City of Vancouver Addendum (v1.0)

to the National wbLCA Practitioner's Guide

Last amended April 14, 2025

Background and Context

Version 1 of the City of Vancouver's Embodied Carbon Guidelines[1] was adopted by the National Research Council Canada and was published as the National Whole-building Life Cycle Assessment Practitioner's Guide (2024). Consequently, this addendum provides Vancouver-specific additions to be used to demonstrate compliance with the embodied carbon requirements in the Vancouver Building Bylaw (VBBL) or other City policies and programs.

The National Research Council Canada's (NRC) National Whole-building Life Cycle Assessment Practitioner's Guide (2024)[2] is referred to as the "National wbLCA Practitioner's Guide" in this document.

The National wbLCA Practitioner's Guide, this addendum, and its referenced standards serve as the normative standard for compliance with the VBBL. Where there are differences between the National wbLCA Practitioner's Guide and this addendum, the provisions of this addendum shall apply.

Table i: Summary of Key Additions Contained within this Addendum

Section	Key Additions to the National wbLCA Practitioner's Guide
Section 2: Compliance	• **Vancouver-specific Absolute Embodied Carbon Intensity** value is provided to calculate the Embodied Carbon Benchmark using the Intensity Limit pathway. • **Industry Leadership Credits** are introduced as optional incentives that provide embodied carbon reduction credit, up to a maximum of 5%. Additional details on the credit criteria and documentation requirements are in Appendix I[3].
Section 3: Specification of the Object of Assessment and Life Cycle System Boundary	• **Cradle-to-grave life cycle boundary** is specified to be used for the City of Vancouver requirements.
Section 4: Quantifying Embodied Carbon	• **Short-Cycle Biogenic Carbon** is defined and allowed to be accounted for compliance. • **Acceptable wbLCA and embodied carbon assessment software tools** and additional tool-specific guidance is provided.
Section 5: Determining the Baseline	• **Default baseline assumptions for below-grade construction** is provided since the City of Vancouver does not have bylaws requiring a minimum amount of parking.
Section 6: Documentation	• **Vancouver-specific documentation submission requirements** are outlined.

[1] https://vancouver.ca/files/cov/embodied-carbon-guidelines.pdf
[2] https://nrc-publications.canada.ca/eng/view/ft/?id=533906ca-65eb-4118-865d-855030d91ef2
[3] https://vancouver.ca/files/cov/embodied-carbon-vancouver-addendum-appendic-industry-leadership-credits.pdf

Application

The primary application of this addendum is for demonstrating compliance with the embodied carbon requirements specified in Section 10.4 of the VBBL.

This addendum may also be used:

- For assessing and reporting the embodied carbon of Part 9 buildings. However, the VBBL does not currently have any embodied carbon requirements for Part 9 buildings.
- As a reference for policies or programs with requirements to report or to reduce embodied carbon in construction, such as rezoning policies or owner's project requirements.

Where uncertainty exists, applicants should consult with the Authority Having Jurisdiction's building officials to confirm the applicability of embodied carbon requirements.

Additions to National wbLCA Practitioner's Guide

Note:
Within this addendum, the following format is used to locate and present additions to the NRC wbLCA Practitioner's Guide.

Section number (where applicable) - Page number
Section Path (E.g., Section > Sub-Section(s)) of the additions within NRC wbLCA Practitioner's Guide

Text to be added to the NRC wbLCA Practitioner's Guide.

Page 3
Definitions and Acronyms > Definitions

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.

Section 2.1 (a) (ii) - Page 9
Compliance > Calculate the Embodied Carbon Benchmark > Intensity Limits > Based on Gross Floor Area (GFA)

The Intensity Limit compliance pathway shall be based on the Gross Floor Area (GFA).

The following Absolute Embodied Carbon Intensity (*ECI*) value shall be used to determine the Embodied Carbon Benchmark (EC_{BM}):

$$ECI = 400\ \mathrm{kgCO_2e/m^2}$$

The ECI value (400 $kgCO_2e/m^2$) pertains to the required scope of the object of assessment, as specified in Section 3. This value is based on data collected from embodied carbon submissions for the City of

Vancouver rezoning requirements from 2017 to 2023. As data collection progresses, the value may be refined to reflect new data, different building types, or other important variables in wbLCA.

The ECI value is used to calculate the Embodied Carbon Limit (EC_L) based on the applicable reduction factor (f). Currently, f is set to 2 (double the acceptable benchmark) in Section 10.4 of the VBBL.

Note:

The embodied carbon benchmark calculated from the intensity path is independent of the parkade area, and two buildings with the same GFA will have the same benchmark regardless of the size of the parkade.

Since all the structure is included in the object of assessment, as specified in Section 3.3 of NRC wbLCA Practitioner's Guide, a building with less parkade structure will find it easier to meet the benchmark and the resulting limit compared to a building with more parkade structure. See Figure 1 for an example of the areas included in object of assessment and areas included in calculating GFA.

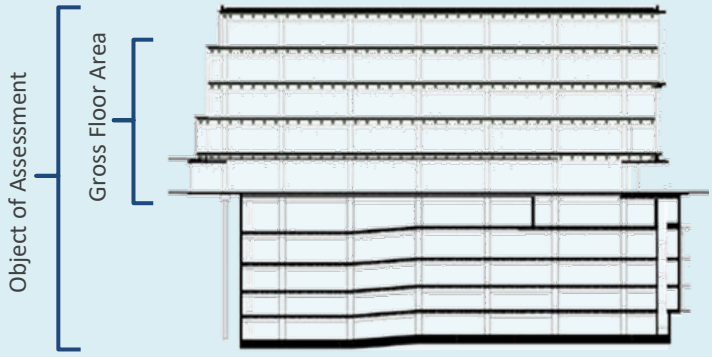

Figure 1: Areas Included in Gross Floor Area and Object of Assessment

By comparison, the baseline path provides more flexibility with respect to parking than the intensity path. This is consistent with the intent of the baseline path – while more complicated, it removes many variables from compliance considerations, such as parking, height, soil conditions, shape, overall material efficiency, and more.

Section 2.4 - Page 11

Compliance > Determine Compliance

The Embodied Carbon Design Report automatically calculates the embodied carbon benchmark and limit, determining compliance based on user inputs and the formulas outlined in the National wbLCA Practitioner's Guide and the City of Vancouver Addendum.

a. Industry Leadership Credits

Industry Leadership Credits (ILCs) incentivise optional industry-leading practices that enhance embodied carbon reduction capacity by allowing higher embodied carbon limits in determining compliance, i.e., relax the reduction requirement. Refer to Appendix I: Industry Leadership Credits[4] for the details and documentation requirements of credits that projects can claim for:

- reporting additional information, and
- implementing reuse practices.

If claiming ILCs, compliance shall be determined as follows:

$$EC_L = EC_{BM} \times (f + ILCs)$$

Where:

$EC_L = Embodied\ Carbon\ Limit$ (in $kgCO_2e$)

$EC_{BM} = Embodied\ Carbon\ Benchmark$ (in $kgCO_2e$)

$f = Embodied\ Carbon\ Reduction\ Factor = 2$, double the acceptable benchmark per section 10.4 of the VBBL

$ILCs = sum\ of\ the\ Industry\ Leadership\ Credits$ (in %, represented as decimal place, e.g., 5% is 0.05)

Section 3.2 – Page 12

Specification of the Object of Assessment and Life Cycle System Boundary > Life Cycle Stages

Embodied carbon shall be calculated using a cradle-to-grave life cycle boundary per Section 3.2 (a).

Section 4.2 (b) (i) - Page 18

Quantifying Embodied Carbon > Establishing a Bill of Materials > Completeness > Early Design Stage

Calculations made as part of a rezoning application shall comply to at least the completeness level described in this section.

[4] https://vancouver.ca/files/cov/embodied-carbon-vancouver-addendum-appendic-industry-leadership-credits.pdf

Section 4.2 (b) (ii) - Page 18

Establishing a Bill of Materials > Completeness > Construction Documents Stage

Calculations made as part of a Building Permit application shall comply to the completeness level described in this section.

Section 4.3 (a) - Page 21

Embodied Carbon Quantification > Software Tools

The default accepted wbLCA and embodied carbon assessment software tools, and the criteria for accepting other tools, are provided below. Users must use the latest version of the tool available at the date of their first Building Permit application and must check that the latest tool version remains in compliance with the National wbLCA Practitioner's Guide. Projects may use different acceptable tools for rezoning applications and Building Permit applications. However, the same tool must be used for both the proposed design and the baseline within a single application stage.

Section 4.3 (a) (i) - Page 21

Embodied Carbon Quantification > Software Tools > Early Design Stage

Default Accepted Tools for Rezoning

Rezoning applications shall use one of the following design tools:

1. Carbon Designer tool of One Click LCA[5]
2. Embodied Carbon Pathfinder[6]
3. C.Scale[7] and design tools that use the C.Scale API[8].
4. Tools listed in Section 4.3 (a) (ii) Default Accepted Tools for Building Permit.

> **Note:**
>
> Some design tools used in the early design stage, such as Embodied Carbon Pathfinder, estimate embodied carbon based on modeled scenarios for select building archetypes rather than a project's specific geometry or material quantities. As a result, project teams should treat these estimates as high-level, order-of-magnitude assessments. When sufficient project information is available, teams are encouraged to use tools that allow for project-specific inputs early in the design process to better inform material selection and design decisions.

[5] https://www.oneclicklca.com/carbon-designer/
[6] https://www.buildingpathfinder.com/
[7] https://docs.cscale.io/
[8] https://www.cscale.io/examples

Section 4.3 (a) (ii) - Page 21

Embodied Carbon Quantification > Software Tools > Construction Documents Stage

Default Accepted Tools for Building Permit

Building Permit applications shall use one of the following tools:

- Athena Impact Estimator for Buildings[9]
- tallyLCA[10] (formerly known as Tally)
- bimCAT[11] (formerly known as tallyCAT)
- Embodied Carbon in Construction Calculator (EC3)[12]
- One Click LCA[13]
- BEAM[14] – only accepted for new buildings and additions with a GFA not exceeding 1,800 m^2

Note:

Some tools, such as EC3 and tools that use the EC3 database, display Uncertainty-Adjusted GWP (uaGWP) values by default. The "Reported GWP" embodied carbon results shall be used instead of the uaGWP values in submissions.

Section 4.3 (c) - Page 23

Quantifying Embodied Carbon > Embodied Carbon Quantification > Assumptions, Data Modifications, and Manual Calculations > Material Type and EPDs

If the user modifies the default embodied carbon results from the software tool used to incorporate EPDs that are not available in the tool, the user shall confirm the EPD used complies with the standards listed in Appendix A.1 (c) of the National wbLCA Practitioner's Guide and note the substitutions in the Embodied Carbon Design Report.

If a software tool does not allow selecting specific EPDs, such as Athena Impact Estimator and tallyLCA, it is acceptable to demonstrate embodied carbon reductions through specifying low-carbon products by either submitting additional manual calculations of the reduction achieved outside of the software tool or by replacing the tool default GWP with that specified in the project documents. Additionally, if showing compliance via the baseline path (Section 2.1 (b) of the National wbLCA Practitioner's Guide) and the GWP in the tool for that particular product does not match the industry-wide EPD, the baseline shall

[9] https://calculatelca.com/software/impact-estimator/
[10] https://choosetally.com/
[11] https://www.c-change-labs.com/bimcat/about
[12] https://www.buildingtransparency.org/tools/ec3/
[13] https://www.oneclicklca.com/construction/life-cycle-assessment-software/
[14] https://www.buildersforclimateaction.org/beam-estimator.html

also be modified outside the software tool to replace the GWP of that product with the industry-wide EPD.

If the tool default data is replaced with a specific EPD that only includes modules A1-A3, the user shall only replace modules A1-A3 of the specified product and not data from modules B and C. If the tool does not allow separating emissions by modules and products, the user may remove the GWP impacts from all modules for that product and manually replace it using A1-A3 emissions from the EPD and calculate emissions from A4, A5, B and C modules using estimates provided in Section 4.3 (c) (iii) of the National wbLCA Practitioner's Guide.

Additions to Table 2 (Page 25): Default Materials and Product Assumptions and EPD Selection

Material/Product	Default Material Type and EPD Assumptions
Windows and Glazing	In the baseline, all windows and glazing products shall be assumed to be non-dynamic (i.e., not electrochromic, thermophonic, etc.).
Steel Reinforcement (Rebar)	The user does not need to model rebar recycled content, as the CRSI EPD specifies the recycled-content steel, which is 98%.

Section 4.4 (a) - Page 30

Quantifying Embodied Carbon > Treatment of Special Topics > Biogenic Carbon

Biogenic carbon stored in *Short Cycle Biogenic Material* products can optionally be included in demonstration of compliance with the embodied carbon limit using the following formula:

$(EC_P - BioC_{SC}) \leq EC_L$

Where:

$EC_P = Embodied\ Carbon\ of\ the\ Proposed\ Design$ (in $kgCO_2e$)

$BioC_{SC} = Biogenic\ Carbon\ Stored\ in\ Short\ Cycle\ Biogenic\ Material\ products$ (in $kgCO_2e$)

$EC_L = Embodied\ Carbon\ Limit$ (in $kgCO_2e$)

The Embodied Carbon Design Report calculates the *Short Cycle Biogenic Carbon* eligible for compliance based on user input material quantities. Biogenic carbon results from wbLCA tools can also be reported but shall not be used for determining compliance.

Section 5.4 – Page 36

Determining the Baseline > Default Baseline Assumptions

Additions to Table 3 (Page 36): Calculating Embodied Carbon of the Baseline Relative to the Proposed Design

<table>
<tr><th>Baseline</th><th>Proposed Design</th></tr>
<tr><td colspan="2">Reduce Floor Area of Below-Grade Construction</td></tr>
<tr><td>
As the City of Vancouver does not have parking minimums, the following method can be used to define the baseline.

Embodied carbon reductions from below grade construction, including parking and other below grade areas, can be claimed if the project reduces either of the following compared to the baseline:

a) the number of below-grade levels, or
b) the below grade total floor area*.

The baseline shall assume storage garage* area consistent with either,
a) the proposed design, or
b) adjusted to include the Expected Parking Spaces per Unit or Expected Area per Space listed in the table below.

Assumptions on Baseline Parking Construction Quantity[15]
<table>
<tr><th rowspan="2">New Construction</th><th colspan="2">Expected Spaces per Unit</th><th rowspan="2">Expected Area per Space m² (ft²)</th></tr>
<tr><th>Strata</th><th>Rental</th></tr>
<tr><td>12+ storey apartment, mixed use</td><td>0.98</td><td>0.54</td><td>NA</td></tr>
<tr><td>4-12 storey apartment, mixed use</td><td>1.39</td><td>0.77</td><td>NA</td></tr>
<tr><td>Townhouse, Multiplex</td><td>1.12</td><td>0.55</td><td>NA</td></tr>
<tr><td>Industrial (Employment Lands)</td><td>NA</td><td>NA</td><td>94.18 (1013.7)</td></tr>
<tr><td>Institutional</td><td>NA</td><td>NA</td><td>94.18 (1013.7)</td></tr>
<tr><td>Large Hotel/Conference/ Assembly >100,000 ft²</td><td>NA</td><td>NA</td><td>145.44 (1565.54)</td></tr>
<tr><td>Office Tower NA</td><td>NA</td><td>NA</td><td>54.73 (589.07)</td></tr>
<tr><td>Mixed Use Office and Retail NA</td><td>NA</td><td>NA</td><td>52.23 (562.16)</td></tr>
<tr><td>Retail Standalone</td><td>NA</td><td>NA</td><td>73.36 (789.62)</td></tr>
</table>
*As defined in VBBL Div A. Section 1.4.1.2
</td><td>As per the proposed design</td></tr>
</table>

[15] Removal of Parking Minimums and its Impacts on Carbon Emissions in the City of Vancouver (Oct. 2023) https://council.vancouver.ca/20231115/documents/cfsc1.pdf#page=148

6.3 City of Vancouver Documentation Submission Requirements

The embodied carbon documentation requirements for project Rezoning, Building Permit, and Occupancy Permit applications are summarized in the table below.

Table ii: Summary of City of Vancouver Required Embodied Carbon Documentation

Embodied Carbon Requirements	Rezoning	Building Permit	Occupancy Permit
Reference Policy	Refer to the applicable policy and/or bulletin[16].	Refer to Div. B Section 10.4 of VBBL[17]. • For multi-staged permits under the Certified Professional Program[18], the date of the first stage Building Permit sets the applicable version of VBBL. Documents should be submitted at the Full Construction stage.	
Required Documents	• Embodied Carbon Design Report[19] in Excel format. • Embodied Carbon Design Report in PDF format. • Raw data files from embodied carbon or wbLCA tool in Excel[20].	• Embodied Carbon Design Report in Excel format. • Embodied Carbon Design Report PDF format. • Raw data files from embodied carbon or wbLCA tool in Excel.	• No Requirements.
Required Documents (If Applicable)	• Manual calculations in Excel, if any[21].	• Manual calculations, if any. • Industry Leadership Credit documentation[22], if pursued for compliance.	• Industry Leadership Credit documentation, if pursued for compliance.

[16] https://vancouver.ca/green-vancouver/zero-emissions-buildings.aspx#bylaws-policies-guidelines
[17] https://www.bcpublications.ca/BCPublications/
[18] https://vancouver.ca/home-property-development/certified-professional-program.aspx
[19] Large developments with multiple parcels must provide at least one Embodied Carbon Design Report for each parcel of the development.
[20] CoV Embodied Carbon Design Report Raw Data Submission Instructions: https://priopta.notion.site/COV-Embodied-Carbon-Design-Report-Raw-Data-Submission-Instructions-44469d8b2adf4d21bf835d7a77f49a6d
[21] See Section 6.2 (a) (i) (page 41) of National wbLCA Practitioner's Guide.
[22] See Section I.3 of Appendix I for ILCs submission requirements. https://vancouver.ca/files/cov/embodied-carbon-vancouver-addendum-appendic-industry-leadership-credits.pdf

Appendix I: Industry Leadership Credits (Draft)

Appendix to the City of Vancouver Addendum (v1.0) to the National wbLCA Practitioner's Guide

The optional Industry Leadership Credits are contained in a separate appendix document located on the City of Vancouver Zero Emissions Buildings website[23].

[23] https://vancouver.ca/files/cov/embodied-carbon-vancouver-addendum-appendic-industry-leadership-credits.pdf