Alternative formats and communication supports available upon request. Please contact accessibility@brantford.ca or 519-759-4150 for assistance.

Date September 27, 2022 **Report No.** 2022-571

To Chair and Members
Combined COW-O PA

From Inderjit Hans, P. Eng., PMP
General Manager, Public Works Commission

1.0 Type of Report

Consent Item	[ ]
Item For Consideration	[X]

2.0 Topic City of Brantford Net-Zero Building Strategy [No Financial Impact]

3.0 Recommendation

A. THAT Report #2022-571 titled “City of Brantford Net-Zero Building Strategy” BE RECEIVED; and
B. THAT Council APPROVE the “City of Brantford Net-Zero Building Strategy” as presented in Appendix B and the “City of Brantford Net-Zero Building Standard and Checklist” as presented in Appendix C.

4.0 Executive Summary

This report provides an overview of the Net-Zero Building Strategy and Standard for the City of Brantford that will help achieve the goal of net-zero emissions from Corporate buildings by 2050.

With the City of Brantford’s goal to be net-zero by 2050, buildings need to start being designed in such a way to make that goal feasible. The City of Brantford Net-Zero Building Strategy presents a long-term goal for reducing greenhouse

gas (GHG) emissions produced by Corporate buildings. The goals presented in this Strategy align with the City's Declaration of a Climate Emergency and the targets set in the Corporate Climate Change Action Plan (CCAP).

GHG emissions from buildings are the result of electricity and natural gas use. Incorporating net-zero building standards into the construction of Corporate buildings will result in greater long-term energy savings, lower operational costs, and GHG emissions reductions.

Net-zero buildings operate by phasing out combustion sources and utilizing renewable energy sources, which boost the resiliency of the building and electrical power. Net-zero ready buildings are built to the same efficiency standards as net-zero buildings. The only difference is that in net-zero ready buildings the renewable energy system (i.e. solar panels) has not yet been installed.

The goal of the City of Brantford Net-Zero Building Standard and Checklist is to improve the environmental performance of new Corporate buildings, including community buildings, housing, office space, etc. The Standard defines sustainability expectations for all new Corporate buildings in Brantford and includes a Checklist to be used by designers and consultants. The Net-Zero Building Standard requires all new Corporate buildings to be built net-zero. If it is found that it is not economically feasible and a payback cannot be achieved within one-third of the building's operational lifespan, buildings will proceed with a net-zero ready design.

The Checklist will be provided to designers and consultants to examine and evaluate the measures and report back on the items that will have the largest GHG emissions savings and cost implications. If the decision is made to not proceed with a measure, reasoning must be provided about why not. As part of the design process, consultants are expected to submit the Checklist and a Sustainability Report.

There is no financial impact as a result of this Report. The financial impact of the net-zero buildings will be captured in each capital project. This Report will have a positive impact on the environment and climate by providing a strategy for new City buildings to be more energy efficient and reduce GHG emissions.

5.0 Purpose and Overview

This report provides an overview of the Net-Zero Building Strategy for the City of Brantford that will help achieve the goal of net-zero emissions from Corporate

buildings by 2050. The Net-Zero Building Standard provides information about how the City will design and construct new Corporate buildings to be net-zero.

6.0 Background

In December 2019, Brantford City Council declared a Climate Emergency, committing the City, in principle, to becoming carbon neutral by 2050. With this declaration, staff were directed to develop a carbon reduction strategy, in collaboration with the Environmental and Sustainability Policy Advisory Committee, that details the following:

- A process to ensure that every matter coming before City Council will quantify and report its impact relative to the climate emergency and Brantford's carbon reduction strategy;
- A public reporting framework regarding the climate emergency that includes quarterly updates on the impact of municipal actions and decisions on Brantford's carbon reduction strategy;

In response to the above, a carbon reduction strategy was developed which is the Corporate Climate Change Action Plan (Corporate CCAP) and was approved in November 2020 in Report #2020-472 titled "Corporate Climate Change Action Plan and Climate Lens Assessment". This Plan included emissions reduction targets and a list of action items identified to reduce carbon emissions from Corporate sources.

On March 22, 2022 City Council Approved Report #2022-94 "Climate Lens, Climate Action and Clean Brantford Update" which outlined the work plan for 2022 to achieve the goals in the Corporate CCAP. The Climate Action Implementation Projects for 2022 included the development of a Green Building Standard to guide the design and construction of new City facilities with consideration of energy efficiency and GHG emission reductions.

The goals presented in this Strategy align with the City's Declaration of a Climate Emergency and the objectives identified in the Corporate CCAP for the City to be Net Zero by 2050. The purpose of this Strategy is to reduce GHG emissions by making buildings more sustainable.

7.0 Corporate Policy Context

2021-2022 Council Priorities, Desired Outcome 7: The City is mitigating its environmental footprint and adapting to climate change.

The Corporate Climate Change Action Plan approved by Council in 2020 Report #2020-472 directly guides the work outlined in this report and gives staff guidance on emission reduction efforts for Corporate activities.

Council declared a Climate Emergency in 2019 which directed staff to develop a carbon reduction strategy and work toward a long term goal of net-zero carbon emissions by 2050.

8.0 Input From Other Sources

Various City of Brantford Departments including: Engineering Services, Parks and Facilities Services, Finance.

9.0 Analysis

With the City of Brantford's goal to be net-zero by 2050, buildings need to be designed in a way to make that goal feasible. If buildings are not built to a net-zero or net-zero ready standard now, then major retrofits will be required to bring the buildings up to the emissions standards required by 2050.

9.1 Emissions from Buildings

Emissions from buildings are the result of electricity and natural gas use. Natural gas produces methane, a potent GHG that contributes to climate change. The total GHG emissions from Corporate buildings in 2018 was 6,754 metric tonnes of CO_2 equivalent which is the same as 1,455 gasoline-powered passenger vehicles driven for one year. The City's GHG emissions from buildings was estimated to be 46% of all Corporate emissions in 2018.

The majority of emissions from buildings are due to the use of natural gas for space heating and water heating. A small percentage is a result of electricity consumption from lighting, space cooling, and other electrical plug loads. By designing buildings to be net-zero or net-zero ready, the City will:

- Lower the demand for energy;
- Improve occupant thermal comfort;
- Improve energy efficiency;
- Have a more resilient building stock;

- Adapt to climate change; and
- Lower GHG emissions.

Incorporating net-zero building standards into the construction of Corporate buildings will result in greater long-term energy savings, lower operational costs, and GHG emissions reductions.

9.2 Net-Zero Buildings vs. Net-Zero Ready Buildings

Net-zero buildings operate by phasing out combustion sources and utilizing renewable energy sources, which boost the resiliency of the building and electrical power. Renewable energy sources include solar panels, wind turbines, geothermal wells, biogas, etc. Net-zero means that any GHGs produced by the building are offset via trees or purchased from a high-quality carbon offset projects. Net-zero buildings are typically more expensive because of the renewable energy component but usually experience the most operational savings from reduced utilities bills.

Net-zero ready buildings are built to the same efficiency standards as net-zero buildings. The only difference is that the renewable energy system (i.e. solar panels) has not yet been installed. However, in net-zero ready buildings everything has been designed and constructed to easily put the solar panels in place at a later date.

Net-zero ready buildings provide benefits similar to fully net-zero buildings with lower initial financial investment. However, as net-zero ready buildings do not incorporate renewable energy sources upon initial construction, they will likely experience higher operational costs than fully net-zero buildings from utilities bills (i.e. electricity).

Net-zero and net-zero ready buildings have both been found to have improved thermal comfort, improved lighting and noise control, have increased productivity in occupants, and reduced absenteeism. Both of these building types lead to a significant reduction in GHG emissions and will help the City of Brantford achieve its goal of net-zero emissions by 2050.

9.3 Benefits of Net-Zero Design

Aside from the environmental benefit of net-zero buildings from the reduction in GHG emissions, there are various other benefits that must be considered.

Building to net-zero standards costs approximately 1% to 8% more up-front than traditional buildings. Despite the additional capital costs, constructing buildings to net-zero is an important goal being prioritized by many municipalities in Ontario because of the various social, environmental, and economic benefits.

Net-zero buildings are highly efficient and also achieve operational savings. For buildings that could still be standing in 60 years, there is significant savings over the lifetime of the building as well as significant emissions savings, and potentially water and waste savings. On average, net-zero buildings also achieve 24% in annual operating savings.

The economic case for net-zero buildings is further strengthened by the costs that are avoided by building to net-zero, including:

- Costly future retrofits: Buildings that are not designed at the outset to be net-zero can expect to undergo more costly retrofits. These retrofits are likely to be disruptive, resulting in adverse economic impacts such as lost rent, or in the case of owner-operator buildings, displacement of staff.

- Reduced service life of buildings: Although some of the carbon reduction measures may not be cost-effective, such as window frames and additional wall insulation, their service life exceeds the 25-year time frame, extending their energy cost savings.

- Reduced resilience and value impairment: Net-zero buildings can help insulate owner-operators from future energy and carbon cost risks. There is the potential that the cost of carbon emissions in the period 2030-2050 will be higher than assumed. It is also possible that the price for electricity and natural gas will rise faster than presumed. Additionally, net-zero buildings that incorporate low-powered systems and onsite green power generation will further support buildings to withstand, respond, and recover from prolonged power outages and other impacts of extreme weather events.

Most of the social benefits of net-zero buildings are related to the health of the end-users involved in working in the building. People tend to have an increase in brain functioning, getting better sleep at night, and due to the low concentration of CO_2 and other pollutants, their overall performance is increased. Net-zero buildings have better temperature control and indoor air quality and has proved to provide more comfortable and healthy working environments, reducing absenteeism and increasing productivity.

9.4 Net-Zero Building Examples

Various municipalities and organizations are beginning to construct their buildings to net-zero standards and are seeing various savings in electricity consumption and utility costs. The detailed jurisdictional scan is attached as Appendix A: “Jurisdictional Scan Net-Zero Standards and Buildings”.

9.5 Net-Zero Building Strategy

This report presents a strategy for achieving net-zero Corporate buildings by 2050, attached as Appendix B: “City of Brantford Net-Zero Building Strategy”. The Strategy includes high level goals to reach net-zero for both new builds and existing buildings.

In 2022, a Standard and Checklist, attached as Appendix C: “City of Brantford Net-Zero Building Standard and Checklist” will be implemented to ensure new Corporate buildings are built to net-zero standards.

In 2023, a Net-Zero Building Retrofit Strategy will be developed to determine the most effective way to retrofit existing Corporate buildings to achieve net-zero. The Retrofit Strategy will incorporate the same components from the Net-Zero Building Standard and outline an implementation plan for the existing Corporate buildings.

In 2024, staff will examine and evaluate the metrics from the Net-Zero Building Standard and the Net-Zero Building Retrofit Strategy. Staff will reevaluate the recommendations in the Net-Zero Building Standard and consider changing the suggestions to requirements.

The proposed framework is designed to be adaptive, flexible, and to evolve. As it develops, consideration will need to be given to how grid systems, utility costs, and carbon taxes might change as policy and

legislation progresses, technology advances, research evolves, new build products are developed, and building codes change.

The action items within the proposed framework are anticipated to be relevant and effective within the short to medium term and will need to be revisited and continually updated moving forward.

This Strategy will allow the City of Brantford to lead by example and show how the City is being a leader in sustainability. Following the implementation of this Strategy, the City will explore private buildings and how this Standard can apply to residential, businesses, and institutional buildings.

9.5.1 Net-Zero Building Standard for New Builds

The goal of the City of Brantford Net-Zero Building Standard is to improve the environmental performance of new Corporate buildings, including community buildings, housing, office space, etc. The Standard defines sustainability expectations for all new Corporate buildings in Brantford and includes a Checklist to be used by designers and consultants.

The City of Brantford Net-Zero Building Standard and Checklist is organized into seven sustainable principles with corresponding performance measures that promote sustainable site and building design. New buildings should be constructed to reduce energy demand, which includes having an airtight building envelope, efficient insulation, electric and energy efficient HVAC and lighting, enhancing the use of daylighting and natural ventilation, etc. These buildings would consume less energy and experience lower utility costs.

The Net-Zero Building Standard requires all new Corporate buildings to be built net-zero. If it is found that it is not economically feasible and a payback cannot be achieved within one-third of the building’s operational lifespan, buildings will proceed with a net-zero ready design.

The Checklist will be provided to designers and consultants to examine and evaluate the measures and report back on the items that will have the largest GHG emissions savings and cost implications. If the decision is made to not proceed with a measure, reasoning must be provided about why not. As part of the design process, consultants are expected to submit the Checklist and a Sustainability Report. The intent of the Sustainability Report is to provide an overview of the consultant’s sustainability and net-

zero commitment and how that commitment has been achieved. The Report will include sections outlining all performance measures being pursued and their related energy and GHG savings and cost implications as well as all performance measures not being pursued and the reasoning as to why not. This will help Council and staff to make decisions and ensure that the financial impact of the net-zero buildings is captured in each capital project.

9.6 Next Steps

The City is currently proceeding with a net-zero design for the Brantford Police Services headquarters and will be conducting a net-zero building feasibility study for the Wayne Gretzky Sports Centre, Brantford and District Civic Centre, and Lions Park Arena. Once the Net-Zero Building Strategy is approved, all new Corporate buildings will be built to net-zero standards and a Net-Zero Retrofit Strategy will follow for existing buildings.

10.0 Financial Implications

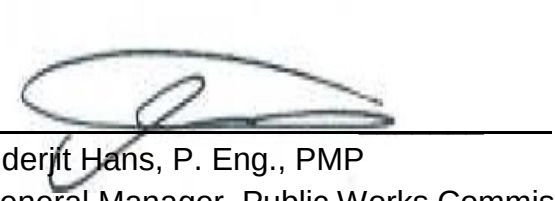
There are no financial implications as a result of this report. Financial impact of net-zero buildings will be captured in each capital project.

11.0 Climate and Environmental Implications

This Report does not have any direct climate and environmental implications. However, the Net-Zero Building Strategy is directed at reducing Corporate GHG emissions. The measures identified in the Net-Zero Building Standard including reducing water consumption, encouraging green and active transportation, reducing energy consumption, choosing sustainable materials, and planting more trees, will have positive environmental impacts. These environmental impacts can be measured and quantified through utility consumption and GHG emissions analyses.

12.0 Conclusion

This report has provided an overview of the Net-Zero Building Strategy for the City of Brantford that will help achieve the goal of net-zero emissions from Corporate buildings by 2050. The Report also provided an overview of the Net-Zero Building Standard and Checklist which will apply to all new Corporate building construction projects.



Inderjit Hans, P. Eng., PMP
General Manager, Public Works Commission

Prepared By:

Rebecca Szczepanowski, Climate Change Officer
Gagan Batra, Manager, Business Support and Sustainability

Attachments (if applicable)

Appendix A: Jurisdictional Scan Net-Zero Standards and Buildings

Appendix B: City of Brantford Net-Zero Building Strategy

Appendix C: City of Brantford Net-Zero Building Standard and Checklist

In adopting this report, is a by-law or agreement required? If so, it should be referenced in the recommendation section.

By-law required	[ ] yes	[x] no
Agreement(s) or other documents to be signed by Mayor and/or City Clerk	[ ] yes	[x] no
Is the necessary by-law or agreement being sent concurrently to Council?	[ ] yes	[x] no