

## Energy Efficient Fresh Air Ventilation & Airtight Building Envelope +2

**Challenge:** The number of potential places that air leakage can occur increases with the scale and complexity of building projects. When warm or cool air escapes from the building envelope it decreases the efficiency of heating and cooling systems, which must use more power to maintain internal comfort. Internal air quality may also be adversely affected by air leakage from outside the building envelope.

**Solution:** Adopt rigorous building practices relating to air tightness in combination with energy efficient, fresh air ventilation solutions that maintain the integrity of the building envelope.

**Benefits:** An airtight building accompanied by efficient fresh air ventilation, potentially allows engineers to specify heating and cooling solutions with lower capacities, thereby reducing costs.

**Benchmark:** Specify energy efficient heat recovery ventilation systems and commit to a blower door test post construction to achieve the following:

- Dwelling 3.0 ACH/Per Hour @ 50Pa
- Office 2.0 ACH/Per Hour @ 50Pa
- Retail 1.5 ACH/Per Hour @ 50Pa
- Industrial 3.5 ACH/Per Hour @ 50Pa

**Reference:** Green Star Design & As Built - Greenhouse Gas Emissions Section 15A and Guidance

## Further References

Built Environment Sustainability Scorecard (BESS)  
[www.bess.net.au/](http://www.bess.net.au/)

Green Building Council Australia - Green Star Rating Tool  
[www.gbca.org.au/](http://www.gbca.org.au/)

Living Building Challenge  
[living-future.org.au/](http://living-future.org.au/)

Fishermans Bend Urban Renewal Area  
[www.portphillip.vic.gov.au/](http://www.portphillip.vic.gov.au/)

National Construction Code  
[www.abcb.gov.au/](http://www.abcb.gov.au/)

World Building Design Guide  
[www.wbdg.org/](http://www.wbdg.org/)

Wood Solutions Technical Design Guides  
[www.woodsolutions.com.au/](http://www.woodsolutions.com.au/)

Growing Green Guide  
[www.growinggreenguide.org/](http://www.growinggreenguide.org/)

St Kilda Indigenous Nursery Co-operative  
[www.skinc.com.au/](http://www.skinc.com.au/)

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## Life Cycle Assessment (LCA) +1 +2

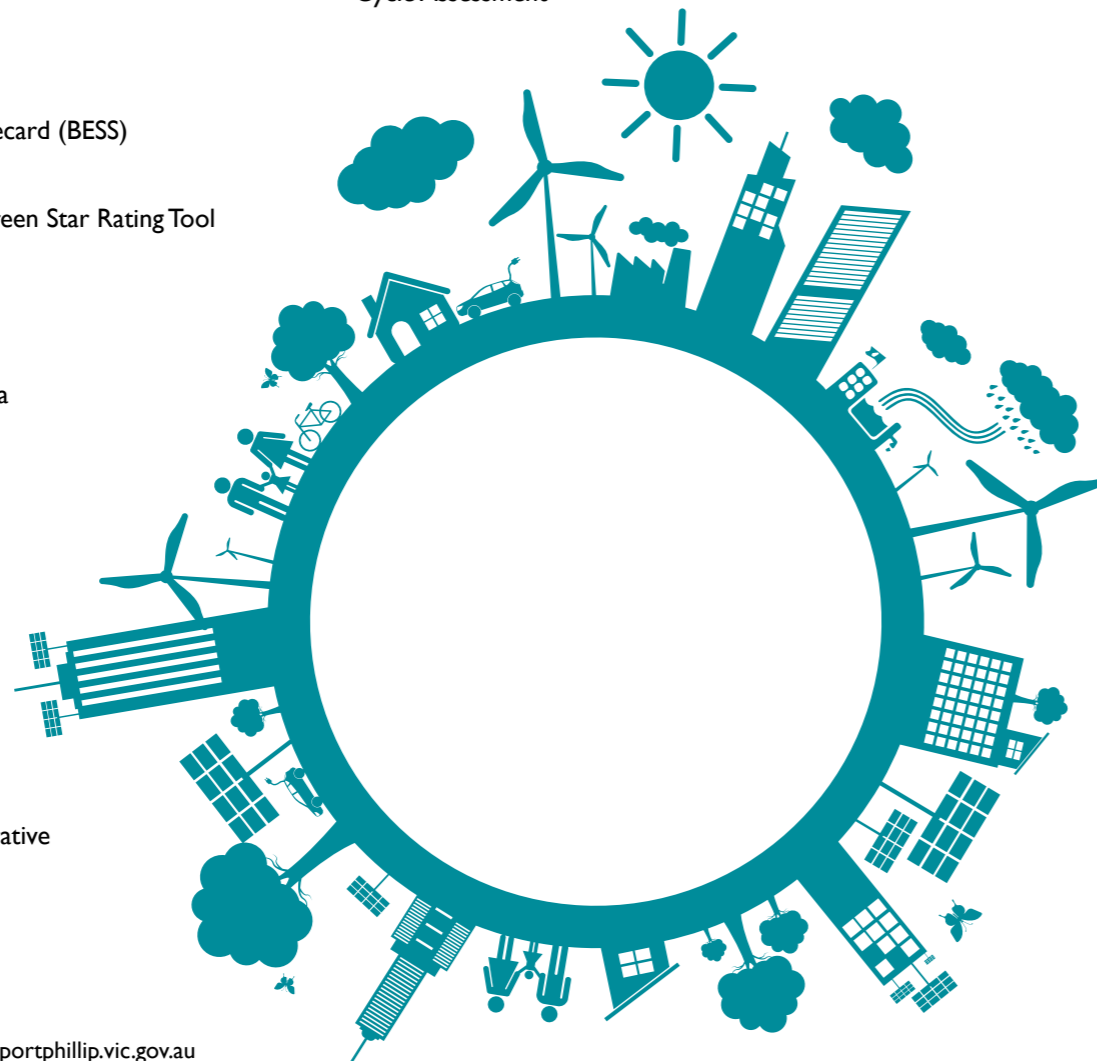
**Challenge:** Design principles and building practices that minimise environmental impact are being employed as knowledge and standards improve, however, once a project is realised and becomes operational, the true impact of large scale developments is rarely understood.

**Solution:** LCAs that employ Whole-of-building, whole-of-life methodology should be undertaken to work out the overall environmental impact of developments. Once assessed, various strategies to lower embodied energy such as selection of materials with recycled content or prefabrication can be considered effectively.

**Benefits:** A lifecycle measure of reduced environmental impacts will elevate developments in the eyes of planning authorities, while attracting interest from the increasing environmentally-conscious markets. With information gained from whole-of-life analysis, design and cost decisions on energy efficiency can be made effectively.

**Benchmark:** Conduct a whole-of-building, whole-of-life (cradle-to-grave) LCA for the proposed design compared with a reference building. Achieve a Cumulative Impact Reduction up to 70% for 1 point (90% for 2 points).

**Reference:** Green Star Design & As Built - Section 19A Life Cycle Assessment



# Innovative Sustainable Design for Large-Scale Developments

The design and construction of large scale development provides specific opportunities for Environmentally Sustainable Design (ESD), particularly where urban renewal is implicit in the design brief. Environmental outcomes contribute not only to the connectivity and liveability of spaces but also to the overall success of developments from the perspective of economic return and market prestige.

ESD Policy - Clause 22.13 for 2 dwellings or more. The overarching objective is that development should achieve best practice in environmentally sustainable development from the design stage through to construction and operation.

The [Built Environment Sustainability Scorecard](#) (BESS) has been developed to demonstrate compliance with the ESD policy.

BESS has 9 environmental categories to holistically assess sustainable design at the planning stage. One of these categories is Innovation which allows users to self nominate initiatives which they think may obtain points within the tool. This document provides defined credits for the Innovation category that relate to large scale development and compliment the sustainability principles for Fishermans Bend Urban Renewal Area (FBURA).

Council will award the indicated points in the Innovation category for each of these credits provided that the evidence has been provided as part of the Sustainable Management Plan submitted when lodging for a planning permit. Up to ten points may be obtained by meeting benchmarks for multiple innovative initiatives. Each single initiative can be awarded one or two points. The points achievable for the initiatives discussed in this fact sheet are indicated by 1 point or 2 point symbols. +1 +2

This document is aligned with the [Sustainability Principles for Fishermans Bend](#) endorsed by Council in December 2015. The 6 principles outlined promote building and precinct development that is sustainable at all stages of its lifecycle. All innovative design initiatives are in alignment with 2 or more of these principles:

-  **A LOW CARBON CITY**  
Greenhouse emissions will be minimised through energy efficiency, and use of clean and renewable energy generation.
-  **A WATER SENSITIVE CITY**  
Potable water will be minimised through water efficient buildings, open space and infrastructure; use of rainwater, stormwater and recycled water. Water sensitive urban design will play a key role in water management.
-  **A CLIMATE ADEPT CITY**  
Built form, infrastructure, and vegetation will be used in ways to create a more favourable local climate, whilst 'absorbing' the impacts of extreme weather events during the asset life (at least 100 years).
-  **A CONNECTED AND LIVEABLE CITY**  
Residents, visitors and workers can live and travel car free by improving the convenience, safety, accessibility and range of sustainable travel choices.
-  **A LOW WASTE CITY**  
Minimal waste during construction and operations, by applying the principles of the 'waste hierarchy'. Demolition and refurbishment waste will be minimised through adaptive reuse. Maximum value will be extracted from the waste stream and waste to landfill minimised.
-  **A BIODIVERSE CITY**  
Urban development, built form and open spaces that create habitat opportunities for indigenous flora and fauna. This may include the use of green roofs and walls, street trees and planting in open spaces to maximise habitat and preservation of local species.

Note: The benchmarks for innovation within this document have been selected from the most relevant industry tools. Initiatives that meet equivalent or higher standards will be considered by Council on a case by case basis.



## Daylight Access +1

**Challenge:** Increased density in the built environment of our city can lead to reduced access of living and working spaces to daylight. Exposure to daylight is well recognised as important to physical & mental wellbeing.

**Solution:** Have designs professionally assessed and verified as allowing a high level of daylight to habitable areas.

**Benefits:** The market values spaces with abundant natural light.

**Benchmark:** Daylight Factor (DF) of at least 2.0% at finished floor level (FFL) under either a CIE (International Commission on Illumination) overcast sky or a CIE uniform sky

**Reference:** Green Star Design & As Built - Section 12.1 Daylight

## Building thermal performance +1

**Challenge:** Creating high density buildings that provide a high level of thermal comfort and have a low energy footprint.

**Solution:** Improve thermal fabric quality beyond the National Construction Code's Section J Deemed-to-Satisfy (DTS) requirements for non-residential areas.

**Benefits:** To the market, energy efficiency can be communicated as savings on on-going bills.

**Benchmarks:** A 7.5 NatHERS star average for apartments and a 20% improvement on Section J DTS standards using JV3 modelling for non-residential areas.

**Reference:** Green Star Design & As Built - Greenhouse Gas Emissions Section 15A, 15B, 15E and Guidance

## Urban Agriculture +1

**Challenge:** Transport of produce into urban supermarkets from farms hundreds of kilometres beyond the city creates significant noise, carbon dioxide pollution and traffic within urban areas.

**Solution:** Design green roofs, balconies and communal spaces that allow market or community gardens.

**Benefits:** The produce from these gardens can be sold to local outlets or purchased directly from the source by local communities, representing a potential source of revenue for developers.

**Benchmark:** Dedicate a minimum of 0.50m<sup>2</sup> of site area per resident / occupant to food production.

**Reference:** BESS Urban Ecology - Section 3.1 Food Production

## Building User Engagement +1

**Challenge:** Sustainable buildings are only as 'green' as the occupants who use them.

**Solution:** Increase the environmental awareness of building users by incorporating web based applications in to design which monitor energy & water use.

**Benefits:** Smart interfaces that complement design and allow building users to minimize their consumption can be an attractive feature for buyers.

**Benchmark:** Commit to installing a system capable of capturing data produced by energy and water meters and accurately and clearly displaying consumption trends for building users.

**Reference:** Green Star Design & As Built - 6.1 Metering & Monitoring

## Sharing of Infrastructure +1 +2

**Challenge:** Space for accommodation and community areas within new developments is constrained by the necessity for waste removal, water and energy supply and associated infrastructure.

**Solution:** Share waste removal and services infrastructure with existing and concurrent developments.

**Benefits:** Locating services infrastructure, partially or wholly off-site creates the opportunity to increase the net let-able area of the development.

**Benchmark:** Provide a letter of commitment from the site owner and adjoining site owners indicating an agreement to share the cost, implementation and location of infrastructure in relation to the proposed development. One point per utility shared, up to 2 points.

## Construction Waste Reduction +1

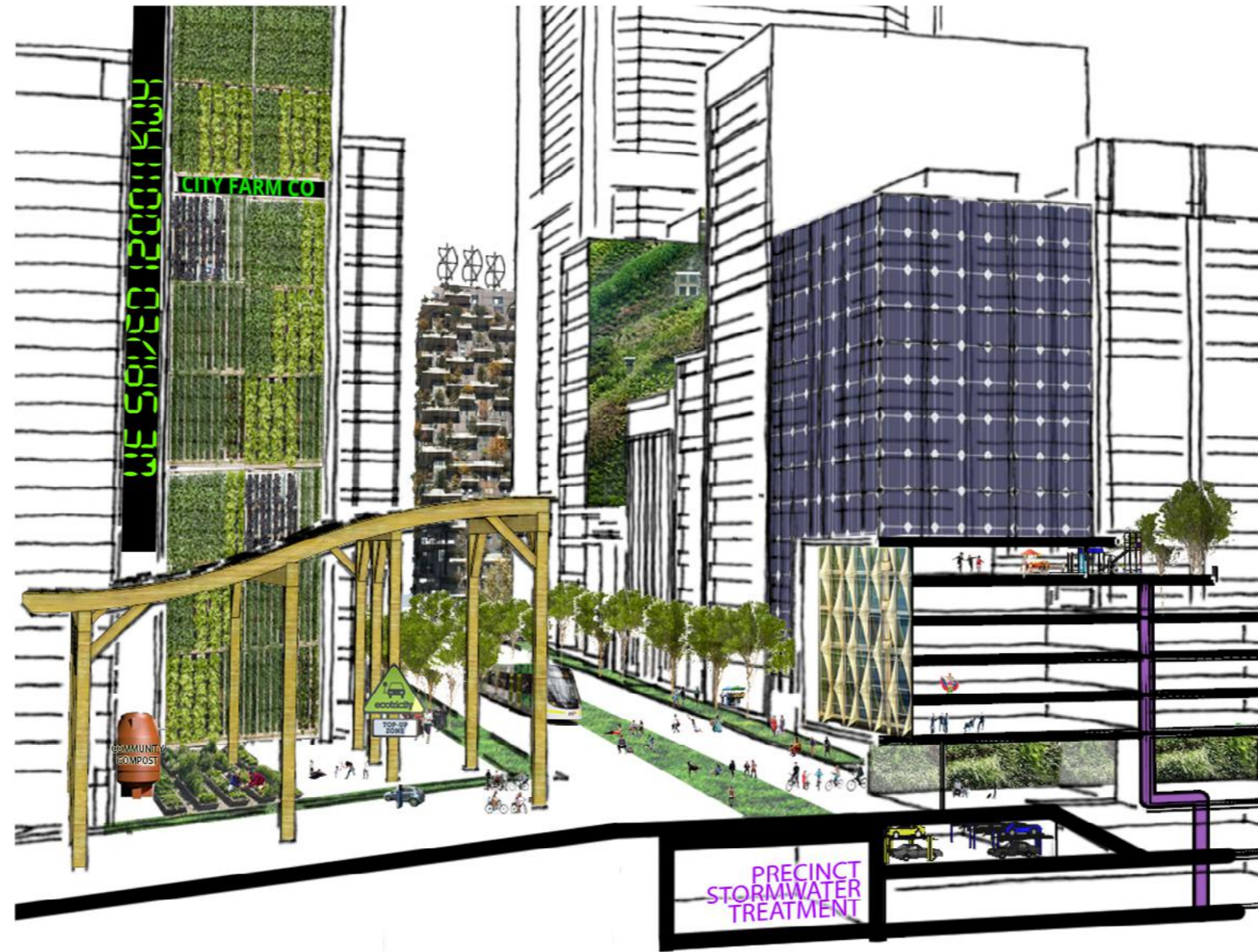
**Challenge:** Construction contributes to a third of all waste going to landfill in Australia.

**Solution:** Reduce the amount of waste that becomes landfill during construction by designing for standard material sizes, through prefabrication of building components and by sorting waste on site so that the majority is recycled.

**Benefits:** A clean, controlled construction site is safer for workers and more conducive an efficient build.

**Benchmark:** Provide a construction waste management plan that commits to diverting at least 90% of construction and demolition waste from landfill.

**Reference:** BESS Waste - Section 1.0 Construction Waste Management



## Structural Timber Construction +1

**Challenge:** Typical construction methods for multistorey buildings involve high volumes of heavy concrete and steel, which are costly to transport and manipulate.

**Solution:** Timber is light-weight in comparison to steel and concrete. Improvements in timber construction methods make multistorey timber buildings a viable alternative.

**Benefits:** Structural timber reduces overall building loads and is less labour intensive when compared with concrete and steel, representing significant cost savings. Building with timber reduces carbon emissions.

**Benchmark:** Use timber for 70% of the above ground structure.

**Reference:** National Construction Code - Section C1.13 Fire Protected Timber Concession, Wood Solutions Technical Design Guides

## Building-Integrated Photovoltaics (BIPV) +1 +2

**Challenge:** The roof space of large scale developments is valuable with communal gardens or the efficient location of plant and services competing for priority. This constrains the space available for conventional photovoltaic (PV) panels.

**Solution:** Integrate BIPV products into components of the building envelope such as roofing, skylights and wall cladding.

**Benefits:** Renewable energy can be generated without sacrificing an efficient and appealing external aesthetic.

**Benchmark:** Design and Install BIPV systems that contribute to at least a 10% reduction (15% reduction for 2 points) of on-site greenhouse gas emissions.

**Reference:** World Building Design Guide - Building Integrated Photovoltaics (BIPV)

## Third-Pipe Ready +1

**Challenge:** Potable water is a precious commodity. Enabling homes and businesses to use less is essential to the continued viability of our water catchments.

**Solution:** In addition to the installation of water saving faucets, new developments should incorporate plumbing systems with a "third pipe" that pipes non-potable water to all non-potable areas, for example toilet flushing.

**Benefits:** Third-pipe infrastructure enables reduced on-going water use, reduces water costs and helps to "future-proof" the development against water shortages.

**Benchmark:** Install third-pipe infrastructure for non-potable water uses:

- Toilet flushing
- Irrigation
- Fire services
- Bin and balcony washing

**Reference:** Fishermans Bend Strategic Framework Plan 2015 - Objective 7.2 Guideline 1

## Urban Ecology for Biodiversity +1 +2

**Challenge:** The massive physical form of high density developments absorbs a large amount of heat and retains it for a long period of time. This phenomenon as it applies to cities is called the Urban Heat Island (UHI) effect.

Additionally, high density development traditionally limits opportunities for urban ecology and biodiversity.

**Solution:** Enhance biodiversity by incorporating the strategic use of plants in landscaped areas and through the use of green roofs, walls and balconies.

**Benefits:** Urban ecology absorbs carbon dioxide, breaks up large, heat-absorbing physical forms and is correlated with a number of health benefits derived from reduced stress. A reduction in the UHI effect helps to improve outdoor urban spaces and reduce cooling demands internally.

**Benchmark:** At least 50% (75% for 2 points) of the site must be comprised of combination of:

- Vegetation, Green Roofs
- Roofing materials including shading structures with a three year Solar Reflectance Index (SRI) of more than 64 for roof pitches greater than 15° or a three year SRI of more than 34 for pitches less than 15°
- Unshaded hard-scaping elements with a three year SRI of more than 34
- Hard-scaping elements shaded by overhanging vegetation or roof structures, including solar hot water panels and photovoltaic panels
- Water bodies and/or water courses; or
- Areas directly to the south of vertical building elements, including green walls and areas that are shaded by these elements at the summer solstice.

**Reference:** Green Star Design & As Built - Section 25 Heat Island Effect Reduction

## Integrated External Shading +1

**Challenge:** Large buildings present expansive areas of glazing to the hot summer sun, potentially decreasing user comfort and increasing energy costs associated with cooling.

**Solution:** Use fixed and adjustable shading to reduce sun penetration into internal spaces.

**Benefits:** Aesthetically integrated shading enhances the visual appeal of the development. Additionally, the reduced operating costs of passively cooled buildings are appealing to an energy conscious market.

**Benchmark:** For all development types shading devices are provided for north (fixed or operable), east and west (operable only) facing glazing which protect 100% of the glazing at the equinox.

**Reference:** BESS Indoor Environment Quality - Section 3.2 Thermal Comfort - External Shading

## Source Local Services & Suppliers +1

**Challenge:** High density development represents a significant community disturbance for the duration of a given project, usually drawing in activity from a range of sources beyond the local community.

**Solution:** Engage design teams, suppliers, fabricators and builders that are within the local community or within close proximity.

**Benefits:** Engaging businesses local to the development site reduces transport costs and greenhouse gas emissions.

In addition, stimulating local economic activity will likely improve community attitudes towards the project.

**Benchmark:** A 20% or more of materials construction budget must come from within 500km of the project site. An additional 30% of materials construction budget must come from within 1000km of the project site. An additional 25% of materials construction budget must come from within 5000km of the project site. 25% of materials may be sourced from any location. Consultants must be based within 2500km of the project site.

**Reference:** Living Building Challenge - Section 113 Living Economy Resourcing