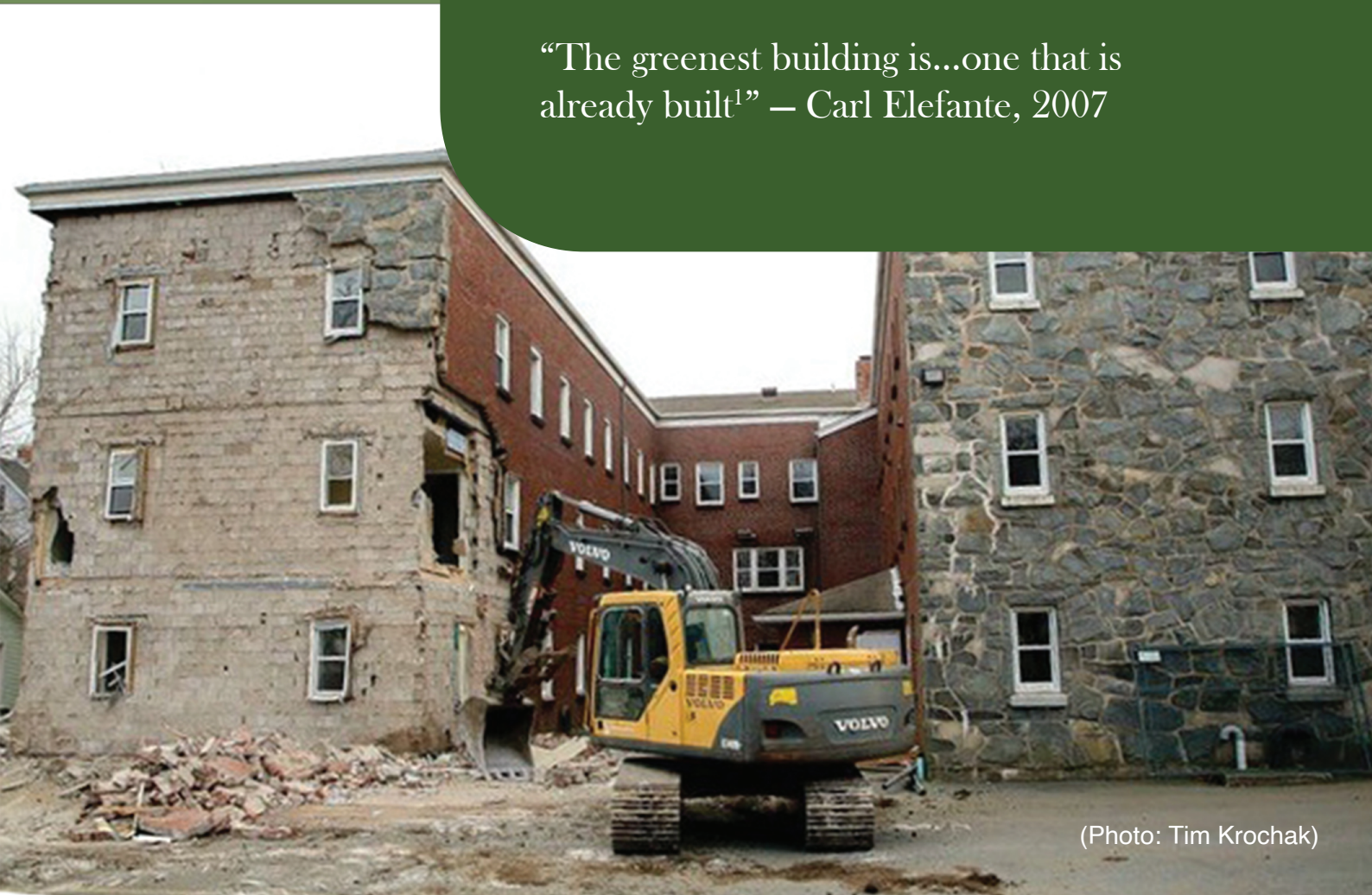


Buildings For the Climate Crisis - A Halifax Case Study

(Executive Summary)

“The greenest building is...one that is
already built¹” – Carl Elefante, 2007



(Photo: Tim Krochak)

This report was prepared by **Development Options Halifax** with support from **Friends of Halifax Common** and **Mantle Development**.

Development Options Halifax is a volunteer citizens' group working to improve government decision-making by providing better information.

Friends of Halifax Common is a volunteer citizens' group working to protect Canada's oldest and largest Common.

Mantle Developments is a Canadian interdisciplinary climate change strategy consultancy with offices in Toronto and Vancouver.

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Image 1: Five-unit Arts and Crafts style Campbell home, 825 Young Avenue, designed by Canada's then foremost architect Edmund Burke 1902, demolished in 2016. (CBC)

“We cannot believe that a situation can be so bad, so desperate that the only solution is to demolish.” — Anne Lacaton and Jean-Philippe Vassal, French architects and 2021 winners of their field's highest honour, the Pritzker Architecture Prize, in part, for never destroying a building to create a new one.

Executive Summary

Canada's demolition, building and construction sector is adversely affecting our climate crisis and our ability to reduce greenhouse gas (GHG) emissions. The impact includes the release of **embodied carbon**—GHG emissions from construction material manufacturing and processes, transportation and end-of-life disposal/recycling that are mostly released **upfront** (11% of global GHGs); and **operational carbon**—emissions from heating, cooling, and lighting (28% of global GHGs). This total is 39% of global GHGs.

Canada has the worst GHG emissions record of the G7, at least 21% above 1990 levels. By contrast, the US is at 1990 levels, Europe is 25% below and the UK is 42% below 1990. With less than a decade to achieve a 50% reduction in GHG emissions, we must find and implement climate solutions in all sectors.

In the building sector, embodied carbon is largely ignored and unregulated due to a focus on operational carbon, but its reduction must be a part of the solution. As operational energy efficiency is a proxy for carbon, retrofits or new builds don't usually consider embodied carbon in materials used, wasted or land-filled. This omission is preventing us from reaching **net zero carbon**.

A **Halifax based case-study** led by **Mantle Development** finds that two proposed developments for four **high-rise** towers in the Carlton Street block will have a huge and unacknowledged cost to the climate, emitting approximately 31,000 tonnes of embodied carbon in global warming emissions or carbon dioxide (CO₂e) equivalents. This number does not include the estimated 160T from associated demolitions. The majority of these GHG emissions will be released upfront before the buildings are occupied or the doors, elevators, air conditioning, parking garages etc. begin to spew operational and transportation GHGs.

Note that this preliminary GHG emissions estimate is very conservative, since the developers continue to request and receive permission to construct ever taller buildings. Initially proposed for 16- and 30-storeys and 20- and 26- storeys, the preliminary embodied carbon estimate was for new heights of 16- and 30-storeys and ~29 and 30-storeys. 'Now, each of the four towers may be 90 meters or ~30 storeys.'

Buildings at this scale use substantially more carbon-intensive materials—aluminum, cement, glass or steel—than smaller-scale ones. Cement alone is responsible for 8% of global CO₂ emissions; if it were a country this amount of cement would make it the third largest emitter after China (27%) and the US (11%). But there is no room left in a GHG emissions reduction plan to add any new GHGs as we are already failing to meet targets.

And there are additional social costs. The projects will trigger the **demolition** of 12-14 mixed-use, small-scale historic buildings in a central Halifax neighbourhood. These beautiful, character buildings contain approximately 110 affordable residential and commercial units. Their destruction will compromise a total area that is the same as that of three four-storey buildings or a single 12-storey building. The embodied carbon cost to replace this area with a new building is 2,214 tonnes CO₂e. This is an irretrievable, unnecessary penalty to the climate and threat to society.

A citizens' group, **Development Options Halifax (DOH)**, has examined the space already available on the site to help understand alternatives. It proposes a hypothetical nine-storey **in-fill option** retaining all but one of the existing buildings. This design follows the principle of distributed density; small-scale buildings that fit into empty areas in a city, keeping the existing structural resources and adding to the built environment's diversity. This **mid-rise building option**, along with a renovation of the existing historic buildings, will result in approximately 18,000 tonnes of CO₂e, which is 40% less embodied carbon emissions/m² than the proposed new highrises.

Activity	Invisible Embodied Carbon GHG Emissions (t CO ₂ e)	Embodied Carbon Intensity (kg CO ₂ e/m ²)
Developers' towers— construction, demolition, relocation.	~31,000	~360 - 490
Citizens' in-fill option + retained with renovation.	~18,000	~270 - 380 (or with careful planning zero)
GHGs to replace demolished area (~12-storey climate penalty)	~2,214	~360-490

Table 1: Summary of preliminary embodied carbon emissions of proposed Carlton block developments, citizens' in-fill alternative, demolitions climate/social cost. Note the 31,000T does not include ~160T associated with the demolition of 12-14 buildings.

And here's more good news. At 9-storeys, the DOH proposal's scale offers unique carbon advantages:

- **Low-rise** and mid-rise buildings can more easily use less **carbon intensive** building materials or ones that capture and store CO₂ (**carbon negative**), and can be designed to produce surplus operational energy, via solar panels etc. (**carbon positive**).
- Buildings at this scale can be built more quickly and at less cost so developers can earn back more on their investment faster and citizens can have more housing options sooner.
- Adding to a city's ecosystem has measurable social, cultural, equity, economic and environmental advantages when compared to city blocks with newer, larger buildings.
- With few exceptions, renovation or repurposing buildings is the best environmental choice creating many more jobs, using fewer materials and releasing fewer GHG emissions.
- Carefully planned retrofits and smaller-scale in-fill designs reduce both climate and societal disruption and harm.

Halifax has a habit of demolitions. From 2003 - 2020 the city issued 2,535 demolition permits³, estimated to be equal to the area of 17 city blocks. Of these, approximately 50 buildings that were to receive heritage designation under the HRM by Design Plan were demolished. And while the demolition average for Halifax during this period was 140 buildings each year, the annual number of squandered buildings and materials has been steadily increasing, with 101 permits granted in 2003 compared to 188 in 2020.

A building's demolition may seem inconsequential but it is scalable. Worldwide, improving existing building use could potentially cut GHGs by 11% between 2017 and 2050⁴. It is time to avoid, reduce, reuse, recycle, repurpose, add-on and in-fill.

Policy Recommendation 1: Recognizing the carbon cost of demolitions, the material waste and the unnecessary penalty to the climate, society and the economy Halifax, along with all levels of government—municipal, provincial and federal—must immediately prioritize conserving, adapting, and adding on to buildings or in-fill as a first course of action, and if demolition is an appropriate last resort, dismantling and reusing materials more effectively

Over the past decade, the approved height of new buildings in Halifax has increased from an average of 10-storeys to 20-storeys. The city's Centre Plan has recently changed zoning regulations to permit even taller building heights of between 20- and 30-storeys. Other than the city of Vancouver, which is a recognised world leader in establishing targets and timelines for carbon reduction in the building sector by requiring a **carbon budgets**, Canada's local, provincial and federal governments are mostly ignoring the impact of building scale on GHG emissions. That includes Canada's National building codes.

While the high-rise is touted for increased density and affordability, it is not as efficient in land use as is widely assumed. DOH's in-fill option is just one of many possibilities for quickly accommodating housing needs. For example, a single Halifax west-end block can increase its population by as much as 44% using in-fill and third-storey additions with modest 1- 2- and 3-bedroom residential units, while at the same time maintaining 40% greenspace. This adaptive approach can create homes for 66 new households without altering the look and feel of the neighbourhood. By avoiding demolition and carefully choosing materials, this option can also be carbon neutral.⁵

We do not have the luxury of time to reduce emissions by 50% by 2030. In the context of the climate crisis, permitting high-rise buildings at a scale where the materials are known to have an unnecessarily high carbon intensity is a climate crime.

Policy Recommendation 2: Recognizing the carbon cost of large-scale buildings, Halifax and all levels of government must change the rules of development to reduce the impact of the industry by requiring a carbon budget for each new development, and by not approving buildings beyond a scale that can be made carbon neutral. This must include benchmarks for what is permissible now, with targets and timelines for what will be permitted in subsequent years, to enable at least a 50% reduction in embodied carbon emissions by 2030.

Nova Scotia's Sustainable Development Goals Act advocates the creation of a circular, economy...

“an economy in which resources and products are kept in use for as long as possible, with the maximum value being extracted while they are in use and from which, at the end of their service life, other materials and products of value are recovered or regenerated.”⁶

Tearing down existing buildings to make way for tall structures, rather than creatively adapting and adding to what already exists, works against this mandate. We've used a real Halifax-based example to show the problem and offer possibilities, but all citizens have a role in addressing the climate crisis and pushing for solutions now. Regulation of embodied carbon is an important start.

Planning for a **circular economy** with **environmental full-cost accounting**, such as **Genuine Progress Index Atlantic**, needs to include measures for social and environmental well-being to better inform and guide choices. Earth's resources are finite.

Policy Recommendation 3: Recognizing the limits of growth and the impact of climate change, waste and over-consumption on Earth along with its incumbent inequity all levels of government must change the policies and practices that perpetuate growth in material consumption and production to balance social, environmental and economic measures and create a more equitable human existence. In Nova Scotia this is a focus area of the goals and initiatives established under the Sustainable Development Goals Act that must no longer be ignored.

Transitioning to low-carbon construction requires changes at many levels. Be it carbon negative, carbon positive or real net-zero carbon that includes embodied carbon and eliminates demolition, change must be implemented now. Success stories abound. Inform yourself, tell others and get started. Let the creativity and metamorphosis begin.

Best wishes with your work ahead,
Peggy Cameron, October 2021



Image 2: This block of Carlton Street is the last remaining historic neighbourhood on the Halifax Common. It has Heritage Designation (Municipal, Provincial, Federal) as 'a rare early Victorian streetscape'. Developers plan to demolish 12-14 historic buildings on the three streets adjoining Carlton Street to construct four ~30-storey towers. (Photo: Alvin Comiter)