

Building Net Zero Emissions City Buildings: Corporate Real Estate Management's Net Zero Carbon Plan

Date: June 18, 2021

To: Infrastructure and Environment Committee

From: Executive Director, Corporate Real Estate Management

Wards: All

SUMMARY

In 2016 City Council adopted TransformTO, the City of Toronto's (the "City") comprehensive climate action strategy to reduce greenhouse gas emissions by 2050. Further, in 2019, City Council declared a climate emergency and adopted a stronger emissions reduction target for Toronto, net zero emissions by 2050, or sooner. This report outlines Corporate Real Estate Management's Net Zero Carbon Plan (the "Plan") for the City's building portfolio in response to this declaration.

The Plan provides a road map to achieve net zero emissions in City buildings, first and foremost through changes to facility utilities¹ consumption. It offers seven initiatives to reach this goal, including, fuel switching and efficiency retrofits, lower-carbon new builds, strategic divestment, on-site renewables and storage, training and education, enhanced use of building performance data and carbon offsets and off-site renewables. The Plan focuses on making the right investments into City buildings in order to meet the targets set by City Council. The Plan would be delivered by Corporate Real Estate Management in collaboration with other City Divisions and City Agencies².

This report, based on the Plan, includes cost estimates associated with achieving net zero emissions in City buildings, using fuel switching and efficiency retrofits as the primary means to achieve a reduction of facility utilities consumption and thereby, emissions reduction. The estimated cumulative investment required to achieve the City's net zero emissions targets over the next 20 to 30 years ranges from \$2.6 billion to \$4.1 billion, depending on how quickly the City is able to support the investment.

Under a business as usual scenario, by 2040, the City will see an estimated 14 percent increase in annual carbon emissions, and 16 percent increase in annual operations

¹ Utilities under the Plan include electricity, heating and cooling.

² The Plan excludes City corporations, including Toronto Community Housing Corporation and Exhibition Place.

costs (due electrical grid changes, rising carbon prices, and planned energy reduction efforts across its assets). However, in implementing the Plan, the City would realize at least an 80 percent reduction in greenhouse gases (from its buildings) by 2040. With further investment, the City has the potential to achieve net zero status by 2040. As the Plan aligns with the City's climate-action work under TransformTO, the City would be contributing to Toronto's overall climate resiliency, improved local air quality, less overall reliance on fossil fuels, and the opportunity to contribute to the creation of jobs in the community and economic growth. Approximately 2000 to 4000 new jobs would be created in the City, along with the generation of approximately \$6 to \$8 billion in gross domestic product.

The Plan was developed in partnership with City stakeholders from 29 different Divisions and Agencies, using a third-party consultant, and aligns with the overall TransformTO Net-Zero Strategy that will be brought forward to City Council in the fourth quarter of 2021.

RECOMMENDATIONS

The Executive Director, Corporate Real Estate Management, recommends that:

1. City Council receive this report for information.

FINANCIAL IMPACT

There are no current year financial impacts arising from the recommendations contained in this report; however, future year impacts are expected as the Plan will be integrated into the City's capital planning process.

Table 1 provides an order of magnitude of the estimated total and annual investment in City buildings the City could be expected to make to achieve an 80 percent reduction in greenhouse gas emissions and net zero emissions status by 2040 respectively.

Table 1: Estimated total and annual capital investment into City buildings to reduce greenhouse gas emissions

	Annual Average Expenditure for 80 percent reduction by 2040	Annual Average Expenditure for Net Zero emissions status by 2040
Fuel Switching and Efficiency Retrofits	\$90 million	\$165 million
Lower Carbon New Builds	\$5 million	\$5 million
Training and Education	\$10 million	\$10 million
On-site renewables and storage	\$25 million	\$25 million
Total Estimated Cost	\$130 million	\$205 million
Total Estimated Investment to 2040	\$2.6 billion	\$4.1 billion
Total Estimated Carbon Reduction	114,000 tonnes ³	131,000 tonnes ⁴

To determine the estimated investments outlined in Table 1, the age and size of City assets were considered, along with assumptions about their characteristics (for example, heating and cooling system types) and renewal cycles of the assets within City buildings. The investments were derived using standard costing assumptions for system replacements versus low carbon alternatives.

The move away from carbon-intensive fuel sources and equipment, as required for fuel switching and efficiency retrofit work, is a cost-avoidance action that reduces both operating expenditures and emissions. Although the current cost per unit of low-carbon alternatives fuel sources, such as electricity, is higher, it is anticipated that carbon taxation will increase the cost of fossil fuels in the future, making fuel switching a financially prudent option. More details on the cost avoidance associated with fuel switching and energy retrofits are provided in the comments section.

The estimates for Lower Carbon New Builds reflect the incremental cost associated with constructing new buildings to Toronto Green Standard Version 3, Tier 4, as opposed to Tier 3 reflected in a business as usual scenario. The percentage incremental increase was applied to the business as usual cost per square foot construction cost to determine the estimated cost.

The estimates for On-site Renewables and Storage were determined by considering the cost of energy generation using solar photovoltaic panels, and storage in accompanying battery systems.

All of the estimates above do not factor in existing or future unfunded capital investments. In order to achieve the City's net zero emission targets, investments in

³ Represents approximately 14,000 homes' energy use for one year.

⁴ Represents approximately 16,000 homes' energy use for one year.

assets that will contribute to meeting these targets will need to be prioritized and funded, and all funding opportunities need to be explored and considered.

Capital Planning Process

Although the overall cost to achieve net zero emissions targets is large, the majority of emission reductions, achieved through fuel switching and efficiency retrofits and to a lesser extent lower carbon new builds, will be attained incrementally. As such the annual incremental expense to implement the Plan is expected to be nominal. Implementation of the Plan will happen through integration with the City's capital planning process, synchronously with the application of a climate lens and Financial Planning's asset management strategy. In this way, the City will make incremental investments, year by year, to achieve the Council-identified emissions reduction targets and net zero emissions status in its buildings systematically. Corporate Real Estate Management will work with Financial Planning in 2021 and 2022 on the integration.

Funding Opportunities

Despite the expected nominal annual incremental expenditure to implement the Plan, Corporate Real Estate Management is exploring funding and loan opportunities provided by other orders of government and associated programs to support its implementation, such as those through the Canadian Infrastructure Bank Commercial Building Retrofits Initiative, and Infrastructure Canada's Green and Inclusive Community Buildings Program. The City may also wish to consider exploring Green Bonds for a portion of the capital work.

The Chief Financial Officer and Treasurer has reviewed this report and agrees with the financial implications as identified in the Financial Impact section.

DECISION HISTORY

At its meeting on February 1, 2021, the Environment and Energy Division provided a Greenhouse Gas and Climate Resilience Investment Summary, as requested by Budget Committee.

<https://www.toronto.ca/legdocs/mmis/2021/bu/bgrd/backgroundfile-163340.pdf>

At its meeting on January 13, 2020, Corporate Real Estate Management provided City Council with information on the impacts of Toronto's Climate Emergency direction, as it pertains to new buildings in the City construction pipeline through a 2020 Capital Budget Briefing Note.

<https://www.toronto.ca/legdocs/mmis/2021/bu/bgrd/backgroundfile-163340.pdf>

At its meeting on November 26, 2019, City Council adopted item MM12.10 "Building Net Zero Buildings Now - by Councillor Mike Layton, seconded by Councillor Jennifer McKelvie" and requested the Deputy City Manager, Corporate Services, in consultation with all divisions and agencies, to report on the impacts of Toronto's Climate

Emergency direction, as it pertains to new buildings in the City's construction pipeline and investments into existing City buildings.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.MM12.10>

At its meeting on October 2, 2019, City Council adopted item MM10.3 entitled "Declaring a Climate Emergency and Accelerating Toronto's Climate Action Plan" which directs Director, Environment and Energy report back by the second quarter on the feasibility of actions that could achieve net zero emissions by 2040.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.MM10.3>

On December 5, 2017, City Council adopted Toronto Green Standard Version 3 performance measures, to be applied to new development applications under the Planning Act commencing May 2018. In addition, City Council requested Build Toronto and the Toronto Realty Agency to consider the application of, at minimum, Tier 2 of the Toronto Green Standard Version 3 standards as part of their development agreements with future owners of land.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.PG23.9>

At its meeting on May 24, 2017, City Council adopted item EX25.9 "City-Wide Real Estate Transformation", which outlined a new service model that centralizes all real estate activities City-wide, including all real estate strategy and portfolio planning, major building projects, developments, real estate transactions and facilities management.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX25.9>

At its meeting on December 13, 2016, City Council adopted item 2016.PE15.1 "TransformTO" Climate Action for a Healthy, Equitable and Prosperous Toronto" Report #1" which outlined 23 strategies for moving Toronto towards the trajectory needed to achieve the 2050 goal. City Council's decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.PE15.1>

COMMENTS

Overview

In October 2019, the City declared a Climate Emergency (the "Declaration") and adopted a stronger emissions reduction target for Toronto: net zero greenhouse gas emissions by 2050 or sooner. The Declaration deepened the City's commitment to protecting Toronto's economy, ecosystems and community from climate change, bolstering its resiliency. It further supported City Council's 2016 adoption of TransformTO and direction from City Council that the City must lead by example.

Buildings are reported to be Toronto's largest source of emissions, accounting for about 55 percent of total community-wide emissions. The City operates the second-largest real estate portfolio in Canada, after the Government of Canada, with over 2,500 facilities (approximately 9.5 million square meters) under its management.

Consequently, its buildings are a large source of emissions. Sustained operation of the City's portfolio currently requires an annual utility budget estimated at \$240 million and generates approximately 260,000 tonnes of greenhouse gas emissions annually.

The Net Zero Carbon Plan

In 2019, following the Declaration and during the 2020 Budget process, Corporate Real Estate Management provided a response to the request from City Council for further information on the impacts of Toronto's Climate Emergency direction, as it pertains to new buildings in the City's construction pipeline. Corporate Real Estate Management advised that it would work with Divisions and Agencies to determine the financial impact of ensuring City buildings are net zero through coordinating capital investments City-wide, including state of good repair and major capital projects such as the construction of new facilities.

To move this important work forward, Corporate Real Estate Management created the Net Zero Carbon Plan, which provides a road map to achieve net zero emissions in City buildings by 2050 or sooner. In this context, the City defines a net zero emissions building as one that is "highly energy-efficient and produces onsite, or procures, carbon-free and or renewable energy in an amount sufficient to offset the annual carbon emissions associated with its operations or simply eliminates carbon emissions altogether".

The Plan aims to reduce greenhouse gas emissions first and foremost by fuel switching, which would result in the reduction of utility consumption in facilities. In addition, the Plan would include attention to lower-carbon new builds and other efficiency retrofitting, which are described in subsequent sections. The Plan does not address emissions from fleet vehicles, land use⁵, or waste processing, and does not currently address embodied carbon^{6,7} or emissions from other sources. Embodied carbon is addressed in the upcoming iteration of the Toronto Green Standard and may be considered in future strategic divestment decisions. More details about the Plan and its associated initiatives are provided in the following section.

The Plan was developed in partnership with City stakeholders from 29 different Divisions and Agencies, using a third-party consultant. The Plan aligns with initiatives outlined in other concurrent and upcoming staff reports from Environment and Energy and City Planning, including a broader Net Zero Buildings Strategy for non-City buildings, updates to the Toronto Green Standard, and the overall TransformTO Net-Zero Strategy that will be brought forward to City Council in the fourth quarter of 2021.

Recommended Plan Initiatives to Achieve Net Zero Emissions

The Plan outlines a set of seven initiatives that, when implemented, have the potential to reduce the annual emissions by 114,000 to 131,000 tonnes by 2040. Corporate Real Estate Management's strategy to operationalize the Plan is to take a phased approach,

⁵ For example, agricultural uses are a type of land use.

⁶ Embodied carbon refers to carbon that was used in the materials and processes to build a facility, for example concrete has a high amount of embodied carbon compared to wood.

⁷ Corporate Real Estate Management is committed to investigate embodied carbon reduction in City assets in cooperation with Environment and Energy and City Planning

integrate these initiatives into the capital planning process, and rationalize what assets receive what treatment in order to make the right investments and achieve City Council's reduction targets. The following sections provide a high level overview of the seven initiatives, followed by anticipated outcomes and recommended next steps.

Seven Initiatives of the Zero Carbon Plan

1. Fuel Switching and Efficiency Retrofits

The City can most significantly reduce utility consumption and greenhouse gas emissions through fuel switching. Fuel switching focuses on replacing combustion heating systems in City buildings, to high-efficiency heat pump technologies. In addition, efficiency retrofits may be considered, which include energy conservation measures that can be made to a building to improve its overall performance and reduce utility consumption.

As introduced in the Financial Impact section, the move away from carbon-intensive equipment is a cost-avoidance action that reduces both operating expenditures and emissions. In the next 20-30 years, it is anticipated that the carbon tax will make fossil fuels, like natural gas, more expensive than electricity on a per unit of energy basis. In addition, upgrading equipment to improve thermal performance of building walls and roofs, and high efficiency heat pumps helps the City avoid increased utility consumption costs, which would not be possible with continued reliance on conventional electric heaters. The move away from carbon-intensive fuel sources and equipment also supports cost avoidance through operational efficiencies, including the application of carbon budgets to buildings, remote monitoring and management of building systems, and staff training on efficient energy management.

Fuel switching and efficiency retrofits are the highest cost initiatives contemplated in the Plan; however, they are also expected to contribute to reduce greenhouse gas emission reductions significantly, accounting for an estimated 50 percent of the total reduction envisioned by the Plan.

2. Lower Carbon New Builds

This initiative aims to design and construct new builds, including ongoing projects that are currently in pre-construction, to be net zero emission buildings by adhering to the most current version of the Toronto Green Standard (currently Version 3, Tier 4) or equivalent. The updated Toronto Green Standard proposes net zero emissions targets for new construction related to all City-funded buildings. It is more cost effective to meet the City's new zero carbon emissions goals through building new facilities to net zero emissions standards than to retrofit those facilities in the future at a higher cost.

Currently, there are 15 City-owned development projects that are seeking to achieve high performance levels set out in the Toronto Green Standard Version 3. A sample of these projects is provided below:

a. Dufferin Waste Management Facility

The Dufferin Waste Management Facility is a five-storey office building being designed to meet net zero carbon emissions and relevant Toronto Green Standard Tier 2 performance measures.

b. Modular Housing Initiatives

All modular housing initiatives that are in development will be built to Tier 2 of the Toronto Green Standard; however the energy efficiency of these buildings approaches the standard set out in Tier 4.

c. Mount Dennis Child Care Centre

The Mount Dennis Child Care Centre will be the City's first net zero carbon building. This institutional building is under construction and is expected to be the City's first building to be awarded the Canadian Green Building Council's Zero Carbon Building standard.

d. Northeast Scarborough Community Centre

Northeast Scarborough Community Centre is planned to meet Toronto Green Standard Version 3, Tier 2 core requirements and performance measures. The City is pursuing the Zero Carbon Building Certification for this facility through the Canada Green Building Council.

3. Strategic Divestment

At a high level, the Plan recommends that the City divest from carbon-intensive assets and focus on the creation of lower-carbon buildings, either by constructing new buildings or, for existing buildings, undertaking fuel switching in combination with efficiency retrofits. Strategic divestment involves the creation of a process to guide decisions to either create a lower-carbon building, sell an asset, or redevelop a property. In making these decisions, Corporate Real Estate Management will work with CreateTO on the strategic development of City buildings and lands, as the City did in developing the ModernTO Workplace Modernization Program to optimize the City's office portfolio.

4. On-site Renewables and Storage

On-site electrical energy generation and storage remains rare at new and existing City facilities, as it is not appropriate for all facilities. This initiative aims to determine the viability of on-site energy, building on promising results from a pilot project at Toronto Paramedic Services Station number 46 at 105 Cedarvale Avenue. At that location, a combination of on-site renewable energy and battery storage replaced the need for a fossil-fuel generator at the site, while retaining the resilience provided by a fossil-fuel generator. Corporate Real Estate Management intends to consider the inclusion of on-site renewables and storage through the process of strategic divestment, along with other considerations such as fuel switching and efficiency retrofits.

5. Training and Education

Achieving emissions reductions also requires investment in training for staff that are involved in building maintenance activities so that they are able to effectively operate the new technology, software and systems associated with fuel switching and efficiency retrofits. Corporate Real Estate Management expects that the centralization and standardization of City facilities services will support these efforts and ensure a portfolio-wide approach to maintaining efficient building operations.

6. Enhanced Use of Building Performance Data

As previously mentioned, the Plan aims to reduce greenhouse gas emissions first and foremost through reducing utilities consumption in City buildings. This initiative will be supported by the consolidation of building performance data that will allow the City to track and analyze utility consumption data, and then use those data to calculate carbon emissions, set key performance indicators, and track overall progress towards carbon emissions reduction. Central management of the City's real estate assets will ensure appropriate oversight and the consistent application of the Plan to meet Council's targets for emissions reductions, and is aligned with the City-Wide Real Estate transformation. Corporate Real Estate Management expects no incremental capital cost to undertake this initiative.

7. Carbon Offsets and Off-Site Renewables

Once the City implements the previous six initiatives, carbon emissions will be greatly reduced; however, buildings will still be using electricity from the grid or may be consuming fossil fuel, depending on the building system. To offset the emissions that result from the outstanding use of electricity or fossil fuels, the City should look to purchase carbon offsets to balance out operational emissions, in the short-term. In the long term, it is expected that the market may begin to offer power purchasing agreements for zero carbon energy (in the next 10-20 years). When purchasing power agreements become readily available, it is recommended that the City look to enter into such agreements for a stable and cost effective power supply.

Additional actions to achieve Net Zero Emissions

In tandem with the seven initiatives described above, Corporate Real Estate Management will develop design standards to help with efforts such as the reduction of embodied carbon in building materials. The creation of design standards promotes a sustainable procurement strategy and also supports the transition to the Toronto Green Standard, Tier 4, which will require that new developments to be constructed to a near-zero emissions level of performance.

Anticipated Outcomes

The investment into City buildings will support resiliency and mitigate the anticipated effects of climate change. Notable expected outcomes include:

- A reduction in annual City facility emissions by 114,000 -131,000 tonnes;

- Avoidance of \$90 million per year in utility costs by 2040⁸;
- Maintaining asset resilience despite decreased reliance on fossil fuels;
- An improvement in local air quality; and
- The creation of 2000 to 4000 new jobs in the community and increased activity within the local economy (approximately \$6 to \$8 Billion in gross domestic product growth).

Recommended Next Steps

The Plan, once adopted, will apply to all City buildings. Corporate Real Estate Management would commence application of the Plan in the buildings it manages, with the expectation that City Divisions will use the Plan to apply net zero considerations to their building portfolios in tandem. As the City-Wide Real Estate Strategy to centralize real estate and facilities services of City Divisions, Agencies and Corporations (approved by City Council in 2017) continues to be implemented and more buildings come under centralized management, Corporate Real Estate Management will apply the Plan to those buildings as well.

Corporate Real Estate Management is proposing to undertake the work in phases and will first focus on integrating the Plan into the capital planning process in order to streamline the implementation of the measures outlined above in upcoming capital construction and renovation projects. Once better data and processes that consider greenhouse gas reduction options are in place, the City will be able to commence the work to undertake strategic divestment and create lower-carbon buildings. The phased approach would also allow Corporate Real Estate Management to rationalize which assets get what treatment under the Plan, and should increase the accuracy of the investment estimates required, year over year.

Conclusion

The Net Zero Carbon Plan is the road map forward, identifying the right type of investments the City should make to meet the greenhouse gas emissions reduction targets set by City Council. It reflects inputs from City Divisions and Agencies and aligns with the broader TransformTO strategy. While the overall estimated cost to the City is significant, the City can easily achieve net zero emissions status incrementally, and lead by example.

⁸ This estimate assumes that natural gas will increase in price as a result of taxation. The \$90 million in cost avoidance is achieved cumulatively, through the implementation of the Plan's initiatives.

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