

TransformTO

2019 Implementation Update

City of Toronto
Environment and Energy Division

June 2020

Transform TO: 2019 Implementation Update

TransformTO

TransformTO is Toronto's climate action strategy to reduce local greenhouse gas emissions, increase climate resilience, improve our health, grow our economy, and improve social equity. This update outlines progress on the implementation of TransformTO during 2019.

In October 2019, the Toronto City Council declared a climate emergency, deepening the City's commitment to addressing climate change. As part of the climate emergency declaration, Toronto's long-term greenhouse gas (GHG) reduction target was revised. The City's targets (based on 1990 levels) are:

- 30 per cent by 2020
- 65 per cent by 2030
- Net zero by 2050, or sooner

Achieving these targets will require transformational changes in how we live, work, build and commute, and everyone will have a role in transforming Toronto into a low-carbon city.

2019 Implementation Update

This update provides a summary of TransformTO implementation progress in 2019. It follows the comprehensive *TransformTO: Climate Action for a Healthy, Equitable and Prosperous Toronto (Implementation Update 2017 and 2018)* that was released in 2019 and can be found on the Environment and Energy website¹.

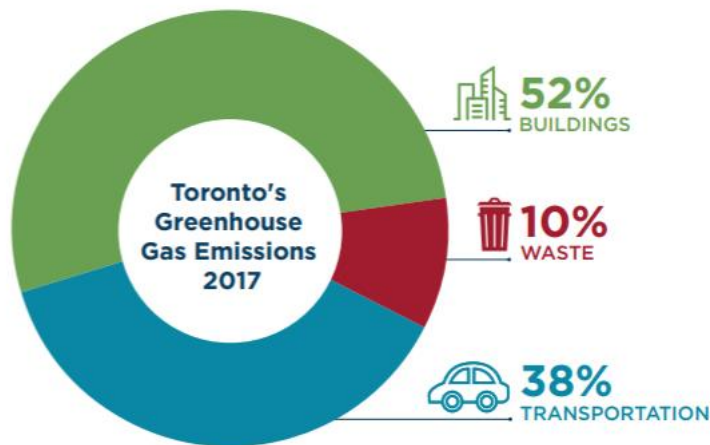
This summary updates key performance indicators (KPIs) that were introduced in the 2018 TransformTO Update, and it highlights some key "project profile" examples of TransformTO achievements in 2019. The update is divided into two parts. Part 1 covers community-facing programs and initiatives, and Part 2 covers City of Toronto Leading by Example activities, focused on City facilities and operations. Each part details progress with KPIs and provides some project profiles in key climate action areas.

¹ <https://www.toronto.ca/wp-content/uploads/2020/02/92f8-TransformTO-Climate-Action-for-a-Healthy-Equitable-Prosperous-Toronto-Implementation-Update-2017-and-2018.pdf>

Progress Towards a Low-Carbon Toronto

TransformTO identifies a series of long-term goals and short-term actions to reduce community-wide greenhouse gas emissions in key sectors and set Toronto on the path to a low-carbon, resilient, healthy, equitable and prosperous future. As the examples highlighted in this update demonstrate, TransformTO has momentum and implementation continues to move ahead in all action areas.

According to the most recent community-wide GHG inventory, buildings are the largest source of GHG emissions in Toronto (based on 2017² data). Buildings are responsible for just over half (52%) of the GHG emitted in Toronto. Transportation sources in Toronto are responsible for just over one third (38%) of local GHG emissions, and waste is responsible for an estimated 10% of GHG emissions.



Community-wide GHG emissions in 2017 were 44% lower than the 1990 baseline. This reduction reflects the cumulative impact of efforts by all orders of government including the City of Toronto, along with the significant response of community and private-sector actors and methodological changes. These emission reductions happened in the context of a growing city and growing economy.

While these achievements have exceeded the 2020 short-term target, a great challenge remains to transform Toronto into a net-zero carbon and resilient city.

² The City of Toronto uses an internationally recognized methodology to calculate greenhouse gas emissions. This data is received approximately 18 months after the end of the calendar year being measured. As a result, 2018 data is not available until mid-2020.

Part 1: Progress Towards TransformTO Long-Term Goals

TransformTO Goal		Indicator	Measure	Baseline (2016)	Indicator (2018)	Indicator ^a (2019)
Buildings	1	100% of new buildings are designed and built to be near zero GHG emissions by 2030	Decreased average GHG intensity of new construction	Average GHG Intensity (kilograms per square metre) of new building development applications ^b	23 kg/m ²	19 kg/m ²
			Increased number of near net zero buildings	Number of applications pursuing Toronto Green Standard near-zero pathway (tier 4) ^c	0	1 ^d
	2	100% of existing buildings are retrofitted to the highest emission reduction technically feasible, on average achieving a 40% energy performance improvement over 2017 levels, while limiting affordability impacts to residents, by 2050	Decreased tonnes of CO ₂ e from buildings sector ^e	Total tonnes of CO ₂ e from all buildings ^f	8,150,000 tonnes of CO ₂ e	7,900,000 tonnes of CO ₂ e (2017)
			Decreased GHG intensity of privately owned buildings	Weather normalized average energy use intensity for all buildings over 100,000 square feet ^g	N/A ^h	94 kBtu/ft ² (2018)
Energy	3	75% of community-wide energy use is derived from renewable or low-carbon sources by 2050	Increased percentage of energy derived from renewable or low-carbon sources	Percentage of community-wide energy derived from renewable or low-carbon ⁱ	25% Low-carbon 17% Renewable	25% Low-carbon 17% Renewable (2017) ^j
	4	30% of total floor space community-wide – residential and commercial – will be	Increased percentage of floor space connected to low-carbon thermal energy	Percentage of community-wide floor space energy derived from renewable or low-carbon ^k	2%	2% (2017)

TransformTO Goal		Indicator	Measure	Baseline (2016)	Indicator (2018)	Indicator ^a (2019)
		connected to low-carbon thermal energy by 2050	Increased total square metres of floor space connected to low-carbon thermal energy	Total square metres of floor space connected to low-carbon thermal energy ^l	4-6 million square metres	4-6 million square metres
Transportation	5	100% of transportation options - including public transit and personal vehicles - use low or zero-carbon energy sources	Decreased tonnes of CO ₂ e from transportation sector	Total tonnes of CO ₂ e from transportation sector ^e	6,400,000 tonnes of CO ₂ e	5,700,000 tonnes of CO ₂ e (2017)
			Increased number of low or zero-carbon personal vehicles	Number of electric private vehicles in Toronto ^m	1,600	6,200 (2018)
			Increased number of low or zero-carbon public transit vehicles	Number of low or zero-carbon transit vehicles ⁿ	0	0
	6	Active transportation accounts for 75% of trips under 5 km city-wide by 2050	Increased percentage of active transportation used for trips under 5km	Percentage of commuting trips under 5km by walk or cycle ^o	37%	37% (2016)
Waste	7	95% of waste is diverted in all sectors – residential, institutional, commercial and industrial - by 2050	Decreased GHG emissions from waste	Total tonnes of CO ₂ e from waste	3,700,000 tonnes of CO ₂ e	1,500,000 tonnes of CO ₂ e ^p (2017)
			Increase in residential waste diversion	Percentage of residential waste diversion ^q	52%	53% (2017)

^a Data is from 2019 unless otherwise indicated.

^b Greenhouse gas intensity (GHGI) is a measure of the total amount of GHG emissions associated with a building's operational energy use, per unit of floor space, and is calculated using an emissions factor for the specific energy sources typically used by the building (e.g. grid electricity, natural gas). In this way, it accounts for the performance of different fuels – for example, renewable sources of energy have a low carbon intensity, while natural gas has a higher carbon intensity. Using a GHGI metric therefore encourages the use of low carbon energy, on-site renewable energy, and energy efficient building envelopes and components. A low GHGI, expressed in kg/m²/year, indicates a building with low operational GHG emissions. In the table, this calculation represents an average of GHGI for all development proposals received under the Toronto Green Standard in a calendar year. Actual building performance may vary from development proposal.

^c This measure includes building applications that are submitted and reviewed that meet the Toronto Green Standard tier 4. The Toronto Green Standard's implementation is designed to include updates to the standard, with higher performance standards in each version. The City's Zero Emissions Building Framework sets out a pathway for new buildings to be designed to near zero emissions levels by 2030. Four tiers of increasing performance were developed to reflect the

need to update building performance targets every four years to reach the zero emissions target. Every four years, a new version of the Toronto Green Standard will come into effect, raising the minimum performance standards until near zero emissions designs become mandatory starting in 2030. In May 2018, Toronto Green Standard version 3 came into effect.

^d In 2019, the Environment and Energy Division reviewed a total of 84 building applications, including 78 for TGS Tier 1, 5 for Tier 2, 0 for Tier 3 and 1 for Tier 4.

^e CO₂e, or carbon dioxide equivalent, is a standard unit for measuring carbon footprints to express the impact of each different greenhouse gas in terms of the amount of CO₂ that would create the same amount of warming.

^f The City of Toronto uses an internationally recognized methodology to calculate greenhouse gas emissions. This data is received approximately 18 months after the end of the calendar year being measured. As a result, 2018 data is not available until mid-2020.

^g Site Energy Use Intensity (EUI) expresses a building's energy use as a function of its size, and is calculated by dividing the total energy consumed by the building in one year by the total gross floor area of the building. A lower EUI indicates a more efficient building. In 2019, the Province of Ontario's Energy & Water Reporting and Benchmarking (EWRB) regulation was updated to require privately owned buildings within the City of Toronto which are over 100,000 square feet in size to self-report. More information will become available in the future as the regulation expands to include more building sizes. The City of Toronto will further analyze and report on this data as it becomes available.

^h Since the EWRB regulation was updated in 2019, there is no 2016 baseline for this metric. As a result, the most recent data is the new baseline.

ⁱ This percentage is determined by calculating the portion of all energy sources (including mobile fuels) that is low-carbon or renewable. For this calculation, renewable energy is understood as energy that is from a non-fossil fuel and is renewable while low-carbon energy is understood as non-fossil fuel sourced energy, including nuclear.

^j Data on the electrical grid mix for 2018 is not yet available.

^k Based on an estimate of gross floor area connected to low-carbon thermal energy networks (district energy) and standalone installations (e.g. geo-exchange system for a building). Information was obtained directly from system owners where possible. The accuracy of this information will increase through continued coordination and partnership with system owners and energy developers.

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^m This is the number of active electric vehicle registrations in the city of Toronto, including both plug-in hybrid electric vehicles (PHEV) and battery electric vehicles (BEV). Data provided by the Ontario Ministry of Transportation (MTO).

ⁿ Data provided by the Toronto Transit Commission. The TTC placed orders from three companies for a total of 60 electric buses to be delivered by the end of March, 2020. As of December 31, 2019, 23 buses were received, with 17 of these put into service.

^o Data from the Transportation Tomorrow Survey 2016, including all trips from home to work and trips from home to school that are less than 5km by walking or cycling. The survey is updated every five years.

^p Compared to 2016, this is a reduction of half of the emissions reported. This is due largely to changes in methodology where the contribution of privately collected and managed waste has been adjusted to better reflect the contribution of waste from the private sector.

⁹ This diversion rate represents the amount of diverted tonnes achieved by both single-family homes and multi-residential buildings (categorized as having nine or more units). This breaks down into a 64 per cent diversion rate for residents living in single-family homes and 28 per cent for residents living in multi-residential buildings. This diversion rate does not include waste collected at institutional, commercial and industrial facilities as diversion information is not available for privately collected waste.

Project Profiles

Buildings

Green Will Initiative

The Green Will Initiative (GWI) is a City of Toronto program that is driving public and private sector building portfolios across Toronto to net zero greenhouse gas (GHG) emissions. The GWI was announced by Mayor John Tory in October 2019, prior to Toronto City Council's Climate Emergency Declaration and the C40 World Mayors Summit.

Eleven major building portfolio owners with over 4,500 buildings and 320 million square feet of building space have committed to accelerate GHG emissions reductions through the GWI. City staff will support each building portfolio through recognition, collaboration and building a pathway to net zero based on the specific needs of each participant.

The GWI was launched in early 2020 and the development of Pathway to Net Zero Plans has started. Amongst the first cohort of participants, the City of Toronto building portfolio is leading by example and was the first to finalize and sign off on their Pathway to Net Zero Plan.

York University's McEwen Building

The Rob and Cheryl McEwen Graduate Study and Research Building at York University's Schulich School of Business is a showcase of advanced new construction that demonstrates the power of integrated design, where the various disciplines (architecture, engineering, energy modelling) are coordinated early in the design process to create a more holistic and sustainable building design. The Baird Sampson Neuert architects-designed building far surpasses the minimum energy and emissions performance requirements of the Toronto Green Standard (TGS). Though only subject to TGS Version 2, the estimated performance of the building would exceed Tier 3 of TGS Version 3. For context, this will not be the minimum requirement for new development until 2026.

Through the Independent Electricity System Operator High Performance New Construction (HPNC) Program, City staff in Environment and Energy assisted York University in obtaining incentives of over \$110,000 for this project. The modelled energy performance – which must exceed the National Energy Code of Canada for Buildings by at least 13% – showed an improvement of



McEwen Building at York University's Schulich School of Business (Baird Sampson Neuert architects)

over 52% when compared to the baseline of a typical building in this category.

Key to achieving this level of performance is a number of innovative features, such as optimized solar orientation, triple-glazed windows, a concrete structure for thermal mass, low-energy heating and cooling, and a 27-metre solar chimney, which drives effective natural ventilation throughout all occupied spaces and preheats ventilation air in winter months. The design also allows for the future addition of solar photovoltaic arrays and a geo-exchange system, which could achieve net-zero energy and carbon status.

The integrated design of the McEwen Building reduces energy use and emissions, and improves comfort for occupants, all while providing a superb learning environment with thermally comfortable and quiet classrooms. The McEwen Building officially opened in January 2019.

Toronto Community Housing Passive House Pilot at Alexandra Park

Toronto Community Housing Corporation (TCHC), Canada's largest provider of social housing, is exploring the integration of Passive House principles into the design and construction of new residential projects. The Toronto Green Standard has required that high performance building principles, objectives and techniques are to be adopted for all new buildings constructed by 2030. TCHC is currently revitalizing the Alexandra Park community and as an initial part of Phase 2, is seeking to construct a pilot project consisting of 21 townhome units that will be Passive House certified.

Passive House is an international construction standard that is focused on very high energy efficiency and rates of fresh air ventilation, in service of occupant comfort and resiliency. Passive House projects have reported heating and cooling energy savings of up to 90% compared to a typical building, and up to 75% compared to conventional new builds.

Passive House buildings require the exterior walls to be of exceptional quality, with high insulation value, strategic shading, triple glazed windows and meticulous attention to detail in order to prevent energy loss due to drafts or thermally conductive materials. Heat gains from the sun or other internal heat sources are taken into account, as is heat recovered from exhaust air or waste water. This can make conventional heating systems unnecessary throughout even the coldest of winters.

In 2019, a robust procurement strategy was developed to commission an integrated multidisciplinary consultant team to deliver the Passive House pilot. Design began in early 2020. It is intended that lessons learned from the pilot project will be incorporated into the TCHC Design Guideline and Construction Specification for application to future construction projects undertaken by or on behalf of TCHC.

BetterHomesTO

To achieve Transform TO targets, including net zero by 2050, all existing homes in Toronto must be retrofitted. In late 2019 the City of Toronto launched BetterHomesTO, a multi-partner program that aims to help homeowners make their homes more energy efficient.

BetterHomesTO offers a comprehensive online resource where Toronto homeowners can find information, tools and resources to help them learn about and undertake home energy retrofits (31 retrofits in all) and access all the programs, rebates and incentives offered by

the City and its partners. This includes access to HELP, the City's Home Energy Loan Program, which offers financing of up to up to \$75,000 to cover the cover the cost of home energy efficiency improvements.

A net zero home is comfortable, healthier and better for the environment because all the efficient features work together to lower energy consumption, reduce greenhouse gas emissions and shrink the home's carbon footprint. BetterHomesTO partners include Enbridge Gas Inc., Humber College, Toronto Hydro, Clean Air Partnership, University of Toronto Building Industry and Land Development (BILD) Association GTA, Canadian Home Builders' Association, ecobee, School for Social Entrepreneurs, and The Roots Collaborative.

Energy

Creative Energy's Mirvish Village District Energy System

Redevelopment of the Honest Ed's department store at Bathurst Street and Bloor Street will see the creation of nearly one million square feet of purpose-built rental housing and retail space. Currently under construction, the Westbank Corporation development will be supplied with low-carbon heating and cooling through a thermal energy network where waste heat is heat recovered from the process of electricity generation.

By making use of a combined heat and power (CHP) plant, the entire development will be supplied with low-carbon waste heat recovered from the CHP unit, and a reliable, resilient power source. For a typical natural gas power plant, heat is generated as a by-product of the electricity, and is allowed to escape into the atmosphere. In this development with CHP, most of the heat will be captured and used for space/water heating, making use of the heat by-product and significantly lowering the demand for conventionally generated heat. In addition, the energy centre was designed so that additional equipment can be added over time in order to expand the district energy system to other buildings in the area.

Creative Energy, a district energy company that has provided heating to Downtown Vancouver for over 50 years, is representative of an emerging actor in Toronto: the energy developer. Under this innovative arrangement, energy developers cover the capital costs of low-carbon heating and cooling and see a return on investment over time through a contract with the unit owners. The Energy Developer's capital costs are eventually recovered, and they are also able to earn a return, while the unit owners pay the same or less on their monthly utility bills. This project marks an important milestone for Toronto as it will be the first new district energy system delivered entirely by an energy developer.



Rendering of Mirvish Village. (Credit: Creative Energy)

Transportation

Toronto's First Electric Vehicle Strategy

Toronto's first Electric Vehicle (EV) Strategy was developed over 2019 and approved by City Council in early 2020. It was co-created under the leadership of the Environment and Energy Division with an Electric Vehicle Working Group of over 20 City divisions, agencies and corporations, and external stakeholders. It identifies actions that need to be taken to ensure Toronto is prepared for the global shift towards electric mobility and achieves a key TransformTO goal: 100% of transportation uses zero-carbon energy sources by 2050.

The transportation sector is responsible for over a third of greenhouse gas emissions in Toronto, and close to 80% of transportation emissions are from private passenger vehicles. Supporting the shift to EVs can lead to a number of benefits for the City and its residents and businesses. Local GHG emissions for EVs are much lower than those of gasoline vehicles. Resident health can benefit from transportation electrification due to air quality improvements, noise pollution reduction, and a reduction in the urban heat island effect. As EVs cost less to operate and maintain, they have a lower overall ownership cost creating spending power for EVs owners.

With a focus on the electrification of passenger vehicles, the EV Strategy identifies ten actions the City can take to increase charging availability, address cost and convenience barriers, increase public awareness and education, and create economic opportunities that will benefit the local economy.

Adequate access to charging infrastructure is a key barrier to EV adoption. While most charging occurs at home, many residents do not have reliable access to home charging infrastructure. In response to this, the City of Toronto worked with Toronto Hydro in 2019 on planning and implementing its on-street EV charging pilot project in residential areas. Thirteen curbside EV chargers are expected to be installed in the Beaches-East York, Spadina-Fort York, and Toronto-Danforth neighbourhoods with a launch anticipated in 2020. This pilot should assist the City in assessing EV charging frequency and demand, EV parking space selection, on-street EV charging station operation and maintenance, as well as related regulation and enforcement issues. If successful, the pilot will pave the way for a larger-scale roll-out of EV charging infrastructure in Toronto.

The City recently launched a Workplace EV Charging Program at City Hall and Metro Hall to provide City employees the option to charge their personal plug-in vehicles at work. Improving the availability of EV charging infrastructure can help increase the proportion of consumers willing and able to use EVs relative to fossil-fuel based vehicles.

City of Toronto Cycling Network

Toronto City Council approved the Cycling Network Plan Update in July 2019, which provides a new timeframe to improve road work coordination, accountability, and implementation for cycling infrastructure. The Cycling Network Plan, developed and implemented by Transportation Services, consists of a longer-term overall proposed network, as well as a detailed three year rolling implementation program (currently 2019 to 2021).

As part of network implementation, approximately 44 lane km of new or upgraded cycling infrastructure was added in 2019. This includes new bike lanes on Scarlett Road and Lawrence Avenue East, and upgrades to existing bike lanes on Royal York Road, Harbord Street and Bloor Street West. Several more cycling infrastructure projects are scheduled to go before City Council in 2020, including the Bloor West Bikeway Extension, which would extend the existing Bloor Bike Lanes westward by 4.5 km (9 km of cycle lanes).

More people are riding bicycles in Toronto than ever before, especially where new or improved cycling infrastructure has been provided. After the installation of the Richmond Adelaide cycle tracks in 2014, daily ridership between Bathurst Street and University Avenue increased from just over 400 daily cyclists to 4,780. After the Bloor Street Bike Lanes pilot area (Avenue Road to Shaw Street) was installed in 2016, ridership increased from 3,300 to over 6,000 cyclists per day. In some Toronto neighbourhoods, over 20% of trips are now taken by bicycle.

Cycling is a sustainable form of transportation that generates no emissions and promotes healthy, active lifestyles. Continuing to increase and enhance cycling infrastructure will be an essential component of achieving the TransformTO transportation goal of 75% of trips under 5 km by active transportation by 2050.



Recently constructed permanent cycle track on Bloor Street West at Brunswick Avenue.

Engagement and Collaboration

TransformTO Reference Panel on Climate Action

The TransformTO Reference Panel on Climate Action was created in the summer of 2019. The Panel was made up of a group of 30 randomly selected Torontonians to learn and discuss ways that, in the coming years, their City government can help reduce Toronto's greenhouse gas emissions. Panel members were randomly selected to broadly represent the demographics of Toronto, including members with a variety of views and opinions on climate change. The Reference Panel was developed to help shape, along with stakeholders, experts and the public, what actions will be recommended to City Council.

The Reference Panel convened for three days, and was presented with information about how the City of Toronto is currently addressing greenhouse gas emissions. Participants were asked to examine several new actions that City staff were considering, and panelists were also able to introduce their own ideas, and were free to recommend changes to any of the City's climate-related efforts that were already in progress.

Despite the variety of perspectives amongst the group members, the Panel endorsed, and sometimes recommended strengthening, a number of significant municipal actions. These included proposals on retrofitting existing buildings, providing incentive programs for retrofits, and improving public transit to reduce reliance on personal car use, among other recommendations. The Panel's final report

calls on the City to do more to encourage and enable personal, neighbourhood, and corporate action. Panelists recognized that progress will be more consistent if individuals, neighbourhood groups, companies, and governments are all visibly involved. The panel encouraged the City to get creative and be collaborative so climate action is both top-down and bottom-up.

Panelists also emphasized the importance of practical, visible, incremental progress. The Panel approached the TransformTO Strategy as an exercise in momentum-building, calling on their City government to actively demonstrate action and results in a number of different climate-related policy areas, as a way to lay a foundation for bolder and more significant actions in the future.

More information, including the TransformTO Reference Panel on Climate Action Final Report, can be found at toronto.ca/TransformTO.

Funding Community Climate Actions

The Neighbourhood Climate Action Grants (NCAG) aim to increase awareness and engagement on climate action at the local level by funding resident-led projects, activities and events. Through these actions, the program hopes to reduce harmful greenhouse gas emissions, educate and engage the public on climate change and climate action, and advance the principles, priorities and actions of TransformTO and the Toronto Strong Neighbourhoods Strategy.

In 2019, the NCAG program received 40 applications. A total of \$101,689.50 was distributed to fifteen resident-led groups, representing 16 Neighbourhood Improvement Areas. An average of \$6,800 in funds were received, which funded projects including educational workshops, youth engagement, cycling clinics, neighbourhood summits and fairs, local research and art installations. An online survey distributed to applicants, funded groups, Planning Table members, City staff and community networks revealed that 92% of respondents recommended the grant program to continue in future years.

Proposed Partnership with the Toronto District School Board (TDSB)

The Toronto District School Board is in support of TransformTO and the City's declaration of a climate emergency, and EED Outreach & Engagement staff have been engaged with TDSB staff, teachers and interested parents for several years. As demonstrated in their school pilot project in late-2019, the TDSB has been, on an ongoing basis, examining ways to ensure that all students and parents understand climate change and the relevant actions necessary. At this time, EED is proposing *[letter to be finalized]* a formal partnership between the TDSB and the City of Toronto in exploring and inspiring community climate action. The vision for this partnership may include the following:

- Shared messaging on climate action to students, parents and communities
- Co-hosted events and workshops to allow students, parents and local communities to engage on climate change and climate action
- Professional development for staff on city-wide climate action and messaging
- Support for student-led civic engagement at the municipal level
- Shared resources on best practices in climate action and community / youth engagement

Part 2: Progress Towards TransformTO Leadership Goals

Sector	TransformTO Goal	Indicator	Baseline ^r (2016)	Indicator ^s (2018)	Indicator ^t (2019)
Buildings	100% of new City-owned buildings are designed and built to be near-zero GHG emissions by 2026	Average GHG Intensity (kilograms per square metre) of new buildings ^u	28 kgCO ₂ /m ² (2017)	15 kgCO ₂ /m ^{2v}	22 kgCO ₂ /m ²
		Number of new near-zero City buildings	0	1	0
	Retrofit all City-owned buildings, including social housing, to the highest emission reduction technically feasible, on average achieving a 40% energy saving over 2017 building energy performance by 2040	GHGs from City buildings ^w	320,000 tonnes of CO ₂ e	274,000 tonnes of CO ₂ e (2017)	274,000 tonnes of CO ₂ e (2017)
		Average Energy Consumption (ekWh/m ²) ^x	3.23 ekWh/m ²	3.38 ekWh/m ²	3.35 ekWh/m ²
Energy	Install 24 Megawatts capacity of renewable energy capacity on City-owned facilities and lands by 2020	Total megawatts capacity	4.7 MW	12 MW	12 MW
	Generate and utilize 1.5 million gigajoules from biogas by 2030	Total gigajoules of energy generated and utilized ^{yz}	0.6 million gigajoules	0.6 million gigajoules	0.9 million gigajoules

Transportation	Update the City's Green Fleet Plan to ensure transition of 45% of City-owned fleet to low-carbon vehicles by 2030	Percentage of fleet vehicles that are low-carbon	21%	24%	24% (2018) ^{aa}
Waste	Achieve zero waste status at all City-owned facilities by 2030	Percentage of waste diverted at City offices and civic centres	86%	87%	88%
People & Engagement	Earn a designation as one of Canada's Top 100 Employers - Greenest Employers by 2020.	Designation earned	Not achieved	Not achieved	Not achieved

^r Data is from 2016 unless otherwise indicated.

^s Data is from 2018 unless otherwise indicated.

^t Data is from 2019 unless otherwise indicated.

^u Greenhouse gas intensity (GHGI) is a measure of the total amount of GHG emissions associated with a building's operational energy use, per unit of floor space, and is calculated using an emissions factor for the specific energy sources typically used by the building (e.g. grid electricity, natural gas). In this way, it accounts for the performance of different fuels – for example, renewable sources of energy have a low carbon intensity, while natural gas has a higher carbon intensity. Using a GHGI metric therefore encourages the use of low carbon energy, on-site renewable energy, and energy efficient building envelopes and components. A low GHGI, expressed in kg/m²/year, indicates a building with low operational GHG emissions. In the table, this calculation represents an average of GHGI for all development proposals received under the Toronto Green Standard in a calendar year. Actual building performance may vary from development proposal. In the table, this calculation represents an average of GHGI for all development proposals received under the Toronto Green Standard in a calendar year. Actual building performance may vary from development proposal.

^v 2018 greenhouse gas intensity includes Mount Dennis Early Learning and Child Care Centre, City of Toronto's first near zero emission building.

^w The City of Toronto uses an internationally recognized methodology to calculate greenhouse gas emissions. This data is received approximately 18 months after the end of the calendar year being measured. As a result, 2018 data is not available until mid-2020.

^x Improvements have been made to better capture energy consumption resulting in additional sources of information used to calculate the data.

^y Biogas energy is generated and utilized at City of Toronto's organics processing facilities and wastewater treatment plants. The amount of biogas generated at the wastewater treatment plants can vary year over year due to natural variability and climatic conditions.

^z At Highland Creek Wastewater Treatment Plant, a biogas equivalent is calculated to account for the energy recovered from raw sludge. The energy value recovered offsets natural gas usage in incineration.

^{aa} 2019 data collection has been interrupted in response to managing the City's emergency and essential services during the COVID-19 pandemic.

Leading by Example: Project Profiles

Buildings

City Buildings Moving Toward Net Zero Energy and Emissions

The City of Toronto set a TransformTO leadership goal that one hundred per cent of new City-owned buildings will be built to be near-zero GHG emissions by 2026. The current minimum requirement for new City buildings is Tier 2 of the Toronto Green Standard (TGS), version 3, which includes advanced sustainable performance requirements in the categories of Air Quality, Energy, Water, Ecology and Waste. By 2026, City Agencies, Corporations and Division-owned facilities are required to apply Tier 4 of the TGS to all its development and achieve net-zero emission. The City is working to improve design approaches to achieve that target. This includes incorporating additional measures such as passive strategies that increase building insulation, to improving mechanical systems such as utilizing air source heat pump technologies to reduce energy usage, to maximizing the use of renewable energies.

In 2019, the City began studying net zero potential for several building projects, and additional net zero feasibility studies will follow in 2020. These net zero energy and emission (NZEE) studies provide design options and costs at levels appropriate to Schematic Design. The results will be used to provide City Council or City staff with up to date information on the incremental cost of achieving net zero energy and emissions. The design teams will start the next phase of detailed design work based on the approved design option from the NZEE study.

Energy

Digester Gas Usage at Wastewater Plants

Toronto set a TransformTO leadership goal that 1.5 million gigajoules of energy will be generated from biogas by 2030. Biogas is a renewable energy source that can reduce overall greenhouse gas emissions. Biogas converts methane, a potent greenhouse gas, into a safer form with lower environmental impacts. Biogas generation recovers waste materials that would otherwise go to landfills, reduces fossil fuel reliance and saves money, energy and material by treating the waste on-site.

Three of the City's four wastewater treatment plants have on-site digesters used for sludge processing. This process reduces the volume of biosolids in wastewater, while also producing biogas. Biogas usage displaces natural gas and fuel usage, both of which contributes to greenhouse gas (GHG) emissions. The



Ashbridges Bay Wastewater Treatment Plant

City has initiatives underway aimed at optimizing the production and usage of biogas at these facilities.

The Ashbridges Bay Treatment Plant has 20 digesters that produce biogas using sludge from the wastewater. The energy is used to heat the plant buildings and maintain the digesters' heating levels. In 2019, work commenced to replace the pelletizer facility with a new one designed to use biogas and natural gas, virtually eliminating the need to flare biogas. Currently the plant flares about 30% of the biogas it produces. The new facility will use biogas to fuel the pelletizer and for heating. The assignment of a consultant for design services is expected to be awarded in the summer of 2020.

In 2019, design to replace multiple existing hearth incinerators with more efficient fluidized bed incinerators began for the Highland Creek Treatment Plant. The incinerators have been procured and the detailed design is in progress with construction planned to start in 2021. Analysis shows that the net GHG emissions are lowest if raw sludge is incinerated; however, some digestion will be necessary to optimize the incinerator design and manage peak production over its service life. Biogas produced will be used for heating with an estimation that less than five per cent of biogas will be flared at project completion.

The Humber Treatment Plant continues to commission and optimize the 4.6 megawatt cogeneration system on-site to generate both heat and power. Work has focused on reducing the downtime of the equipment and supporting systems. Three additional boilers designed to use biogas are being procured so biogas does not need be flared when the engines are down.

Solar Energy Initiatives

One of the TransformTO leadership goals is that 24 megawatts of renewable energy capacity will be installed on City-owned facilities and lands by 2020. Solar energy, a form of clean and renewable energy, is an alternative to conventional fossil fuels where extraction and usage is expensive and harmful to the environment. Generation of solar energy through on-site solar PV systems can off-set electricity usage, reduce GHG emissions, provide savings on utility bills while mitigating against rising energy costs.

To date, the City has installed over 100 rooftop solar PV systems through the Provincial Feed-in Tariff (FIT) program, which allows the City to obtain revenue based on the renewable energy generated over a 20-year contract. This portfolio includes 12 megawatts (MW) of solar PV generation capacity on City-owned buildings, generating over 13,600,000 kilowatt hours, enough to power 1,500 homes for a year. Other solar energy initiatives the City has undertaken in 2019 are profiled below.

Building Resilience into our Emergency Services

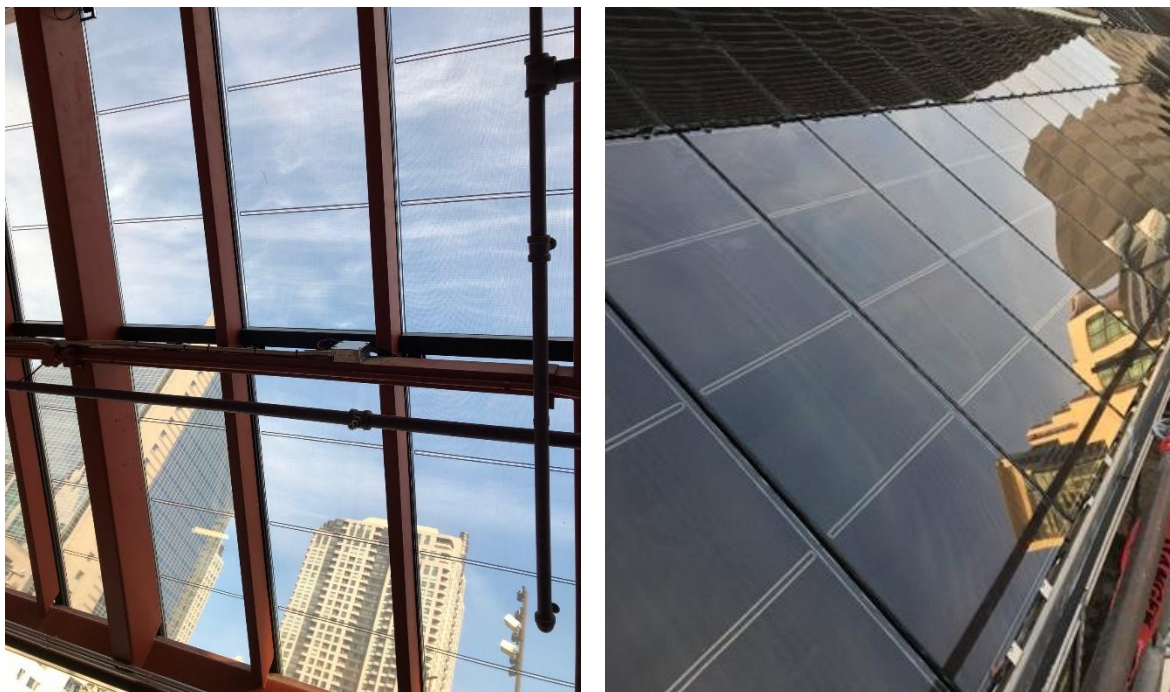
In 2019, the City of Toronto completed its first solar PV energy storage project on Toronto Paramedic Services' EMS station 46. The building's roof and south-facing wall have been outfitted with a 10 kilowatt (kW) solar PV system, coupled with two 13.5 kilowatt-hour (kWh) Tesla Powerwall batteries. The energy generated by the installation is used to power the building's demand or charge the batteries, with extra generation fed back into the grid for an electricity credit. The system offsets 39% of the site's electricity costs and is expected to provide indefinite emergency back-up power. The added component of resiliency becomes crucial in ensuring the continuity of City services and infrastructure as the incidence of extreme weather events increases as a consequence of climate change. The City plans to scale this solution to other facilities such as the Waterfront Neighbourhood Centre, and transition its dependency on expensive fossil fuel-powered generators for backup.

Expanding Solar PVs to Parking Lots

Although solar panels are well-suited for buildings, large parking lots offer a significant opportunity to expand solar energy in the city. Solar carports offer several benefits, from sheltering cars from the sun and inclement weather, prolonging the life of the asphalt, and making use of underutilized space while generating clean electricity. Carport installations can be paired with electric vehicle charging infrastructure so users can charge their vehicles while parked. In 2019, the City started planning the first round of carport projects and held multiple stakeholder meetings. A number of solar PV projects were identified for a Request for Proposal that seeks service providers for project implementation. The contracts for this service delivery are expected to be awarded in 2020.

Exploring Emerging Solar Technologies

Emerging solar technologies like Building Integrated Photovoltaics (BIPV) are of particular interest concerning on-site generation in urban areas where roof space is limited. This application replaces conventional windows with a solar glass that generate electricity but still allow natural light to come through. Combining solar with batteries makes it possible to store and discharge energy as it is required, which gives the building an added benefit of resiliency. In 2019, the City installed its first project of this kind at the North York Civic Centre with a small three kilowatt BIPV system to demonstrate the utility of this technology in dense urban environments. Early success has been observed as the new system continues to generate electricity for the building. The City continues to monitor and collect performance data from the system, and is actively seeking other types of buildings to apply this technology. Results gathered from these demonstration sites will inform future decisions on whether to expand BIPV to other City facilities.



Building Integrated Solar Photovoltaics Demonstration Project at North York Civic Centre

Transportation

Toronto Transit Commission Electric Buses

Vehicle emissions account for over one-third of the greenhouse gas emissions in Toronto today. Although public transit is more energy efficient than automobile use, conventional diesel buses have a significant carbon footprint. As part of the City's commitment to lead by example, the Toronto Transit Commission (TTC) ordered 60 electric buses that will be delivered in 2019 and 2020.

By the end of 2019, the TTC had taken delivery of 23 eBuses, with 17 put into service. The new eBuses operate on electric propulsion technology and generate zero tailpipe emissions. To accommodate this new green fleet, charging infrastructure has been installed in the TTC's Arrow Road, Eglinton and Mount Dennis bus garages.

The project was funded by the City of Toronto and the Government of Canada under the federal Public Transit Infrastructure Fund (PTIF). By April 2020, the TTC's 60 eBuses will represent one of the largest fleets of electric buses in North America.



One of the TTC's new fleet of electric buses.

The Pathway to Sustainable City of Toronto Fleets

In Fall 2019, City Council adopted 'The Pathway to Sustainable City of Toronto Fleets', a five-year green fleet plan that addresses climate mitigation and adaptation with strategies for transitioning City fleets to sustainable, climate resilient, low-carbon operations.

The scope of the new Plan has been expanded to include approximately 98 per cent of all City-owned and operated motor vehicles and equipment. This multi-agency City-wide Plan focuses on reducing the environmental impacts of more than 10,000 motor vehicles and equipment owned and operated by the City of Toronto, and adapting to changing climate while ensuring long-term sustainability of City fleets.

The Plan builds on the achievements of the City of Toronto Consolidated Green Fleet Plan (2014 – 2018), which was recognized for its successes, as well as an example of effective local leadership on climate mitigation. As a result of the strategies from the previous plan, the City of Toronto Fleets' greenhouse gas (GHG) emissions were reduced by approximately 27 million kilograms of carbon dioxide equivalents (CO₂e), a 9 per cent decrease during this five year period.

The Plan's strategies and actions provide feasible paths to reach the established objectives. These paths will utilize different green technologies and fuels, including renewable energy sources and efficient fleet management practices. They are designed to ensure that City fleets are fully optimized, utilized and maintained efficiently, while remaining cost effective, resilient, and sustainable for decades to come.

Championing Smart Commute Options with City Staff

A 2017 report from Toronto Public Health on health risks related to traffic-related air pollutions identified motor vehicles as the primary source of local air pollution. Reducing single occupancy vehicle use and increasing active transportation are key components of TransformTO. The City of Toronto participates in the Smart Commute program, which helps commuters explore sustainable options such as walking, cycling, transit and carpooling to ease traffic congestion, help individuals save time and money, and reduce the environmental impact of daily commuting.

To encourage City staff to commute sustainably, the Smart Commute Champions Network was established with staff serving as internal champions to promote Smart Commute campaigns and events, as well as to identify opportunities for specific initiatives in their workplaces. As an example, the Smart Commute Champions promote the City's bicycle training programs, which have been developed for individuals that are required, expected or actively encouraged by management to use their bicycles or Bike Share Toronto rentals for work related trips and commuting. This includes training on road safety, safe work procedures, provision and maintenance of equipment and personal protective equipment. The Smart Commute Champions Network added its 100th member in 2019.

In addition to its Leading by Example work with City employees, the Smart Commute Program also runs three major public campaigns a year: Bike Month, Smart Commute Month and Winter Commute Week. Smart Commute also provides ongoing cornerstone commuter programs and services, such as Emergency Ride Home, the Smart Commute ride-matching tool, workshops and clinics.

Waste

Working Towards a Circular Economy

The City of Toronto's Long Term Waste Management Strategy includes an aspirational goal of zero waste and the goal to work towards a circular economy. A circular economy aims to reduce waste and maximize resources by moving away from the linear take-make-and-dispose approach to an innovative system that focuses on product longevity, renewability, reuse and repair. Transition to a circular economy provides opportunities to enhance social and environmental outcomes, improve economic performance and profitability, decrease the risk associated with relying on external sources of raw materials and labour, and increase the resiliency of City services and infrastructure.

The City has established a circular economy business unit and a Cross-Divisional Circular Economy Working Group to drive innovation and the growth of a circular economy. In 2019, City staff in Solid Waste Management Services and other City divisions continued working on implementing circular procurement pilots and capacity building initiatives under the Circular Procurement Implementation Plan and Framework. The framework was developed to outline how circular economy principles can be applied within the City's purchasing process to drive waste reduction, economic growth and social prosperity. The divisional pilots will assist the City in testing best practices towards an evidence-based circular procurement policy.

In June 2019, the City of Toronto co-convened the first Great Lakes Circular Economy Forum with the UN Environment Programme and the Council of the Great Lakes Region. The Great Lakes region is uniquely positioned for a transition to a circular economy because of its tightly integrated industries and its strong cross-border collaborations. From a regional perspective, a shift towards circularity can improve resource efficiency, promote innovation, and help drive economic growth. As the largest body of freshwater on the planet, maximizing sustainability and minimizing waste in the Great Lakes region is essential for safeguarding our future. The event demonstrated the City of Toronto's leadership as a global city advancing circular economy outcomes.

In recognition of its circular economy efforts, the City of Toronto received the Runner Up award in the Public Sector Category of the '2019 Circulars', the world's premier circular economy awards. The award offers recognition to an organization or government body that has made notable contributions to the circular economy and best enables an environment for the circular economy to develop and flourish. Toronto was also featured in the 2019 Ellen MacArthur Foundation Circular Economy in Cities case studies and in the C40's publication of municipality-led circular economy case studies from around the world.

Engagement and Collaboration

Live Green @ Work

Live Green @ Work encourages City of Toronto staff to get involved in greening their workplace and contributing to reaching TransformTO emission reduction targets at work. It does this by building organizational capacity to support staff engagement and providing resources for staff-initiated greening projects and events.

In October 2019, Live Green @ Work hosted The Green-mazing Race, a staff engagement competition that challenged City staff to complete missions that fostered green behaviours in the workplace and in their day to day lives. Throughout October, hundreds of City staff from all regions competed in The Green-mazing Race, and prizes were awarded to the top three teams in the competition.

Research has shown that employees are critical to the success of organizational sustainability initiatives. The City has increased the number of active Live Green Teams to 12 City workplaces and plans to double that in 2020-21. The team is comprised of multi-divisional volunteers who meet on a regular basis to promote greening in their building and liaise with Live Green @ Work to implement workable ideas. The Live Green Teams will form the backbone of a comprehensive green employee engagement strategy that the EED will implement starting in 2020.



The City Hall Live Green Team encouraged staff to use reusable cups through a display that showed what the use of a disposable cup a day would look like after a year.