

Appendix A – GHG Reduction Actions in the Prepared Budget

Introduction

This appendix provides new detail on the estimated emissions reduction impact of specific City-led GHG reduction actions (projects and programs). Specifically, a table is provided for each GHG reduction action that shows the 2024 capital and operating budget amounts associated with the action, estimated GHG reduction in 2024 (where feasible), and an assessment of the emissions scenario alignment for the action. Commentary on the emissions impact information is provided beneath each table. Finally, certain GHG reduction actions also have specific notes below the table to ensure clarity around information presented in the table.

As an initial baselining exercise, it is expected that future estimates may differ as data availability and quality improves, and as methodologies become more refined. Where it is not currently possible to estimate the emission reduction impact for 2024, it is recognized that more effort will be required to estimate these potential GHG reductions in future.

Regarding scenario alignment, the GHG reduction actions identified have been compared to modelled outcomes prepared as part of the Business as Planned (“BAP”) scenario or the Net Zero by 2040 (“NZ40”) scenario modelled for the [TransformTO Net Zero Strategy](#). Emissions under the BAP scenario do not decline quickly enough to meet Council-adopted interim targets nor the net zero by 2040 target. This is important because it helps identify that while many City-led GHG reduction are estimated to reduce emissions versus if the action did not happen, because these reductions are already included in the BAP scenario, they are not *additional* beyond BAP reductions necessary to accelerate the City’s progress toward the 2025 or 2030 targets, or the net zero by 2040 end goal.

The sections below are organized consistent with how emissions are tracked in the City’s annual Sector-Based GHG Inventory. GHG reduction actions are sorted according to the sector in which their primary emission reduction effect occurs: Community buildings, Community transportation, Corporate buildings, Corporate transportation, or Community/Corporate waste. Each sector has its own section. Each section begins with a statement of the TransformTO goals relevant to that sector and information on actual emissions for that sector from the City’s most recent Sector-Based GHG Inventory.

COMMUNITY EMISSIONS

The TransformTO Net Zero Strategy identified Toronto's GHG reduction targets from 1990 levels as:

- 45 per cent by 2025
- 65 per cent by 2030
- net zero by 2040.

In 2021, Toronto's community-wide greenhouse gas (GHG) emissions were **14.5 megatonnes (MT) of carbon dioxide equivalent (CO₂e)**, a four per cent increase over the 14 MT CO₂e emitted in 2020. Emissions were **41 per cent** less than 1990 levels. The four per cent increase in emissions in 2021 followed a 13 per cent decrease in emissions in 2020 from 2019 levels.

Unlike corporate emissions, the City of Toronto has indirect control over community emissions. Investments in programs, projects and infrastructure are in place to help reduce emissions, but participation within these investments is voluntary from the community. Community emissions may also be influenced through by-laws that regulate emission sources (e.g., buildings).

COMMUNITY BUILDINGS

The TTO Net Zero Strategy (NZS) identified the following 2030 goals for community buildings:

- All new homes and buildings will be designed and built to be near zero greenhouse gas emissions.
- Greenhouse gas emissions from existing buildings will be cut in half, from 2008 levels.
- 50 per cent of community-wide energy comes from renewable or low-carbon sources.
- 25 per cent of commercial and industrial floor area is connected to low carbon thermal energy sources.

In 2021, emissions from residential, commercial, and industrial buildings accounted for approximately **8.1 MT** of the city's total inventory, making buildings the largest source of emissions at roughly **56 per cent** of community-wide emissions.

The largest single source of community-wide emissions is from natural gas heating in residential buildings, accounting for 30% of the total emissions in 2021.

ACTION: [Better Buildings Navigation & Support Services](#)

Description: Consulting support for building owners, operators, and property managers navigating the process of improving the energy efficiency of their buildings and reducing greenhouse gas emissions.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Better Buildings Navigation & Support Services	Buildings	Environment & Climate	-	-	0.18	N/A	N/A

GHG Impact Commentary

- Educational and support service programs are important parts of any city's climate action plan but are not suitable for a program-specific, quantified GHG reduction estimate.

ACTION: [Eco-Roof Incentive Program](#)

Description: Financial support provided by the City to incentivize the installation of green roofs and cool roofs - known together as 'eco-roofs' - on Toronto homes and buildings.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO2e)	Scenario alignment
Eco-Roof Incentive Program	Buildings	Environment & Climate	-	-	0.31 ¹	28	-

GHG Impact Commentary

- Estimate is based on the best available data and methodology, using the average of historic annual reductions for the program (2020-2022). This methodology is expected to be updated next year.
- Scenario alignment was not assessed because Eco-Roof Incentive Program was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and this program's impact may be considered for inclusion.

¹ The operating amount for Eco-Roof Incentive Program only reflects staff FTE salaries. Further amounts have been dedicated to disbursing incentives. Please see the Environment & Climate Division's budget for further details.

ACTION: [Green Roof By-law](#)

Description: By-law setting out a graduated green roof requirement (20-60% of the Available Roof Space) for new development or additions that are greater than 2,000 m² in gross floor area.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Green Roof By-law	Buildings	City Planning	-	-	0.08	-	-

GHG Reduction Commentary

- No estimate for 2024 emissions reductions due to lack of necessary data.
- Scenario alignment was not assessed because Green Roof By-law impact was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and this program's impact may be considered for inclusion.

ACTION: [Energy Retrofit Loan Program](#)

Description: Financing for the incremental part of energy efficiency measures and renewable energy projects to achieve full decarbonization of existing buildings in the city (except single family homes).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Energy Retrofit Loan Program	Buildings	Environment & Climate	10.00	100.00	0.04	330	BAP

GHG Reduction Commentary

- The emission reduction for 2024 is estimated based on recent performance of the loan program, however actual reductions will depend on the specific projects that are funded. Several projects are expected to be funded in 2024, although interest rates may lower demand. Funding of projects will be prioritized based on GHG reductions.

- This program has contributed to an observed pace of retrofits in Toronto that aligns approximately with the BAP scenario. The BAP scenario assumes 4,500 commercial buildings will be retrofitted by 2050.

ACTION: [High-Rise Retrofit Improvement Support Program \(HI-RIS\)](#)

Description: Low-cost financing available for owners of residential apartment buildings built before 1990 of three or more storeys to make improvements that reduce energy and water consumption.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
High-Rise Retrofit Improvement Support Program (HI-RIS)	Buildings	Housing Secretariat	6.75	13.51	-	1,155	BAP

GHG Reduction Commentary

- Estimate based on average per building reductions reported by current program users, multiplied by expected number of buildings in the program in 2024. This methodology can be revised in future data shows the range of reductions per building and the average changing over time. Note that the estimate presumes building retrofit projects begun in 2024 will be completed in 2024, which may not occur.
- This program has contributed to an observed pace of retrofits in Toronto that aligns approximately with the BAP scenario. The BAP scenario assumes 6,000 residential buildings are being retrofitted per year.

ACTION: [Home Energy Loan Program \(HELP\)](#)

Description: Low-interest loan program providing up to \$125,000 for homeowners to cover the cost of home energy improvements (low rise residential housing). HELP also has a capacity building function that helps homeowners understand and act on the need to make homes more energy efficient with fewer GHG emissions.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Home Energy Loan Program (HELP)	Buildings	Environment & Climate	4.00*	4.55*	0.42 (loan program) 0.15 (capacity building)	211	BAP

*100% funded through grants from Federation of Canadian Municipalities

GHG Reduction Commentary

- Emission reduction estimate is specific to the loan program. The capacity building function of HELP will lead indirectly to further, unquantifiable GHG reductions. Estimate for the loan program is based on average per building reductions reported by current program users, multiplied by expected number of buildings in the loan program in 2024. This methodology can be revised in future if data shows the range of reductions per building and the average changing over time.
- HELP has contributed, along with other factors including the Federal grant and loan programs (e.g., Greener Homes Grant) and market factors, to an observed pace of retrofits in Toronto that aligns approximately with the BAP scenario. The BAP scenario assumes 6,000 residential buildings are being retrofitted per year. To be on pace for net zero by 2040 the pace of residential (and commercial) retrofits needs to increase multiple times from current levels – a key reason why the City is developing new actions like the Emission Performance Standards (see below).

ACTION: Toronto Green Standard (TGS) – Community

Description: Sets GHG and other performance requirements for new private developments, enforced via site-plan approval. Version 4 of the TGS consists of Tiers 1-3, with Tier 1 currently being a mandatory requirement of the planning process and Tiers 2 (“High Performance” level) and 3 (“Near Zero Emissions” level) incentivized via Development Charge Refund Program. The GHG requirement of Tier 2 becomes mandatory in 2025 and the GHG requirement of Tier 3 becomes mandatory in 2028.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO _{2e})	Scenario alignment
Toronto Green Standard - Community	Buildings	City Planning, Housing Secretariat, Environment & Climate	109.90	479.19	0.78	15,000	NZ40

*This table does not include capital spending which City Planning invests to support TGS Tier 2 DC Refund Program, a major contribution in raising the bar in reducing GHG emissions for new development.

GHG Reduction Commentary

- Estimate based on projecting forward a 5-year trailing average. Emission reductions are based on the difference between GHG values from energy modelling for the proposed new developments and the same values for equivalent reference buildings built to Ontario Building Code minimum standards. 2024 estimate reduced to 15,000 t CO_{2e} to reflect expected reductions in application volume.
- The accelerated implementation of the Tiers 2 and 3 GHG target becoming mandatory in 2025 and 2028 is more closely aligned with the actions modelled in the NZ40 scenario than the BAP scenario.

ACTION: [Emission Performance Standards \(EPS\)](#) (in-development)

Description: Mandatory EPS are planned to apply to all buildings in Toronto, from the largest office towers to low-rise residential homes. The EPS will set appropriate emissions limits so that Torontonians have reasonable, achievable pathways to make improvements to their buildings over time.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Emission Performance Standards (EPS)	Buildings	Environment & Climate	-*	-*	0.9	N/A	NZ40

*Capital impacts are expected with by-law implementation and are yet to be defined.

GHG Reduction Commentary

- No GHG reductions for 2024 were estimated because the EPS are still in-development and planned to phase-in in future years.
- The EPS are being developed with understanding of the emission reductions required from existing buildings to be on pace for net zero by 2040 and so that so that Torontonians have reasonable, achievable pathways to make improvements to their buildings over time.

ACTION: [Enabler- Community Buildings](#)

Description: This action includes various activities funded through the capital and/or operating budget that are important enablers of action to reduce GHG emissions in the buildings sector but may not have a direct or immediate impact (e.g., policy work, feasibility studies, education).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Enabler-Community Buildings	Buildings	Various	7.25	18.55	3.47	N/A	N/A

GHG Reduction Commentary

- Enabler actions are important parts of any city’s climate action plan but are not suitable for quantified GHG reduction estimates.

COMMUNITY TRANSPORTATION

The TTO NZS identified the following 2030 goals for community transportation:

- 30 per cent of registered vehicles in Toronto are electric.
- 75 per cent of school/work trips under 5km are walked, bicycled or by transit.

Transportation sector emissions continued to be the second largest source of GHG emissions in Toronto, accounting for 35 per cent of community-wide emissions in 2021. This is an increase in share from 33 per cent in 2020.

These emissions were mostly attributable to gasoline used in passenger cars and trucks, accounting for 27 per cent of community-wide emissions in 2021.

ACTION: [Bike Share Toronto](#)

Description: City-wide bike share system offering paid access to over 9,000 bikes at over 700 stations across Toronto.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO2e)	Scenario alignment
Bike Share Toronto	Transportation	Toronto Parking Authority	5.04	31.00	6.94	2,044	-

GHG Reduction Commentary

- Estimate is based on the difference between emissions to run the Bike Share Toronto program (electricity needs of e-bikes and vehicles to move the shared bikes to stations around the city) and the emissions equivalent of the number of expected 2024 bike share trips if taken via the current mode share of transportation (private vehicles, public transit, or active transportation).
- Scenario alignment was not assessed because Bike Share Toronto impact was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and this program's impact may be considered for inclusion.

ACTION: [Complete Streets](#)

Description: Capital projects implementing the Complete Streets design guidelines to make Toronto's streets and roads more accessible and safe for active transportation.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Complete Streets projects	Transportation	Transportation Services	90.13*	1,045.12*	-	-	BAP

*Figures reflect the full cost of capital projects that have been tagged as Complete Streets projects. Transportation Services has estimated a proportion of the right of way for such projects that is solely devoted to motor vehicles versus sidewalk or street space used for active transportation. The proportion dedicated to Complete Streets is currently estimated at \$749 million for the total ten year plan. This provides a methodology for determining the percentage of the projects that relates to GHG reductions.

GHG Reduction Commentary

- No category-wide estimation methodology could be used based on the broad variety of capital projects and lack of data about how the complete streets projects underway affect transportation mode share. In general, complete streets support GHG reduction by increasing right of way for pedestrians, cyclists, and potentially transit vehicles.
- Complete Streets projects contribute to “as-planned infrastructure improvements” (circa 2020) that were modelled in the BAP scenario to reduce GHG emissions by increasing active transportation mode share.

ACTION: [Cycling Network Plan](#)

Description: Ongoing capital projects to build out and renew cycling network bikeways (near-term implementation plan covers 2022-2024, long-term plan to 2030).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO2e)	Scenario alignment
Cycling Network Plan	Transportation	Transportation Services	42.95	289.11	-	1,138	BAP

GHG Reduction Commentary

- Estimate is based on the difference between the emissions equivalent of an expected higher level of cycling mode share resulting from implementing the remainder of new projects included in the Cycling Network Plan’s 2022-24 Near Term Program (100 km inclusive) and the emissions equivalent of the current mode share of transportation (private vehicles, public transit, or active transportation). The increase in cycling mode share is based on the historical growth in ridership over the past five years and assumed to wholly result from cycle network expansion, however factors such as population growth and fuel prices may also play a role. Cycling mode share attributable to Bike Share Toronto trips are excluded to avoid double counting.
- Cycling Network Plan’s 2019-2021 Near Term Program (65 km inclusive) contributed to “as-planned infrastructure improvements” that were modelled in the BAP scenario to reduce GHG emissions by increasing active transportation mode share.

ACTION: [Green Bus Program](#)

Description: Procurement of fully electric and diesel hybrid-electric buses to transition the Toronto Transit Commission bus fleet toward net zero emissions. Only fully electric buses to be procured after 2024, transitioning the TTC bus fleet to become zero-emissions by 2037. Also includes procurement of new gasoline Wheel-Trans buses to replace diesel buses.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO2e)	Scenario alignment
Green Bus Program	Transportation	Toronto Transit Commission	262.83	779.39	-	1,590	NZ40

GHG Reduction Commentary

- Estimate based on the difference between the emissions of the Green Bus fleet vehicles added through 2024 procurement and the emissions of diesel bus fleet vehicles completing the same kilometers. Further and larger emission reductions will occur in future years as a result of rising share of Green Bus fleet vehicles.
- Completing the electrification of transit before 2040 is more closely aligned with the NZ40 scenario than BAP.

ACTION: [Smart Commute](#)

Description: Educational program promoting sustainable commuting (e.g., carpooling, cycling, and public transit) and providing tools and resources for businesses and individuals.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO2e)	Scenario alignment
Smart Commute	Transportation	Environment & Climate	-	-	0.60	2,295	NZ40

GHG Reduction Commentary

- Estimate based on emission reductions due to reduced transportation emissions from increased hybrid working among City of Toronto employees. The portion of transportation emission reductions attributable to ModernTO program has been excluded to avoid double counting.
- Smart Commute contributes to transportation emission reductions from hybrid working, consistent with the assumption of half of professional/management/technical and general office/clerical workers in Toronto working from home 3 times a week that was modelled for the NZ40 scenario.

ACTION: [Transit expansion projects](#)

Description: Capital funding supporting the build out of [SmartTrack Stations Program](#).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.)	Scenario alignment
Transit expansion projects	Transportation	Transit Expansion	134.26	691.12		-	BAP

GHG Reduction Commentary

- No estimate for 2024 emission reductions because stations are not anticipated to be in operation until 2029.
- SmartTrack Stations Program contributes to “as-planned infrastructure improvements” that were modelled in the BAP scenario to reduce GHG emissions by increasing transit mode share.

ACTION: [TTC transit system - SOGR](#)

Description: Replacement of some existing lighting in transit system with LED.

GHG reduction action	Emissions Sector	Responsible	Capital		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO2e)	Scenario alignment
TTC transit system - SOGR	Transportation	Toronto Transit Commission	0.65	8.58	-	-	N/A

GHG Reduction Commentary

- No estimate for 2024 emissions reduction due to timeframe limitations.
- Scenario alignment was not assessed because LED conversions in the transit system was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and this project’s impact may be considered for inclusion.

ACTION: Enabler - Community Transportation

Description: This action includes various activities funded through the capital and/or operating budget that are important enablers of action to reduce GHG emissions in the transportation sector but may not have a direct or immediate impact (e.g., policy work, feasibility studies, education).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO _{2e})	Scenario alignment
Enabler - Community Transportation	Transportation	Various	19.84	109.96	1.66	N/A	N/A

GHG Reduction Commentary

- Enabler actions are important parts of any city's climate action plan but are not suitable for quantified GHG reduction estimates.

CORPORATE EMISSIONS

The TransformTO Net Zero Strategy set a goal for the City of Toronto's corporate GHG emissions to be reduced by 65 per cent over 2008 levels by 2030.

In 2021, corporate emissions were 0.67 MT, which was about five per cent of Toronto's community-wide emissions. The City's corporate emissions increased by four per cent from 2020 but remained a stable share of community-wide emissions between 2020 and 2021.

The City of Toronto's corporate (or local government) emissions are calculated based on the energy used in all municipal buildings (offices, community recreation centres, Toronto Community Housing Corporation (TCHC) housing), vehicle fleets including Toronto Transit Commission (TTC) transit vehicles, waste, water supply, and treatment, as well as streetlights.

Buildings accounted for 43 per cent, the largest source of corporate emissions, followed by transportation emissions at 40 per cent and waste emissions accounting for 17 per cent.

CORPORATE BUILDINGS

In 2021 corporate buildings emissions were 0.29 MT, which is about 43 per cent of total corporate emissions. Natural gas consumption used primarily for space heating facilities including THCH housing, comprised approximately 44 per cent of all corporate emissions, four per cent lower than 2020 and accounted for the largest single source of emissions.

ACTION: [ModernTO](#)

Description: Plan to reduce the City's office footprint from 55 to 15 locations.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
ModernTO	Buildings	Corporate Real Estate Management	23.13	198.71	-	2,512	NZ40

GHG Reduction Commentary

- Estimate based in part on emission reductions due to optimization of the City's office portfolio (217t CO₂e). Remainder of estimate based on emission reductions due to reduced transportation emissions from increased hybrid working among City of Toronto employees. The portion of transportation emission reductions attributable to Smart Commute program has been excluded to avoid double counting.
- Program contributes to the transportation emission reductions from half of professional/management/technical and general office/clerical workers in Toronto working from home 3 days a week, which aligns more closely with the NZ40 scenario than BAP.

ACTION: [Net Zero Carbon Plan- Toronto Green Standard \(TGS\) - Corporate](#)

Description: GHG and other performance requirements for new City Agency, Corporation and Division-owned building developments and additions greater than 100m². TGS for Corporate buildings requires Net Zero Emissions (Tier 3) and an embodied emissions cap.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Net Zero Carbon Plan- Toronto Green Standard (TGS) - Corporate	Buildings	Children's Services, Corporate Real Estate Management, Fire Services, Parks, Forestry & Recreation, Toronto & Region Conservation Authority, Toronto Paramedic Services, Toronto Police Services, Toronto Public Library, Toronto Zoo	236.62*	3,293.74*	0.31	0-781**	NZ40

*Figures reflect the full cost of capital projects that have been tagged as relating to a TGS Net Zero Corporate new building. CREM advises the incremental cost of work to make a new building net zero is generally 15% of total project cost, depending on building type.

**Range reflects the fact that emission reductions for Corporate buildings approved under TGS Net Zero Emissions standard begin only once buildings are occupied and producing operational emissions from energy consumption. The top end of the range (781 t CO₂e) indicates estimated emission reductions if all 8 approved Corporate Net Zero Emissions buildings are completed and occupied in 2024, though it is unlikely that more than one building will be occupied as of 2024.

GHG Reduction Commentary

- Estimate based on the difference between GHG and energy intensity values from energy modelling for the proposed new developments and the same values for equivalent reference buildings built to Ontario Building Code minimum standards.

- The implementation of Net Zero Emissions (Tier 3) for new Corporate developments as of 2022 is more closely aligned with the actions modelled in the NZ40 scenario than the BAP scenario.

ACTION: [Net Zero Carbon Plan](#) - Renewable Natural Gas (RNG) Utilization - Buildings

Description: Displacement of a portion of fossil natural gas consumption in Corporate buildings by consumption of renewable natural gas (RNG) produced at City-operated anaerobic digesters.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Net Zero Carbon Plan - Renewable Natural Gas (RNG) Utilization	Buildings	Corporate Real Estate Management, Environment & Climate, Solid Waste Management	-	-	0.54	1,181	-

GHG Reduction Commentary

- Estimate based on the difference between the emissions of combusting RNG, which produces only biogenic CO₂ emissions that do not contribute to climate change, and the emissions of an equivalent amount of fossil natural gas for heating Corporate buildings.
- Scenario alignment was not assessed because RNG utilization in Corporate buildings was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and this program’s impact may be considered for inclusion.

ACTION: [Net Zero Carbon Plan](#) - Fuel switching + Efficiency retrofits

Description: Implementation of fuel switching from natural gas to clean electricity and efficiency retrofits at Corporate buildings.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Net Zero Carbon Plan (Fuel switching + Efficiency retrofits)	Buildings	Corporate Real Estate Management, Economic Development & Culture, TO Live, Toronto & Region Conservation Authority, Toronto Paramedic Services, Toronto Public Library, Toronto Zoo, Toronto Transit Commission	57.30*	397.82*	0.93	-**	BAP

*Figures reflect the full cost of capital projects that have been tagged as containing one or more components related to fuel switching and/or efficiency retrofits. CREM advises the incremental cost of fuel switching and energy efficiency work to make existing buildings net zero is generally 15%, depending on building type, on top of the figures reported above which generally cover baseline SOGR work.

**CREM can provide figures on expected emission reductions (tonne/\$) among Corporate buildings. These figures are derived from the incremental costs, above the cost of SOGR, for emission reduction actions analyzed in the Net Zero Carbon Plan.

GHG Reduction Commentary

- No estimate for 2024 emissions reductions or assessment of scenario alignment due to lack of necessary data. Processes for pre- and post-project analysis and data collection for fuel switching and efficiency retrofit projects are evolving under the Net Zero Carbon Plan.
- This program has contributed to an observed pace of retrofits in Toronto that aligns approximately with the BAP scenario. The BAP scenario assumes 4,500 commercial buildings (which typology approximately corresponds to Corporate buildings) will be retrofitted by 2050.

ACTION: [Net Zero Carbon Plan](#) - On-site renewables & storage

Description: Implementation of on-site renewables and storage at Corporate buildings.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Net Zero Carbon Plan (On-site renewables & storage)	Buildings	Toronto Transit Commission	0.50	0.50	-	-	-

GHG Reduction Commentary

- No estimate for 2024 emissions reductions or assessment of scenario alignment due to lack of necessary data. Processes for pre- and post-project analysis and data collection for implementation of the Net Zero Carbon Plan are evolving.
- Scenario alignment was not assessed because On-site renewables and storage for Corporate buildings was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and this program's impact may be considered for inclusion.

ACTION: [Net Zero Carbon Plan](#) - Training and Education

Description: Training and Education at City-owned buildings to move toward a uniform, portfolio-wide process for maintaining efficient building operations and achieving incremental efficiency improvements.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Net Zero Carbon Plan (Training and Education)	Buildings	Corporate Real Estate Management	-	-	0.31	N/A	N/A

GHG Reduction Commentary

- Educational and training programs are an important action under the Net Zero Carbon Plan but do not directly produce emission reductions, rather they support emission reductions in the Plan’s other aspects such as fuel switching and efficiency retrofits.

ACTION: [Net Zero Carbon Plan](#) - Other activities

Description: Implementation of actions that generally support the Net Zero Carbon Plan, such as feasibility studies and exploratory work for retrofits.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Net Zero Carbon Plan (other)	Buildings	Corporate Real Estate Management	8.84	44.36	0.15	N/A	N/A

GHG Reduction Commentary

- Activities captured under this action are an important action under the Net Zero Carbon Plan but do not directly produce emission reductions, rather they support emission reductions attributable to the Plan’s other aspects such as fuel switching and efficiency retrofits.

ACTION: Sustainable Energy Plan Financing

Description: Program to provide financing at the City's cost of borrowing to invest in energy efficiency, renewable energy, and emission reduction projects for new construction (primarily in buildings) in support of TransformTO.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Sustainable Energy Plan Financing	Buildings	Environment & Climate	12.60	170.10	0.07	-	BAP

GHG Reduction Commentary

- Not possible to estimate GHG reductions for 2024 until projects are confirmed in 2024. Program uptake is influenced by higher interest rates which impacts the ability to provide financing through this program.
- This program has contributed to an observed pace of retrofits in Toronto that aligns approximately with the BAP scenario. The BAP scenario assumes 4,500 commercial buildings (typology approximately corresponding to Corporate buildings) will be retrofitted by 2050.

ACTION: TCHC - Energy Efficiency Action Plan

Description: Capital projects to achieve 25% reduction in energy consumption in Toronto Community Housing Corporation (TCHC) buildings by 2028.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
TCHC - Energy Efficiency Action Plan	Buildings	Toronto Community Housing Corporation	142.82	1,600.00	-	6,418	BAP

GHG Reduction Commentary

- Estimate is based on aggregated emission savings reported in Level 2 energy audits, energy models and detailed engineering studies for TCHC capital projects, and comparison to similar projects.
- This program has contributed to an observed pace of retrofits in Toronto that aligns approximately with the BAP scenario. The BAP scenario assumes 6,000 residential buildings are being retrofitted per year to a level of 10% annual electricity percent savings per building and 35% annual thermal demand percent savings per building.

ACTION: [Energy Optimization Plan](#)

Description: Load shifting and energy efficiency techniques for water treatment and supply system.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Energy Optimization Plan	Buildings	Toronto Water	3.43	31.87M	0.38	89	-

GHG Reduction Commentary

- GHG reduction estimate based on anticipated reductions to grid electricity consumption due to two projects.
- Scenario alignment was not assessed because Energy Optimization Plan projects' impacts were not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and these projects' impact may be considered for inclusion.

ACTION: [Enabler- Corporate Buildings](#)

Description: This action includes various activities funded through the capital and/or operating budget that are important enablers of action to reduce GHG emissions in the buildings sector but may not have a direct or immediate impact (e.g., policy work, feasibility studies, education).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO _{2e})	Scenario alignment
Enabler-Corporate Buildings	Buildings	Various	13.35	156.94	0.31	N/A	N/A

GHG Reduction Commentary

- Enabler actions are important parts of any city’s climate action plan but are not suitable for quantified GHG reduction estimates.

ACTION: [Biogas/landfill gas capture for beneficial use \(RNG\)](#)

Description: Capital projects for facilities to capture biogas/landfill gas for beneficial use (RNG).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO _{2e})	Scenario alignment
Biogas/landfill gas capture for beneficial use (RNG)	Buildings	Solid Waste Management	0.07	0.11	2.41	N/A	N/A

GHG Reduction Commentary

- Producing RNG from biogas or landfill gas creates a zero-carbon fuel that can displace combustion of fossil fuels by the ultimate end-user. The RNG produced by City facilities is currently purchased by the City and used to displace consumption of fossil natural gas in Corporate buildings and Corporate fleet vehicles. Estimated emission reductions due to this displacement are reported in the Corporate Buildings and Corporate Transportation sectors to avoid double counting.
- Scenario alignment was not assessed because RNG production from biogas/landfill gas was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and these projects’ impact may be considered for inclusion.

CORPORATE TRANSPORTATION

In 2021, corporate transportation emissions were 0.27, which is about 40 per cent of total corporate emissions. Within transportation, diesel and biodiesel emissions accounted for about 84 per cent of corporate transportation emissions, while gasoline emissions represented approximately 12 per cent.

ACTION: [Sustainable City Fleets](#)

Description: Corporate-wide plan to reduce emissions from Corporate fleet vehicles 65% below 2008 levels by 2030 and to net zero by 2040, primarily through fuel switching to biodiesel and procurement of zero emission vehicles to replace internal combustion engine vehicles.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Sustainable City Fleets	Transportation	Fleet Services, Parks, Forestry & Recreation, Toronto Paramedic Services, Toronto Police Services, Toronto Water, Toronto Transit Commission	180.58	1,585.88	0.68	19,911	NZ40

GHG Reduction Commentary

- Estimate based on the difference between the emissions of the new zero emission and low-carbon (biodiesel) fleet vehicles and the emissions of comparable internal combustion engine fleet vehicles completing the same kilometers.
- Sustainable City Fleets plan includes transitioning all fleet vehicles to zero emission vehicles, which is consistent with full electrification of City fleet vehicles that was included in the NZ40 scenario. Current progress implementing the Sustainable City Fleet plans indicates the City is on track to meet interim emission reduction goals from fleet vehicles for 2025 (45% below 1990) and potentially 2030 (65% below 1990) but may not achieve goals for increasing zero emission vehicle proportion of the fleet by 2025 (20%) and 2030 (50%) unless unfunded needs for electric charging and support infrastructure are met.

ACTION: [Renewable Natural Gas \(RNG\) Utilization - Transportation](#)

Description: Displacement of a portion of compressed fossil natural gas consumption in Corporate fleet vehicles by consumption of renewable natural gas (RNG) produced at City-operated anaerobic digesters.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO2e)	Scenario alignment
Renewable Natural Gas (RNG) Utilization - Transportation	Transportation	Fleet Services, Environment & Climate, Solid Waste Management	-	-	0.04	80	-

GHG Reduction Commentary

- Estimate based on the difference between the emissions of combusting RNG, which produces only biogenic CO₂ emissions that do not contribute to climate change, and the emissions of an equivalent amount of compressed fossil natural gas for powering Corporate fleet vehicles.
- Scenario alignment was not assessed because RNG utilization in Corporate fleet vehicles was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and this program’s impact may be considered for inclusion.

ACTION: [Enabler - Corporate Transportation](#)

Description: This action includes various activities funded through the capital and/or operating budget that are important enablers of action to reduce GHG emissions in the transportation sector but may not have a direct or immediate impact (e.g., policy work, feasibility studies, education).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Enabler - Corporate Transportation	Transportation	Fleet Services, Toronto Water, Transportation Services, Toronto Transit Commission	7.55	34.48	0.08	N/A	N/A

GHG Reduction Commentary

- Enabler actions are important parts of any city's climate action plan but are not suitable for quantified GHG reduction estimates.

COMMUNITY / CORPORATE WASTE

The TTO NZS set a goal that by 2030, 70 per cent residential waste diversion from the City of Toronto’s waste management system.

In 2021, waste sector emissions, primarily from landfills, were the third largest source at roughly nine per cent of community-wide emissions (1.3 MT). This remained stable compared to 2020. In 2021, corporate waste emissions were 0.12 MT, which is about 17 per cent of total corporate emissions.

ACTION: [Green Bin Organics Processing](#)

Description: Service collecting organic material from approximately 460,000 houses, as well as most apartment and condo buildings, schools and City-owned buildings.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Green bin organics processing	Waste	Solid Waste Management Services	4.79	177.35	28.30	19,678	BAP

GHG Reduction Commentary

- Estimate based on the difference between emissions if organics collected by the City were sent to landfill instead of being processed at City-owned or contracted anaerobic digesters. 19,678 t CO₂e represents the annualized reduction over a 30-year period (reflecting the decay period of organics in landfill) between the organics and landfill scenario. Further annualized reductions of 975 t CO₂e have been estimated for future years if the City begins processing all collected organics at City-owned anaerobic digesters instead of sending a portion to contractors.
- Continuing the Green Bin organics program at current levels maintains existing waste diversion patterns, consistent with outcomes modelled in the BAP scenario.

ACTION: [Enabler- Community & Corporate Waste](#)

Description: This action includes various activities funded through the capital and/or operating budget that are important enablers of action to reduce GHG emissions in the waste sector but may not have a direct or immediate impact (e.g., policy work, feasibility studies, education).

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Enabler-Community & Corporate Waste	Waste	Solid Waste Management Services	6.27	15.86	6.79	N/A	N/A

GHG Reduction Commentary

- Enabler actions are important parts of any city’s climate action plan but are not suitable for quantified GHG reduction estimates.

ACTION: [Wastewater projects](#)

Description: Process changes or equipment changes, including energy efficiency projects at wastewater facilities that reduce GHG emissions.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Wastewater	Buildings	Toronto Water	94.93	1,626.90	0.04	233	-

GHG Reduction Commentary

- GHG reduction estimate based on anticipated reductions to grid electricity consumption due to two projects.
- Scenario alignment was not assessed because Wastewater projects’ impact was not modelled for the Net Zero Strategy scenarios. Modelling scenarios are being updated in 2024 and these projects’ impact may be considered for inclusion.

CROSS-SECTOR

ACTION: [Enabler – TransformTO](#)

Description: This action includes various activities funded through the operating budget that are important enablers of action to support the implementation of the TransformTO Net Zero Strategy and reduce GHG emissions across the City but may not have a direct or immediately measurable impact. Important examples include work on [SolarTO](#), [Wastewater Energy Program](#), [District Energy](#) (which support emission reductions in the community buildings sector), as well as cross-sector policy work, public consultation, and education.

GHG reduction action	Emissions Sector	Responsible	Capital (\$ millions)		Operating (\$ millions)	Emissions	
			2024 Capital Budget	Capital Plan 2024 - 2033	2024 Operating Budget	2024 GHG Reduction (est.) (t CO ₂ e)	Scenario alignment
Enabler – TransformTO	-	Environment & Climate	-	-	6.35*	N/A	N/A

*This does not include operating budget specific to SolarTO, Wastewater Energy Program and District Energy, which are included in the total operating budget number for GHG reduction actions in the community buildings sector.

GHG Reduction Commentary

- Enabler actions are important parts of any city's climate action plan but are not suitable for quantified GHG reduction estimates.