

GREENHOUSE GAS EMISSIONS

Credit 16

Points Available: 20

AIM OF CREDIT

To encourage energy efficient buildings and the reduction of greenhouse gas (GHG) emissions associated with the use of energy in building operations.

CREDIT CRITERIA

Two pathways are available for this credit to demonstrate reductions in fitout GHG emissions.

16.1	Conditional Requirement	In order for the project to be eligible for a Green Star – Interiors rating, the minimum points' threshold for the 4 Star rating must be met. Projects targeting 5 and 6 star ratings are required to meet a higher minimum point's thresholds for GHG emissions reduction.
16.2A	GHG Emissions Reduction – Non-Residential Fitouts: Prescriptive Pathway	Up to 14 points are available where 'best practice' levels of prescriptive performance are achieved for mechanical, hydraulic, lighting services, domestic hot water systems, and all equipment and appliances.
16.2B	GHG Emissions Reduction – Non-Residential Fitouts: Reference Fitout Pathway	Up to 20 points are available where it is demonstrated that there is a specified reduction in the predicted energy consumption and GHG emissions of the proposed fitout when compared to a reference fitout. Points are awarded based on improvements to the project's predicted ability to reduce its energy consumption and GHG emissions towards 'net zero'.

For projects wishing to pursue an alternate pathway or looking for a pathway for residential space, please contact the NZGBC.

COMPLIANCE REQUIREMENTS

16.1 CONDITIONAL REQUIREMENT

All projects are required to comply with the conditional requirement outlined in this credit.

All projects are required to achieve the minimum points' threshold for the 4 Star rating. Projects targeting 5 and 6 star ratings are required to meet a higher minimum point's thresholds for GHG emissions reduction.

The thresholds must be met through energy efficiency solutions, or the provision of on-site renewable energy systems. District or near-site solutions are acceptable only if they are zero carbon. Low-carbon, or off-site solutions will not count towards meeting the thresholds.

Rating targeted	Minimum points' threshold
4 Star	3
5 Star	4
6 Star	6

16.2A NON-RESIDENTIAL FITOUTS: PRESCRIPTIVE PATHWAY

This pathway is applicable to non-residential fitouts. A maximum of 14 points can be awarded in this pathway. Points will be calculated using the *Green Star – Interiors: Greenhouse Gas Emissions Calculator*.

Table 16.2A.1: Non-residential energy end-use compliance requirements

Credit Element	Requirement
Lighting	<p>In order for points to be awarded for lighting power density and/or lighting controls, the following condition must be met:</p> <p>For office and healthcare projects only, the size of individually switched lighting zones must not exceed 100 m² for 95% of the nominated area and switching must be clearly labelled or easily identifiable and easily accessible by building occupants.</p> <p>In order to be deemed 'easily accessible', switching for each zone of 100m² or any part thereof must be located as follows:</p> <ul style="list-style-type: none"> • Within no more than 8m from the 100m² zone AND at every entry (two or three-way switches may need to be provided) to the floor OR • At the entry point to the floor if the area controlled by the switching does not exceed 500m². <p>Lighting power density:</p> <p>Up to 3 points are awarded where the actual installed aggregate illumination power density is less than the maximum illumination power densities defined in the amendment to NZS 4243.2:2007A1 and the lighting complies with the two conditions outlined below:</p> <ul style="list-style-type: none"> • 1 point where the reduction amounts to 20%; • 2 points where the reduction amounts to 30%; • 3 points where the reduction amounts to 40%; <p>Lighting controls:</p> <p>Up to 2 points are awarded as follows:</p> <ul style="list-style-type: none"> • 1 point is awarded where presence detectors are installed in all tertiary spaces to control lighting AND luminaires switch off automatically when the lighting zones are unoccupied. • 2 points are awarded where the first point is achieved, AND it is demonstrated that an automated, intelligent dimmable lighting system is provided to all luminaires for 80% of the assessable area.

Credit Element	Requirement
Ventilation and air-conditioning	<p><u>Naturally Ventilated Fitouts</u></p> <p>4 points are awarded where the fitout's primary and secondary spaces are naturally ventilated in accordance with the 'Indoor Air Quality' credit (8).</p> <p><u>Mixed Modes Fitouts</u></p> <p>Both modes of operation must satisfy the relevant mechanical and natural ventilation criteria. The points awarded will be limited to the maximum points awarded under the mechanical ventilation criteria.</p>
Domestic hot water systems	<p>1 point is awarded where any domestic hot water systems provided by the fit-out are powered by one of the following heat sources:</p> <ul style="list-style-type: none"> <li>• Renewable energy (which may include electric/gas boost); <li>• Electric heat pump with a minimum coefficient of performance (COP) of 3.5 under design conditions; or <li>• Heat recovered from another process. <p><u>No hot water systems provided as part of the fit-out</u></p> <p>Where hot water systems are entirely provided from the centralised building supplies, this point is 'Not Applicable' and are excluded from the points available used to calculate the total project score.</p>
IT equipment	<p>1 point is awarded (for a maximum of 3 points) for each IT equipment initiative achieved. Partial points are not available for partial compliance with each initiative.</p> <ul style="list-style-type: none"> <li>• Equipment at workstations are either laptops no more than two years old, or thin clients no more than one year old; <li>• All computer monitors have an Energy Rating Labelling of at least 6 stars, or have the highest available rating where 6 star equipment is not available. Printers and servers are excluded from this requirement; and <li>• All workstation equipment is set to standby mode after no more than 10 minutes of inactivity, and all workstation equipment is automatically scheduled to turn off at the end of the working day. Workstation equipment encompass desktop computers, thin clients and laptop computers. Computers required to run 24 hours a day for specific uses may be excluded from this requirement.

Credit Element	Requirement
Appliances and equipment	<p>1 point is awarded when all appliances installed in the fitout are:</p> <ul style="list-style-type: none"> • Within one star of the highest energy star rating of the comparable equipment class (i.e. type and capacity for refrigerators/freezers; and place settings for dishwashers); or • For appliances not covered by the Energy Rating Labelling system, appliances or equipment must be 20% more efficient than comparable equipment that is no more than 2 years of age. <p>Appliances included in this credit element are:</p> <ul style="list-style-type: none"> • Refrigerators/freezers; • Dishwashers; and • Display screens.

16.2B NON-RESIDENTIAL FITOUTS: REFERENCE FITOUT PATHWAY

This method may be applied to all fitout types. Refer to the Energy Consumption and Greenhouse Gas Emissions Calculation Guide for details of how to complete the calculation, including definitions.

16.2B.1 Conditional Requirement

Project teams must demonstrate that the operational greenhouse gas (GHG) emissions from the 'proposed fitout' are less than those of the equivalent 'benchmark fitout'.

The 'benchmark fitout' represents a 10% improvement on a fitout which would achieve the 'Deemed to Satisfy' criteria as described in the Energy Consumption and Greenhouse Gas Emissions Calculation Guide.

16.2B.2 Credit Requirement

Up to 20 points are available for this credit. Points are awarded for reducing emissions when compared against the 'benchmark fitout'.

Points are awarded on a continuous scale, correct to one decimal place, in accordance with Table 6.2B.1 Final rounding to a whole number occurs in the Green Star total score.

Table 16.2B.1: Points awarded for emissions reduction

Greenhouse Gas Emissions Reduction (Proposed fitout relative to benchmark fitout)	Points Awarded
10%	2
20%	4
30%	6
40%	8
50%	10

Greenhouse Gas Emissions Reduction (Proposed fitout relative to benchmark fitout)	Points Awarded
60%	12
70%	14
80%	16
90%	18
100% (maximum rewarded)	20

INNOVATION

Innovative Technology or Process – Onsite Renewable Energy

Up to two (2) points may be awarded in the Innovation Category for installing renewable energy sources onsite in accordance with Table 16l.1.

Table 16l.1: Points awarded for onsite renewable energy

Renewable Energy Contribution (including shared renewable services)	Points Awarded
5%	1.0
10% (maximum rewarded)	2.0

See the *Energy Consumption and Greenhouse Gas Emissions Calculation Guide* for details of how to claim the incentive.

Innovative Technology or Process – Onsite Renewable Energy

One (1) point is available where Building Integrated Photovoltaic (BIPV) systems contribute to the reduction of greenhouse gas emissions by at least 15%. This point can be awarded in addition to the 'Onsite Renewable Energy' points highlighted above.

Improving Green Star Benchmarks – Reference Building Pathway

On-site energy renewable systems produce 5% more energy than what is required by the building. Energy must be exported or stored on site.

One (1) point is available for a 5% improvement, with a maximum of two (2) points available for a 10% improvement.

Innovation Challenge – Carbon Neutral Fitouts

An Innovation Challenge for projects seeking net zero emissions is available for project teams to take part of. For more information, contact NZGBC or check the Innovation section of our website.

GUIDANCE

Fitout in a Green Star rated building

For fitouts in Green Star – Design & As built rated buildings, and where the base buildings achieved the applicable element of the *Greenhouse Gas Emission* credit, the submission for the base building may be used as evidence of compliance with the relevant requirements of this credit.

Shared Services

This credit allows projects with shared energy supplies to be rewarded for a reduction in GHG emissions. The intent of this approach is to also reward fitouts within buildings which connect to low-carbon energy sources at a utility-scale, rather than only rewarding those projects which produce low-carbon energy on-site.

This approach is intended to cover the procurement opportunities for energy and utility systems including the following:

- District thermal networks;
- Shared combined heat and power systems;
- Private wire networks with embedded renewable energy; and
- Grid connected low-carbon energy (e.g. biomass or biogas systems).

Other options may be available to projects through asking a technical question. Please contact the NZGBC for more information.

Where shared systems are intended to meet the full building load for a particular energy stream, the energy contracts must clearly demonstrate that sufficient capacity is available. These contracts may take the form of Power Purchase Agreements (PPA) and Thermal Power Purchase Agreements (TPPA). The agreements must be for at least five years after Practical Completion and identify supply availability and other matters related to reliance of supply.

Where a building is subject to a PPA for a period of less than five years, the emissions reduction benefit will be prorated. Where a building is subject to a TPPA for a period of less than ten years, the emissions reduction benefit will be prorated as follows:

- If the building is provided with conventional plant able to satisfy 100% of the building's design heating or cooling load requirements (as applicable), in addition to connections to the local infrastructure, the emissions reduction benefit will be prorated. In this case, a reference case GHG emission factor will need to be defined to set the upper limit for interpolation. By default this would assume the same fuel source as for the reference building, and reference system efficiencies.
- If the building is provided with conventional plant only able to satisfy less than 100% of the building's design heating or cooling load requirements (as applicable), in addition to connections to the local infrastructure, then the building is dependent on the ongoing delivery of thermal energy to satisfy its design loads. In this case, it is acceptable to take full emissions reduction credit, and no adjustment is applied to the GHG emission factor.

At this time, no benefit is given for contract periods greater than five years.

Refer to *Shared Services and Low-Carbon Energy Supply Assessment Guide* for more details.

Referenced Documents

The following documents are referred to in this credit:

AS 1668.4-2012 The use of ventilation and air-conditioning in buildings – Natural ventilation of buildings

AS/NZS 3823.2:2013 Performance of electrical appliances – Air-conditioners and heat pumps – Energy labelling and minimum energy performance standards (MEPS) requirements

AS 4552-2005 Gas fired water heaters for hot water supply and/or central heating

AS 4556-2011 Indirect gas-fired ducted air heaters

ASTM E779-10 Standard test method for determining air leakage rate by fan pressurisation

ATTMA TSL2 Air testing standard for non-dwellings for 2010 Part L2

CIBSE TM23, 2000 Testing buildings for air leakage

NABERS Energy Guide to Building Energy Estimation

Green Star – Interiors Greenhouse Gas Emissions Calculator

Energy Consumption and Greenhouse Gas Emissions Calculation Guide

Shared Services and Low-Carbon Energy Supply Assessment Guide

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

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

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template** (for the selected compliance pathway)

Recommended Supporting Evidence

- **Documentation** showing compliance with all of the applicable Deemed-to-Satisfy requirements.
- **Documentation** showing the performance of applicable components (lighting, ventilation, and air-conditioning, domestic hot water, and appliances and equipment).
- **Lighting**
 - A **schedule** showing the actual lighting power density of each area being rated and the applicable NCC minimum requirement.
 - **Drawings** identifying the control zones and the luminaire and switch locations.
- **Ventilation and air-conditioning**
 - Schedule identifying all air-conditioners installed in the building, their capacities, star ratings, and the manufacturer and model of each.
 - Documentation showing the heat load and cooling load for each area served by a heater or air-conditioner.
 - Manufacturers' documentation or information from www.energyrating.gov.au confirming the energy star rating applicable to each air-conditioner or heater.
 - Documentation demonstrating that each dwelling has been designed to provide effective natural cross ventilation.
 - For naturally ventilated spaces, drawings for each naturally ventilated space showing openings, with dimensions clearly indicated, and ventilation inlets and outlets.
- **Domestic hot water**
 - Manufacturers' documentation showing the gross thermal efficiency of the heating appliance.
 - Documentation demonstrating that the solar heating system contributes at least 30% of the annual requirement.
 - Documentation demonstrating the non-renewable energy sources for all domestic hot water systems
- **IT Equipment**
 - Documentation demonstrating the age of laptops; the equipment energy rating; and standby mode setting policy as applicable.
- **Appliances and Equipment**
 - **Schedule** identifying all appliances installed in the fitout, and the manufacturer and model of each.
 - **Manufacturers' documentation** or information from www.energyrating.gov.au confirming the energy star rating applicable to each product.

- **Information** from www.energyrating.gov.au confirming the highest energy star rating applicable to each product type.

Shared Services

Procurement Contract Approach*

- **Power Purchase Agreement (PPA) and Thermal Power Purchase Agreement (TPPA)** identifying the duration of the power supply contract, supply availability (including proportion of GreenPower®) and guaranteed GHG emission factor.
- **Designer's statement** indicating the total capacity of conventional chilled water, heating hot water heating, and domestic hot water heating plant installed in the building, the design heating or cooling load of each system, and hence the percentage of design load met by conventional plant.

Design Analysis Approach

- **Design Intent Report (DIR)** for the utility identifying its characteristics and associated GHG coefficient calculations.
- **Power Purchase Agreement (PPA) and Thermal Power Purchase Agreement (TPPA)*** for identifying the duration of the power supply contract, supply availability (including proportion of GreenPower®) and an operational plan which corresponds with the DIR.
- **Designer's statement** indicating the total capacity of conventional chilled water, heating hot water heating, and domestic hot water heating plant installed in the building, the design heating or cooling load of each system, and hence the percentage of design load met by conventional plant.

Refer to the *Shared Services and Low-Carbon Energy Supply Assessment Guide* for more details regarding the above documents.

Design and construction documentation for the energy utility are not required for the purposes of the Green Star submission for the buildings.

REVISIONS AND AMENDMENTS

Version No.	Date of Release	Description
NZv1.0	11/4/2019	Initial release.
NZv1.0_r1	15/01/2020	Reference Fitout Pathway added.