustainable city. We will carry out our responsibilities to meet the needs of the present community without compromising the ability of future generations to meet their own needs.”

The City of Brampton has a lot to be proud of, including:

- In June 2019, City Council declared a climate emergency and a GHG emission reduction target of 80% by 2050.
- In partnership with Sheridan College, the City developed this Community Energy and Emissions Reduction Plan.
- The City is also working in partnership with Sheridan College and the Region of Peel to define and establish a Community Organization, the Centre for Community Energy Transformation (CCET), based on the Institute for Sustainable Brampton (ISB) recommended by the Brampton 2040 Vision.
- In November 2019, the City signed the declaration to join the Global Covenant of Mayors for Climate and Energy.
- In January 2020, Brampton Eco Park Strategy was approved, which will implement a green framework by better integrating and enhancing natural heritage spaces into our community.
- In February 2020, the Brampton One Million Trees Program was approved, which will enhance the urban forest through a robust tree planting strategy.

As Brampton moves forward with achieving the economic, emissions, and energy saving goals of the CEERP, we also need to look beyond our targets and work towards climate neutrality. By adopting the CEERP, Brampton will be joining the ranks of the global community of cities taking a leadership role in the fight against climate change. We can set an example as to what a successful, growing, suburban city looks like for others to follow.

The CEERP provides a more sustainable, urban, and vibrant future for our city, aligned with nature and “one planet” living. Our diverse community is energized and ready to take action towards energy and emissions reduction. We believe in the power of connections, and our partnerships will allow us to work towards our vision of an energy future that is clean, sustainable, resilient, and supports the Brampton 2040 Vision.

At the time of writing this report, the Covid-19 pandemic was occurring. It has shown us a glimpse of the impacts future climate threats could have on our communities. It has taught us about the urgency of taking swift action collectively and the need to build resilient communities. If we wait to see further impacts of climate change, it will be too late.

## Notes

<sup>1</sup> Source: IPCC. (2018). *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels*. [https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15\\_Full\\_Report\\_High\\_Res.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf)

<sup>2</sup> Source: World Economic Forum. (Dec, 2019). *The Net-Zero Challenge: Global Climate Action at a Crossroads (Part 1)*. Briefing Paper. [http://www3.weforum.org/docs/WEF\\_The\\_Net\\_Zero\\_Challenge\\_Part1.pdf](http://www3.weforum.org/docs/WEF_The_Net_Zero_Challenge_Part1.pdf)

<sup>3</sup> Source: World Economic Forum, (Dec, 2019).

<sup>4</sup> Source: Government of Canada. (2016). *Canada's Mid-Century Long-Term Low-Greenhouse Gas Development Strategy*. [http://unfccc.int/files/focus/long-term\\_strategies/application/pdf/canadas\\_mid-century\\_long-term\\_strategy.pdf](http://unfccc.int/files/focus/long-term_strategies/application/pdf/canadas_mid-century_long-term_strategy.pdf)

<sup>5</sup> "green" as in more nature, trees and natural systems present.

<sup>6</sup> Source: City of Brampton. (2015). *Transportation Master Plan*.

<sup>7</sup> Source: IEA. (n.d). "Energy efficiency: The first fuel of a sustainable global energy system". International Energy Agency. Retrieved from: <https://www.iea.org/topics/energyefficiency/>

<sup>8</sup> Source: TRCA.(2011).Peel Region Urban Forest Strategy

<sup>9</sup> Source: Natural Resources Canada. (2020). "Residential Secondary Energy Use (Final Demand) by Energy Source and End Use". Natural Resources Canada website. Retrieved from: <https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=HB&sector=res&juris=00&rn=1&page=0>

<sup>10</sup> Though described in the Brampton 2040 Vision as the Institute for Sustainable Brampton and referred to as the Community Organization throughout this plan, the final name is subject to change.

<sup>11</sup> Source: Quest. (2015). *National Report on Policies Supporting Community Energy Plan Implementation*. [https://questcanada.org/wp-content/uploads/2018/08/2015\\_National-Report-on-Policies-Supporting-Community-Energy-Plan-Implementation\\_Full\\_Report.pdf](https://questcanada.org/wp-content/uploads/2018/08/2015_National-Report-on-Policies-Supporting-Community-Energy-Plan-Implementation_Full_Report.pdf)