

SUSTAINABLE DEVELOPMENT GUIDELINES

2020



Prepared for:

Township of
Douro-Dummer

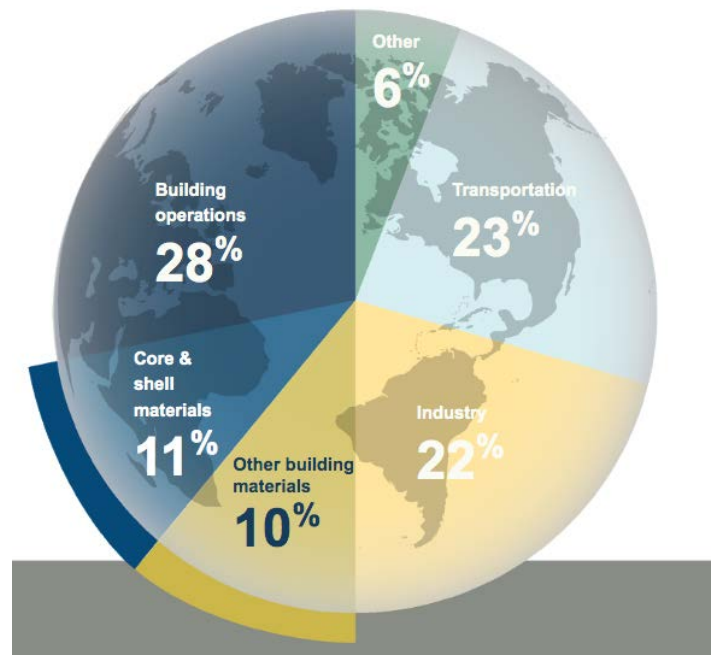
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Introduction:

The purpose of this document is to act as a resource for the design, development and operation of new buildings with a greatly reduced carbon footprint. To provide a significant reduction in greenhouse gas (GHG) emissions, it is important to influence as much of the building process as possible, given that 49% of the world's GHGs come from the building and construction industry. Of the total building-related emissions, 28% are operational and 21% are from up-front embodied carbon emissions from material manufacturing. By reducing or removing our upfront emissions, we can have a significant impact while also reducing operating emissions.



Source: Adapted from 2019 Global Status Report, Global Alliance for Building and Construction (GABC) and Architecture 2030.

The Sustainable Development Guidelines will help guide a proponent through the design and construction process of a new residential building to achieve a meaningful reduction in total GHG emissions. The guidelines are focused on initial considerations, material selections and energy-use reduction strategies.

This program is not designed to be “one size fits all” as there are many variations and site-specific considerations that make different approaches viable.

Program Goal:

In 2016, the Township of Douro-Dummer agreed to the Greater Peterborough Area Climate Change Action Plan, which encompasses a 29% reduction in our community sector GHG emissions by 2031. The reduction in emissions through reduced fossil fuel use and lower energy use will help us better prepare for a changing climate.

The Sustainable Development Guidelines are proposed to establish a program to dramatically reduce upfront emissions in new construction through intentional selection of low-carbon building materials, as well as incorporating near net zero levels of energy efficiency. Our program intends to provide incentive to building owners to reduce emissions by providing grants for building permits. The program will be:

- Easy to use
- Cost-neutral
- Demonstrate that an achievable reduction in GHG emissions is possible through education and better building practices.

This program is innovative in its combination of reduction in up-front emissions from materials and operational emissions, using a metric known as “Carbon Use Intensity” (CUI).

Program Criteria:

The program is devised to be easy to use and low barrier to entry. It is designed to accommodate flexibility in design choices and style, as well as building size.

Eligibility:

The program is eligible for the first 50 applications received after March 1, 2020. To be eligible, the following criteria apply:

- ❑ Applicant to is either a property owner or a Tarion Registered Builder
- ❑ Applicant has read, understands and agrees to the Program Guidelines.
- ❑ Applicant has paid their building permit application fee as per the required amount.
- ❑ Applicant acknowledges that if they fail to meet the Program Guidelines then there will be no grant available and they will forfeit their application.
- ❑ The construction will be measured in accordance with this Program Criteria and the associated Carbon Calculator. The calculator may be updated at anytime, however, if a change is made to the calculator which increases the carbon footprint of a material, the applicant may use the older number which was available when they applied for the program.
- ❑ For current grant amounts, please contact the Municipality as grant amounts may change during the course of the program as additional funds become available.
- ❑ The Municipality reserves the right, at its sole and absolute discretion, to limit the program, change the scope of the program, or terminate the program at any time, notwithstanding that existing applicants would be maintained.
- ❑ The program thresholds for up-front carbon emissions as well as operating emissions are set by the Program Provider, Builders for Climate Action.

Carbon Calculation:

The Carbon Calculator will be established and maintained by the program provider, Builders for Climate Action. The calculator will allow an applicant to enter a quantity takeoff for their building (floor areas, wall areas, roof areas, etc. by type/component) to establish the Carbon Footprint of the building. The entire building will be calculated, but only interior floor area (defined below) will be entered into the calculation. Inhabitable rooms such as exterior decks/porches will contribute to the carbon cost, but will not be utilized for the floor area calculation.

Example:

- One Storey Dwelling with 144m² floor area
- Full basement with 118m² of floor area (plus 26m² inhabitable space)
- Porch with 16m² area

Using the Carbon Calculator, the entire building was calculated to have up-front carbon emissions of 12,484kgCO₂e.

As there is 262m² of eligible floor area, the up-front carbon footprint is:

$$47.6 \text{ kgCO}_2\text{e/m}^2$$

Definitions:

“Floor Area” means the aggregate of the floor areas of all habitable rooms in a dwelling, but excluding the thickness of any exterior walls.

"Habitable Room" means a room designed to provide living, dining, sleeping, or kitchen accommodation for persons. This definition may include a bathroom, den, library or enclosed sun room but shall not include any private garage, carport, porch, veranda, deck, unfinished attic, unfinished basement or unfinished cellar.

Reporting:

An initial report will be required to be submitted with the application outlining the proposed design and providing up-front carbon footprint results from the carbon calculator.

A single progress report will be required, roughly 50% of the way through the project, after framing/insulation has been completed. The report should identify any challenges encountered, changes, revisions, trade offs, and an updated carbon calculation if any material substitutions have been made.

A final report will be required to receive the grant funding which will identify that program criteria have been met. Any challenges encountered and how they were overcome, as well as general feedback should be provided in this final report.

Substitutions/Revisions:

If material substitutions are made throughout the construction process which will have an impact on the carbon calculation, these changes must be reported and approved prior to being implemented. If changes have not been approved and the resultant change causes an ineligibility, this is the responsibility of the applicant and not the program administrator. Changes which would reduce the carbon emissions do not need to be submitted immediately and can be completed at the interim report.

Fuel Burning Device Trade off:

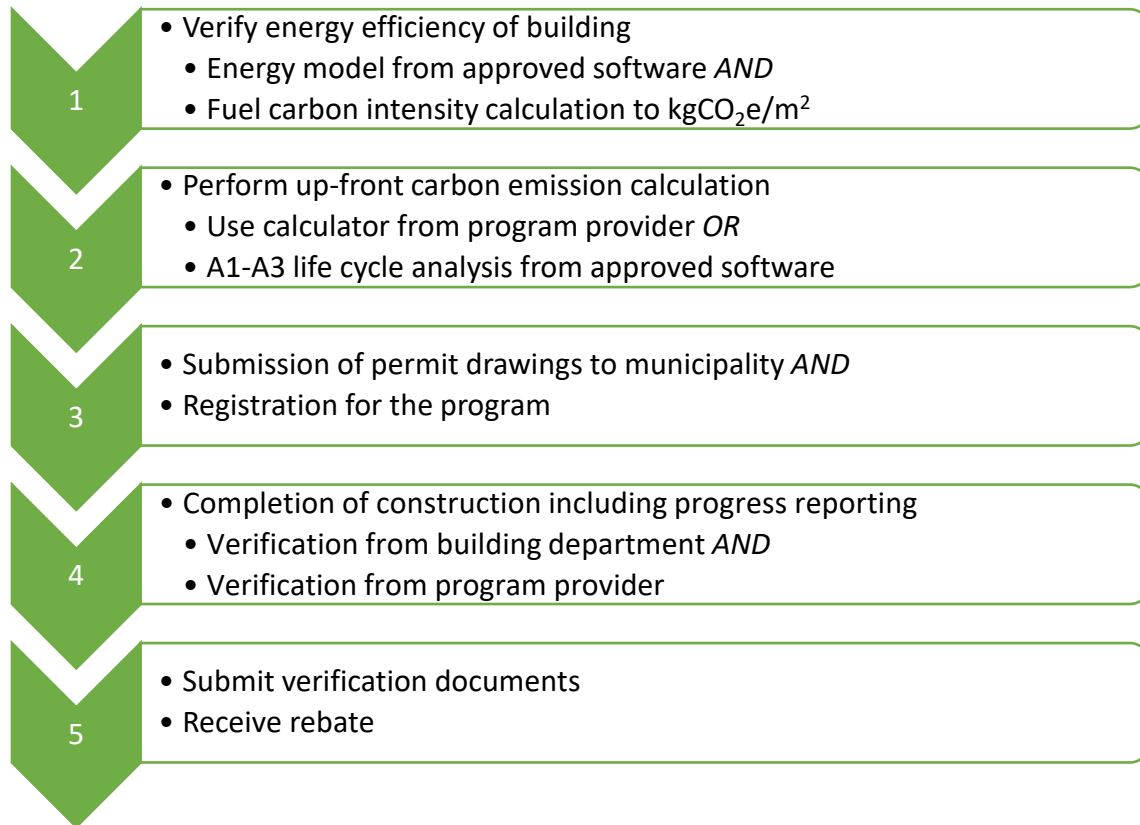
Generally speaking, the program would not permit any combustion devices as they have a high carbon footprint. It is acknowledged though that part of living in a rural community is a plentiful access to solid fuel (wood). It would therefore be permitted, as part of the program, to permit one wood burning appliance, which is generally design to be as efficient as possible, and further that the appliance is not used as a primary or secondary heat source.

In addition, the utilization of gas cooking equipment will be permitted, ensuring that the appliance is as efficient as possible.

If either of these options are selected, a trade off must be achieved to compensate. The criteria for the completed building must now achieve 5kgCO₂e/m² less GHG emissions.

If both of these options are selected, the completed building must now achieve 10kgCO₂e/m² less GHG emissions.

Program Flow



Design for Operational Carbon Reductions:

There are many resources available to building designers that focus on strategies for improving energy efficiency and thereby reducing GHG emissions. Designers can refer to existing programs for more detailed implementation strategies.

The program will use “near net zero” levels of energy efficiency as the benchmark for the allowable levels of operational carbon emissions to qualify for the program.

Unlike other energy efficiency programs, the energy use of the building will be converted to carbon emissions based on the type of fuel being used and the efficiency rating of the HVAC equipment.

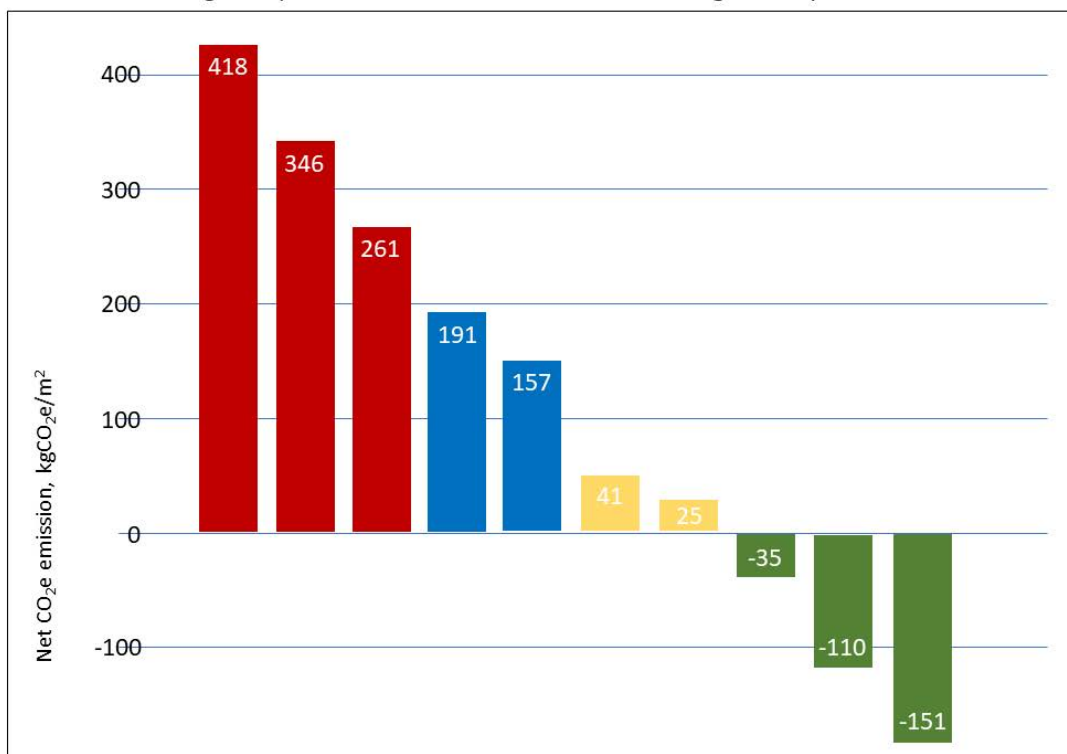
Design for Up-Front Carbon Reductions:

The choices of materials are significant in their impact to the emissions of the building. Uninformed choices for materials can negate operational emission reductions for decades. To ensure that new residential construction does not unintentionally drive overall emissions the use of materials with high carbon emissions from material production should be avoided, while materials that act as a carbon sink should be included wherever practical.

The program will use an up-front embodied carbon calculator tool available to program participants through the program provider, Builders for Climate Action. The tool will require the applicant to enter the overall dimensions of the building and to choose from a list of potential materials for each major assembly component. The calculator will create an up-front carbon emissions value for the selected components and compare that to the program target. The applicant can, if necessary, adjust the material selections and refine choices until the program target is achieved.

The applicant will provide verification documents to the program provider to ensure that material selections were used during construction. The program provider will then notify the municipality that all requirements for the rebate were met.

Range of Up-front Embodied Carbon Results for Single Family Residence



Conclusion:

Thank you for taking the time to read through this document and hopefully engaging in the program. Together, the efforts of this program are estimated to reduce our GHG emissions by up to 50 tonnes of CO₂ per building, which would represent a 2500 tonne reduction in CO₂e over a two-year period for 50 buildings.

This program is an innovative design to significantly reduce the emissions caused by new building construction projects. As has been demonstrated, the program was designed to be a low barrier to entry, maximizing benefits and hopefully will spur changes in the building industry and community as a whole with respect to building design, material selection, and the associated impacts of greenhouse gas emissions.