ZERO CARBON BUILDING

DESIGN STANDARD **VERSION 4**

PART 9 RESIDENTIAL PILOT

CAGBC | Canada Green Building Council

JUNE 2025

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Acknowledgements

CAGBC is grateful for the input of our volunteer technical committees, including Zero Carbon Steering Committee, Embodied Carbon and Energy & Engineering Technical Advisory Groups.

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ISBN: 978-1-998647-11-8

The Zero Carbon Building – Design Standard™ (ZCB-Design) is a made-in-Canada framework that guides the design of low-carbon, highly efficient buildings. As of 2025, the Standard is already in use by over 400 project teams across the country, with over 100 projects having achieved certification as of January 1, 2025.

As Canada accelerates residential construction to help address housing affordability, ensuring low-cost, low-carbon operations is vital. ZCB-Design already informs the design of multi-unit residential buildings (MURBs). However, MURBs have only been eligible to pursue ZCB-Design certification if they fell under Part 3 of the National Building Code of Canada (NBC); that is, if they were more than three storeys tall or had a building area[1] exceeding 600 m^2.

Residential developers have increasingly expressed interest in applying the ZCB-Design Standard to certain Part 9 projects. In response to this demand and in recognition of the opportunity to broaden the program's impact, CAGBC has launched the **ZCB-Design Part 9 Residential Pilot**.

Eligibility

Part 9 of the NBC covers all residential buildings of three storeys or less and under 600 m^2 in building area. This includes single family homes, townhomes, and smaller MURBs. While Part 3 and Part 9 represent distinct classifications under the code, in practice there exists a spectrum of design and construction approaches that spans both categories. The smallest of the MURBs that fall under Part 3 bear significant similarities to MURBs that fall under Part 9.

The ZCB-Design Part 9 Residential Pilot seeks to evaluate the suitability of a modified set of requirements for larger MURBs that fall under Part 9 of the code — specifically, Part 9 MURBs that contain five or more stacked dwelling units.

Other than the allowance for Part 9 MURBs that contain five or more stacked dwelling units, all eligibility requirements of ZCB-Design v4 apply, including provisions for major renovations, additions, and attached buildings (see Section 2.2 of ZCB-Design Standard v4). Note that buildings that share a common site cannot be certified under a single project unless attached by programmable space. Buildings that have no physical connection or are connected only by corridors, parking, mechanical rooms, or storage rooms are considered separate buildings.

[1] "Building area means the greatest horizontal area of a building above grade within the outside surface of exterior walls or within the outside surface of exterior walls and the centre line of firewalls." NBC 2020, Division A, Section 1.4.1.2. Defined Terms.

Requirements of participation

Pilot projects follow the existing registration and certification process, with the following exceptions:

- Prior to registering, projects must contact CAGBC at zerocarbon@cagbc.org to confirm their eligibility.
- Projects must complete an interview or survey following project submission, with the intent to capture (a) the motivation for pursuing ZCB-Design through this Pilot program, (b) any challenges encountered specific to Part 9 MURBs, and (c) any recommendations for the Part 9 Residential Pilot to improve its accessibility and effectiveness.
- Certification fees are assessed on a per-building basis, please contact zerocarbon@cagbc.org with any questions.

Pilot duration and updates

CAGBC reserves the right to close registration under the Pilot at any time and/or revise the Pilot in any way. That said, it is expected that the Pilot will remain open to new projects until the next version of the ZCB-Design Standard is released; this next update will aim to incorporate the learnings from the Pilot.

Eligibility for ZCB-Performance certification

Even the best building design cannot ensure zero carbon operations, thus the CAGBC Zero Carbon Building – Performance Standard™ (ZCB-Performance) can be used to verify a building's annual impact on climate. ZCB-Performance relies on operating data including any needed purchases of energy and carbon offsets. Extending ZCB-Performance eligibility to qualifying Part 9 residential projects will be considered after this Pilot's conclusion.

Applicability of ZCB-Design v4 requirements

All ZCB-Design v4 requirements and submittals apply to the Pilot projects, except for certain modifications relating to the treatment of embodied carbon. Specifically, modifications are made to Section 3.1.1 Whole-Building Life Cycle Assessment; Section 4.1 Embodied Carbon Limit, and Section 10 Impact and Innovation.

1. **Section 3.1.1 Whole-Building Life Cycle Assessment:**

   For methodology, all Part 9 MURBs should follow the direction of the provided reference standard, *National Research Council (NRC) – National Whole-Building Life Cycle Assessment Practitioner's Guide: Guidance for Compliance Reporting of Embodied Carbon in Canadian Building Construction (hereafter referred to as the National wbLCA Practitioner's Guide)*. It is recognized that portions of this resource may not be fully applicable to Part 9 MURBs, such as Table 1, "Default Common-Practice Assemblies and Materials for the Key Building Elements." In these cases, project teams should use their best professional judgement; where there are challenges, project teams can reach out to zerocarbon@cagbc.org for direction.

   For project teams following Option 2 to meet the Embodied Carbon Limit requirements (below), the scope elements must include interior construction/surfaces in addition to structure and enclosure; detailed guidance on scope elements can be found in section 2.3.3 of the *Emissions of Materials Benchmark Assessment for Residential Construction* study (2022). Alternatively, project teams can utilize the guidance from *City of Vancouver Addendum (v1.0) to the National wbLCA Practitioner's Guide, Appendix I: Industry Leadership Credits*, page I-7 to I-8, for interior construction/surfaces; that is, include all elements defined as Optional (R) under OmniClass Level 3, 03 10 Interior Construction and 03 20 Interior Finishes.

2. **Section 4.1 Embodied Carbon Limit:**

   Path 1 Embodied Carbon Intensity: Two options are available to Part 9 MURB projects under Path 1 Embodied Carbon Intensity.

   Option 1: Follow the Embodied Carbon Limit requirements of Path 1 within ZCB-Design v4 as written; that is, the designed embodied carbon intensity of the project must not exceed the 425 $kgCO_2e/m^2$ Built Floor Area (BFA) threshold set for all building types except warehouses and distribution centres.

   Option 2: This approach provides a path to use less-complex tools, more common in the low-rise market, that only consider life-cycle stages A1 to A3 (Cradle-to-Gate). Project teams must account for structures, enclosures, and also interior construction/surfaces (as defined above); the interior elements are part of some software packages and cannot easily be separated. For this same reason, carbon sequestration within short cycled

biogenic materials[2] can be included. Project teams can use one of the embodied carbon estimator tools commonly used for Part 9 MURB projects, such as BEAM, GESTIMAT2.0 or MCE[2]. Under Option 2, Part 9 pilot projects must demonstrate that the embodied carbon of life cycle stages A1 to A3 is below 350 $kgCO_2e/m^2$ Gross Floor Area (GFA) for structure, enclosures, and interior construction/surfaces; short cycled biogenic materials can be accounted for in this determination.

- For reporting purposes, project teams must also separately calculate their Cradle-to-Grave emissions using the approach outlined in the *National wbLCA Practitioner's Guide*, Section 4.3(c)viii Modules Beyond A1 to A3.

As this is a pilot, project teams are encouraged to reach out to zerocarbon@cagbc.org with any difficulties reaching these thresholds and to discuss options. Note that teams should be prepared to discuss in detail the measures that were considered to lower embodied carbon and why the thresholds are not achievable.

Path 2 Improvement over Baseline: This path is not available for use in the Part 9 Residential Pilot due to the challenges of setting an appropriate reference baseline for this construction type.

3. **Section 10 Impact and Innovation (I&I):** The three Embodied Carbon Strategies listed in ZCB-Design v4 are not applicable to the Part 9 Residential Pilot. However, project teams can use either, or both, of the following alternatives:

    a. Create an Embodied Carbon Case Study - Provide a detailed case study on the embodied carbon analysis and reduction measures being implemented. At a minimum, the case study must include:

        i. Project description including size (Built Floor Area and Gross Floor Area), number of above and below ground floors, number of residential units, number of stalls (within parking garages), and construction type (per the *ZCB-Design v4 Workbook*, the elements include the primary superstructure, horizontal gravity system, vertical gravity system, and lateral system; foundation type is also requested). Additionally, include residency tenure (e.g., fraction of units at market rates and below market rates, owner occupied vs rental, etc.).

        ii. The embodied carbon emissions in total, by intensity, and broken out by element of the structure and enclosure (and interior, if pursuing Path 1 Option 2 (above) to meet the embodied carbon limit requirements). Consider reporting embodied carbon emissions per bedroom unit or occupant.

[2] Short Cycle Biogenic Materials are "biogenic materials from agricultural or forestry crops with a natural growing life cycle of 10 years or less, as well as biogenic materials from waste streams, salvage, or forestry residues." From City of Vancouver's, "Addendum (v1.0) to the National wbLCA Practitioner's Guide" April 14, 2025.

iii. Biogenic carbon if reported (include both long and short cycle biogenic carbon).

iv. The wbLCA methodology and modelling software/tool (and version).

v. Information on at least three of the most significant reduction strategies applied. Consider graphically showing the impact of the different measures on embodied carbon.

vi. Cost impacts of the embodied carbon reduction measures.

vii. Lessons learned.

For a recommended example, see the Trafalgar project case study from Carbon Leadership Forum BC's website.

b. Use an impactful reuse strategy as outlined in Table v of the City of Vancouver's *Appendix I: Industry Leadership Credits*. The options are:

i. Relocate Existing Building;

ii. Salvage Materials from Project Site (either path); or,

iii. Design for Disassembly.

For option ii, Path 2, one percent of the new building's embodied carbon must be shown to have been achieved. For option iii, a minimum of 2.5 percent of the Industry Leadership Credit value, as defined by the city's addendum, must be achieved. Follow the calculation and documentation guidance outlined in the city's document. Include any feedback on this strategy in the submission.

Support

You can find the ZCB-Design Standard v4 and associated documentation on the CAGBC website at cagbc.org/zerocarbon.

For questions, comments or concerns, contact us at zerocarbon@cagbc.org.