Information Report

Service Area	Infrastructure, Development and Enterprise Services
Date	Friday, January 10, 2020
Subject	**Net Zero Carbon Development: Tools and Opportunities**
Report Number	IDE-2020-14

Executive Summary

Purpose of Report

To provide information regarding potential tools and other opportunities for the City to pursue its net zero carbon objectives through the development approvals process.

Key Findings

There are a number of potential tools and opportunities available to municipalities in Ontario that can assist in facilitating net zero carbon development.

Given the City's targets to achieve net zero carbon in the future, this report is focused on opportunities for new building construction, although broader opportunities are also described.

It is noted that there are legislative and regulatory limitations to what municipalities can require through Planning Act approvals.

Financial Implications

There are no immediate financial implications associated with this report. A number of the potential opportunities described in this report could have financial implications, which would need to be further examined, if the City were to pursue implementing such tools.

Report

Council has endorsed the Community Energy Initiative (CEI) Update, which includes a significant work plan and technical actions to achieve the goal of Guelph becoming a Net Zero Carbon community by 2050. To help achieve this goal, a not-for-profit entity called Our Energy Guelph (OEG) has been contracted to act as the City's CEI delivery partner. The City has entered into a Service Agreement with OEG that sets out roles, responsibilities and key deliverables, and defines an ongoing relationship with the City as a key stakeholder (see Report IDE-2019-80).

Of the 25 actions contained in the CEI Update, two specifically relate to new development:

1. Incrementally increase the number of net zero new homes to 100% by 2030.
2. Incrementally increase the number non-residential buildings that achieve Passive House levels of performance to 100% by 2030.

At the May 27, 2019 meeting of Council the following motion was carried:

"That Council direct staff to review the municipal tools for catalyzing net-zero energy development identified in the Federation of Canadian Municipalities/GMF Feasibility study, consult with community partners as needed, and return to Council with implementation options and recommendations."

In response, a staff working group was established to investigate policy, regulatory and legislative tools potentially available to single tier municipalities in Ontario to incentivize and/or impose net zero carbon measures through development approvals under the *Planning Act*. The working group carried out their investigations under three general themes:

1. Building Energy Efficiency/Ontario Building Code/Passive House Standard
2. Land Use Policy/Legislation/Development Approvals
3. Research/Literature Review

Attachments 1-3 summarizes the results of the staff investigations into these three theme areas. **Attachment 4** provides the list of potential tools identified and an initial evaluation of each tool.

Based on an initial evaluation, the following items have been identified as the most promising opportunities that could warrant further investigation. Each tool/approach is briefly described and next step(s) are outlined.

Building Energy Efficiency/Ontario Building Code/Passive House in Standard

Opportunity 1: That the City identify and participate in advocacy efforts to promote changes to the Ontario Building Code, in collaboration with OEG, with the objective of achieving net zero carbon construction standards by 2030.

Description: Municipalities in Ontario cannot impose conditions of development approval that require new building construction to exceed the energy efficiency standards set out in the Ontario Building Code (OBC). This is a key limitation to achieving the City's targets for net zero carbon new construction. To address this limitation the OBC would have to be amended, or municipalities would need to be given the authority to impose standards higher than the OBC. The City could participate in advocacy efforts in this regard. Advocacy efforts could also include promoting amendments to planning and other legislation to give municipalities more authority to impose mandatory conditions of development approval related to net zero carbon development.

Opportunity 2: Participate in the New Construction Advisory Group to be established by Our Energy Guelph.

Description: The CEI Update Report presented to Council in May 2019 identifies the convening of an advisory group for new construction as one of OEG's proposed immediate work plan priorities once an Executive Director is in place. The City would participate in the advisory group subject to the availability of staff resources and mandate of the group.

Land Use Policy/Legislation/Development Approvals

Opportunity 3: Integrate Community Energy Initiative Update considerations into the development review process.

Description: Planning staff have already begun to identify CEI Update objectives to prospective development applicants. Through the mandatory pre-consultation process staff can identify the need to include a CEI Update report as part of the complete application submission. Through this report an applicant will identify what measures they are proposing to incorporate into the development to contribute to achieving Council's net zero carbon development targets, focusing on net zero carbon construction. As noted in Attachment 2, due to limitations in current planning legislation, an applicant's commitment to implement net zero carbon measures will largely be achieved through voluntary action and negotiation with the City.

Opportunity 4: Consider the objectives of the CEI Update through the City's next Official Plan Review.

Description: As outlined in Attachment 2, the City's current Official Plan contains policies that were designed to contribute to achieving the targets of the 2007 Community Energy Plan. The next review and update of the City's Official Plan is being initiated in 2020 and will afford an opportunity to consider how to respond to the goals, objectives and targets of the 2018 CEI Update, and subsequent reports, such as Report IDE-2019-47 Community Energy Initiative Update: Pathway to Net Zero Carbon by 2050.

Opportunity 5: Consider the objectives of the CEI Update through Secondary Planning.

Description: The Clair Maltby Secondary Plan that is currently underway includes the development of energy policies aimed at pursuing the City's CEI Update objectives. Block Plans to be prepared by proponents of development within the Guelph Innovation District are required to include a net zero carbon strategy component to indicate how development will contribute to achieving the City's net zero targets.

Opportunity 6: Consider the objectives of the CEI Update through the City's Comprehensive Zoning By-law Review.

Description: The Comprehensive Zoning By-law Review process that is currently underway is taking into consideration the CEI Update. Zoning regulations cannot address building construction methods, and cannot therefore directly contribute to achieving net zero carbon new construction targets. It is also not possible under current legislation to make zoning approvals conditional on achieving specific municipal objectives, such as net zero carbon construction. However, there may be opportunities to include regulations that enable or facilitate lower carbon development patterns, such as bicycle parking requirements, reduced vehicular parking requirements in strategic growth areas, broader pedestrian areas, etc.

Research/Literature Review

Opportunity 7: Consider establishing a Community Improvement Plan (CIP) focused on incentivizing net zero carbon development.

Description: Through the research and literature review, numerous examples of financial incentives were identified, particularly in jurisdictions such as Ontario, where municipalities are limited in what they can mandatorily impose through development approvals. The most common tool used to design and deliver a package of financial incentives aimed at facilitating specific municipal policy objectives is a CIP enacted under the *Planning Act*. The City has extensive experience with CIP's through the Brownfield Redevelopment and Downtown CIP's. Developing and operationalizing a Net Zero Carbon Development CIP would require significant staff and financial resources. Therefore, this concept is going to be assessed through the City's current Strategic Plan action planning process, and potential next steps will be reviewed with Council in the context of the Strategic Plan action planning.

Opportunity 8: Encourage and recognize excellence in net zero carbon development and building projects through an awards and recognition program.

Description: Publicly recognizing positive examples of net zero development and new construction in the City is one way of promoting voluntary innovation. The City's Urban Design Awards program that is being re-launched in 2020 includes criteria associated with innovation in sustainable development, including net zero carbon measures.

Opportunity 9: Develop net zero carbon development guidelines.

Description: A number of municipalities have developed guidelines or standards to help facilitate or encourage more "sustainable" development patterns. These can include a compilation of relevant best practices, model green development or building standards, and a listing of available resources and funding programs. Such guidelines are generally used as a resource to help staff and development proponents explore opportunities through development applications. As with the concept of exploring a net zero CIP, this idea will be assessed through the Strategic Plan action planning process.

Summary:

In summary, this report discusses the range of tools and opportunities that could potentially assist the City in pursuing its net zero carbon development goals, with a focus on new construction, and identifies the 9 most promising opportunities and related recommended next steps. Opportunities 3, 4, 5, 6 & 8 will be pursued through current or planned City initiatives. Opportunities 1, 2, 7 & 9 would require the allocation of staff resources and funding, and will be assessed in the context of overall City priorities through the ongoing Strategic Plan action planning process, the results of which are scheduled to be presented to Council in June 2020.

Financial Implications

There are no immediate financial implications associated with this report. A number of the potential opportunities described in this report could have financial implications, which would have to be further examined if the City were to pursue implementing such tools. These will be assessed through the City's Strategic Plan action planning process.

Consultations

Multiple City departments were involved in the Net Zero Carbon Development working group, including: Planning and Building Services; Facilities and Energy Management; Legal and Realty Services, and Business Development and Enterprise. The Finance Department was also consulted. No external consultation was undertaken in the preparation of this report.

Strategic Plan Alignment

Priority

Sustaining Our Future

Direction

Plan and design an increasingly sustainable City as Guelph grows.

Alignment

Identifying and implementing tools that can be used to facilitate the City's net zero carbon goals through new development is aligned with this priority of the Strategic Plan and will help prepare Guelph for a net zero carbon future.

Attachments

Attachment 1 - Net Zero Development Working Group - Building Energy Efficiency/Ontario Building Code/Passive House Standard

Attachment 2 - Net Zero Development Working Group - Land Use Policy/Legislation/Development Approvals

Attachment 3 - Net Zero Development Working Group - Research/Literature Review

Attachment 4 - Table 1: Summary of Potential Tools

Departmental Approval

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Internal Memo

Date	January 10, 2020
To	**Todd Salter**
From	Net Zero Carbon Development Working Group
Service Area	Infrastructure, Development and Enterprise Services
Department	Planning & Building Services, Facilities and Energy Management
Subject	**Building Energy Efficiency, Ontario Building Code and Passive House Standard**

Introduction

Council has directed staff to explore potential tools that could be used through the development approvals process to facilitate achievement of "net zero" carbon targets set out in the Community Energy Initiative (CEI) Update.

This memo provides a brief overview of the science of building energy efficiency, outlines current Ontario Building Code Standards in relation to building energy efficiency, reviews technical approaches to increasing efficiency, including cost/benefit where information is readily available, and discusses the Passive House Standard and how it could be applied to new non-residential buildings in Guelph.

Context

City of Guelph CEI Update

Two referenced actions from the CEI Update – Pathway to Net Zero Carbon by 2050 Appendix: Actions in the low carbon pathway are as follows:

1. Incrementally increase the number of net zero new homes to 100% by 2030
2. Incrementally increase the number of non-residential buildings that achieve Passive House levels of performance to 100% by 2030

Background on Building Energy Efficiency

Concern over building energy consumption has persisted in Canada since the oil crises in the 1970's. The first initiatives to conserve energy were rooted in safeguarding Canada's energy security, however, more recently attention has shifted to mitigating negative climate impacts by reducing greenhouse gas emissions resulting from excessive energy consumption. Early conservation

initiatives focused heavily on installing insulation in accessible locations and rudimentary draft proofing. However, this was done without consideration of impacts to other building components, such as the performance of combustion equipment and associated impacts on indoor air quality. Research in the field of building science and best practice standards for energy efficiency now recognize that buildings are comprised of multiple, complex systems that need to be considered as a whole to ensure optimal performance and avoid potential negative impacts to the longevity of buildings and the health of their occupants. For example, upgrading insulation levels and reducing building air leakage must also be accompanied by dedicated mechanical ventilation to deliver fresh air for building occupants and to allow recovery of energy that would otherwise be exhausted to the outdoors.

Some of the key energy efficiency measures addressed in building codes and voluntary energy efficiency standards, include:

- Increase insulation levels
- Better performing windows and doors
- Increase heating and cooling equipment efficiency
- Provide mechanical ventilation systems with energy recovery
- Provide efficient hot water systems and insulate hot water piping
- Automatic shutoff controls for lighting and idle electrical equipment
- High efficiency (LED) lighting systems
- Reduce overall window areas to prevent overheating and minimize heat loss
- Reduce building air leakage
- Minimize heat loss associated with thermal bridging by eliminating uninsulated components in exterior building assemblies

Many energy efficiency standards recognize the importance of focusing on the so called "passive" building elements, which are non-mechanical systems that can reduce heat loss, thereby minimizing the need to expend additional energy to heat or cool a building to compensate for these losses. By reducing these losses, it may also be possible to install smaller, more cost effective heating and cooling systems. Further, items included under the "passive" category, such as insulation, generally have a much longer service life than mechanical systems and are often more costly and difficult to upgrade at a later date without substantial disruption to building occupants.

It is important to distinguish between the various definitions of "Net Zero" used by different energy efficiency standards. For example, the Canadian Home Builders Association has a Net Zero Energy Homes program for low-rise residential construction, which contains two distinct certifications: 1) "Net Zero Energy Ready" and 2) "Net Zero Energy Home".

- **Net Zero Energy Ready (NZEr) Home: "is a home that is NZE but has not yet installed the renewable energy component"**
- **Net Zero Energy (NZE) Home: "A NZE home is one that is designed, modelled and constructed to produce as much energy as it consumes**

on an annual basis. The energy produced is generated on-site and is renewable. NZE can be achieved via net-metering or on-site generation and storage".

It should be noted that both of these certifications use site energy as the basis for calculation, meaning the calculated theoretical difference between modelled consumption and production at the home's electricity and gas meters. While site energy consumption is often used as a proxy for carbon emissions, it is not as accurate as using source energy or directly addressing carbon emissions. Further, achieving certification with these standards does not guarantee that the home will actually achieve net zero energy on an annual basis once constructed and occupied. This is due to a multitude of factors, the most significant of which include homeowner energy consumption behaviour and yearly variations in weather.

Some standards target net zero carbon instead of energy. For example, the Canada Green Building Council's (CaGBC) recently launched the Zero Carbon Building standard that was developed specifically for large buildings with the Canadian context in mind. **The definition used by the CaGBC Zero Carbon Building standard is as follows: "A zero carbon building is a highly energy efficient building that produces on-site, or procures, carbon-free renewable energy in an amount sufficient to offset the annual carbon emissions associated with building operations"**.

Other programs, such as the Toronto Green Standard (TGS) consist of measures mandating increased energy efficiency for buildings and reduced carbon emissions with the goal of near-zero emissions buildings by 2030. TGS includes four different tiers, representing different levels of energy efficiency and carbon emission reductions, with Tier 1 being the current mandatory requirement for planning approvals in the City of Toronto. Refunds to development charges are offered for applications meeting higher voluntary standards of Tiers 2 through 4 of TGS. **The Toronto Green Standard, version 3 defines Tier 4, the top level of certification as follows: "Tier 4 targets represent a near-zero level of emissions performance, at which point fuel switching is promoted to foster a shift away from natural gas towards electricity and renewable energy sources".**

While it may be convenient to choose just one standard as the reference for verifying conformance with a net zero carbon development requirement or rebate program, it may not be applicable to all building types or relevant to site specific constraints. Each of the different net zero standards offer unique advantages and disadvantages, determination of which would be best left to the building designer to determine on a project by project basis.

Energy Efficiency Requirements in the Current Ontario Building Code

The Ontario Building Code (OBC) sets minimum requirements for building construction, including energy efficiency for new low-rise residential buildings under Supplementary Standard SB-12 and energy efficiency and carbon emissions for new commercial, institutional, industrial and non low-rise residential buildings under Supplementary Standard SB-10.

Prior to the most recent provincial election, the energy efficiency requirements of the OBC were poised to become more stringent on January 1, 2020, including

planned increases in energy efficiency towards the goal of a "net zero energy ready" building code by 2030. However, the current provincial government has shelved these planned code updates and also revoked all requirements mandating rough-in and installation of electric vehicle charging infrastructure in buildings containing parking facilities. To date, the government has not provided any indication whether future updates related to increasing energy efficiency requirements in the OBC will be undertaken. Meanwhile, the federal government, via the Canadian Commission on Building and Fire Codes (CCBFC), continues development of the model National Building Code and National Energy Code for Buildings with a stated goal that by 2030, all new buildings will be "near net zero energy ready". The federal government announced the goal of harmonizing building codes across Canada in their 2018 Federal Fall Economic Statement and code harmonization was highlighted in the 2019 Ontario Budget, however, provinces and territories ultimately have the authority to decide whether or not to adopt specific National Building Code and National Energy Code requirements.

Current energy efficiency measures covered in the OBC include: prescribed minimum levels of insulation for roofs, walls, foundations and floors and mandating the use of double pane windows with improved thermal performance. The OBC also contains minimum standards covering the efficiency of mechanical systems such as water heaters, furnaces and air conditioning units. For large buildings, the OBC also regulates the efficiency of lighting systems, pumps, motors and energy using fixed appliances, such as refrigerated display units in grocery stores.

While the OBC does contain basic requirements covering building air leakage, including mandating installation of a continuous air barrier and defining acceptable materials to be used for the air barrier, it does not currently require testing of buildings for air leakage, nor does it set a limit on acceptable levels of air leakage. Air leakage is, however, one of the most important considerations in building energy efficiency, since leakage of air from buildings results in lost energy from heating or cooling. Several voluntary building standards, including the Passive House standard, set stringent limits on the air leakage allowed for buildings targeting certification and mandate air leakage testing of each building to verify compliance with these limits. Several North American jurisdictions, including the province of British Columbia and the state of Washington have legislated requirements for air leakage testing and limits on acceptable levels of building air leakage.

Passive House Standard – Applicability to Non-Residential and Non-Low Rise Residential Buildings

The Passive House Institute U.S. (PHIUS) developed a climate specific iteration of the International Passive House Standard, which is more broadly applicable across North America's highly varied climate regions. The PHIUS+ 2018 Passive Building Standard is applicable to all buildings, including multi-unit residential and large non-residential building types. Requirements differ somewhat between single-family projects and large buildings, due to differences in design requirements and energy use patterns. It is a pass/fail performance-based energy standard that also includes prescriptive quality assurance provisions adopted from U.S. government programs, such as Energy Star and Zero Energy Ready Home.

While the PHIUS+ 2018 standard does not directly limit carbon emissions from buildings, it does put a limit on overall source energy consumption through the use of a net source energy criterion. **Source energy is considered a better representation of emissions associated with energy use of a building than site energy, as source energy accounts for losses associated with the extraction, generation and distribution of energy**. In the rationale for implementing a limit on source energy, the PHIUS+ 2018 standard documentation states that: **"[t]he source energy limit is not set based on cost optimization, but rather on the 'fair share' of carbon emissions allowed for each sector. To limit global warming and avoid many harmful impacts on society, emissions must go to zero overall and the energy system must go to 100% renewable".**

Further, in order to comply with the required net source energy criterion, the PHIUS+ 2018 standard allows for offsetting source energy consumption of a building with both on-site and off-site renewable generation. Off-site renewables may consist of: Virtual Power Purchase Agreements, community renewables, directly owned off-site renewable, and renewable energy credits.

Several other voluntary energy efficient and low carbon building standards are used throughout Canada. These include:

- Toronto Green Standard, Version 3
- Canada Green Building Council – Zero Carbon Building Standard
- Canadian Home Builder's Association – Net Zero Energy & Net Zero Energy Ready Homes Standard, which is only applicable to low-rise residential buildings

As is the case with the PHIUS+ 2018 standard, each of these other standards have rigorous requirements that must be met which includes third party verification of the design and construction, before certification is granted.

Comparison of OBC and energy efficiency/low carbon building standards

A comparison analysis was conducted to determine the level of carbon emission reductions possible from upgrading energy efficiency of buildings beyond minimum OBC requirements to meet two different voluntary energy efficiency standards. Standards selected for comparison include the PHIUS+ 2018 Passive Building Standard and Toronto Green Standard, version 3. Toronto Green Standard was selected for comparison with the PHIUS+ 2018 Standard, as it represents a currently active energy efficiency program being used in Ontario's largest City. An additional comparison case examines the impact to building carbon emissions by switching from natural gas in the code compliance case to 100% electric resistance heating with no additional upgrades. Several code compliant building cases were selected to represent low-rise residential, non-low rise residential and commercial buildings. These cases are based on actual building permit applications received since December 31, 2016 in the City of Guelph, which is reflective of the current energy efficiency requirements of the OBC. Full details of these analyses are provided in Appendix A.

The analysis indicates that building carbon emissions reductions up to approximately 90% from the OBC compliant design are attainable by designing to meet the PHIUS+ 2018 Passive Building Standard, regardless of building type. A similar level of carbon emissions reductions is achievable by designing buildings to comply with Tier 4 of the Toronto Green Standard, version 3 for commercial and non-low rise residential buildings. However, for low-rise residential buildings, the level of emissions reductions attainable is less pronounced, at approximately 60% less than the OBC compliant design.

Interestingly, fuel switching from natural gas for heating and hot water production to electric resistance with no additional energy saving measures yielded substantial carbon emissions reductions of around 58% for low-rise residential buildings to 65% and 68% reductions for non-low rise residential and commercial buildings, respectively. This is primarily due to the heavy reliance of all building types on natural gas as an inexpensive energy source for space heating and hot water production and the relatively high carbon intensity of natural gas when compared with electricity. It is important to note that even greater emissions reductions would be attainable if implementing advanced electrically powered technologies, such as ground source or air source heat pumps for space heating and hot water production. Due to the higher current cost of electricity as an energy carrier relative to natural gas, it is still recommended to add insulation and reduce air leakage in order to minimize energy costs for electrically heated buildings.

From the analyses summarized above, it can be concluded that significant carbon emissions reductions are attainable by designing new buildings of any type to comply with voluntary energy efficiency standards. Although only two standards have been analyzed here, other energy efficiency and low-carbon standards would be expected to enable similar levels of carbon emissions reductions. Additionally, incentivizing fuel switching could also result in substantial carbon emissions reductions, although likely not to the same extent as designing to either of the efficiency standards analyzed.

References

PHIUS+ 2018 Passive Building Standard: https://www.phius.org/media/W1siZiIsIjIwMTgvMTEvMDIvM2puNXJ3NnV2cV9QSElVU18yMDE4X1N0YW5kYXJkX1NldHRpbmdfRG9jdW1lbnRhdGlvbl92MS4wLnBkZiJdXQ?sha=1ca3bc8e

The City of Toronto Zero Emissions Buildings Framework Report: https://www.toronto.ca/wp-content/uploads/2017/11/9875-Zero-Emissions-Buildings-Framework-Report.pdf

Toronto Green Standard v3 – Sustainability Requirements for New Development in Toronto – Mid to High-Rise Residential & All Non-Residential: https://www.toronto.ca/legdocs/mmis/2017/pg/bgrd/backgroundfile-107487.pdf

CaGBC Zero Carbon Buildings Framework For Commercial, institutional and Multi-Family Buildings in Canada, November 2016: https://www.cagbc.org/cagbcdocs/NetZero/2016_CaGBC_Zero_Carbon_Framework_Full_Framework.pdf

Canadian Home Builder's Association Net Zero Energy Labelling Program Pilot – January 2016, Version P1: http://www.enerquality.ca/wp-content/uploads/2016/04/netZeroStandardPilot_vP01.pdf

APPENDIX A – Details of Carbon Emissions Comparison Analysis of OBC vs. Select Voluntary Energy Efficiency Standards

A basic comparison analysis is performed to determine where the OBC requirements for energy efficiency and carbon emissions currently stand in relation to the net zero carbon goal. Three categories of buildings were analysed, including:

1. low-rise residential buildings regulated under Supplementary Standard SB-12
2. commercial buildings regulated under Supplementary Standard SB-10
3. non-low rise residential buildings (apartment buildings and condo buildings) regulated under Supplementary Standard SB-10.

Two building energy efficiency standards were selected for this analysis based on their relevance to the goal of net zero carbon and the ability to translate the criteria of these standards for comparison with the OBC requirements. The selected standards are:

1. Passive House Institute U.S. (PHIUS+ 2018 Passive Building Standard)
2. Toronto Green Standard Version 3 (TGS v.3) – Tier 4 compliance for energy and carbon emissions

Data was collected and aggregated from building permit applications received within the past couple of years, representing the maximum annual energy consumption and carbon emissions allowed per the Code for these specific buildings. Model results presented in Table 1 are on a per square meter of occupied, heated building floor area and are compared with Passive House and TGS v.3, Tier 4 standards.

Table 1 – Comparison of Annual Energy Intensity for Buildings Designed to OBC, Passive House and TGS v.3 Tier 4 requirements

Criteria	**Ontario Building Code (SB-10 or SB-12)**	**Passive House Standard (PHIUS+ 2018)**	**Toronto Green Standard v3, Tier 4**
	Energy Intensity kWh/m2-year	**Energy Intensity** kWh/m2-year, (% reduction vs OBC)	**Energy Intensity** kWh/m2-year, (% reduction vs OBC)
Low Rise Residential (buildings < 4 stories)	96	27 (72% reduction)	70 (27% reduction)
Non- Low Rise Residential (buildings > 3 stories)	260	56 (79% reduction)	75 (71% reduction)

Criteria	Ontario Building Code (SB-10 or SB-12)	Passive House Standard (PHIUS+ 2018)	Toronto Green Standard v3, Tier 4
	Energy Intensity kWh/m2-year	**Energy Intensity** kWh/m2-year, (% reduction vs OBC)	**Energy Intensity** kWh/m2-year, (% reduction vs OBC)
Commercial Buildings	367	110 (70% reduction)	68 (82% reduction)

Table 2 – Comparison of Annual Carbon Intensity for Buildings Designed to OBC, Passive House and TGS v.3 Tier 4 requirements

Criteria	Ontario Building Code (SB-10 or SB-12)	Passive House Standard (PHIUS+ 2018)[b]	Toronto Green Standard v3, Tier 4
	Carbon Intensity kg CO2eq/m2-year	**Carbon Intensity** kg CO2eq/m2-year, (% reduction vs OBC)	**Carbon Intensity** kg CO2eq/m2-year, (% reduction vs OBC)
Low Rise Residential (buildings < 4 stories)	12 [a]	1 (92% reduction)	5 (60% reduction)
Non- Low Rise Residential (buildings > 3 stories)	37	3 (92% reduction)	5 (86% reduction)
Commercial Buildings	56	6 (89% reduction)	4 (92% reduction)

Notes to Table 2:

a. The OBC does not have a defined maximum allowable carbon emissions criteria for low rise residential buildings in Supplementary Standard SB-12, the energy model data were used to calculate what these emissions would be based on the proportions of annual electricity and natural gas consumption to allow for comparison with the requirements of the two standards.

b. The PHIUS+ 2018 does not have specifically defined criteria for maximum allowable carbon emissions. The estimated carbon emissions presented in the table are calculated based on the PHIUS+ 2018 net source energy criteria and carbon emission factors for Ontario's electricity grid.

Table 3 – Comparison of Annual Carbon Intensity for Buildings Designed to OBC and the Same Buildings with Fuel Switching to 100% Electric

Criteria	**Base Ontario Building Code Case (SB-10 or SB-12)**	**Ontario Building Code + Fuel Switching to 100% Electric** [b]
	Carbon Intensity kg CO2eq/m2-year	**Carbon Intensity** kg CO2eq/m2-year, (% reduction vs Base OBC Case)
Low Rise Residential (buildings < 4 stories)	12 [a]	5 (58% reduction)
Non- Low Rise Residential (buildings > 3 stories)	37	13 (65% reduction)
Commercial Buildings	56	18 (68% reduction)

Notes to Table 3:

a. The OBC does not have a defined maximum allowable carbon emissions criteria for low rise residential buildings in Supplementary Standard SB-12, the energy model data were used to calculate what these emissions would be based on the proportions of annual electricity and natural gas consumption to allow for comparison with the requirements of the two standards.

b. It was assumed that all natural gas using systems were converted to straight electric resistance heating. Additional reductions in carbon emission intensity could be realized through the use of electric heat pumps. Calculations are based on carbon emission factors for Ontario's electricity grid.

Attachment 2 - Net Zero Development Working Group Memo: Land Use Policy/ Legislation/Development Approvals

Internal Memo

Date	January 10, 2020
To	**Todd Salter**
From	Net Zero Carbon Development Working Group
Service Area	Infrastructure, Development and Enterprise Services
Department	Planning and Building Services, Legal, Realty and Court Services
Subject	**Land Use Policy, Legislation and Development Approvals**

Introduction

Council has directed staff to explore potential tools that could be used through the development approvals process to facilitate achievement of "net zero" carbon targets set out in the Community Energy Initiative (CEI) Update.

This memo examines potential tools, opportunities and limitations related to land use policy, legislation and development approvals processes.

Policy Context

Provincial Policy Statement (PPS) 2014 - Climate Change Overview (planning decisions shall be consistent with)

The Provincial Policy Statement (2014) (PPS) recognizes that efficient development patterns optimize the use of land, resources and public investment. In turn, this assists in creating strong, liveable and healthy communities that promote and enhance human health and social well-being, are economically and environmentally sound, and are resilient to climate change.

The PPS requires that municipalities shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and climate change adaptation through land use and development patterns which:

a) promote compact form and a structure of nodes and corridors;

b) promote the use of active transportation and transit in and between residential, employment (including commercial and industrial) and institutional uses and other areas;

c) focus major employment, commercial and other travel-intensive land uses on sites which are well served by transit where this exists or is to be developed, or designing these to facilitate the establishment of transit in the future;

d) focus freight-intensive land uses to areas well served by major highways, airports, rail facilities and marine facilities;

e) improve the mix of employment and housing uses to shorten commute journeys and decrease transportation congestion;

f) promote design and orientation which:

   1. maximizes energy efficiency and conservation, and considers the mitigating effects of vegetation; and
   2. maximizes opportunities for the use of renewable energy systems and alternative energy systems; and

g) maximize vegetation within settlement areas, where feasible.

Through the review of Planning Act applications, consistency with the PPS must be considered and analyzed. However, the PPS does not provide specific policy direction with respect to building construction methods, nor does it require Net Zero Carbon development.

The PPS is currently being reviewed by the Provincial Government. An updated PPS is expected in late 2019 or early 2020. One notable proposed change includes introducing a defined term 'impacts of a changing climate' which means 'the potential for present and future consequences and opportunities from changes in weather patterns at local and regional levels including extreme weather events and increased climate variability'.

A Place to Grow - Climate Change Overview (planning decisions shall conform or not conflict with)

The Greater Golden Horseshoe contains many of Ontario's significant ecological and hydrologic natural environments. These natural areas support biodiversity, provide drinking water for the region's inhabitants, sustain its many resource-based industries, support recreational activities that benefit public health and overall quality of life, and help moderate the impacts of climate change.

One of the guiding principles of A Place to Grow: the Growth Plan for the Greater Golden Horseshoe is to integrate climate change considerations into planning and managing growth. This could include planning for more resilient communities and infrastructure – that are adaptive to the impacts of a changing climate – and moving towards environmentally sustainable communities by incorporating approaches to reduce greenhouse gas emissions.

The policies in the Growth Plan encourage municipalities to plan 'complete communities' which support climate change mitigation and adaptation and reduce greenhouse gas emissions through various different methods and strategies including: protecting natural areas; planning for green infrastructure; and, increasing the modal share of transit and active transportation, among other things.

Through the review of planning act applications, conformity with A Place to Grow must be considered and analyzed. However, the growth plan does not provide specific policy direction with respect to building construction methods, nor does it require Net Zero Carbon development.

Conclusion

While it is noted that both the PPS and the Growth Plan should be read and applied in their entirety, some policies have broader implications and should be enacted through the City's Official Plan (OP), others are more relevantly applied through the review of site-specific development applications under the Planning Act. As both the PPS and the Growth Plan are implemented at the local municipal level, this must be taken into consideration.

Consistency or conformity with these two provincial documents is an important consideration when reviewing and evaluating a development application under the Planning Act. However, both only require that it be demonstrated that planning for climate change has been considered. At this time, neither require that development be carbon neutral, therefore while they can be used as a basis for local climate change related policies, they cannot be relied upon to require conformity with the City's Net Zero Carbon by 2050 goal.

City of Guelph Official Plan

The City's Official Plan provides policies to contribute to achieving the targets of the City's Community Energy Plan (CEP) (2007).

OP sections 4.6 entitled 'Climate Change' and 4.7 entitled 'Community Energy' provide a policy framework for increasing community resiliency to climate change and demonstrating corporate leadership in reducing energy use. Section 4.6 focuses on actions the City could take through the development of a climate adaptation strategy with its partners. Section 4.7 generally encourages action on the part of the City to implement the CEP (2007) and provides policies that are mainly a restatement of the CEP in the Official Plan. Its primary focus is on the City's plans for district energy as set out in the CEP (2007) and how the City would support the development of district energy systems. Section 4.7 also provides encouragement policies for building end-use energy efficiency by suggesting ways in which energy efficiency could be achieved through the development and construction processes.

OP chapter 11.2, entitled 'Guelph Innovation District Secondary Plan' contains policies that support the creation of sustainable and energy efficient infrastructure in the development of this area. These policies were largely premised on the development of, and connection to, an integrated energy distribution system and the use of low impact development standards. Specifically, section 11.2.3.2 provides policies that encourage development to approach carbon neutrality through gains in energy efficiency in built form and by sourcing additional needs from renewable sources and encourages roof area to be dedicated to roof top solar.

The OP policies related to climate change, energy and the CEP are encouragement policies; they encourage action to achieve the goals of the CEP and the vision of the OP. They provide a framework for achievement of goals through willing partners, negotiation, and education. They are not prescriptive.

Planning Act Applications and Relevant Legislation

Planning Act applications have been and assessed with respect to the opportunities and constraints of implementing Net Zero Carbon requirements, focussing on CEI Technical Actions 1 and 2 that apply to new buildings, as follows:

1. Incrementally increase the number of net zero homes to 100% by 2030.
2. Incrementally increase the number of non-residential buildings that achieve Passive House levels of performance to 100% by 2030.

The different planning applications that have been identified for this discussion are:

- Zoning By-law Amendments
- Official Plan Amendments
- Draft Plan of Subdivision
- Consent to Sever applications
- Minor Variances
- Site Plan

A brief description of the relationship between the Ontario Building Code and these Planning Act applications is provided for the purpose of context prior discussing any details under the various types of applications.

The Ontario Building Code is a regulation under the Building Code Act. It establishes detailed technical and administrative requirements and minimum standards for building construction. In addition, there is other applicable law that must be satisfied prior to issuance of a building permit, and this includes compliance with the City's Zoning By-law. However, there are limitations to what can be imposed through zoning, noting that conditional zoning cannot be imposed and that zoning cannot regulate the manner of building construction.

Subsection 10(2) of the Municipal Act conveys authority on single-tier municipalities to pass By-laws respecting the economic, social, and environmental well-being of the municipality. This, however, is limited by section 14 of the Municipal Act, which explains that a By-law is without effect to the extent of any conflict with a provincial Act or a regulation made under such an Act (which mandates the common law "paramountcy doctrine" approach to resolving conflicts between By-laws and provincial legislation).

Section 35 of the Building Code Act sets out the following:

> 35 (1) This Act and the building code supersede all municipal by-laws respecting the construction or demolition of buildings.
>
> (2) In the event that this Act or the building code and a municipal by-law treat the same subject-matter in different ways in respect to standards for

> the use of a building described in section 10 or standards for the maintenance or operation of a sewage system, this Act or the building code prevails and the by-law is inoperative to the extent that it differs from this Act or the building code.

Therefore, while Council could pass a By-law dealing with the environmental well-being of the City, it would be without effect and inoperative to the extent that it conflicted with, or treated the subject-matter differently than, the Building Code Act or Building Code.

Despite these limitations identified, the City will continue to negotiate and encourage carbon neutral construction techniques throughout the various steps of the development planning process, beginning at the earliest pre-consultation stages. This will be done in an effort to voluntarily solicit cooperation and get agreement from owners to implement energy efficiencies into their developments towards meeting CEI Technical Actions 1 and 2.

Zoning Bylaw Amendments

A Zoning By-law controls the use of land. Within the geographic boundaries of the City it mandates:

- how land may be used
- where buildings and other structures can be located
- the types of buildings that are permitted and how they may be used
- the lot sizes and dimensions, parking requirements, building heights and setbacks from the street
- minimum landscape requirements
- parking and loading facilities.

If a proposed development is not in accordance with the zoning bylaw, a zoning bylaw amendment can be requested to change how the land is used and/or specific zoning regulations. However, zoning and zoning bylaw amendments cannot determine how a building is constructed. Building construction details are outside the scope of the Planning Act development processes. Therefore, Planning review of a Zoning By-law amendment application (or any Planning Act development application) cannot make recommendations for approval or refusal on the basis of whether or not certain Net Zero Carbon targets through building construction are being met. It is recognized that zoning by-law amendment applications must conform with the OP, which does include Climate Change (Section 4.6) and Community Energy (Section 4.7) policies. However, as stated previously, these are encouragement policies and not prescriptive.

It is acknowledged that there could be specific zoning provisions implemented through approvals, which still represent good planning as part of a comprehensive development review process that could facilitate the future implementation of low and net zero carbon measures associated with the final building design. For example, this could include consideration of the orientation of buildings to

accommodate solar panels, and establishing specific building envelopes to address efficiencies. However, it is important to note that zoning by-law amendments cannot be passed subject to conditions, such as tying the approval of specialized zoning regulations to requirements that are related to how the building is constructed.

Official Plan Amendments (OPA)

Development applications that include a request to amend the Official Plan relate to broader land use designations and policies and no opportunities to respond to Technical Actions 1 and 2 in the CEI through the OPA process have been identified.

Draft Plan of Subdivision

Section 51(24) of the Planning Act outlines the criteria to be considered in reviewing a proponent's draft plan of subdivision application and includes "the extent to which the plan's design optimizes the available supply, means of supplying, efficient use and conservation of energy".

Conditions of Draft Plan approval and conditions within subdivision agreements will also be carried forward and implemented into the detailed design and ultimate development of the approved subdivision. Staff will also pursue opportunities to have conditions relating to CEI Technical Actions 1 and 2 implemented into site plan control agreements for development blocks within the plan, albeit as a voluntary action by the owner.

While conditions relating to building construction may not be enforceable (as previously discussed), planning staff's review and recommendations associated with a draft plan of subdivision application do include consideration of other sustainability and energy efficiency goals of the Official Plan that can assist in meeting net zero carbon targets in the CEI update. This includes such matters as considering lot orientation for solar access, mix of land use and density to support transit and pedestrian oriented development, low impact development, provision of centralized shared parking, water efficiency measures, etc. The subdivision review process also presents opportunities to implement alternative development standards for streets, utilities and infrastructure that could facilitate the implementation of Net Zero Carbon solutions.

Consent to Sever Applications (Committee of Adjustment)

The planning review of consent to sever application generally utilize the same review criteria as draft plan of subdivision applications, so therefore could include energy conservation measures with conditions of consent applied to approvals. However, the Committee of Adjustment does not have authority to impose conditions related to building construction, and any recommendations from staff would require voluntary uptake from proponents.

Minor Variances (Committee of Adjustment)

Planning staff review of minor variance applications are limited in scope to meeting all 4 tests under Section 45(1) of the Planning Act as follows:

- Is the application minor?
- Is the application desirable for the appropriate development of the lands in question?
- Does the application conform to the general intent of the Zoning Bylaw?
- Does the application conform to the general intent of the Official Plan?

Assessing energy efficiency in building construction can form part of the Official Plan conformity test with respect to the relevant climate change policies in the Official Plan. However, because the Official Plan policies are "encouraging" in nature, the staff recommendations or decision could not be determinative on this one component in recognition that construction standards are beyond the scope of the Committee of Adjustment.

Site Plan

The opportunity to apply condition(s) relating to net zero carbon commitments into site plan control agreements has been identified, subject to agreement by the owner. However, if an owner voluntarily agrees to have such a condition implemented into a site plan control agreement it would be unlikely that such a condition could be enforced in the case of future non-performance given the clear limitations of site plan control to determine building construction. Section 41 (4.1) of the Planning Act lists the following matters that staff cannot consider when approving/conditioning site plan applications:

- Interior design;
- The layout of interior areas, excluding interior walkways, stairs, elevators and escalators;
- The manner of construction and standards for construction.

Council has delegated the authority to approve/condition site plans to staff. It is recommended that staff continue to negotiate specific conditions and continue efforts in persuading owners to implement these type of conditions at the building permit stage. However, it would have to be done voluntarily recognizing once again that the construction of buildings is governed by the Building Code.

Development Application Review Process

The following outlines the various steps of the development review process for Planning Act applications (Official Plan and Zoning By-law Amendments and Draft Plan of Subdivisions) and discusses opportunities and constraints in integrating net zero carbon considerations into these development application review processes.

Pre-consultation

Through the mandatory pre-consultation meetings held at the Development Review Committee (DRC), City staff request information, material or studies to assess planning applications (OPAs, ZBLA, Draft Plan of Subdivision) as part of a complete application. It is recommended that these requirements include the submission of an Energy Strategy Report prepared by a qualified professional. Requiring this Energy Strategy Report would allow the early identification of opportunities to integrate energy solutions that are efficient and contribute to the CEI Net Zero Carbon goals. The nature and scope of Energy Strategy Report would vary based on the type of application being proposed but would be focused on addressing Action Items 1 and 2 in the CEI Update. The development of a Terms of Reference for the Energy Strategy Report is recommended to provide direction to proponents and could include the following elements:

- Establish baseline design energy performance
- Identify and evaluate opportunities for low-carbon energy solutions
- Identify passive and active conservation strategies that should be considered to reduce external loads on the building
- Estimate the contributions of the identified on-site and off-site low carbon solutions towards achieving zero emissions
- Identification of preferred scenario and recommendations and next steps for implementation

The Energy Strategy Report would be used by the development industry to provide upfront focus on additional requirements from development applications, those required, incented and/or encouraged through the climate change and energy efficiently policies of the Official Plan. This will also help identify opportunities early in the process that can be coordinated and help inform and build on the broader work of Our Energy Guelph (OEG).

Complete application review

Upon receipt of a formal application, planning staff would review the submission and ensure that the submission included the required Energy Strategy Report that was requested during the pre-consultation process prior to deeming the application complete.

Development Review (circulation for comment)

Once the planning application is deemed complete, which could include the submission of the required Energy Strategy Report, planning staff would circulate the application to internal and external departments and agencies for review and comments. Staff from Building Services and the Facilities and Energy Management Department could be used as a resource to review the proponent's energy strategy. This review could also be outsourced to an external peer reviewer if needed. Through the review of the application staff would continue to negotiate and encourage the ultimate implementation of identified net zero or low carbon

solutions, also taking advantage of any incentives or initiatives that may be developed through the broader work of the City and OEG.

Staff recommendation report

Once the review of the planning application is complete planning staff bring forward their planning recommendation report at the decision meeting at Council. This decision report would include a separate section in the main body of the report specifically addressing how the proposed development intends to address Technical Actions 1 and 2 of CEI Update. This section generally refers to a commitment letter prepared by the proponent as a separate attachment to the report that outlines the intended actions the owner intends to take to implement energy efficiencies into their development towards the net zero carbon goal. Zoning By-law amendment applications decision reports also include wording of a condition that would be intended to be applied at the subsequent site plan approval process. This is provided simply as information to Council recognizing that the zoning conditions cannot be tied to these approvals. In terms of draft plan of subdivision decision reports, the recommended conditions associated with a draft plan approval could contain a similar condition outlining how the proponent's development intends to address Technical Actions 1 and 2 of the CEI Update.

Site Plan Control

With the exception of applications that involve single detached and semi-detached dwellings, development applications approved by Council are subject to site plan approval with staff having delegated approval authority. As discussed previously, while staff could continue to negotiate and encourage owners to agree to construct towards meeting Net Zero Carbon targets, it would still have to be done voluntarily. Again, this is based on the recognition that the construction of buildings is governed by the Building Code.

Conclusion

Planning staff currently communicate CEI Update objectives to development proponent and request planning application submission requirements focussing on how their proposed development would contribute to achieving Council's Net Zero Carbon targets. However, due to the limitations in current planning legislation discussed and with the understanding that the construction of buildings is governed by the Ontario Building Code, an applicant's commitment to implement Net Zero Carbon measures ultimately relies on the voluntary action by development proponents.

Attachment 3 - Net Zero Development Working Group Memo: Research/Literature Review

Internal Memo

Date	January 10, 2020
To	**Todd Salter**
From	Net Zero Carbon Development Working Group
Service Area	Infrastructure, Development and Enterprise Services
Department	Planning and Building Services, Facilities and Energy Management
Subject	**Research and Literature Review**

Introduction

Council has directed staff to explore potential tools that could be used through the development approvals process to facilitate achievement of "net zero" carbon targets set out in the Community Energy Initiative (CEI) Update, and specifically referred the Federation of Canadian Municipalities/Green Municipal Fund Feasibility Study to staff for consideration.

This memo identifies key literature sources that were reviewed by staff, and summarizes potential tools identified through this review. To provide necessary context, the memo also defines the difference between "net zero carbon" and "net zero energy".

Context

In May 2019, Guelph City Council endorsed the community target of Net Zero Carbon by 2050 with the focus of reducing carbon or greenhouse gas (GHG) emissions and acting on climate change. In alignment with this target initiative, there is opportunity to encourage the design and construction of new building sites to be more sustainable through the development approvals process, where energy usage is minimized and energy efficiency and production is maximized.

The term 'Net Zero Carbon' refers to a site's zero balance of carbon emissions. Carbon emissions are generally produced from the use of energy and fuel such as, but not limited to, electricity, natural gas, diesel and gasoline. Energy conservation and energy efficiency, or using low-to-no carbon emission energy sources, are strategies that reduce the amount of site generated carbon emissions. Carbon emissions can also be offset by sequestering carbon through methods such as growing trees and natural elements, or by purchasing carbon credits to bring the carbon emissions accounting to net zero. The accounting period is typically for a given a year.

This is different than 'Net Zero Energy' which is defined as when a site's net energy use is equal to zero, or all energy needed for the site can be produced onsite and is renewable.

Strategies such as energy conservation and energy efficiency will reduce energy usage, while generating energy at the site will counter energy consumption and bring the energy accounting to net zero. Again, the accounting period is typically for a given a year.

Guelph City Council has endorsed the updated CEI which is Guelph's commitment to use and manage energy differently moving forward. The main goal of the CEI is for Guelph to become a Net Zero Carbon community by 2050. The CEI is led by Our Energy Guelph (OEG), a not-for-profit organization that is intended to act as the City's CEI delivery partner with the goal of community influence to reduce energy consumption, save energy dollars, increase local economic benefit from energy spending, and reduce GHG emissions.

The updated CEI includes the following technical actions relevant to new construction:

- Incrementally increase the number of net zero new homes to 100% by 2030.
- Incrementally increase the number of non-residential buildings that achieve Passive House levels of performance to 100% by 2030.

It is anticipated that OEG will work toward these goals by:

a. Creating advisory groups on residential new construction, ICI new construction, and community/neighborhood/urban planning
b. Building Net Zero Carbon capacity in the local property development and building construction sector (information sharing, best practices, etc.)
c. Advocating for changes in the Ontario Building Code / National Building Code
d. Stimulating demand for Net Zero new construction through awareness and outreach campaigns to the home-buying public.

Through established policies and procedures, municipalities are required to support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and climate change adaptation through land use and development. However, the current planning and development approvals process does not require new construction to comply with Net Zero Carbon development or specific sustainable building construction methods. However a number of current resources have been reviewed with the purpose of identifying potential tools for municipalities to utilize to facilitate net zero carbon through development applications.

Context continued

Key sources of information used to identify and assess the potential tools are as follows:

- FCM/GMF Feasibility Study: Municipal Tools for Catalyzing Net-Zero Energy Development

The Federation of Canadian Municipalities (FCM) is a national non-profit organization consisting of members from municipalities across Canada. The Green Municipal Fund (GMF) is a unique FCM program that provides low-interest funding and knowledge services to support sustainable community development in Canada including improving air, water, and soil quality, and to mitigate the impacts of climate change. The above noted study focused on exploring technical, financial, or process/policy related barriers and possible solutions for municipalities to help motivate and enable the development community to adapt to net zero energy construction.

- Clean Air Partnership's Clean Air Council Green Development Standards Workshop

  Clean Air Partnership is a charitable environmental organization with the mission to help municipalities minimize GHG emissions and to become sustainable communities. In coordination with over 30 Southern Ontario municipalities a Green Development Standards Workshop was held in November 2018 to work collaboratively and advance Green Development Standards.

- Presentation from webinar by the Security and Sustainability Forum (SSF) on Climate Action Planning

  The Security and Sustainability Forum is a US-based organization is promoting knowledge sharing on climate action matters. They offer free webinars that convene global experts on a variety of topics including food, water, energy and climate for the purpose of information sharing and promoting clean energy and solutions to protect the environment. The above noted webinar held in August 2019 was focused on Creating Low Carbon, Resilient Communities.

Through the research and literature review, a number of potential tools were identified, summarized and assessed that could be utilized through the processing of development applications, including Official Plan Amendments, Zoning By-law Amendments, Plans of Subdivision and Site Plan Approvals. The tools were analyzed based on the following criteria:

- Level of municipal influence
- Potential net zero carbon impact
- Financial impact
- Available examples from other municipalities

Table 1, included as Attachment 2 to Report IDE-2020-14, provides the list of identified potential tools and associated analysis. A summary of the most promising tools, based on the analysis, is provided below:

a) Consider establishing a Community Improvement Plan (CIP) focused on incentivizing net zero carbon development. Numerous examples of financial incentives were identified, particularly in jurisdictions such as Ontario, where municipalities are limited in what they can mandatorily impose through development approvals, and where there are legislated limitations regarding financially `bonusing` development. The most common tool used to design and deliver a package of financial incentives aimed at facilitating specific municipal policy objectives is a CIP enacted under the *Planning Act*. The City has extensive experience with CIP's through the Brownfield Redevelopment and Downtown CIP's.
b) Encourage and recognize excellence in net zero carbon development and building projects through an awards and recognition program. Publicly recognizing positive examples of net zero development and new construction in the City is one way of promoting voluntary innovation. The City's Urban Design Awards program that is being re-launched in 2020 includes criteria associated with innovation in sustainable development, including net zero carbon measures.

c) Develop net zero carbon development guidelines. A number of municipalities have developed guidelines or standards to help facilitate or encourage more "sustainable" development patterns. These can include a compilation of relevant best practices, model green development or building standards, and a listing of available resources and funding programs. These types of guidelines are generally used as a resource to help staff and development proponents explore opportunities through development applications.
d) Feasibility Study Grant can provide an incentive for a developer to consider alternative energy measures in the development. Funding from the municipality or other entity would pay the developer for a study that considers alternative energy solutions that could include district energy or other technologies that would achieve a Net Zero Carbon standard.
e) Development Charge Reductions/Exemptions/Rebates as a means to incentivize developers and builders to adapt to net zero construction methods.
f) Tax increment based grants that allow deferral of taxes incrementally to encourage the redevelopment of sites with significant development costs and are paired with specific net zero building requirements.
g) Advocate for change in Provincial planning policies and regulation that include mandatory adoption to Net Zero Carbon development standards.

Attachment 4 - Table 1: Summary of Potential Tools

Table 1: Review of Potential Tools to facilitate Guelph's Net Zero Carbon targets through Development Applications

Note: "Development Applications" includes: Official Plan Amendments, Zoning By-law Amendments, Plans of Subdivision and Site Plan Approvals)

Note: with respect to Level of Municipal Influence, "Direct" means that single tier municipalities in Ontario currently have specific legislative authority to implement the tool, and "Indirect" means that there isn't specific legislative authority enabling use of the tool, but single tier municipalities could voluntarily opt to develop such a tool to indirectly encourage, support or facilitate lower carbon development.

Note: this is a high-level initial evaluation and a more detailed evaluation, such as a business case/cost benefit analysis, may be required, if the City were to pursue specific actions with higher financial implications.

Potential Tool	Level of Municipal Influence	Potential Net Zero Carbon Impact	Financial Impact	Example	Notes
Community Improvement Plan (CIP) a plan to implement policy initiatives towards a specific project area with funding/financial incentives	Direct	Moderate to High, depends on outcomes of CIP	High, depends on specific plan attributes	Kitchener (CIP: Energy & Water Efficiency for Land and Buildings), City of Guelph Downtown CIP for sustainable design elements	Further review needed; outcomes depend on scope and potential incentive programs undertaken. FCM developed a framework that municipalities are currently refining.

Potential Tool	Level of Municipal Influence	Potential Net Zero Carbon Impact	Financial Impact	Example	Notes
Development Approvals	Direct	Low to High, depends on level of developer uptake	Limited to municipality. Can impact cost of development	All municipalities follow Planning Act development approvals processes	Relevant CEI Update elements could be integrated into different process steps, as applicable
Our Energy Guelph Activities	Indirect	Low to High, depending on outcomes	To be determined (depends on specific activity)	Guelph has established a service agreement with OEG	OEG work plan includes certain items related to development and construction that the City could participate in
Awards and Recognition Program	Indirect	Low	Low	Waterloo, Vaughan, Canadian Green Building Council	Could be coordinated together with Urban Design Awards

Potential Tool	Level of Municipal Influence	Potential Net Zero Carbon Impact	Financial Impact	Example	Notes
Green Building Standards	Indirect	Moderate	Moderate, depends on incentives	Hamilton, Brantford, Toronto, Halton Hills	Many municipalities have developed voluntary GBS, easier to implement, could standardize with other municipalities to measure performance on the path to net zero carbon guidelines
Feasibility Study Grant Incentive for developer to consider alternative energy measures	Direct (under CIP)	Moderate	Moderate	Further review needed	Municipality or other entity pays for the study for developer to consider alternative: i.e. district energy, other technology that would get them to a net zero carbon standard
Development Charge Reductions/Exemptions/Rebates Incentive programs for Developers and Builders	Direct	Moderate	Moderate to High	Not been used for energy to date. Cambridge used for rebates for Urban Agriculture Rooftop program	Further review needed, potential CIP outcome. Rebates generally considered best municipal tool because action has already been taken and is more measurable.

Potential Tool	Level of Municipal Influence	Potential Net Zero Carbon Impact	Financial Impact	Example	Notes
Tax Increment Based Grant Permits deferral of taxes incrementally to encourage the redevelopment of sites with significant costs associated (i.e. Brownfields)	Direct (under CIP)	Moderate to High – would need to be paired with specific net zero requirements	Moderate	Waterloo	Used frequently to incentivize brownfield redevelopment; potential CIP outcome
Building Permit Fee Reduction/Rebate	Direct	Moderate	Moderate	Ottawa, St Thomas, Welland	Further review needed, potential CIP outcome

Potential Tool	Level of Municipal Influence	Potential Net Zero Carbon Impact	Financial Impact	Example	Notes
Official Plan, Secondary Plan and Zoning Best Practices Implemented	Direct	Low to high	Low	Many Official Plans contain climate change/low carbon policies	Could be considered through the current Comprehensive Zoning By-law Update, next OP update and Secondary Plans. The Official Plan/ Secondary Plans have high potential to address sustainable development patterns at a land use/urban form/infrastructure planning level. But Official Plan policies and zoning regulations have limited ability to directly regulate/ mandate low carbon construction based on Provincial legislation
Green Roof Program	Indirect	Moderate; potential energy and infrastructure savings	Moderate	Toronto	Further review needed of potential costs and benefits of a voluntary or incentivized program.

Potential Tool	Level of Municipal Influence	Potential Net Zero Carbon Impact	Financial Impact	Example	Notes
Expedited Development Approvals – prioritize review of developments that promise to be net zero	Indirect	Low	Moderate	Further review needed	Application processing times are only partially controlled by the municipality (i.e. the portions of the process related to City review) but other elements are less under municipal control (i.e. developer-led portions of the process, involvement of external agencies). Timelines set out in Planning Act are already very tight and it would be difficult to expedite further. It is also not possible at building permit to require construction standards that exceed the Ontario Building Code (i.e. net zero carbon standards).

Potential Tool	Level of Municipal Influence	Potential Net Zero Carbon Impact	Financial Impact	Example	Notes
Advocate for stronger provincial planning policies/legislation related to net zero carbon development and enhanced Ontario or National Building Code for net zero construction standards	Indirect	Low to High (depending on outcomes of advocacy)	Low	Stronger Provincial Policies, regulations for Net Zero in PPS and Planning Act and changes to Ontario Building Code	Guelph could leverage its involvement in larger municipal advocacy efforts, such as through the Association of Municipalities of Ontario (AMO) and the Federation of Canadian Municipalities (FCM).