



Name	Sustainable Buildings
Document Number	CA.GL.08
Responsible Section	Building and Property Assets
Responsible Department	City Assets
Date Last Endorsed	14 December 2021
Date of Next Review	December 2024
Applicable Legislation	Local Government Act 1999
Related Governance Documents	Living Environment Strategy 2022 AdaptWest Regional Climate Change Adaptation Plan Greater Metropolitan Adelaide 30 Year Plan
City Plan Theme	Environment and Heritage

PURPOSE/OBJECTIVE

This guideline has been designed to inform decision making and assist in meeting requirements of the Sustainable Building Design Policy when designing, constructing, renovating and demolishing Council buildings. This document is intended as a general reference guide in order to ensure buildings improve their environmental performance, while also defining objectives, issues, recommendations and suitable rating tools.

In order for these guidelines to be successfully adopted, Council will need to follow and drive sustainable design considerations in their projects. For this to occur, there needs to be internal upskilling and training to ensure responsible practice. Although each section of these guidelines can be read individually and applied in isolation, it should be recognised that for a building to be sustainable and efficient it must consider all these guidelines as a collective at any stage of its lifecycle.

There are many different standards or rating” schemes which can be applied to sustainable building design and additional references are provided at the end of this document. These guidelines attempt to simplify these and other concepts into a less structured or rigid form for consideration.

It should also be recognised that new technologies are constantly being developed to complement current practices, but the ultimate vision is to reduce or improve the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving productivity
- Reducing waste, pollution and environmental degradation
- Adapting to climate change

SCOPE

Integrating sustainability into development will help create a city that is more resilient to future climate change impacts, while assisting in reducing energy and water consumption and CO² emissions. Improving the environmental sustainability of our buildings is not just about building design but requires a holistic approach and an organisation culture that supports the building and operation of sustainable buildings. This guideline supports and informs how Council's buildings, renovations, retrofits and upgrades can meet the new sustainability standards and perform the best they can.

As such it requires cooperation and input from all stakeholders within building project stages and operations, with the intention of coordinating building design considerations including economy, utility, durability and comfort.

Early consideration of sustainable design at the concept, scoping and design stage is key to achieving the most benefits including:

- Reduced running costs
- Lower energy bills
- Lower water consumption
- Improved amenity and liveability
- Compliance with building regulations
- Product differentiation
- Cheaper operational costs
- Improved comfort and productivity
- Demonstration of corporate responsibility
- Reduced costs over life of the building
- Cleaner air
- Reduction of waste

STRATEGIC CONTEXT

The City of Port Adelaide Enfield is guided by the City Plan 2030. A vision that values its diverse community and embraces change through innovation, resilience and community leadership.

Living Environmental Strategy

One of the themes that the City Plan 2030 focuses on is to create a 'city that cares for its natural environment and heritage'. The *Living Environment Strategy 2017-2022* is the leading strategy under this goal. The Strategy identifies the key environmental challenges and opportunities that our city will face over the next decade and, what actions can be taken to protect and improve our natural environment and heritage.

The strategy focuses on the following six key challenges and priorities for action:

- Identifying and progressing economic opportunities that support the environment, including green industries and nature based tourism
- Enabling and supporting greater community engagement and participation in environmental programs and advocacy

- Ensuring provision of open space, and green infrastructure in a period of intensified and higher density development
- Ensuring natural, cultural and built heritage is protected, respected and celebrated
- Managing coastal development to ensure coastal ecosystem protection and enhancement
- Building resilience and adaptation to the projected impacts of climate change, including increased inundation and heatwaves.

Energy and Water Conservation Management

The Council's Energy and Water Efficiency Management Plan 2017 – 2022 provides key objectives and targets with associated cost effective implementation measures for Council to meet its commitment to reduce the overall organisational-wide greenhouse gas emissions.

It involves improving the management of Council's own corporate carbon and water 'footprint'. This focus ensures that the Council is able to demonstrate leadership in minimising its energy and water consumption within its own operations, and putting appropriate strategies and reporting processes in place. The sound management of the organisation's energy, fuel, and water resources also minimises cost impacts for Council's ratepayers as fuel, energy, and water prices increase in the coming years in response to market and policy changes.

Council has installed 14 roof-top solar PV systems with a combined total capacity of 489.7kw on Council operational buildings. Council's largest PV system is located on the new Lights Community and Sports Centre to mitigate a combined 360 tonnes of greenhouse gas emissions per year.

Adapt West

With regard to climate change adaptation, the City of Port Adelaide Enfield, the City of Charles Sturt, and the City of West Torrens are partners in the *Adapt West* program. This regional adaptation program has assessed the risks that climate change presents for our region and identified the key adaptation pathways that need to be followed to adapt to existing and projected changes in our climate.

The preparation of the Plan was undertaken over three key stages as follows:

- understanding the Western Adelaide Region in relation to a changing climate, which included a review of climate change science and preparation of a snapshot of our region's environmental, social and economic characteristics
- Identifying and assessing the vulnerability of what we value in our Region, and identifying adaptation responses.



BUILDING ASSET TYPES

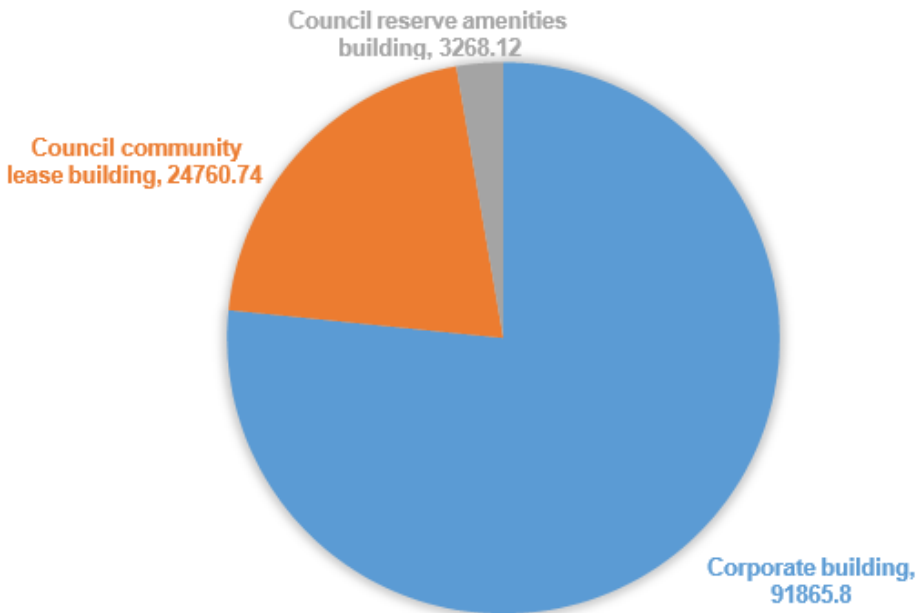
The Asset Management Plan has organised building assets according to their function that reflects the intention of how they are managed and the level of service they provide.

Corporate	Corporate building assets are those that are directly utilised and operated by Council Staff. They support the operations of Council and services to the Community. For example, Council Chambers, civic centre, visitor information centre, depot offices and libraries.
Commercial	Commercial building assets are those owned directly by Council that are Leased or Licensed to Businesses or Organisations to operate Commercial Activities within the premises for which Council may or may not receive a financial income. For example, a shop that is operated privately is considered commercial such as kiosks and golf clubs.
Community	Community building assets are those owned directly by Council that are leased or licensed to community groups or organisations that provide a service or goods that are specific to the community. For example, clubrooms, halls and community centres.
Amenity	Amenity building assets are toilets or change rooms that could be directly owned and operated for the purposes of providing toilet facilities during restricted and unrestricted hours.
Outbuildings	Outbuildings assets are those non-habitable buildings that are owned and operated by Council for its operational purposes or those that are Leased or Licensed on a Community or Commercial basis. For example, these include sheds, pump sheds and irrigations sheds.
Structure	Structure assets include those miscellaneous uninhabitable buildings or structures that are owned by Council and operated by Council, Businesses, or Organisations. For example, they include structures being a fence, compound, mast, antenna, retaining or free-standing wall, statues and monuments.

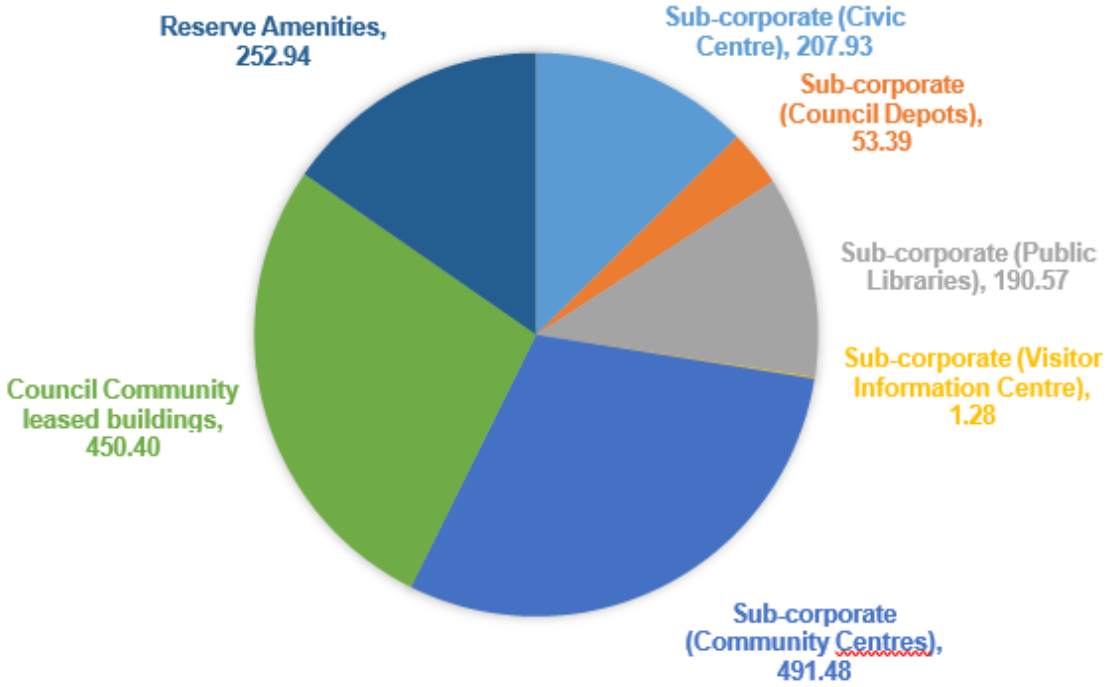
It should be acknowledged that different building asset types consume more energy than others. Graph 1 compares the annual total emissions levels of corporate, community leased and amenity buildings. It is evident that corporate buildings are responsible for 91865.8 tonnes of CO^{2-e} per year, meaning there is significant room for improvement needed to reach future targets.



Graph 1: Building Asset Types – Total Emission levels (tonnes CO²-e) per year

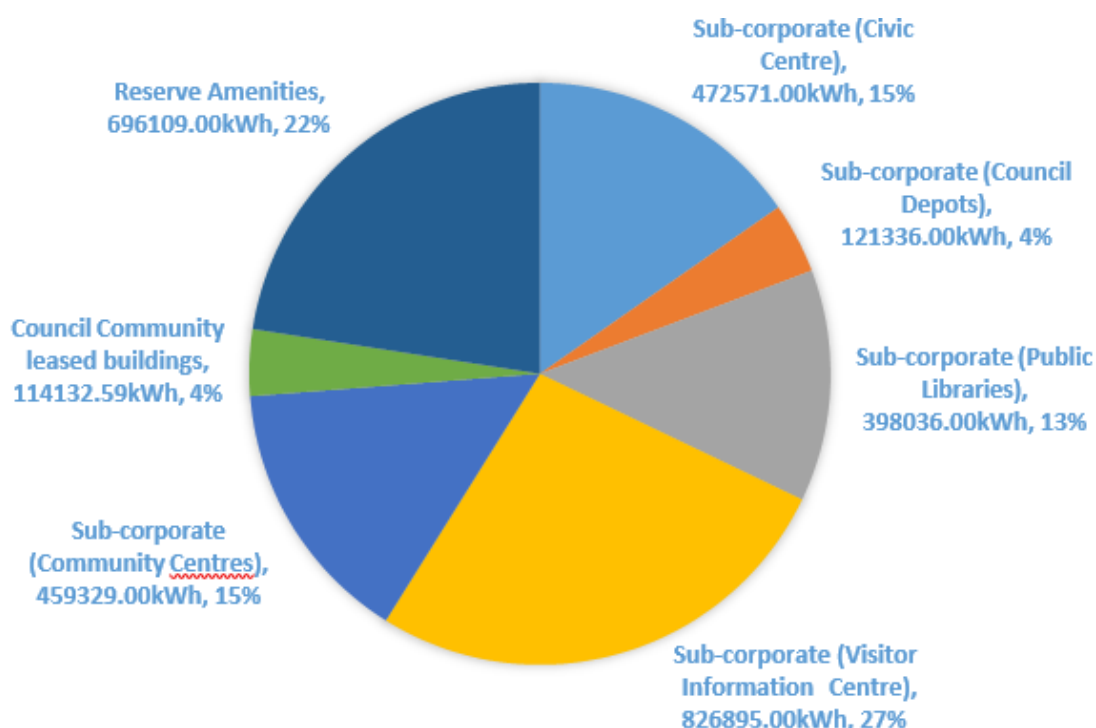


Graph 2: Building Asset Types- Total Emission levels (tonnes CO₂-e) per year



Graph 2 represents the total emission levels of Corporate Building Asset Types, while Graph 3 represents the total energy consumption levels of Corporate Building Asset Types, including the Civic Centre, Council depots and public libraries.

Graph 3: Building Asset Types- Total Energy Consumption Levels (kWh per year)



ENVIRONMENTALLY SUSTAINABLE DESIGN

This guideline provides a consistent framework and assessment of sustainability, while providing strategies for achieving the best sustainable outcomes and efficiency. Implementation and adoption of these guidelines will support the vision the City of Port Adelaide Enfield to achieve the direction of the City Plan 2030 and meet future zero net emission targets.

Council recognises the importance of improving sustainability and efficiency by incorporating environmentally sustainable design during the design stage through to construction and operation of a building to see long-term benefits for our community. Council buildings will be built, expanded or upgraded to an agreed minimum sustainability requirement dependent on the nature of the project in order to ensure energy, water and waste efficiency. Improving the environmental sustainability of our buildings is not just about building design but involves a holistic approach and an organisational culture that supports the building and operation of sustainable buildings.

Council will achieve this by:

- Implementing sustainable principles into the design of their buildings
- Managing energy, water and waste resources sustainably



- Demonstrating corporate responsibility and leadership to the community
- Predicting user behaviour and providing solutions that encourage sustainability

RATING TOOLS

Rating tools are used to assess and recognise whether buildings meet certain requirements and standards. They vary in their approach and can be applied to the planning and design, construction, operation and maintenance, renovation and demolitions phases of a building. There are currently two key sustainable building rating tools employed by the property sector that establishes environment performance standards, the Green Star Rating and the National Australian Built Environment Rating System (NABERS) (see Appendix 1).

PROJECT OPPORTUNITIES

Different building project types vary in their ability to improve sustainability. It is recognised that projects may not need to adopt and embrace all categories to achieve an acceptable level of sustainability, as the scope of works of the project will limit the ability to target every objective. It is not intended that the mandated scope of works is extended in order to satisfy all objectives.

New buildings and certain major building renewals create a distinct opportunity in the building asset's lifecycle to incorporate sustainable principles within the building envelope to create great gains in efficiency and reduce environmental impact. While smaller buildings are a great way to get improve energy and water efficiency through building maintenance and replacement.

OPERATIONS	MAINTENANCE	RENEWAL	UPGRADE/NEW
Includes the use of rating tools, policies, leasing provisions, auditing of operational building performance and training/educating Council staff.	Includes treatment methods undertaken to retain appearance and improving operational efficiency of the building. This could include replacing damaged water fittings with WELS rated fittings to the highest star rating or replacing hot water services with new energy efficient versions.	Includes renovation, retrofits or refurbishments. This could include replacing fixtures, appliances and services with the highest rated systems or replacing all luminaires to be LED.	New buildings must follow a set of minimum sustainability standards and provide a set of plans/demonstration of every environmentally sustainable design element applicable, e.g. description of intended materials to be used that have already been recycled and/or their potential to be recycled.

ENVIRONMENTALLY SUSTAINABLE DESIGN CATEGORIES

ENERGY EFFICIENCY

Objectives:

- To ensure the efficient use of energy
- To reduce total operating greenhouse emissions
- To reduce energy peak demand
- To reduce associated energy costs



WASTE EFFICIENCY

Objectives:

- To ensure waste avoidance, reuse and recycling during the design, construction and operation stages of development
- To ensure long term reusability of building materials
- To ensure a Waste Management Plan has been created where required

WATER EFFICIENCY

Objectives:

- To ensure the efficient use of water
- To reduce total operating potable water use
- To encourage the collection and reuse of stormwater
- To encourage the appropriate use of alternative water sources (e.g. grey water)
- To minimise associated water costs

BUILDING MATERIALS

Objectives:

- To minimise the environmental impacts materials used by encouraging the use of materials with a favourable lifecycle assessment based on the following factors; fate of material, recycling/Reuse, embodied energy, biodiversity, human health, environmental toxicity and environmental responsibility

INDOOR ENVIRONMENTAL QUALITY

Objectives:

- To achieve a healthy indoor environment quality for the wellbeing of building occupants
- To provide a naturally comfortable indoor environment will lower the need for building services, such as artificial lighting, mechanical ventilation and cooling and heating devices

URBAN ECOLOGY

Objectives:

- To protect and enhance biodiversity
- To provide sustainable landscaping
- To protect and manage all remnant indigenous plant communities
- To encourage the planting of indigenous vegetation

OPERATION AND MANAGEMENT

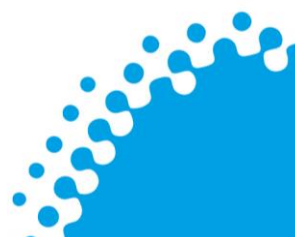
Objectives:

- To encourage a holistic and integrated design and ongoing high performance
- To extend service life of equipment and building materials

USER BEHAVIOUR

Objectives:

- To educate and encourage building users in sustainable practices
- To predict users' behavioural patterns and provide solutions that encourage sustainable outcomes



ENERGY EFFICIENCY/ZERO CARBON CITY

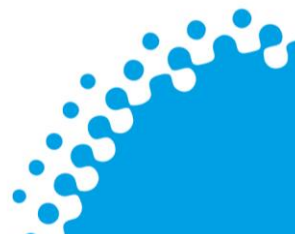
By reducing greenhouse gas emissions and promoting energy efficiency, The City of Port Adelaide Enfield will be closer in becoming a zero carbon city. All new building development should provide adequate thermal comfort for occupants and minimise the need for energy use for heating, ventilation, air conditioning and lighting.

Objectives:

- To ensure the efficient use of energy
 - To reduce total operating greenhouse emissions
 - To reduce energy peak demand
 - To reduce associated energy costs
1. A building, including its services, should consider features that facilitate the efficient use of energy appropriate to:
 - The function and use of the building and services
 - The internal environment
 - The geographic location of the building
 - The effects of nearby permanent features such as topography and structures
 - Solar radiation being utilised/controlled for heating and cooling
 - The sealing of the building envelope against air leakage
 - The utilisation of air movement to assist heating and cooling
 - The energy source of the services
 2. Consider installing, adding to or upgrading insulation to walls, floors and ceilings. Climatic conditions influence the appropriate level, thickness and type of insulation. Insulation must cater for daily and seasonal variations in temperature (*see Appendix 2*)
 3. To avoid thermal bridging or condensation into the building envelope, provide condensation analysis to mitigate sick building syndrome
 4. Employ passive measures such as sun shading, natural air ventilation, insulation and double glazing to minimise the need for mechanical heating and cooling systems
 5. Glazing in areas with active heating and cooling should be double glazed with thermally enhanced or thermally broken frames
 6. Draft-proof any gaps around doors, windows and vents including any opening between the interior and exterior of the building
 7. Perform audit of existing buildings using fan pressurisation to ascertain air leakage
 8. Consider the use of exposed thermal mass of a building to balance a building's internal temperatures through heat storage and release
 9. Window size and shading device should balance unwanted heat gains in summer and heat gains in winter, while maximising daylight penetration throughout the year
 10. Lighting to be designed for low and efficient energy use by considering the inclusion of all or some of the following technologies and principles:
 - Low wattage lighting
 - Timers
 - Install occupancy sensors to reduce unnecessary lighting in common areas
 - Dimmers
 - Building Automation Systems
 - Repositioning lights so that fewer lights are required
 - Rewiring lighting arrays into smaller zones per light switch, so that flexibility is increased
 - Mixing high illumination task lighting with lower illumination ambient lighting



11. Light reflection from walls and horizontal surfaces contributes significantly to illumination levels and quality. Consider high surface reflectance of interior such white glazed tiles or white painted walls.
12. Use of daylight, via installation of skylights and windows or the repositioning of tasks so that they are located under lights or away from sources of glare can reduce the amount of lighting needed
13. Where possible, alter layout of most common switches to a single location and minimise amount to simplify shut down of facility
14. Relabel light switches whenever layouts change to ensure they remain relevant
15. Installing modern temperature sensors to ensure that heating and cooling is responsive to real ambient and indoor temperatures
16. All electrical appliances should be to the highest energy star rating for product required
17. Buildings with elevators, escalators or electric motors should include systems and controls that have the ability to reclaim energy to reduce energy demand
18. Installing modern building management systems to optimise how plant and equipment work together, and to detect and rectify problems quickly
19. Installing variable speed drives for fans and pumps so that they can throttle in response to demand
20. Develop a shutdown procedure for building and non-critical equipment when not in use
21. Consideration of implementation of energy monitoring systems
22. Use of high efficiency electric hot water heat systems that can be linked to future solar photovoltaic opportunities
23. Hot water systems should use a solar hot water system or gas hot water system with an energy rating of at least 5 or a heat pump system or heat recovery system
24. Where applicable, energy should be obtained from on-site renewable or reclaimed energy sources
25. Where applicable, encourage the involvement of qualified sustainable design professionals and consultants in the project team from the early design stage
26. Where applicable, complete a preliminary energy assessment (Section J analysis or Design Builder) to calculate energy consumption and find possible improvements
27. For data centres and information technology (IT) server facilities:
 - Reduce lighting levels and install sensors
 - Reduce unnecessary airflow and cooling into larger areas than needed
 - Reduce reliance for on premise facilities
 - Prevent mixing of hot and cold air in server racks
 - Allow ambient cooling of product before refrigeration
 - Increase insulation on pipework and avoid hot areas
 - Ensure process equipment is operating correctly and look for unexpected heat gains
 - Ensure product or spaces are not overheated to begin with
 - Assess whether cooling of products is required at all or raise the temperature if not required
 - Place cooling equipment as far as possible from heat sources such as radiators and air-conditioning
 - Minimise air infiltration into a cooled space
 - Install more efficient (especially internal) fan motors

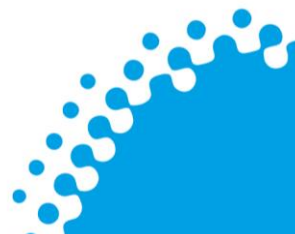


WASTE EFFICIENCY

By reducing waste through increasing re-use and recycling of materials and decreasing waste transportation, The City of Port Adelaide Enfield will minimise their landfill and raw material demand.

Objectives:

- To ensure waste avoidance, reuse and recycling during the design, construction and operation stages of development
 - To ensure long term reusability of building materials
 - To ensure a Waste Management Plan has been created where required
1. Evaluate if components of existing buildings or facilities can be incorporated in any new or refurbished construction
 2. A minimum of 60% of waste of all demolition and construction waste should be recycled or reused
 3. Minimise onsite concrete dust, air and water pollution by the preparation of an Environmental Management Plan including Waste Management Plan
 4. Reduce impacts from transportation by examining material delivery schedules to minimise transport requirements
 5. Give preference to locally produced materials with low embodied energy content and using local waste collection and recycling services
 6. Plan the timing of your purchases so that delivery is just-in-time for the required building stage and identify suitable storage locations reducing damage/spoilage and avoiding waste
 7. Industry measures show that 13% of waste is new or unused material and 60% of skipped material is packaging. Hence take steps to reduce this waste by finding a supplier who accepts returns or exchanges of materials and can reuse provided packaging.
 8. Where possible use materials that are:
 - Local
 - Natural
 - Renewable that regenerate in 10 years or less
 - Recycled or have a high percentage of recycled content
 - Certified or obtains an environmental declaration
 9. When undertaking work within existing facilities, products and equipment, work to find ways to reduce potential sources of toxicity. e.g. paints, caulks and sealants, lead and cadmium in paints, and asbestos
 10. Establish a collection/delivery plan in collaboration with waste contractors for waste and recyclable materials generated on-site
 11. Ensure staff and contractors are aware of their responsibilities in relation to the construction waste management plan
 12. Appropriate storage and management of materials on-site minimising the risk of replacement materials
 13. Optimize product durability by purchasing products with:
 - Extended warranty
 - Upgradeability
 - Access to spare parts and service information

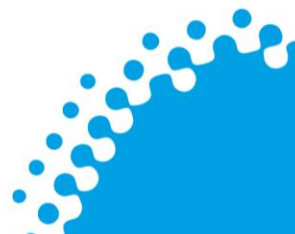


WATER EFFICIENCY

By reducing water consumption through maximising water efficiency of appliances and equipment and implementing infrastructure for captured rainwater and recycled water, The City of Port Adelaide Enfield will ensure water demands for the area are met without compromising future water supplies.

Objectives:

- To ensure the efficient use of water
 - To reduce total operating potable water use
 - To encourage the collection and reuse of stormwater
 - To encourage the appropriate use of alternative water sources (e.g. grey water)
 - To minimise associated water costs
1. Ensure all fittings and fixtures achieve the highest WELS rating possible:
 - Shower Heads: 3 Stars, 7.5 L/S
 - Shower Taps: Push button time delay variable temperature
 - Toilets: 5 Star
 - Urinals: 6 Star, Sensor Operated
 - Staff, Community and Sports Pavilion Taps: 6 star WELS, sensor operated
 - Public Amenities Taps: Push button time delay
 - All appliances: 5 Star WELS (minimum)
 - Wash-down hoses: Commercial high pressure water efficient trigger nozzles
 2. Replace hot water services with new energy efficient alternatives, e.g. solar or energy efficient heat pumps with the intention to move away from gas as a form of energy
 3. Minimise potable water demand and wastewater generation
 4. Encourage alternative water sources such a harvested rainwater and stormwater, reclaimed wastewater and greywater tanks
 5. Encourage the use of underground tanks for water capture and storage to minimise the encumbrances on ground level land
 6. Incorporate measures to reduce water consumption for fire safety system testing such as water on site and fitting isolation valves or shut off points for sprinkler systems
 7. Install appropriately sized rainwater tanks to capture majority of otherwise discharged rainwater and plumb to a consistent year round water use, e.g. flushing toilets
 8. New building development should be plumbed with dual water supply to allow future use of recycled water for non-potable uses
 9. Encourage Water Sensitive Urban Design
 10. Where possible, incorporate green walls and green roofs
 11. Consider planting areas of low-water use and indigenous plant species, rather than typical lawn or plant species not suited to that location
 12. Apply organic soil conditioner to planting beds to improve moisture retention or post construction remediation of soil from site so it is suitable for landscaping



BUILDING MATERIALS

By using sustainable products and materials, The City of Port Adelaide Enfield will reduce environmental impact embodied in its construction. The production and use of building materials can significantly impact the environment as energy is used to extract, produce and transport materials.

Objectives:

- To minimise the environmental impacts materials used by encouraging the use of materials with a favourable lifecycle assessment based on the following factors:
 - Fate of material
 - Recycling/Reuse
 - Embodied energy
 - Biodiversity
 - Human health
 - Environmental toxicity
 - Environmental responsibility
1. Consider materials compatible with the natural features of the site, adjacent buildings and are designed to minimize cut-offs to prevent excess materials
 2. Use materials that emit minimal or no pollutants both in construction and operational stages including:
 - No/low formaldehyde materials
 - Certified PVC materials
 - Responsibly sourced steel
 - Low Volatile Organic Compound (VOC) products
 3. All internally applied paints, adhesives and sealants should contain low levels of VOCs and should not exceed over the maximum acceptable amount (*see Appendix 3*)
 4. Use construction material and products that incorporate low-embodied energy, are robust and weather resilient and are low maintenance to maximise their lifecycle
 5. Use construction material and products that may be re-used or recycled to maximise their lifecycle (*see Appendix 4*)
 6. To encourage sustainability and transparency in product specification
 7. The price of products and manufacturers complying with standards and certifications should be chosen in preference to non-compliance choices and need to be considered in the project budget. These include but are not limited to (*see Appendix 5*):
 - Ecospecifier Green Tag GreenRate
 - Australasian Furnishing Research and Development Institute Green Tick
 - Good Environmental Choice Australia
 - Carpet Institute of Australia; Environmental Certification Scheme
 - Product or industry specific, verified Environmental Product Declaration
 - Products certified to Fairtrade Mark
 8. Where possible, concrete should include at least 30% replacement of cement with alternative materials, mix water should be at least 50% recycled
 9. Ensure timber is certified through an accredited forest certification scheme such as the Forest Stewardship Council or the Australian Forest Certification Scheme (*see Appendix 6*)
 10. Where possible, replace harmful chemical pest treatments with structural pest management measured such as steel mesh, stone and concrete barriers.

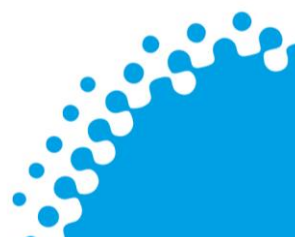


INDOOR ENVIRONMENTAL QUALITY

By improving the indoor environmental quality of buildings, The City of Port Adelaide Enfield will enhance well-being and reduce the likelihood of ill-health.

Objectives:

- To achieve a healthy indoor environment quality for the wellbeing of building occupants
 - To provide a naturally comfortable indoor environment will lower the need for building services, such as artificial lighting, mechanical ventilation and cooling and heating devices
1. Maximise opportunities for daylighting in regularly occupied spaces by considering building orientation, fenestration and glazing options
 2. Provide operable external windows to circulation corridors and lift lobbies to facilitate natural ventilation and daylight
 3. Minimise noise levels and noise transfer within and between buildings and associated external areas
 4. Install appropriate external shading devices which respond to different facade orientations
 5. Prevent high indoor humidity through the proper design and operation of HVAC systems
 6. Reduce the level of indoor air pollutants through preventative measures such as routine maintenance activities, periodic informal building inspections, pollutant source control and other IEQ-specific or non-specific actions
 7. Utilize low emitting (low or no volatile organic compound materials), on at least 60 percent of interior products by cost or surface area, for the following materials and products:
 - composite wood products
 - flooring and carpet systems
 - wall panels
 - insulation
 - adhesives
 - sealants
 - interior paints and finishes
 - solvents
 - janitorial supplies
 - furnishings
 8. Provide condensation analysis or model moisture conditions for building envelope using WUFI Pro
 9. Implement a moisture control strategy (may be part of the operations and maintenance protocols) for controlling moisture flows and condensation to prevent building damage, minimize mould contamination, and reduce health risks related to moisture
 10. Reduce condensation by using exhaust fans, or open windows in wet areas
 11. Reduce water infiltration by regularly checking for plumbing leaks
 12. Develop and implement a plan to protect indoor air quality during construction.



URBAN ECOLOGY

By improving urban ecology, The City of Port Adelaide Enfield will reduce impacts on ecological systems and biodiversity. Consideration of biodiversity, the natural landscape and water capture and run off within any plans can have trade-offs to energy and resource efficiency, health and well-being, reduced maintenance and overall aesthetics.

Objectives:

- To protect and enhance biodiversity
 - To provide sustainable landscaping
 - To protect and manage all remnant indigenous plant communities
 - To encourage the planting of indigenous vegetation
1. Landscaping must consider local biodiversity and include hard wearing native species that reduce water requirements
 2. Native vegetation should be retained and conserved
 3. Where vegetation is cleared, vegetation offsets will be planted and maintained according to Council policy
 4. Revegetation should include locally indigenous plant species or native species that are resilient to climate change
 5. Any clearance of vegetation needs to consider adverse impact to:
 - Soil through erosion, sediment or degradation
 - Surrounding eco system of flora and/or fauna
 - The screening of unsightly views or buildings
 - Water flow or quality from precipitation
 - Urban Heat Island Effect implications due to canopy loss
 6. Development should not be located in environmentally-sensitive coastal features such as sand dunes, cliff-tops, wetlands or substantially intact strata of native vegetation
 7. Consider providing landscaping and habitats to encourage native fauna to the area, such as bird feeders/baths or natural shelters for other fauna.
 8. In no particular order priorities should be given to:
 - The marine and estuarine environment
 - Natural water bodies and wetlands
 - Preservation of significant trees or regulated trees (*see regulations*)
 - Native vegetation and wetlands are not fragmented or reduced in size
 - Maintain natural drainage systems reducing the impact of stormwater run-off and improving water quality by implementation of Water-sensitive urban design principles
 - Adverse impact on the natural, physical, chemical or biological quality and characteristics of soil and water resources.
 - Prevent erosion
 - Minimise alteration to the existing landform or the loss of soil from site through soil erosion or siltation.

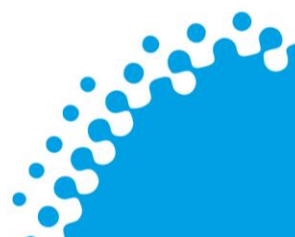


OPERATION AND MANAGEMENT

By practising sustainable building operation and management, The City of Port Adelaide Enfield will ensure green buildings operate as efficiently as their design intended to. No matter how sustainable a building may have been in its design and construction, it can only remain so if it is operated responsibly and maintained properly. Sustainable O&M practices primarily focus on building occupants and encompass safety, security, health, comfort, and productivity with an understanding of the next generation's need to reuse and recycle building components.

Objectives:

- To encourage a holistic and integrated design and ongoing high performance
 - To extend service life of equipment and building materials
1. Ensure operation and maintenance personnel are part of the project planning and development process, including the establishing of commissioning criteria at the onset of a project to assist with reaching sustainability targets throughout the lifecycle of a building
 2. Provide a building operation manual so building users and maintenance teams can efficiently and effectively use the building as it was designed to
 3. Throughout the building's life cycle, operations and maintenance should seek to:
 - Building occupants, facilities managers, and maintenance staff are trained in sustainable design principles and methods that will minimize system failures
 - Purchase cleaning products and supplies that are resource-efficient, biodegradable and safer for both janitorial staff and building occupants, and thereby improving indoor air quality
 - Test sensors on a regular basis to ensure energy efficiency is not compromised
 - Use automated monitors and controls for energy, water, waste, temperature, moisture, and ventilation
 - Reduce waste through source reduction and recycling to eliminate off-site disposal
 - For commercial operations, minimize travel by supporting telecommuting programs and enabling a mobile work environment.
 - For all operations, perform scheduled energy audits and re-commissioning of systems
 - When updating a facility or its systems, choose higher efficiency equipment, durable materials that will withstand storms and other natural events, and improve the tightness of the building envelope if feasible
 - If offered by local utility provider, participate in a renewable energy portfolio program that provides a minimum of 50-percent electrical power from renewable sources.
 4. Ensure ongoing health, safety and amenity levels for equipment and safety installations are in accordance with the National Construction Code requirements.



USER BEHAVIOUR

By considering and foreseeing how occupants use Council buildings, the City of Port Adelaide Enfield will educate and spread awareness on the importance of sustainable behaviour. User behaviour impacts resource consumption, operating and repair costs and quality of use.

Objective:

- To educate and encourage building users in sustainable practices
- To predict users' behavioural patterns and provide solutions that encourage sustainable outcomes

Motivate users through suitable incentive schemes and target agreements, e.g. energy saving goals set by the operator for users

1. Provide appropriate training to Council staff and building users
2. Provide a Building User's Manual/Guide
3. Ensure adequate and appropriate information related to environmentally sustainable design, Council goals and measures are provided for the users within the building and accessible online
4. Provide building users with realistic recommendations for motivation and action
5. Promote active travel to encourage sustainable forms of transportation, including cycling and walking
6. Provide building users up to date, target-group specific information in writing that includes:
 - Operation of building services in the user's range of influence
 - Healthy room climate
 - Low energy and water consumption
 - Avoidance, separation and disposal of waste
 - Modification or revision of the building energy concept
 - Recommendations for actions related to the seasons, e.g. suitable ventilation in summer
 - Mapping of energy and water consumption rates
7. Deliver regular and transparent reports on the success of efforts
8. Clearly display comparison charts of energy, water and waste usage, appliances energy ratings and other educational signage
9. Motivate users through posters, signage, screens and displays that highlights targets and encourages sustainable behaviour and patterns



DEFINITIONS

ESD

Environmentally Sustainable Design is the practice of designing buildings and infrastructure to achieve minimal impact on the environment to conserve natural resources and protect ecosystems.

Environmental impact

Any change or variation to the environment, whether adverse or beneficial.

Zero Carbon city

A city that has no net carbon emissions due to its high standard of energy efficiency and renewable energy sources

Embodied Energy

The energy used during the collection, production and manufacturing of natural resources and building materials.

Energy Audit

Involves an energy auditor examining a variety of building components (windows, walls, lighting) and enables an identification of energy use and costs.

Natural ventilation

The flow of air between the outside and the inside of a building without the use of mechanical HVAC systems.

Thermal bridging

Movement of heat across an object that is more conductive than the materials around it, which creates a path that heat can pass along regardless of insulation.

Energy efficiency

Using the least amount of energy required for a product or activity.

Green walls and roofs

Building elements designed to support living vegetation in order to improve a building's performance.

Waste Management Plan

A plan to define strategies for managing waste during construction, operation and demolition.

Environmental Management Plan

Describes possible impacts on the natural environment and defines clear commitments to ensure the building reduces environmental impact.

WELS

Australian Government, Water Efficiency Labelling and Standards

Water Sensitive Urban Design

An approach that integrates whole of water cycle management into urban planning and design to reuse water and reduce the amount of stormwater and pollution that enters waterways.

Stormwater

Rainwater that has fallen onto roads or roofs which often contain chemicals or pollutants

Greywater

Domestic wastewater from bathroom sinks and washing machines that have not been contaminated by faeces.

Renewable materials

Sustainable materials that do not use up non-renewable resources and can be naturally replaced.

VOCs

Volatile Organic Compounds are solvents that get released into the air as paint dries. There is evidence that exposure to VOCs can cause irritation, nausea, nerve damage, respiratory problems and other health issues.

Formaldehyde

A type of VOC that may be highly toxic when inhaled.

PVC materials

Polyvinyl Chloride is a common thermoplastic polymer which can be highly poisonous in high levels.

EPD

An Environmental Product Declaration is a document which transparently communicates the environmental performance or impact of any product or material over its lifetime.

Stewardship

A certification system that ensures products and materials come from responsibly managed sources.

Indoor air pollutants

Refers to chemical, biological and physical contamination of indoor air.

Fenestration

The arrangement of windows

Solar gain

The increase in thermal energy and temperature of a space that is caused by solar radiation.

Daylight transmittance

The amount of sun that is passing through a material.

Biodiversity

The variety of plant and animal life in a particular habitat.

Urban Heat Island

A metropolitan area that is significantly warmer than nearby rural areas, this effect increases energy costs and air pollution levels.

Erosion

The process of transportation or destruction of rock or soil by natural forces such as wind or water.

Siltation

The process by which water becomes dirty as a result of fine mineral particular in the water.

Sediment

A naturally occurring material that is broken down by processes of weathering and erosions and is subsequently transported by wind or water.

Degradation

The disintegrating and wearing down of a rock.

APPENDICES

Appendix 1: Rating tools

GREEN STAR

Rates the building's potential to reduce its environmental impact. Green Star measures the potential environmental impact of different building elements including environmental management, indoor environment quality, energy use, transport, water use, use of materials, land use and ecology, and emissions.

Building Type	When	How	Rating system	Cost
Most building types are eligible to be rated, including new buildings, major refurbishments and existing buildings. Single dwellings (class 1) and inhabitable structures are excluded. Interiors (fitouts) and performance may also be evaluated.	Can be applied at the planning and conceptual stages and the completed built stage.	Depending on building eligibility, submit documentation to Green Building Council Australia for Green Star assessment. Submissions will be reviewed by experts and given an overall score and star rating.	Projects will only achieve certification if it scores over 4-6 Stars. 1 Star: Minimum Practice 2 Star: Average Practice 3 Star: Good Practice 4 Star: Best Practice 5 Star: Australian Excellence 6 Star: World Leadership	Depends on the contract value of a building, e.g. \$0-1m: \$13,200 \$5-10m: \$20,300 \$20-30m: \$25,400 \$100-150m: \$39,900 \$250+m: \$50,750 GBCA members discount available.

NABERS

Rates an existing building on its operational impacts on the environment. It measures a building's annual energy consumption and other environmental uses. It factors in size, how many people use it, what time of day they use it and the local climate and then benchmarks the data against other buildings with similar conditions.

Building Type	When	How	Rating system	Cost
Commercial buildings including offices, apartments, data centres, shopping centres, public hospitals and hotels.	Is applied to existing buildings only. It is mandatory for office buildings of 1000 square metres or above.	Locate a NABERS accredited assessor to rate the base building, tenancy or whole building. Accredited Assessors carry out physical assessments of buildings to collect and then verify the data required to provide a NABERS rating.	Low consumption of resources is awarded with a high NABERS rating, whereas a poor rating indicates an inefficient use of resources. It uses a rating system between zero to six stars.	Price of a NABERS rating has two parts; NABERS lodgement fee and the Assessor's fee, e.g. an office between 2000m ² -1000m ² would cost \$625 (admin fees) + \$2385 (assessor fees) * NABERS rating calculator can be found online

NATHERS

Rates the efficiency of a home, based on its design. It involves calculating a building's energy consumption, taking into account factors such as the building's construction, local climate and orientation and scoring the building between zero and ten stars.

Building Type	When	How	Rating system	Cost
Residential buildings	Is applied during the initial planning stages of a building design.	Conducted by professionals using purpose-built software that develops a simulation model of the building from architectural drawings. It estimates how much cooling or heating is needed to stay comfortable throughout a year.	A building with an efficient thermal performance will receive a higher rating while a low rating indicates improvement regarding heating and cooling needs. It uses a rating system between zero to ten stars. A minimum of 6 is required.	Depends on the project type and assessor's fee. Certification can start at \$280 and increase to \$450.



Appendix 2: Insulation recommendations

(From Ecolife Solution, 2021)

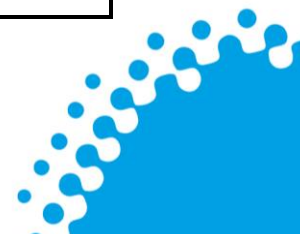
Insulation acts as a barrier to heat flow and is required for keeping buildings a comfortable temperature. A design with adequate insulation improves thermal efficiency which reduces the need for mechanical heating and cooling, resulting in less energy use and fewer emissions released.

Insulation Type	Min. R-value recommended	Max. R-value recommended
Roof insulation (roofing blanket/space blanket)	R1.3	R3.6
Ceiling Insulation Batts	R4.0	R6.0
External Wall Insulation	R2.0HD	R2.7HD
Internal Wall Insulation	R1.5	R2.7HD
Suspended Floor	-	R2.5
<p>*R-value: An insulation product's resistance to heat flow is measured by its thermal and acoustic resistance or R-value. The higher the R-value, the more effective that product will be at keeping your home cooler in Summer and warmer in Winter.</p> <p>*HD: A high density insulation that has a higher thermal resistance</p>		

Appendix 3: Maximum Total VOC content

(From Green Star Office Design and Office as Built Version 3, 2008)

Product type/sub Category	Maximum Acceptable Total VOC content (grams per litre of ready to use product)
PAINTS AND FINISHES	
Walls and ceilings: interior semi-gloss	16
Walls and ceilings: interior low sheen	16
Walls and ceilings: interior flat washable	16
Ceilings: interior flat	14
Trim: gloss, semi-gloss, satin, varnishes and wood stains	75
Timber and binding primers	30
Latex primer for galvanized iron and zincalume	60
Interior latex undercoat	65
Interior sealer	65
One and two pack performance coatings for floors	140
Any solvent-based coatings not covered in table	200
ADHESIVES AND SEALANTS	
Indoor carpet adhesive	50
Carpet pad adhesive	50
Wood flooring and Laminate adhesive	100
Rubber flooring adhesive	60
Sub-floor adhesive	50
Ceramic tile adhesive	65
Cove base adhesive	50
Dry Wall and Panel adhesive	50
Multipurpose construction adhesive	70
Structural glazing adhesive	70
Architectural sealants	250



Appendix 4: Building material best practice standards

(Data taken from Moreland Policy and Green Star Credit Requirements.

For further information visit <https://new.gbca.org.au/>)

Concrete	<ul style="list-style-type: none"> • Concrete can be crushed and recycled as aggregate for new concrete or road base and fill, glass can be reused as aggregate for concrete • 30% cement replacement minimum, with 40% as a stretch target • 40% coarse aggregate substitution or 25% fine (sand) aggregate substitution • At least 50% of all mix water for concrete used in the project is from a captured or reclaimed source
Steel	<ul style="list-style-type: none"> • Steel can be melted and reused within new steel products • Steel should be sourced from a responsible and sustainable steel maker
External surface finishes	<ul style="list-style-type: none"> • 75% of the total project site area comprises building or landscaping elements that reduce the impact of heat island effect. This includes vegetation, green roofs, light roofing materials and hard-scape, water bodies and solar PV
Timber	<ul style="list-style-type: none"> • Timber can either be directly reused or turned into horticultural mulch. If not recycled, always specify sustainably sourced timber • At least 90% of all timber used to be certified, accredited or reused/recycled • The use of tropical hardwoods such as Merbau, Mirabow, Ipil, Kwila, Vesi are not permitted under any circumstances • Preference for laminated timber over native structural hardwoods
Poly Vinyl Chloride (PVC)	<ul style="list-style-type: none"> • To reduce environmental and health impacts for building users internal fits outs plastics (e.g. vinyl flooring and carpet underlays) should exclude PVC • Products claiming that they do not include PVC must provide a Material Safety Data Sheet verifying that a product does not contain PVC.
Internal surfaces and finishes	<ul style="list-style-type: none"> • Low Volatile Organic Compound (VOC) office furnishings, flooring and internal coatings (i.e. paints, adhesives and sealants) • Plasterboard with recycled content or third party certified plasterboard • Use raw and unfinished surfaces where appropriate
Other	<ul style="list-style-type: none"> • Maximise opportunities for the use of recycled materials & equipment • Specify durable materials (via manufacturers' warranties) that can be readily recycled at the end of their life cycle. Products/materials with verified Environmental Product Declaration will be given preference



Appendix 5: Product certification schemes guide

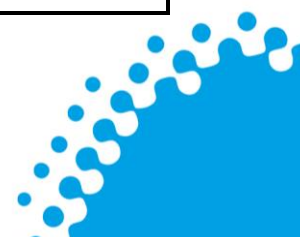
(For further information visit

<http://www.ecospecifier.com.au/certifications/>)

Product certification schemes allow for consumers to select environmentally conscious products and materials that meet specific standards and are more sustainable throughout its life cycle.

Below are some common product certifications used within Australia:

Good Environmental Choice Australia (GECA)	Good Environmental Choice Australia (GECA) is a not-for-profit, membership based organisation with a mission to promote environmentally preferable products and services. Products and services with the GECA Ecolabel represents environmentally preferable production and consumption. Under GECA certification, products and services are certified against minimum environmental performance criteria across its life cycle to ensure that certified products deliver better environmental outcomes.
Ecospecifier GreenTag GreenRate	Green Tag is a third party, green building product rating and certification system, underpinned by rigorous scientific and Life Cycle Assessment (LCA) processes. Its advanced, robust LCA certification methodology developed exclusively by eco-specifier, is a world first. Eco-specifier positions a product within the top end of the green product market enabling manufacturers to communicate the work they have undertaken to improve the ecological and health benefits of their products.
Australasian Furnishing Research and Development Institute Green Tick	The Australasian Furnishing Research & Development Institute (AFRDI) is an international, not-for-profit, membership-based organisation with a mission to promote the production and purchase of sustainable freestanding furniture products. AFRDI Green Tick certification is assessed against requirements of the AFRDI 150 Sustainability Standard which focuses on chain-of-custody procedures for raw materials, corporate social responsibility and resource assessments.
The Forest Stewardship Council	The Forest Stewardship Council is an international, not-for-profit, membership-based organisation with a mission to promote environmentally appropriate, socially beneficial and economically viable management of the world's forests. FSC logo products support healthy forests and strong communities. Under FSC certification, forests are certified against a set of strict environmental and social standards, and material from certified forests is tracked all the way to the consumer through the chain of custody certification system.
The Australian Forestry Standard	The Australian Forestry Standard is an Australian, not-for-profit, membership-based organisation with a mission to promote sustainable forest management in Australia. Under AFS certification, the chain of custody of forests is tracked back through the supply chain to verify the management of forests.
Carpet Institute of Australia-Environmental Certification Scheme	An extension of the Australian Carpet Classification Scheme (ACCS), the Environmental Certification Scheme provides a guide to the environmental performance of carpet. Carpet manufacturers must comply with the Code of Practice for Environmental Management which provides performance standards for raw materials, carpet manufacturing, in-service use and final disposal.
Cradle to Cradle (C2C)	Cradle to Cradle certification is a globally recognised measure of safe and sustainable products made for a circular economy. Products are assessed for environmental and social performance across five sustainability categories; material health, material reuse, renewable energy and carbon management, water stewardship, and social fairness. A product is assigned an achievement level for each category, e.g. basic, bronze, or platinum.
Fairtrade Mark	The Fair Trade Certified Mark is a fair trade certification mark that appears on products as an independent guarantee that disadvantaged producers in the developing world are getting a better deal.
Window Energy Rating Scheme (WERS)	The Window Energy Rating Scheme enables windows to be rated and labelled for their annual energy impact on a whole house, in any climate of Australia. To participate in WERS, window makers must obtain energy ratings for their products from an accredited rating organisation. WERS is independent of any one manufacturer and acts as a fair, rigorous and credible system for testing performance claims.
Water Efficiency Labelling and Standards (WELS)	The Fair Trade Certified Mark is a fair trade certification mark that appears on products as an independent guarantee that disadvantaged producers in the developing world are getting a better deal.



Appendix 6: Sustainable timber recommendations

(For further information visit <http://www.goodwoodguide.org.au>)

BEST CHOICE	
Type	Comments
Recycled timbers	An ideal way to reduce waste and make use of used materials
Australian softwood and hardwood plantation timbers certified by Forest Stewardship Council (FSC)	There are many softwood and hardwood plantation timbers available from Australian plantation sources
GOOD CHOICE	
Non-certified Australian plantation timbers	
FSC certified Australian native forest timbers FSC certified timbers from other countries	While considerable effort has gone into ensuring the integrity of these certification schemes, some doubts have been raised both in Australia and overseas about the effectiveness of this scheme
TIMBERS TO AVOID	
All native Australian timbers unless plantation-grown or certified by FSC	Logging of old-growth forests in Australia is responsible for species loss and severe habitat degradation
Imported timbers without FSC certification	
Commonly imported South East Asian rainforest timbers to avoid include: Meranti: used for all mouldings, dowels, architraves Merbau: used for skirting, joinery Ramin: mostly used for picture frames and fine joinery Pacific Maple: all mouldings, dowels, architraves Teak: outdoor furniture, carved beams, cabinet work Jelutong: joinery, carved work, toys Motoa, Merawan, Batu: house posts	

