

Life Cycle Impacts

Positive

Credit: 26

Points: 2

Outcome

The building has lower environmental impacts from resource use over its lifespan than a typical building.

Criteria

Credit Achievement	1 point	<ul style="list-style-type: none"> The project demonstrates a 15% reduction in life cycle impacts when compared to standard practice.
Exceptional Performance	1 Point	<ul style="list-style-type: none"> The project demonstrates a 30% reduction in life cycle impacts when compared to standard practice.

Additional information

Stage implementation

Strategy	Brief	Concept	Design	Tender	Construction	Handover	Use
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Synergies with other credits

- Energy Use
- Upfront Carbon Emissions
- Water Use
- Other Carbon Emissions
- Responsible Products

Sustainable Development Goals

- Goal 12 (Responsible Consumption and Production)
- Goal 13 (Climate Action)

Relevant reporting initiatives

- None

Requirements

Credit Achievement

The project must comply with the following criteria:

- Life Cycle Assessment

The building's Life Cycle Impacts are at least 15% less than those of a reference building.

Life Cycle Assessment

The reduction in life cycle impacts must be demonstrated through a whole-of-building, whole-of-life (cradle to grave) comparative Life Cycle Assessment (LCA), as defined by EN 15978. All EN 15978 modules (A to D) must be included in the assessment.

The results of the LCA must be entered into the NZGBC's *Life Cycle Assessment calculator*, which will apply normalisation and weightings to the results to determine compliance with the credit. Results are to be reported in the functional unit of per square metre of Gross Floor Area (GFA).

The reduction must be against the impact categories below:

Impact category	Unit	Normalisation factor	Weighting factor
Climate change	kg CO ₂ equivalents (GWP100)	6.96E+03	25.0%
Net use of fresh water	m ³	2.67E+02	25.0%
Stratospheric ozone depletion potential	kg CFC 11 equivalents	4.75E-02	0%
Acidification potential of land and water	kg SO ₂ equivalents	3.87E+01	10%
Eutrophication potential	kg PO ₄ equivalents	1.37E+01	10%
Photochemical Ozone Creation Potential	Kg C ₂ H ₄ equivalents	3.44E+00	10%
Mineral depletion (Abiotic Depleting Potential)	kg Sb equivalents	6.27E-02	10%
Fossil fuel depletion (Abiotic Depletion Potential)	MJ net calorific value	1.47E+06	10%

The *Credit Achievement* cannot be claimed if the calculated impact in any one category (after normalization and weighting) is worse than -10%.

For all building types, a standard practice reference building as per EN 15978 must be used. The reference building must be a standard practice, code-compliant design, which is fit-for-purpose for the site and operating conditions of the proposed building. Refer to the LCA Methodology document for reference model inputs.

Methodology

Scope

Whole-of-Building as defined in EN 15978. Refer to section 7.5 'The Building Model'.

System boundary

Cradle to grave, including all life cycle modules (modules A to D) and scenarios as detailed in EN 15978.

Functional unit

Impacts are assessed and reported on a per square metre (m²) project Gross Floor Area (GFA) basis.

Service life of permanent building elements

The service life required by the client or through regulations, whichever is the greater. If no required service life is defined, a default service life of 50 years is to be applied.

Service life of replaceable building and construction elements

Use actual product/material design life or refer to the datasheet provided by BRANZ of default values for replacement for module B4 which can be applied for modules B3, B4 and B5 collectively.

LCA Data

The selection of data must be based on EN 15978 for construction materials. Data quality shall be reported and peer reviewed.

Use of locally based data, preferably EN15804 compliant Environmental Product Declarations (EPDs), shall take precedence over generic or global data, where available unless it is for imported products.

The standard for non-construction product EPDs is ISO 14025.

Quality Assurance

The LCA report must comply with quality assurance requirements by meeting one of two options:

Option A

- The report produced by an LCA Certified Practitioner
- Subject to organisational quality assurance, which has been certified in accordance with ISO9001.

Option B

- The report produced by an Experienced Individual
- Peer reviewed by an LCA Certified Practitioner or independent Experienced Individual

Refer to the *Definitions* section for competency requirements.

Exceptional Performance

In conjunction with the *Credit Achievement*, the project must comply with the following criteria:

- Life Cycle Assessment

The building's Life Cycle Impacts are at least 30% less than those of a reference building.

Submission content

Submissions for this credit must contain:

- **Submission form**
- **Life Cycle Impacts calculator**
- **Evidence** to support claims made in the submission

Recommended evidence:

- LCA Report
- Peer Review Statement
- LCA practitioner competencies statement or LCACP certificate for practitioner and peer reviewer
- Reference building documentation
- Proposed building documentation

Alternate documentation can also be used by project teams to demonstrate compliance.

The recommended evidence listed above is applicable to the as built submission. See the *Design Assessment* section in the Introduction for more information on submitting evidence for the Design assessment.

The key requirement is that evidence is provided to support each claim made within the Submission form.

Guidance

Upfront Carbon Emissions credit

The results from this credit can be used to demonstrate compliance with the *Upfront Carbon Emissions* credit.

LCA data

When conducting the LCA for the project, the following Green Star based inputs shall be consistent with:

- Reference Building operational energy benchmarks as used in the *Energy Use calculator* for the project for year one energy use
- Reference Building Water usage as used in the *Water Use* credit (if targeted)
- Product-specific and industry-wide EPDs submitted in response to the Responsible Products credits (if targeted)

Bio-based materials

For purposes of the reduction calculation in *Upfront Carbon Emissions*, products that have a Global Warming Potential Total (GWPT) of less than zero must use a GWPT of zero.

In other words, should a product have a negative Global Warming Potential Biogenic (GWPB) that exceeds the Global Warming Potential Fossil (GWPF), that product can be assumed to have no carbon, but cannot be used to reduce the carbon for another product or other modules. Biogenic carbon sequestration is rewarded separately in the Upfront Carbon Credit.

In all *Life Cycle Impacts* calculations, GWPB must be reported separately, but can be taken into account in the final whole of life calculation. GWPB can only be taken into account when the calculation includes the end of life stage, and the timber has an FSC, Responsible Wood, or PEFC chain of custody.

Emission factors for electricity use

The electricity grid emission factors are expected to decrease over time as more renewable generation is added. A list of projected emission factors is available and will be updated to reflect current trends. Current projections are to the year 2050, no further changes are to be assumed for the remainder of the buildings 50 year design life. Where multiple factors are available for different scenarios, the most conservative value is to be used.

Effects of the Zero Carbon Action Plan

The effects of the Zero Carbon Action Plan cannot be taken into account in the LCA model.

Reference building

The reference building is a hypothetical building that represents standard contemporary construction and operation practices. The reference building shall be agreed through consultation with structural, mechanical, electrical, and architectural professionals.

The reference building and the proposed project building must have the same:

- Structural requirements
- Scale
- Function
- Location
- Tenant requirements
- Aesthetics
- Site conditions including underlying geology
- Planning constraints
- Orientation

- Season of construction

The reference building is to be defined using conventional materials predominant for the building and deemed to satisfy current building codes and the Green Star NZ Embodied Carbon Methodology.

Modelled energy consumption of the standard practice reference building shall be based on NZBC Clause H1 compliance. Maximum permissible lighting levels in line with NZBC shall be used. Heating and cooling appliances must comply with efficiencies which meet the latest Minimum Energy Performance Standards.

Definitions

Commissioner

The client, asset owner or other person or entity who commissions the Life Cycle Assessment.

LCA certified practitioner

A person who is qualified as an "LCA Certified Practitioner" by ALCAS, LCANZ or ACLA, or another similar scheme.

Experienced individual

An individual who has produced, co-produced and/or independently reviewed at least three LCA studies of buildings or building products in accordance with EN15804/EN1597 and ISO 14040/14044 or ISO14067, within the past three years.

Peer review

A peer review is performed by an independent practitioner as stated in ISO14044 Clauses 6.1 and 6.2, and in accordance with ISO/TS 14071. The review provides assurance of the credibility of the LCA and its results. The peer review aims to provide a third-party opinion on how the LCA was conducted and whether the results are acceptable to demonstrate credit compliance.

Independent experienced individual

Defined as an Experienced Individual who is:

- Not employed in a full-time or part-time role by the commissioner or practitioner of the LCA study
- Not the practitioner of the LCA study
- Not involved in defining the scope or conducting the LCA study
- Has no direct or indirect incentive or interest linked to the outcome of the LCA results

Supporting information

The following resources support this credit:

- EN 15804 Sustainability of Construction Work - Environmental Product Declarations - Core Rules for the Category of Construction Products
- EN 15978 Sustainability of Construction Works – Assessment of environmental performance of buildings - Calculation method
- RICS professional standards and guidance, UK Whole life carbon assessment for the built environment (2017)
- ISO 14025 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- BRANZ Emission Factors - <https://www.branz.co.nz/environment-zero-carbon-research/framework/data>
- [Green Star NZ Embodied Carbon Methodology](#)