Sustainable Design

Design Standard

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TAFE NSW would like to pay our respect and acknowledge Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of the Land, Rivers and Sea. We acknowledge and pay our respect to the Elders; past, present and emerging of all Nations.

REV	ISSUE DATE	ISSUE	AMENDMENTS SINCE PREVIOUS ISSUE
A	11/11/2022	1	n/a
B	3/02/2023	For approval	Restructured content
C	7/06/2023	Final	Updated layout for web upload

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This document was commissioned by TAFE NSW and prepared by D Squared Consulting Pty Ltd.

For enquiries please send email to:
designteam@tafensw.edu.au

TAFE Infrastructure NSW Design Team
Level 2, Building A, 1 Mary Ann Street
Ultimo NSW 2007
PO BOX 707, Broadway NSW 2007
02 9338 6600
tafensw.edu.au

Solar photovoltaic (PV) system (Source: dsquared)

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As part of the TAFE NSW ITN Design Book, the ''Sustainable Design Standard'' is intended to improve Sustainable Design outcomes, reduce environmental impacts, reduce operational costs and achieve consistency across TAFE NSW facilities.

This Design Standard applies to all capital works projects including major works, refurbishments, minor works, mini minor works, maintenance and replacement programs at all existing and new TAFE NSW sites.

The key objectives of the Sustainable Design Standard support the broader themes of the TAFE NSW Sustainability Strategy:

Sustainability Strategy Themes	Design Standard Focus Areas	Design Standard Objectives
Climate Action	Climate Resilient Campus & People Transition to Net Zero Emissions	Strengthen climate resilience and adaptation across the TAFE NSW community and assets. Support TAFE NSW in transitioning to Net Zero emissions with cost-effective design.
Circular Economy	Waste & resource reduction Sustainable materials and procurement	Set minimum performance standards to reduce energy and water consumption, waste and emissions; and increase the procurement and use of sustainable and recycled materials.
Healthy Environments	Sustainable Design Standards for all TAFE NSW capital works Health & Wellbeing Provisions	Provide healthy, contemporary environments for all users to improve learning outcomes and occupant satisfaction. Provide clear and concise standards including cross-references to sustainability ratings tools for implementation on all TAFE NSW capital works projects.
Education and Engagement	Building as a Learning Tool Sustainable Leadership	Enable TAFE NSW to demonstrate sustainability leadership in the built environment and support learning programs in sustainable design and construction.

1 Introduction

1.2 Audience

The table below broadly defines the diverse audience this Design Standard is written for and the roles they play through the design, selection and delivery process.

Table 1 Who should use this Design Standard?

Group	Members	Group's Roles
Consultants	▪ Sustainability consultants ▪ Architects/Interior Architects/Landscape Architects ▪ Engineers and specialist consultants ▪ Project Managers ▪ Education specialists ▪ NSW Government Agencies	▪ Guide planning and design. ▪ Understand the overall design strategies and ensure mandatory sustainability requirements are met. ▪ Understand Sustainability principles and how the design can demonstrate sustainability leadership and contribute to improved user experience, learning, and teaching. ▪ Collaborate with the TAFE NSW project team and TAFE NSW operations and end users throughout the design project ▪ Identify opportunities for innovation including but not limited to learning environments, industry partnerships and sustainable design. ▪ The project design team is to complete the sustainability checklists to demonstrate how the design complies with this Design Standard.
TAFE NSW Project Team	▪ Program Managers ▪ Design Managers ▪ Strategic Planning ▪ Procurement Group ▪ Sustainability Group ▪ Teaching & Learning Representatives ▪ Logistics ▪ Systems Group ▪ Safety & Security Group ▪ Physical Access Advisory Group ▪ Diversity & Inclusion Team ▪ Work Health & Safety ▪ Industry Partners	▪ Establish project requirements and define the project brief and scope based on project complexity and scale. ▪ Manage the delivery of the project including inputs from users, designers, consultants, contractors and end users throughout the life of project. ▪ Continually review the design and deliverables across multiple disciplines against the requirements of this Design Standard. ▪ Guide project stakeholders through the design development and facilitate collaboration with all stakeholders ▪ Ensure end of life waste is effectively managed including demolition waste. ▪ Identify materials and products for reuse/recycling
TAFE NSW Operations & End Users	▪ Teaching Staff ▪ Product Team ▪ Data Analysts ▪ Facilities Management ▪ TAFE NSW Digital Stakeholders ▪ Education Planning & Services Delivery ▪ Learner Experience Group ▪ Product Group ▪ Change Management Group ▪ Delivery Implementation & Performance ▪ Customer & Stakeholder Relations ▪ Learner Support Services	▪ Understand design principles and strategies & how the design can better support learning, teaching and user experience. ▪ Implement effective monitoring and reporting to demonstrate compliance. ▪ Monitor outcomes and ensure sustainability initiatives are effectively communicated with stakeholders. ▪ Embed sustainability leadership and practices within teaching activities ▪ Ensure that key sustainability learnings from projects are communicated to inform future projects.

1 Introduction

1.2 Audience

The table below broadly defines the diverse audience this Design Standard is written for and the roles they play through the design, selection and delivery process.

Table 1 Who should use this Design Standard?

Group	Members	Group's Roles
Contractors & Suppliers	▪ Construction Contractors and subcontractors ▪ Product suppliers	▪ Build the works in accordance with the design and this Design Standard. ▪ Provide advice to the project team regarding products or systems that comply with this Design Standard. ▪ To provide training to end users as to how to use and operate all spaces and systems.

1 Introduction

1.3 Standards & Documents

This Design Standard must be read in conjunction with:

- Statutory and legislative requirements
- Other TAFE NSW Design Standards, Principles, Policies and Procedures
- Contractual Agreement with TAFE NSW
- The Project Brief and relevant project requirements.

Where there is a conflict between this Design Standard and any statutory or legislative requirement, the higher standard applies.

The following standards and documents, as relevant to the project, should be read in conjunction with this Design Standard when considering the design, specification and procurement of capital works, refurbishments and fitouts and should also be used to inform maintenance programs and equipment replacements.

1.3.1 Statutory Requirements

- National Construction Code and referenced Australian Standards
- Disability Discrimination Act
- NSW Work Health & Safety legislation
- Applicable Statutory planning requirements

1.3.2 NSW Government Policy

- Government Resource Efficiency Policy 2019 (NSW Department of Planning and Environment)
- Net Zero Plan Stage 1: 2020–2030 (NSW Department of Planning and Environment)
- Better Placed - Integrated design policy for NSW (Government Architects NSW) 2017
- NSW Circular Economy Policy Statement – Too Good To Waste 2019
- NSW Waste and Sustainable Materials Strategy 2041
- NSW Electric Vehicle Strategy 2021
- NSW Climate Change Policy Framework 2016

1.3.3 External Certification Scheme

- Green Building Council of Australia (Green Star) and recognised certification schemes (e.g. GECA, AFRDI, GreenTag, etc.)
- International WELL Building Institute (IWBI) WELL Building Standard
- Climate Active Carbon Neutral Building Standard to enable certified net zero emissions to be achieved.
- External certification schemes such as Passivhaus, Living Building Challenge and LEED which may not be targeted for projects but can provide sustainability principles and targets for reference.

1 Introduction

1.3 Standards & Documents

1.3.4 TAFE NSW Overarching Policies

- Environmental Sustainability Policy
- Reconciliation Action Plan
- Diversity and Inclusion Policy
- Work Health and Safety Policy
- Disability Inclusion Action Plan and Implementation guide
-

1.3.5 TAFE NSW Interconnected Training Network Documents

- Interconnected Training Network Design Principles
- Interconnected Training Network Design Procedures
- Other Design Standards relevant to project.

1 Introduction

1.4 Definitions

The following terminology must be followed:

Mandatory/Must/Required:

Where the word “mandatory, "must" or "required” is used this indicates that a statement is mandatory and must be met by projects. Where a project is unable to meet the requirements due to site specific circumstances, a response outlining the reason/s why the requirements has not been met must be provided in the relevant Project Summary report (refer Section 2.3).

Recommended/Preferred/Should:

Where the word “recommended”, "preferred" or "should" is used this indicates that a statement is a recommendation but is preferred to improve sustainability outcomes. Where a project is unable to meet the requirements due to site specific circumstances, a response outlining the reason/s why the requirement has not been met must be provided in the relevant Project Summary report (refer Section 2.3). This will then be used to inform future projects and updates of this Design Standard.

1 Introduction

1.4 Definitions

Abbreviation	Definition
AS	Australian Standard
ATTMA	Air Tightness Testing & Measurement Association (ATTMA)
BCA	Building Code of Australia (as part of the National Construction Code)
EV	Electric Vehicle
GBCA	Green Building Council of Australia
GECA	Good Environmental Choice Australia
GHG	Greenhouse Gas
LEED	Leadership in Energy and Environmental Design
IWBI	International WELL Building Institute
JV3	Energy performance pathway of the National Construction Code (NCC) which compares a reference NCC building to the proposed design.
JV4	Air tightness performance pathway of the National Construction Code (NCC) to demonstrate the air permeability of a building or compartment following construction.
NABERS	National Building Energy Rating Scheme, managed by the NSW Department of Planning and Environment (DPE).
NCC	National Construction Code
PPM	Parts per million
PRG	Project Reference Group
PWG	Project Working Group
Section J	Energy efficiency section of the National Construction Code (NCC)
SSD	State Significant Design
this Design Standard	TAFE NSW Sustainable Design Standard
USGBC	U.S. Green Building Council

1 Introduction

1.5 Contractual Requirements

The contents of this Design Standard does not relieve any consultant, contractor or supplier from their contractual responsibility relevant to the project.

1.6 Queries

Any project specific queries are to be raised through the TAFE NSW Project Lead.

1.7 Continual Improvement

It is acknowledged that sustainability trends, initiatives and best practice outcomes are continually improving. This Design Standard will be subject to ongoing revisions, however project teams are responsible for bringing best practice and improved outcomes to the attention of the Project Lead.

Applications

2 Applications

2.1 How This Design Standard Applies

This Design Standard applies to all TAFE NSW capital works projects. Minimum compliance requirements are based on project category.

The Compliance Checklists specify the set of sustainability initiatives and rating tools for each category. A Project Summary reporting template will be provided to project teams to complete and confirm compliance against this Design Standard (Refer Section 2.3 below). Application of individual items are specified as follows:

- **Mandatory** means the project must comply with this item.
- **Recommended** means the project may be suitable for implementation of this item. Compliance is at the discretion of TAFE NSW. Investigation of the implications of compliance may be necessary. Where initiatives have been recommended but the project has not proceeded with the initiative, a short summary of how the project considered the recommendation must be provided in the Project Summary report . This will be used to inform future projects and updates to this Design Standard.
- **Not required** means the project is not required to comply with this item however should still be considered in the context of continual improvement and as designs and technologies improve.

2 Applications

2.2 Project Categories

The Project Categories are intended to ensure the sustainability requirements of this Design Standard are appropriate for the work being undertaken. The category thresholds are based on project type, construction cost and size.

Where a program of works may fund projects across multiple TAFE NSW locations, the aggregate construction cost or size may reach a threshold where the sustainability requirements are unsuitable for the type of project. In such instances, thresholds may be calculated for single facilities or individual locations, at the discretion of TAFE NSW.

The relationship of TAFE NSW capital works projects to the Project Categories are outlined in the table below.

Category	Threshold	TAFE NSW Project Types	Comments
Small	Construction cost: <$2M Size: <400m2	Minor Works Smaller-scale Major Works	Smaller refurbishments with reduced scope to undertake sustainability initiatives
Medium	Construction cost: $2M - $5M Size: 400m2 - 1,000m2	Medium-scale Major Works	Larger refurbishments and facility expansions with scope to undertake several sustainability initiatives
Large	Construction cost: >$5M Size: 1,000m2	Larger-scale major works Significant new buildings	Large-scale refurbishments and new buildings with scope to fully embed sustainability into the design and assist TAFE NSW in working towards net zero emissions
Precinct	By project type	Precinct developments New campus developments	Master plans, major projects that impact campus infrastructure (thermal plant, electricity, gas, water, access, etc.), and major capital works projects that incorporate multiple buildings or impact multiple areas on a campus.

2 Applications

2.3 Compliance Checklists

The following Compliance Checklists must be followed by all projects, with all mandatory requirements met and recommended initiatives considered. A Project Summary template will be provided to project teams and must be completed at each reporting milestone e.g., Concept Design Report (CDR), Schematic Design Report (SDR), and Detailed Design Report (DDR).

2.3.1 Rating Tools Checklist

The following rating tools must be used on projects based on the project type.

Rating tool	Small	Medium	Large	Precinct
Green Star Interiors (refurbishments)	**Recommended** Green Star Interior Rating recommended	**Mandatory** 6 Star Green Star Interior Rating for refurbishments	**Mandatory** 6 Star Green Star Interior Rating for refurbishments	**Not required**
Green Star Buildings	**Not required**	**Not required**	**Mandatory** 5 Star Green Star minimum **Recommended** 6 Star recommended for flagship developments	**Not required**
Green Star Communities	**Not required**	**Not required**	**Not required**	**Recommended** Minimum 5 Star Green Star Communities Rating for new campuses
WELL Building	**Not required**	**Not required**	**Recommended** Minimum WELL Gold, stretch target Platinum.	**Not required**
WELL Health Safety	**Not required**	**Recommended** All projects are to consider a WELL Health Safety rating if a WELL Building rating has not been pursued.		
WELL Communities	**Not required**	**Not required**	**Not required**	**Recommended** WELL Gold Community rating for new campuses

2 Applications

2.3 Compliance Checklists

2.3.1 Sustainability Initiatives Checklists

The following Compliance Checklists by project type must be used by all projects to ensure sustainability initiatives are incorporated on all projects based on the type and scale of project. Refer to Section 3 Technical Guidance for further information and detail on how to meet the mandatory and recommended initiatives.

Initiative	Small	Medium	Large	Precinct
ESD Scope/Consultant	**Mandatory** ESD in Designer/ Architect Scope	**Mandatory** ESD in Architect/ Engineer Scope Independent ESD consultant recommended	**Mandatory** Independent ESD consultant required	**Mandatory** Independent ESD consultant required
Net zero emissions plan (Refer Section 3.2.1)	**Not required**	**Recommended** for net zero transition planning	**Mandatory**	**Mandatory**
Climate change risk assessment undertaken (refer Section 3.4.2)	**Mandatory**	**Mandatory**	**Not required**	**Not required**
Climate Change Adaptation Plan in line with AS5334	**Not required**	**Not required**	**Mandatory**	**Mandatory**
Embodied carbon emissions: upfront emissions and Life Cycle Assessment (LCA) – GHG emissions reduction (Refer Section 3.5)	**Not required**	**Recommended** Embodied emissions analysis for adaptive reuse of buildings to demonstrate upfront emissions reduction	**Mandatory** GHG emissions reduction: 2022: >10% 2024: >15% 2026: >20%	**Mandatory** Scope to be developed as part of project brief. Must include concrete, asphalt and steel
Passive design (refer Section 3.6)	**Mandatory** When building envelope/fabric in scope External shading review undertaken + double glazing incorporated as a minimum.	**Mandatory** When building envelope/fabric in scope External shading review undertaken + double glazing incorporated as a minimum.	**Mandatory** Passive design to achieve 10% improvement in energy performance compared to reference NCC Section J building (demonstrated using JV3 intermediate modelling with DtS services)	**Mandatory** Master plans and campus designs to maximise northern orientation
Daylight and thermal comfort modelling in line with Green Star/WELL (refer Section 3.7)	**Not required**	**Mandatory** When building envelope/fabric is in scope and Section J triggered.	**Mandatory**	**Not required**
Energy modelling to optimise the design and improve performance (in line with JV3 Performance Solution compared to a DtS reference building) (Refer Section 3.8)	**Not required**	**Mandatory** When building envelope/fabric is in scope and Section J triggered.	**Mandatory** Section J Reference building, intermediate building (proposed fabric + DtS Services) and proposed building modelling required	**Not required**

2 Applications

2.3 Compliance Checklists

Initiative	Small	Medium	Large	Precinct
Energy efficiency improvement (above latest applicable version of the NCC or energy ratings in specifications) (Refer Section 3.8)	**Mandatory** Energy efficiency requirements in specifications met for lighting, HVAC and appliances	**Mandatory** >10% - Demonstrated JV3 modelling or comparison of DtS compared to proposed systems/services (e.g. lighting and air conditioning)	**Mandatory** Demonstrated with JV3 modelling 2022: 20% 2024: 30% 2025: Review NCC Update	**Not required**
Onsite renewable energy assessed to determine opportunity (Refer Section 3.8)	**Recommended** Incorporate if budget permits	**Mandatory**	**Mandatory**	**Mandatory**
Renewable electricity via onsite renewables compared to project energy demand (Refer Section 3.8)	**Not required**	**Recommended** Renewable energy to be reviewed against project scope and incorporated if budget permits. Aim to meet estimated energy demand with renewables.	**Mandatory** Install Solar PV to the maximum available roof area to offset the energy consumption of the facility.	**Mandatory** Install Solar PV to the maximum available roof area to offset the energy consumption of the precinct facilities.
All-electric designs (Refer Section 3.8)	**Recommended** Hot water and heating should be all-electric	**Mandatory** Heating, hot water and cooktops all-electric (excl. teaching related plant and equipment)	**Mandatory**	**Mandatory**
Energy metering (Refer Section 3.8)	**Not required**	**Mandatory** Per floor HVAC, lighting, power minimum	**Mandatory** • Mains supply • HVAC, lighting, power • Renewable energy • Per floor HVAC, lighting, power • Major energy consuming equipment >10% total energy load	**Mandatory** Campus energy and renewable energy and water metering to be implemented and metering strategy developed
Water metering	**Not required**	**Mandatory** Mains supply to refurbishment and end of trip (if applicable) minimum	**Mandatory** • Mains supply per building • Recycled water supply (if applicable) • Irrigation • End of trip • Major water consuming equipment >10% total water load	**Mandatory** Campus water metering to be implemented (potable and non-potable) and metering strategy developed

2 Applications

2.3 Compliance Checklists

Initiative	Small	Medium	Large	Precinct
CO_2 monitoring and automatic fresh air provisions for ventilation systems (Refer Section 3.7)	**Mandatory** Automatic fresh air provisions or alert to open windows acceptable	**Mandatory** When HVAC system upgrades in scope	**Mandatory**	**Not required**
Pandemic responsive HVAC design incl. 100% fresh air flush (Refer Section 3.7)	**Recommended** To be considered as part of HVAC design	**Mandatory** When HVAC system upgrades in scope	**Mandatory**	**Not required**
50% fresh air provision improvement over AS1668.2 (Refer Section 3.7)	**Not required**	**Mandatory** When HVAC system upgrades in scope	**Mandatory**	**Not required**
Increased air filtration to reduce air pollution (incl. bushfire smoke) (Refer Section 3.7)	**Not required**	**Mandatory** When HVAC system upgrades in scope	**Mandatory**	**Mandatory**
Air permeability testing in line with ATTMA/JV4 Target rate: $3m^3/m^2/hr$ @50 Pa. Maximum $5m^3/m^2/hr$ @50 Pa. (Refer Section 3.8)	**Not required**	**Recommended** When building envelope/fabric is and Section J triggered or whole floor/compartment in scope	**Mandatory**	**Not required**
Low/Zero GWP Refrigerants in line with specifications (Refer Appendix A Specifications)	**Mandatory** Lowest GWP possible	**Mandatory** Lowest possible/zero GWP	**Mandatory** Low/zero GWP + Consider offsetting	**Mandatory** Low/zero GWP + Consider offsetting
End of trip facilities (Bicycle racks, showers, lockers) (Refer Section 3.12)	**Not required**	**Recommended** Recommended for inclusion if no end of trip facilities available in the building or adjacent facilities	**Mandatory** Mandatory for metropolitan locations. Application to regional and rural locations on a case by case basis	**Mandatory** Mandatory for metropolitan locations. Application to regional and rural locations on a case by case basis

2 Applications

2.3 Compliance Checklists

Initiative	Small	Medium	Large	Precinct
15% potable water use reduction (Green Star Potable Water Calculator to be used) (Refer 3.9)	**Recommended** Met by achieving the water efficiency specifications in Appendix A	**Mandatory**	**Not required**	**Recommended** For outdoor water use supplied from rainwater tanks
30% potable water use reduction (Green Star Potable Water Calculator to be used) (Refer 3.9)	**Not required**	**Recommended** When project includes external works, landscaping and irrigation	**Mandatory** To be achieved by water efficiency initiatives and alternative water provision e.g. rainwater	**Recommended** For outdoor water use supplied from rainwater tanks
50% potable water use reduction (Green Star Potable Water Calculator to be used) (Refer 3.9)	**Not required**	**Recommended** When project includes external works, landscaping and irrigation AND building connected to alternative water	**Mandatory** When recycled water available/viable	**Recommended** When recycled water available/viable
Stormwater flows and pollutants limited to set thresholds (Refer 3.9)	**Not required**	**Not required**	**Mandatory** 40% Reduction in average stormwater discharge (ML/yr) Pollution Reduction Targets: • Total Suspended Solids: 85% • Gross Pollutants: 90% • Total Nitrogen: 45% • Total Phosphorus: 65%	**Mandatory** Refer Green Star Communities requirements
Construction and Demolition Waste Diversion (Refer 3.10)	**Mandatory**	**Mandatory**	**Mandatory**	**Mandatory**
Construction and Demolition Waste Management Plan (Refer 3.10)	**Not required**	**Mandatory** >80% landfill diversion	**Mandatory** Minimum 4 landfill diversion streams Landfill diversion: 2022: 80% 2024: 90% 2026: 95%	**Mandatory**

2 Applications

2.3 Compliance Checklists

Initiative	Small	Medium	Large	Precinct
Operational Waste Assessed and minimum 3 waste streams incorporated (Refer 3.10)	**Mandatory**	**Mandatory**	**Mandatory** Minimum 3 landfill diversion streams + 2 specialty waste streams (e.g. batteries, soft plastics, 10c deposit)	**Mandatory**
Operational Waste Management Plan with specialist waste streams (Refer 3.10)	**Not required**	**Mandatory**	**Mandatory**	**Mandatory**
Air quality testing to confirm VOC and formaldehyde levels (Refer 3.7)	**Not required**	**Recommended**	**Mandatory**	**Not required**
ESD Specifications (Refer Appendix A Specifications)	**Mandatory**	**Mandatory**	**Mandatory**	**Mandatory**
Built environment as a learning tool (Refer Section 3.13)	**Not required**	**Recommended** Refurbishments should incorporate options for the works to be used as a learning tool such as information on materials, energy monitoring displays, and passive design features	**Mandatory** New builds must incorporate options for the building to be used as a learning tool such as highlighting passive design features, energy/ solar PV monitor displays, exposed building services, and celebrating Connection to Country design input.	**Mandatory** Campus works must incorporate outdoor environment learning opportunities such rain gardens with information/signage, rainwater harvesting initiatives and EV charging information.

Technical Guidance

3 Technical Guidance

3.1 Overview

The following sections provide further information on the minimum sustainability standards and guidelines for projects including:

3.2 - Design strategies that should be used to guide all projects with the aim of working towards resilient, regenerative and net zero emission campuses and buildings.

3.3 - Rating tool guidance information and minimum credit score requirements.

3.4 - 3.13 Minimum standards and guidance on how to achieve the sustainability initiatives requirements in the Compliance Checklists and applicable Rating Tools.

The Compliance Checklists must be used by all projects to identify minimum requirements and a Project Summary completed to demonstrate compliance with these standards at key design report stages e.g., the Concept Design Report (CDR), Schematic Design Report (SDR) and Detailed Design Report (DDR).

3 Technical Guidance

3.2 Design Strategies

The following sustainability matrix by project type must be used by all projects to ensure sustainability initiatives are incorporated on all projects based on the type and scale of project.

3.2.1 Net Zero Emissions Transition

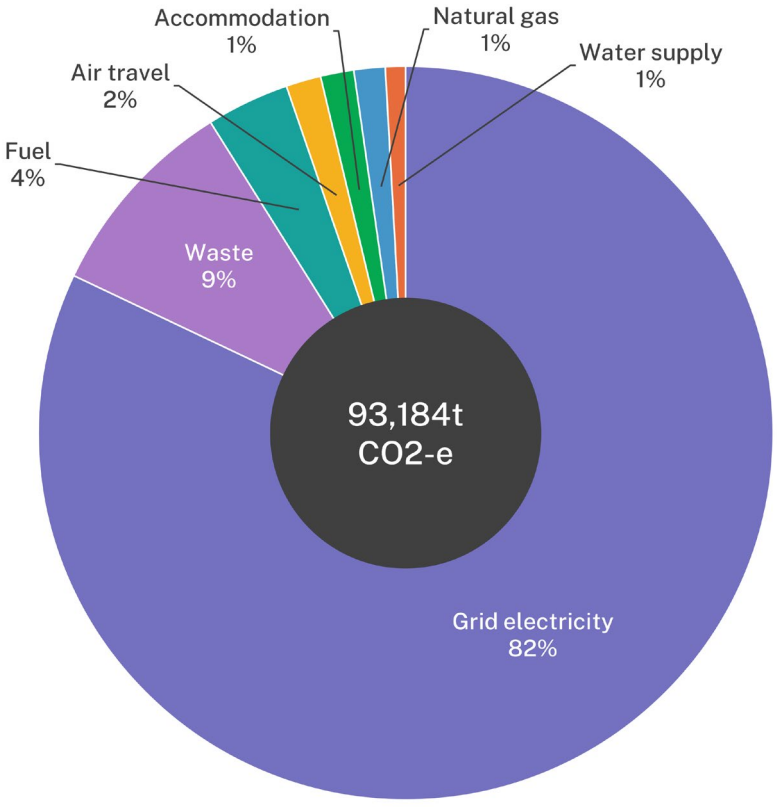
In line with the Net Zero Plan Stage 1: 2020-2030 and associated emission reduction targets, TAFE NSW is working towards reducing emissions across its operations to mitigate the impacts of climate change, while also improving resilience and reducing costs. This includes aiming to reduce greenhouse gas (GHG) emissions by 50% by 2030, and achieving net zero emissions prior to 2050.

In 2018/19 TAFE NSW emissions are as per the below summary and graph which is being used as a baseline to work towards net zero emissions. Electricity, transport fuel, waste, and natural gas contribute to 95% of TAFE NSW's emissions profile and as a result these emission sources are priorities for the Sustainable Design Standards.

In addition, and due to electricity consumption within buildings contributing to 82% of GHG emissions, improving energy efficiency and transitioning to renewable sources of electricity are key requirements of this Design Standard and are applicable to all project scales and types.

Key net zero emission initiatives include:

- Transitioning to 100% renewable energy supplies with a mixture of onsite and offsite generation.
- Supporting the transition to all-electric buildings and services to remove natural gas supplies.
- Maximising passive design, energy and water efficiency, and thermal performance of buildings and services.
- Reducing waste to landfill with effective waste separation.
- Supporting the transition to low and zero emission transport such as electric vehicles (EVs).
- Reducing embodied emissions and integrating sustainable and responsible building materials.



2018/19 Emissions Profile:

Emissions source	t CO2-e	%
Electricity	76,469	82%
Waste	8,412	9%
Fuel	3,401	4%
Air travel	1,432	2%
Accommodation	1,366	1%
Natural gas	1,279	1%
Water supply	825	1%
Total emissions	93,184	

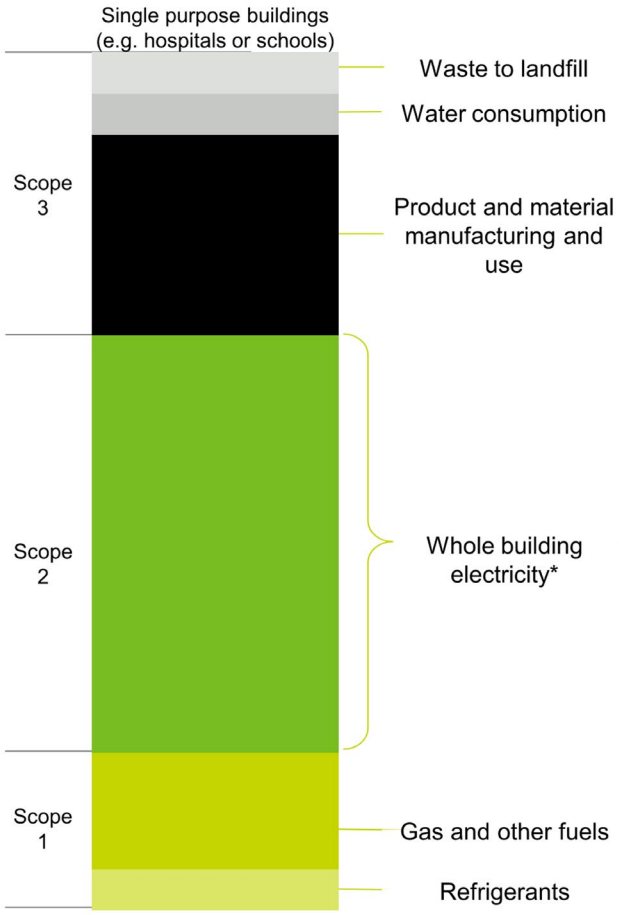
3 Technical Guidance

3.2 Design Strategies

3.2.1 Net Zero Emissions Transition

To ensure all buildings and facilities support a transition to net zero emissions, all projects must confirm how the building is being designed to reduce emissions and consider future trends.

The main emission sources associated with a typical building Australia are as follows:



Building emissions (Source - Green Building Council of Australia (GBCA))

All projects must complete the Compliance Checklists and confirm how the design is addressing these emission sources as follows:

- Refrigerants: Confirm that refrigerants have been specified with the lowest available Global Warming Potential (GWP) option at the time of tender/procurement in line with the Specifications (refer Appendix A).
- Gas and other fuels: Confirm that building services are all-electric and that gas and fuels such as diesel have only been included for teaching plant and equipment and emergency power provisions (refer Section 3.8).
- Electricity: Confirm that onsite renewables have been assessed and incorporated into the design to reduce electricity emissions (refer Section 3.8).
- Water: Confirm that water efficiency and conservation has been maximised to reduce potable water use, and alternative water supplies have been incorporated where viable (refer Section 3.9).
- Waste: Confirm construction and demolition (C&D) and operational waste to landfill diversion has been incorporated and waste targets met (refer Section 3.10).
- Embodied emissions: Confirm that embodied emissions have been reduced by incorporating recycled content and low emission products and materials in line with Section 3.5.

3 Technical Guidance

3.2 Design Strategies

3.2.2 Positive & Regenerative

A key strategy going beyond the net zero transition, as well as mitigating and adapting to a changing climate, is regenerative design. Regenerative design is an approach to the built environment that aims to go beyond minimising environmental impacts to having a positive environmental and social impact on the site, surrounding environment and natural ecosystems. This extends the net zero transition from simply reducing impacts and mitigating climate change, to having a net positive impact on the environment.

As TAFE NSW is teaching tomorrow's workforce and leaders, regenerative design is a key component of this Design Standard with initiatives incorporated that will support precincts, campuses and individual projects in restoring and regenerating the natural environment. Due to the varying project scales and types captured in this Design Standard, it is noted that some projects will be unable to create regenerative outcomes however all initiatives will work towards these outcomes.

Key regenerative design initiatives include:

- Designing for a changing climate, improving resilience and learning from the natural environment.
- Reducing GHG emissions as far as practical, while supporting the wider utility network and infrastructure in transitioning to low emission technologies. This includes both operational and embodied GHG emissions.
- Transitioning to a net positive outcome for energy, with onsite renewable energy maximised and a 100% renewable energy supply implemented for the remaining energy requirements.
- Aiming for a net positive impact on vegetation and tree canopy by integrating landscaping and plantings that improve biodiversity, soil conditions and habitats, This includes native and drought tolerant vegetation that reduces water use and considering xeriscaping to reduce or remove the need for ongoing irrigation in a changing climate.
- Maximising water conservation by being as water efficient as possible and capturing and using onsite water harvesting, with the aim of becoming net positive for water over time.
- Improving water quality and reducing sewer and stormwater pollutants discharged from the site or project.
- Minimising waste to landfill, both during construction and operation, aiming for 100% landfill waste diversion.
- Supporting a circular economy approach to selecting materials, products and services for each project.
- Improving the health and wellbeing of staff and learners, visitors and the community.
- Incorporating sustainability initiatives that support social outcomes including accessibility and equality.
- Encouraging innovation and the adoption of new technologies and practices that reduce environmental impact and support learning outcomes.

3 Technical Guidance

3.2 Design Strategies

3.2.3 CLIMATE RESILIENT CAMPUS & PEOPLE

Designing for climate resilience and adaptation is a key priority for TAFE NSW with buildings and facilities impacted by climate change including temperature increases, more variable and intense rainfall and increased fire weather. This Design Standard has incorporated climate change mitigation measures to improve resilience.

Key design initiatives include:

- Embedding climate change planning and adaptation into designs and maximising opportunities for projects to support the wider campus.
- Connecting and Designing with Country to reflect and share knowledge about the cultural and heritage significance of the area.
- Designing campuses that include joint use and community facilities that can be used by external entities and the public, with aim of increasing utilisation and supporting improved community outreach and engagement.
- Embedding sustainability into precinct planning, including shared approaches for energy, water, waste and transport infrastructure.
- Ensuring sustainability initiatives support health, wellbeing and accessibility for all staff and learners.
- Balancing environmental initiatives, such as energy efficiency, against health and wellbeing improvements such as improved indoor air quality which can increase energy consumption.
- Incorporating active and sustainable transport options into campus and project planning, including public transport networks and bicycle and pedestrian access.
- Celebrating and communicating sustainability initiatives (online, on campus and externally) and embedding sustainability outcomes in learning programs, such as design, construction and sustainability related courses.
- Ensuring access and safety is considered as part of campus wide initiatives, such as improved lighting and safe areas of respite.

3 Technical Guidance

3.3 Rating Tools Guidance

The following is a summary of each rating tool and their main principles and priorities.

3.3.1 Green Star

Green Star is a holistic green building rating tool managed by the Green Building Council of Australia (GBCA). The following rating tools are applicable to TAFE NSW:

Green Star Interiors

Green Star Buildings

Green Star Communities

Green Star Performance

To obtain a rating certificate, a Green Star submission needs to be prepared by a Green Star Accredited Professional (GSAP) based on a combination of As-Built documentation, modelling and compliance reports, and commissioning reports. The rating is available in two stages, with the first, 'Design Review ', being optional and available at approximately 70% design documentation stage, and the second, 'As-Built', being mandatory.

The rating is awarded in three categories, depending on how many credit points are achieved. The larger the number of points, the higher the rating, as follows:

15 points or more: 4 Star

35 points or more: 5 Star

70 points or more + net zero in operations: 6 Star

A minimum 5 Star Green Star rating is required for all new buildings.

3.3.2 Well Building

The WELL standards have been developed by the International WELL Building Institute (IWBI) which aims to improve the health and wellbeing of building occupants. Although aligned with sustainability rating tools, it does not focus on environmental sustainability or typical approaches such as emissions, energy and water efficiency. The rating tool focuses on both design and operation with the certification only achieved after an onsite independent verification audit. Depending on the project and rating pursued, the rating is typically split between 50-60% design related points (building and services) and 40-50% operational related points (policies, staff support, operational/maintenance requirements).

WELL can be readily integrated with a Green Star and provides a number of crosswalks where points are directly related or aligned. In line with Green Star, the WELL rating is awarded depending on the number of points achieved:

50-59 points: Silver

60-79 points: Gold

>80 points: Platinum

A WELL Gold rating is recommended for all new buildings.

3.3.3 Well Health-Safety

The WELL Health Safety rating was developed in response to COVID-19 and targets infection control and hygiene aspects of buildings, rather than the holistic health and wellbeing criteria of the full WELL tool. The Health Safety rating draws upon the features and categories of the WELL building tool and requires 15 of 21 features to be met to achieve the rating. Once achieved, a WELL Health Safety logo can be displayed on building entrances to demonstrate that the facilities are pandemic responsive.

A WELL Health Safety rating is recommended for all TAFE NSW buildings.

3 Technical Guidance

3.3 Rating Tools Guidance

The following is a summary of each rating tool and their main principles and priorities.

3.3.4 Climate Active Carbon Neutral

The Climate Active Carbon Neutral standards are an Australian Government initiative developed to enable organisations, precincts, buildings, events and products to gain a certified carbon neutral rating. There are two options for certification which can be considered with the Organisation standard applicable to TAFE NSW operations and the Building Standard applicable to individual buildings. The building standard has two pathways with a NABERS Energy rating or Green Star Building rating eligible for achieving carbon neutral certification when coupled with certified carbon offsets.

Climate Active Carbon Neutral certification should be considered for flagship/major capital works projects to demonstrate a commitment to net zero emissions.

3.3.5 Living Building Challenge

The Living Building Challenge is the green building tool developed by the Living Futures Institute, promoting buildings which are carbon neutral, self-sustaining for energy and water, and biodiversity positive. The Living Building Challenge provides a number of pathways including a core rating, petal ratings for specific initiatives such as net positive energy and full certification. The LBC standards should be referenced by projects and used to guide regenerative design options e.g. Net Positive Energy, Water and Waste.

Living Building Challenge certification should be considered for flagship/major capital works projects that aim to fully integrate regenerative design and aim to be net positive in operation.

3.3.6 Passivhaus

Passive house is a building standard with the focus on building performance to deliver a high level of thermal comfort and indoor air quality for building occupants for the entire lifetime of the building. As a result of the high thermal performance of the building and focus on indoor air quality, energy efficiency and low emission materials are achieved.

Passivhaus standards should be used to inform projects and certification considered flagship/major capital works that have a strong focus on indoor environmental quality and occupant comfort.

3.3.7 NABERS

The NABERS tool managed by the NSW Government on behalf of Federal, State and Territory Governments and includes separate tools for Energy, Water, Waste and Indoor Environment Quality. The main NABERS Ratings applicable to the TAFE NSW portfolio are the NABERS Energy and Water ratings which are commonly used for office buildings, with government buildings typically mandating a minimum 4.5 Star NABERS Energy rating.

The following NABERS equivalent ratings are recommended for projects which incorporate office spaces, with energy modelling used to demonstrate an equivalent rating.

> 1,000 sqm < 10,000 sqm Class 5 NLA

5 Star NABERS Energy (without GreenPower)

4 Star NABERS Water

> 10,000 sqm Class 5 NLA:

5.5 Star NABERS Energy (without GreenPower)

4 Star NABERS Water

3 Technical Guidance

3.4 Site & Climate

3.4.1 Site Design

To ensure the design of TAFE NSW buildings and facilities maximise sustainability, passive design, biodiversity and climate resilience opportunities, the following should be considered when redeveloping existing assets or selecting sites for major capital works projects.

Topic	Summary
Existing climate conditions and natural hazards	A review of the existing site climate and natural hazards should be undertaken including temperature, wind, rainfall, sun path, humidity, bushfire, and flood. These parameters should be used to inform the design of buildings and facilities, to identify existing risks and to use as a baseline for climate change risk assessments.
Climate change projections and impacts	A review of climate change projections should be undertaken to identify any potential climate change risks that may impact the project. As a minimum, climate change projections and risks in Section 3.2.2 must be reviewed and assessed for the project.
Biodiversity and habitat	An assessment of biodiversity and habitat should be undertaken to ensure projects do not impact areas with a high ecological value. Where sites have a high ecological value, projects must not significantly impact biodiversity and should aim to improve green infrastructure and habitat. This includes protecting and enhancing biodiversity such as waterways and nature corridors.
Utility services	A review of utility services should be undertaken to identify alternative supplies such as recycled water or harvested stormwater schemes. Natural gas is not preferred due to the increasing renewable energy generation in Australia and due to gas being a fossil fuel supply with unavoidable emissions associated with extraction and combustion. An exception is sites with an existing or planned 100% green hydrogen network.
Active and sustainable transport	Access to pedestrian, bicycle and public transport routes should be assessed, with designs aiming to support active and sustainable forms of transport to and from campuses. Access to nature, reserves and parks, health care services, sports and recreation, shops and community services should also be considered to support staff and learner health and wellbeing.
Noise	Noise from industry, adjacent properties and rail, road and air transport should be considered, with strategies developed to screen areas from noise sources to provide quieter spaces and areas of respite.
Site contamination and remediation	Site contamination should be considered, with the Environmental Protection Agency (EPA) websites used to confirm sites with potential ground and soil contamination. A hazardous material inspection should be undertaken by a qualified professional to confirm what hazardous materials are present including but not limited to asbestos, polychlorinated biphenyls (PCB), lead containing paints, lead containing dust, ozone depleting substances, stored hazardous materials (Chemicals) and above and below ground storage tanks. The inspection report should be provided to project teams and hazardous materials removed and/or remediated as part of projects. An additional inspection should also be undertaken following project completion to ensure all hazardous materials have been addressed appropriately.

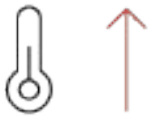
3 Technical Guidance

3.4 Site & Climate

3.4.2 Climate Change Projections

All projects should consider the existing climate and climate change projections to ensure the design adapts and is resilient to a changing climate and will provide efficient and resilient facilities that will support the health and wellbeing of staff, learners and the community.

The following general climate change projections and impacts for NSW must be assessed, with the Climate Change Toolkits will be provided by TAFE NSW based on the project location. The below is based on Adapt NSW resources and NARCliM 1.0 projections. The latest data and sources must be checked to ensure the below climate change projections and impacts are accurate.

Topic	Summary	Potential Impacts
Annual mean temperature increases 	Annual mean temperatures are projected to increase across all regions, impacting both minimum and maximum temperatures.	Increased cooling requirements and peak load Reduced heating requirements Reduced thermal comfort Increased irrigation Changes in plants suitable for the climate Increased likelihood of heat stress for staff, learners and visitors
More frequent periods of hot days and extreme heat 	The number of days above 35 degrees is projected to increase across all regions, with days above 40 degrees increasing in most regions.	Increased heat stress of staff and learners Increased likelihood of brown/black outs Increased cooling requirements and peak load Reduced outdoor environment amenity
Changes in annual rainfall 	Both increases and decreases in annual rainfall have been projected depending on the region.	Increased/decreased irrigation More variable rainfall requiring more active management of irrigation systems
Increased rainfall intensity 	Increased rainfall intensity has been projected across all regions, with increased temperatures increasing the capacity of the air to hold water.	Increased waterway flooding Increased likelihood of stormwater system overflow on site Increased peak stormwater discharge and erosion
Increased periods of drought 	Increased temperatures and changes in rainfall are expected to increase the frequency and period of droughts.	Increased irrigation and maintenance of outdoor areas Landscaping and plantings no longer suitable for the climate Loss of habitat and biodiversity
Increase in severe and extreme fire weather days 	Increased temperatures and changes in rainfall, wind and humidity are expected to increase average, severe and extreme fire weather days across all regions.	Increased frequency and severity of bushfires Direct bushfire damage to infrastructure Indirect bushfire impacts including smoke inundation and poor air quality

3 Technical Guidance

3.4 Site & Climate

3.4.2 Climate Change Projections

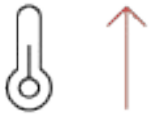
Topic	Summary	Potential Impacts
Sea level rise 	Sea level rise is projected across all coastal locations	Increased likelihood of tidal inundation Stranded assets in the far future
Synoptic systems 	General reduction in frequency but increase in intensity of tropical cyclones	Damage/loss of infrastructure Health and safety of staff and learners compromised
Wind 	Increase/decrease in wind speed depending on the location	Impacts on outdoor amenity Increased storm intensity
Humidity 	Increase/decrease in humidity depending on the location	Impacts on condensation and moisture within buildings
Solar radiation 	Increased solar radiation	Increased likelihood of sun exposure Increased solar PV generation Increased cooling demand

3 Technical Guidance

3.4 Site & Climate

3.4.3 Climate Change Adaptation

The following general climate change impacts and potential mitigation measures have been developed to guide projects on design responses to improve resilience. A Climate Change Assessment template will be provided to project teams to complete and are to be used for each project depending on the project type and scale.

Topic	Potential Impacts	Potential Mitigation Measures
Annual mean temperature increases 	Increased cooling requirements and peak load Reduced heating requirements Reduced thermal comfort Increased irrigation Changes in plants suitable for the climate Increased likelihood of heat stress for staff, learners and visitors	Improve thermal performance including passive design, insulation, and glazing Maximise energy efficiency to reduce consumption and demand Set HVAC design criteria for projected temperature increase Provide outdoor areas for respite (shaded areas, increased landscaping and tree canopy cover) Provide indoor air-conditioned areas for respite, including community access for vulnerable community members
More frequent periods of hot days and extreme heat 	Increased heat stress of staff and learners Increased likelihood of brown/black outs Increased cooling requirements and peak load Reduced outdoor environment amenity	As above
Changes in annual rainfall 	Increased/decreased irrigation More variable rainfall requiring more active management of irrigation systems	Design landscaping and select plantings to match projected rainfall Consider xeriscaping options to remove the need for irrigation Ensure rainwater harvesting takes into account changes in annual rainfall
Increased rainfall intensity 	Increased waterway flooding Increased likelihood of stormwater system overflow on site Increased peak stormwater discharge and erosion	Implement stormwater management plans that take into account increased intensity Design gutters and downpipes for increased intensity Finished floor levels to be based on projected flood levels Critical infrastructure to be elevated above flood levels and/or incorporate flood mitigation measures (e.g. water pumps)
Increased periods of drought 	Increased irrigation and maintenance of outdoor areas Landscaping and plantings no longer suitable for the climate Loss of habitat and biodiversity	Select native drought tolerant plants for landscaping Select native plants that improve habitat Install rainwater harvesting systems for non-potable use
Increase in severe and extreme fire weather days 	Increased frequency and severity of bushfires Direct bushfire damage to infrastructure Indirect bushfire impacts including smoke inundation and poor air quality	Increased Bushfire Attack Level (BAL) for at risk sites Increased requirements to "Build back better" following bushfires Increased air filtration to reduce smoke inundation impacts

3 Technical Guidance

3.4 Site & Climate

3.4.3 Climate Change Adaptation

Topic	Potential Impacts	Potential Mitigation Measures
Sea level rise 	Increased likelihood of tidal inundation Stranded assets in the far future	Assess sea level rise and tidal inundation risk to determine response
Synoptic systems 	Damage/loss of infrastructure Health and safety of staff and learners compromised	Increased standards in cyclone prone regions Implement improved emergency management processes Provide facilities for emergency access for the community
Wind 	Impacts on outdoor amenity Increased storm intensity	Design outdoor areas to protect from increased wind conditions Ensure planning for new buildings and campuses is cognisant of wind directions and intensity to avoid wind tunnels
Humidity 	Impacts on condensation and moisture within buildings	Ensure designs and building sealing factor in future humidity conditions
Solar radiation 	Increased likelihood of sun exposure Increased solar PV generation Increased cooling demand	Ensure appropriate shading (fixed and natural) is incorporated into outdoor areas Select light coloured (high solar reflectance index/SRI) materials (roofs and landscaping)

3 Technical Guidance

3.4 Site & Climate

3.4.4 Pollution Prevention

All developments must reduce pollution to the environment including waste from construction, soil and sediment runoff during construction, increased stormwater pollution and peak discharges from hard surfaces, and air quality and dust. These guidelines incorporate a number of these provisions for building designs and operations. The following is required to ensure pollution prevention is incorporated into construction practices:

- A project specific Environmental Management Plan (EMP) should be developed and implemented by the head contractor with monthly reporting completed. The EMP should include key topics applicable to the project such as erosion and sediment controls, waste management, noise, dust, vibration and pollution.
- For major projects over $5M, the head contractor must establish, implement, and maintain an accredited ISO 14001 Environmental Management System (EMS) for the duration of the Contract.

3 Technical Guidance

3.5 Embodied Carbon Emissions

Sustainable and responsible materials and products provide a range of benefits including reduced environmental impacts and supporting local industry and manufacturing. In addition, embodied carbon emissions in the built environment are a key component to working towards net zero emissions and all projects should aim to reduce embodied emissions by integrating low emission, sustainable and carbon neutral products and materials.

3.5.1 Life Cycle Assessment

Embodied carbon emissions in buildings are estimated to contribute over 15% of emissions over the buildings life, however as renewable energy increases and operating emissions reduce, embodied emissions will become one of the main emission sources.

To reduce embodied emissions, projects must consider the below sustainable and lower emission material options and demonstrate embodied emission reductions by undertaking a Life Cycle Assessment (LCA) aiming for a minimum 10% reduction compared to a reference building. The embodied emissions reduction requirements gradually improve (refer Compliance Checklists) as more products and materials enter the market and as operational emissions continue to reduce.

Key opportunities include:

- Avoiding the need for new buildings and facilities by adapting and reimagining spaces to provide flexible learning environments.
- Assessing project scope, location and future learning requirements to determine if a smaller more flexible design is more appropriate, reducing embodied emissions by using less to achieve more.
- Incorporating adaptive reuse and reusing buildings and materials in preference to building new.
- Optimising structural designs to reduce concrete and steel compared to a standard reference approach. For example, where efficiencies have been made to reduce concrete compared to minimum Australian Standards.
- Utilising offsite and prefabricated manufacturing to reduce material inputs and offcuts by standardising designs.
- Using recycled content in concrete, steel and asphalt. The main opportunities include recycled aggregate in concrete mixes, recycled steel in reinforcement bars and recycled plastic and glass in asphalt.
- Using lower emission materials such as green steel and concrete which improves manufacturing efficiencies.
- Integrating Cross Laminated Timber (CLT) or Glue Laminated Timber (GLT) to replace structural steel, and using recycled and responsible timber supplies for internal walls and fitouts.
- Using materials and products with an Environmental Product Declaration (EPD) demonstrating reduced environmental impacts and embodied emissions.

3 Technical Guidance

3.6 Passive Design

Passive design plays a critical role in ensuring buildings are efficient, resilient to a changing climate and have reduced reliance on mechanical systems such as heating, ventilation and air conditioning (HVAC) systems. All designs should create comfortable and healthy indoor environments, improve connection to nature and ensure efficiency is maximised to reduce operating costs and prolong the life of plant and equipment.

The following passive design initiatives will support good design outcomes, improve indoor environment quality, reduce capital costs associated with mechanical systems, and reduce operating costs.

Topic	Summary
Building orientation	Buildings will be orientated to the north as far as practical with the aim of maximising northern sun while minimising eastern and western exposure.
Thermal mass	Thermal mass will be used to maximise thermal performance. Solid to glazing ration will be optimised to maximise thermal performance while facilitating daylight, views to the outdoors and aesthetic design outcomes. Glazing ratio should not to exceed 70% of wall area to drive performance and can be achieved with insulated spandrels, increased solid elements and designing the facade for targeted views instead of full floor to ceiling glazing.
Eaves and shading	The sun path for the site is used to design appropriate shading which minimises direct sunlight to the east and west while allowing sunlight in winter. External shading is preferred over internal devices as the most effective way of controlling heat loads. Daylight modelling should be used for major developments to ensure a suitable balance between thermal performance and daylight provisions is achieved, while also managing glare.
Glazing	High performance glazing (double glazing) must be incorporated for all new building projects or projects which impact building envelopes and façades and replace glazing.
Increased insulation	External, internal and roof insulation levels should be greater than the National Construction Code (NCC) requirements (latest applicable version) and work towards a minimum 10% improvement over NCC Section J requirements.
Light coloured finishes and materials	All external finishes and materials, including hardscapes, should be selected with a light colour to reduce heat island effect and provide more comfortable and resilient outdoor areas.
Increased landscaping and vegetation	Outdoor areas should incorporate increased landscaping and vegetation to reduce heat island effect and provide outdoor areas which provide respite from extreme temperatures and conditions.
Natural ventilation	Natural ventilation (openable windows) should be incorporated to reduce mechanical ventilation requirements and/or provide a mixed mode solution dependent on the facility type and internal functions. CO_2 monitoring must be incorporated to modulate ventilation systems and maintain indoor environment quality or enable a notification so that operable windows can be opened. Cross ventilation (through openable windows on opposite sides of rooms/buildings) should be incorporated.
Daylight and views	Daylight will be maximised to reduce artificial lighting requirements while aligning with views to the outdoors to create a connection to nature.
Green roofs	Green roofs and walls should be considered to improve thermal performance while providing increased vegetation and views to the nature, reduced peak stormwater flow and pollutants and provide learning opportunities.

3 Technical Guidance

3.7 Health & Wellbeing

The health and wellbeing of TAFE NSW staff, learners, visitors and the community is core to the design and operation of facilities, with pandemic response and health and safety fundamental to the operational of facilities and services.

3.7.1 General Health and Wellbeing Provisions

The following general health and wellbeing measures will support improved indoor environment quality, improve productivity and cognitive function and provide more accessible spaces.

- Daylight and views to the outdoors are maximised with a minimum of 60% of the occupiable spaces to have a view to the outside.
- High quality internal lighting is specified which minimises glare, provides lighting variation and all lights in occupied areas must be flicker free. Green Star and WELL lighting strategies should be used based on the project and user requirements.
- Increased fresh air provisions are provided via operable windows and/or increased mechanical ventilation, aiming for a 50% improvement over AS1668.2 The use of mechanical ventilation and air-conditioning in buildings.
- Mechanical air filtration is designed to reduce external pollutants and improve indoor air quality, while balancing energy demand. Projects should assess indoor air quality requirements and increased filtration (MERV8-14) or allow for temporary filtration to respond to events such as bushfire smoke inundation or poor outdoor air quality.
- Indoor air quality is monitored with CO2 sensors in key occupied areas and alerts for windows to be opened (if applicable) or automatic increased mechanical fresh air provisions to be provided. Average indoor CO2 levels to be maintained at below 700ppm with demand controls for ventilation systems to reduce energy usage.
- Low volatile organic compound (VOC) and low formaldehyde materials should be specified (refer Appendix A).
- Active and sustainable transport (walking and riding) is maximised through the provisions of end of trip facilities (where appropriate) and by interconnecting with local public transport and car share networks.
- Quality landscaping is provided with direct easy access from staff and learner areas. Outdoor areas should focus on quality areas that provide respite and consider climate change projections.
- Indoor planting such as green walls and indoor plants should be considered for communal areas.
- Natural materials and finishes (wood, stone, etc.) and natural colour is integrated into the design.
- Cooling towers are not preferred with all-electric, air cooled systems recommended to reduce maintenance requirements, reduce the risk of legionella outbreaks, reduce water use and integrate with increasing onsite and offsite renewable energy systems.

3 Technical Guidance

3.7 Health & Wellbeing

3.7.2 Pandemic Responsive Design

The following should be considered as part of all designs to improve the ability for TAFE NSW to respond to pandemics which are expected to increase in frequency as a result of urbanisation, higher density cities, increased population and climate change.

Handwashing and sanitisation is integrated throughout the design including:

- Handwashing basins have sufficient space for effective handwashing (minimum 25cm water column for handwashing and minimum 23cm wide/deep basin).
- Liquid soap dispensers have sealed, disposable cartridges to reduce the likelihood of contamination.
- Paper towel is provided, with dedicated organics waste bin for disposal, OR touchless electric hand dryers are provided with HEPA filters.
- Sanitisation stations are provided as part of the fitout at building entrances and key locations to reduce standalone/ temporary stands.
- Automated shutoff times are set to support health department recommendations for handwashing.

HVAC systems are designed for ease of internal cleaning and have full flush capabilities:

- Avoid in-duct coils and filters
- Provide access panels at changes of direction
- All air diffusers to have removable cores
- Reduce flexible duct lengths as far as possible
- Incorporate 100% fresh air full flush provisions.

Consider contactless movement through the building, in particular publicly accessed areas and high touch surfaces. For example:

- Automatic doors
- Auto-flush toilets/urinals
- Automatic hand washing and drying systems
- The use of personal devices (swipe cards, smart phones, smart watches) for door activation, security lock activation, and lift car controls, instead of push buttons.

3 Technical Guidance

3.8 Energy

Energy efficiency is a key consideration for reducing energy consumption, emissions and operating costs and will support increased climate resilience and health and wellbeing outcomes for building occupants. New developments will exceed National Construction Code (NCC) Section J Energy Efficiency requirements with the aim of creating efficient and climate resilient buildings while reducing operating costs and emissions.

3.8.1 Energy Efficiency

The following energy efficiency initiatives will ensure energy consumption and emissions and minimised, reduce operating costs, and support onsite renewable energy.

- NCC Section J Energy Efficiency requirements should be exceeded by a minimum 10% without renewable energy integrated and based on good passive design. Performance is to be demonstrated when modelled in accordance with the Section J/JV3 methodology compared to a compliant deemed-to-satisfy (DtS) reference building and an intermediate building (proposed building fabric and DtS services).
- All major capital works projects should be all-electric and only incorporate gasses for specific learning environments such as laboratories, commercial kitchens or trade skills. This will take advantage of increasing renewable energy supplies in the electricity grid and onsite renewables while removing a fossil fuel supply (natural gas) . All heating, hot water, and cooking should be electric with the exception sites with an existing or planned 100% green hydrogen supply.
- Commercial kitchens should consider a split between gas and induction cooktops to ensure learners are exposed to both equipment types as induction cooking becomes more prevalent.
- Projects should undertake air permeability testing in line with the ATTMA Technical Standard L2 (TSL2) – Measuring Air Permeability of Building Envelopes (Non-Dwellings) and the NCC JV4 Building Envelope Sealing Performance Requirement. A target rate will need to be set for each project in line with the ATTMA and JV4 methodology, with a maximum rate of 5m3/hr/m2 at 50Pa achieved and a recommended stretch target of 3m3/hr/m2 at 50Pa set for projects.
- High efficiency HVAC systems which exceed minimum NCC requirements must be specified. Projects > 8,000 sqm NLA must utilise centralised CHW/HHW thermal plant, and all projects > 2,000 sqm must have centralised heat rejection at minimum. Air cooled systems are preferred to reduce maintenance requirements, reduce the risk of legionella outbreaks, reduce potable water use and integrate with renewable energy.
- All lighting must be LED with automatic controls (e.g., occupancy and daylight sensors, DALI 2.0 lighting control systems, timers) to reduce energy consumption.
- Comprehensive energy metering must be incorporated which will allow energy performance to be monitored and optimised. A display should be incorporated into building entrances to display performance.
- All appliances must be selected to maximise energy efficiency in line with the ESD Specifications (refer Appendix A).

3 Technical Guidance

3.8 Energy

3.8.2 Renewable Energy

Onsite and offsite renewable energy plays a key role in reducing GHG emissions and working towards net zero emissions. The following should be incorporated on all projects.

- Renewable energy (e.g. solar photovoltaic (PV) systems) should be incorporated into all projects to reduce operating costs and greenhouse gas (GHG) emissions. If renewable energy is excluded from the project due to project specific circumstances, the design should consider the integration of renewable energy in the future including rooftop orientation and safe roof access and appropriate locations and provisions for inverters and electrical infrastructure.
- Solar PV designs should be developed based on an assessment of the following:
- Available roof space, orientation, and shading
- Solar PV generation vs. estimated building/project demand with the system optimised for the facility's load and export limited
- Glare modelling is to be undertaken at sites located in airport control zones
- Solar PV must be installed to the maximum available roof area of the facilities to offset the energy consumption of the facilities. If the facilities have insufficient available roof area for Solar PV to offset the facilities' energy consumption, use alternative locations on campus for solar PV installation.
- Renewable energy must have a maximum 30% export to the grid, unless back-up power and battery storage provisions or large-scale electric vehicle (EV) charging systems are incorporated or planned for the facility.
- Battery storage provisions should be considered on a back-up power, resilience and financial basis, with sites that require back-up power provisions considering battery storage where cost effective.

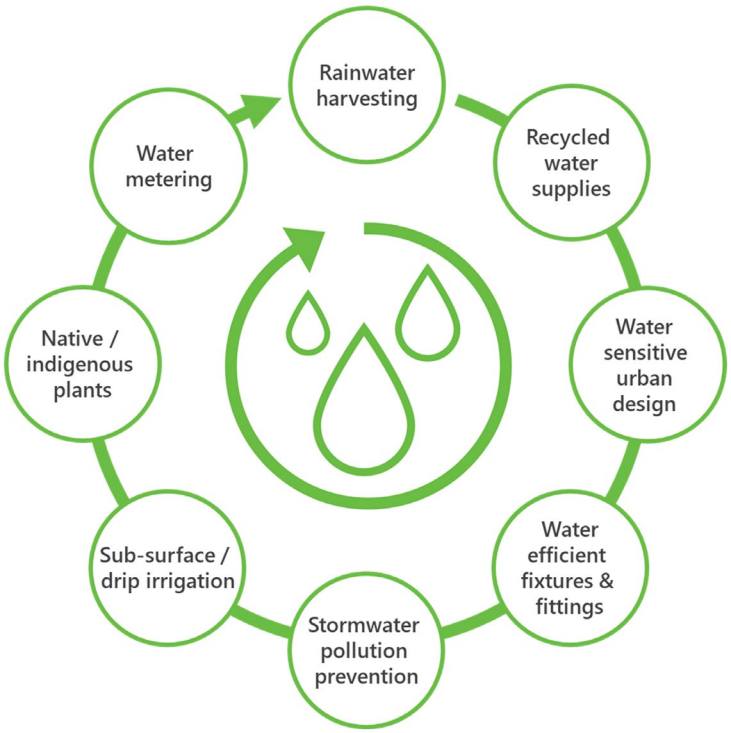
3 Technical Guidance

3.9 Water Conservation

It is critical that new buildings and facilities reduce water consumption and incorporate water conservation measures which improve climate resilience, reduce impacts on the environment and reduce operating costs.

The following initiatives will support water conservation and improve resilience.

- Water efficient fixtures, fittings and appliances are used, including high WELS ratings and automatic shutoffs (refer ESD specifications).
- Stormwater management systems limit peak discharge to pre-development levels and reduce stormwater pollution for Total Dissolved Solids (TDS).
- Water Sensitive Urban Design (WSUD) principles are used in the design of landscaping and outdoors areas, including green roofs, with opportunities to integrate with Local Council initiatives (e.g. raingardens or stormwater harvesting schemes) considered.
- Alternative water supply availability is assessed for non-potable water use including rainwater, harvested stormwater schemes (e.g. Aquifer Storage and Recovery (ASR) networks), bore water and recycled water networks. An analysis of the following should be undertaken by the design team to confirm alternative water supply provision in projects:
- Local climate data and climate change projections (for rainwater harvesting) and water availability (capacity of the network to supply water).
- Water quality and suitable non-potable water uses including irrigation, toilets, washdown, and cooling tower reuse.
- Costs to extend alternative water networks, install a dual non-potable water supply and to maintain the supply including any filtration and maintenance/inspection requirements.
- Consumption reduction (kL/ML) and payback when compared to mains water.
- The Green Star Water Calculator can be used to demonstrate potable water use reduction.
- Where rainwater harvesting and reuse is identified it is recommended irrigation is the main non-potable use to reduce dual water infrastructure, pumping, treatment, and maintenance costs.
- Landscaping and planting should prefer local indigenous and drought resistant plants which require minimal to no irrigation beyond establishment.
- Irrigation systems should be high efficiency sub-surface/drip irrigation systems to reduce water consumption and be connected to non-potable water supplies (rainwater/recycled water) where available.
- Water metering should monitor mains water, recycled water (non-potable), irrigation and any major water consuming appliances or equipment (>10% of total facility consumption) as a minimum.



3 Technical Guidance

3.10 Waste & Resources

Waste and resources, both during the construction of buildings and during operations, are a significant source of emissions and have a high environmental impact when not managed appropriately.

The following waste and resource management initiatives will support projects in reducing waste to landfill.

- Construction and demolition waste to landfill should be minimised, with projects aiming to meet a minimum 80% landfill diversion with increasing rates applied to various project scales and locations. A minimum 4 waste streams are to be separately tracked to demonstrate landfill diversion. Metropolitan projects should aim for a minimum 90% diversion with an assessment of local waste processing facilities undertaken.
- As a minimum, designs should allow for landfill, recycling and organic waste streams with appropriate signage and waste storage areas provided (refer below summary of typical waste streams).
- Cleaning contracts must include requirements for maintaining waste separation and disposal in the correct bin.
- Additional specialist waste streams should be allowed for depending on the project type, including soft plastics, 10c container deposit, batteries, printer cartridges, fluorescent globes, medical and hazardous waste. A minimum of 2 specialist waste streams should be provided.
- An Operational Waste Management Plan (WMP) must be developed for larger developments and facilities with specialist waste streams. Smaller projects such as minor fitouts and refurbishments should consider developing a WMP to clearly capture the above requirements and communicate waste management requirements.

Waste stream bins as below must be in accessible locations on each floor level.

- Facility occupants (staff and learners) are responsible for disposing of waste in appropriate bins.
- Cleaners are responsible for transferring bin contents to waste storage areas and maintaining separation.

Landfill	Co-mingled recycling	Paper/cardboard recycling	Organics
Non-recyclable packaging Plastic bags unsuitable for soft plastic recycling	Glass bottles & jars Aluminium cans Steel & tin cans Plastic bottles and containers	Newspapers & magazines Office paper Cardboard boxes Shredded paper Envelopes	Food scraps Fruit, vegetables, meat & dairy Tea bags & coffee grounds Tissues and paper towels
40-60L bins Red lid and signage	40-60L bins Yellow lid and signage	40-60L bins Blue lid and signage	25-40L bins Green lid and signage

3 Technical Guidance

3.11 Sustainable Materials & Products

Sustainable and responsible materials and products provide a range of benefits including reduced environmental impacts and supporting local industry and manufacturing. In addition, embodied emissions in the built environment are a key component to working towards net zero emissions and all projects should aim to reduce embodied emissions by integrating low emission, sustainable and carbon neutral products and materials.

3.11.1 Sustainable Materials

The following sustainable material options must be incorporated:

- Recycled content and aggregate substitutes must be investigated where suitable to minimise resource use e.g. concrete (fly ash or slag replacement), low carbon/carbon neutral concrete, and recycled plastics in asphalt.
- Materials and products with recycled and/or reused content are preferred in specifications.
- Reusing furniture and materials as part of fitouts and refurbishments to reduce the purchase of new FF&E.
- Ethical and responsible materials and products should be preferred, with a focus on local and Australian made products.
- All paints, adhesives and sealants, flooring, wall and ceiling coverings should be selected for low toxicity (low Volatile Organic Compounds, or VOC's) and low formaldehyde.
- Timber should be from post-consumer reused timber or from recognised forest certification schemes (FSC or PEFC certified).
- Steel should be sourced from a Responsible Steel Maker with ISO 14001 accreditation.
- Cables, pipes, flooring, and blinds should be either PVC free or meet the Best Practice guidelines for PVC.
- Wherever practicable, source all products, materials and trade labour as per the following hierarchy:
- First priority: Local businesses with local manufacturing/assembly and locally sourced materials.
- Second Priority: Australian businesses with local manufacturing/assembly and locally sourced materials.
- Third Priority: Materials sourced from the Asia-Pacific Region.
- Refer to Appendix A for detailed specifications.

3 Technical Guidance

3.12 Sustainable Transport

Sustainable and active forms of transport to, from and within sites are a key priority to improve health and wellbeing, reduce emissions and support a transition to net zero emissions.

3.12.1 Electric Vehicle Charging Infrastructure

In line with the Electric Vehicle Strategy, NSW Government fleets have a target to transition 50% of fleet vehicles to electric vehicles (EVs) by 2026 and 100% EVs by 2030. To support this, EV charging infrastructure will be required and all new projects and major refurbishments that incorporate car parks should provide the following minimum provisions to support this transition.

Refer to the TAFE NSW Electric Vehicle Charging Design Standard for further requirements.

3.12.2 End of Trip Facilities

To support staff, learners and the community in using sustainable and active methods of travel to and from TAFE NSW campuses, end of trip facilities must be provided for:

- Large and Precinct category projects
- Medium category projects where NCC compliance upgrades are triggered at metropolitan locations, in accordance with the metrics below. Application to regional and rural locations shall be on a case by case basis.

The below can be achieved either with individual buildings providing facilities for the number of building occupants; or shared end of trip facilities being provided across the relevant precinct.

Item	Staff 1-100 FTE	Staff >100 FTE	Learners
Bicycle racks	Covered secure storage with racks for 5% of FTE staff	Internal secure storage with racks for 5% of FTE staff	Covered racks for 2.5% of learners
Lockers	1 per bicycle rack	1 per bicycle rack	N/A
Changeroom and showers	1	1 per the first 100 FTE staff, plus 1 per each additional 150 FTE staff	N/A

- Bicycle storage and racks must be in well lit locations with passive surveillance.
- Secure bicycle storage must include 1 accessible GPO per 5 racks for electric bicycle charging.
- Where authority requirements are triggered and conflict with the above, the more onerous requirements shall be applied.
- Changerooms and showers may be colocated with facility toilets, but must have dedicated changing space separate to toilet cubicles and urinal areas.
- The above are minimum requirements. Additional facilities may be required if Green Star sustainable transport credits are targeted for a project.

3 Technical Guidance

3.13 Built Environment as a Learning Tool

The built environment can be used as a learning tool to demonstrate sustainability initiatives and inform occupants and the community on climate change and emission reduction initiatives. With TAFE NSW providing a number of education programs that relate to the built environment, projects should aim to celebrate sustainability within the built environment and provide real examples of how learners can create positive outcomes.

3.13.1 Buildings as a Learning Tool

Buildings can provide a number of learning opportunities including:

- Connection to Country design journey and key inputs such as local Indigenous heritage, materials, landscaping and plantings.
- Building orientation, façades and thermal mass is used to communicate passive design outcomes and celebrate built elements (e.g. exposed thermal mass such as concrete floors). Designs should clearly respond to the local climate and site and demonstrate smart design outcomes.
- Indoor environment quality displays that show air quality such as CO2, VOCs and formaldehyde (e.g. green, amber, red for indoor air quality), acoustics, and light quality.
- Dematerialisation with off-site prefabrication, simplified designs and designing for disassembly to reduce material use and avoiding waste to landfill.
- Energy, renewable energy, water, waste, and emission monitoring displays to show building performance and emission reduction outcomes.
- Exposed services (electrical, mechanical, plumbing) to demonstrate how the building operates. This includes rainwater/alternative water supplies to show the reduction in mains water consumption. Where exposed services are proposed, acoustic design experts should be consulted.
- Signage highlighting key sustainability initiatives or outcomes from rating tool certifications (e.g. Green Star or WELL rating)
-

3.14.2 Campus as a Learning Tool

TAFE NSW campuses can provide a number of learning opportunities including:

Water Sensitive Urban Design (WSUD) initiatives can be highlighted with signage and information explaining how the initiatives are improving water quality, stormwater flows and reducing water consumption.

Increased landscaping and plantings can be celebrated with signage and information on the plantings (e.g. species tags on plantings) to highlight native, drought resistant plantings.

Rainwater harvesting or alternative water supplies can be highlighted with information provided on mains water consumption reduction outcomes.

Total campus energy, renewable energy, water, waste, and emission monitoring displays to show performance and emission reduction outcomes.

Electric Vehicle (EV) charging stations with signage and information incorporated on emission reduction outcomes achieved by transitioning to EVs.

Appendix A

A. Specifications

Sustainability Specifications

This Sustainability Specification is to be used by project teams for new building and refurbishment projects, where appropriate.

VOC Levels in Paints, Sealants and Adhesives

All internally applied paint, adhesive and sealant products must not exceed the following TVOC limits:

Product Type	Maximum VOC Content (g/litre)
General Purpose adhesives*	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

- *Most adhesives and sealants are addressed in the 'General purpose adhesives and sealants' category of the table above, unless they clearly belong in the other specialised product categories.

- Lead Content in Paints
- Industrial surface paints and coatings shall not contain lead nor lead components.

- VOC Levels in Carpets
- All carpets shall comply with the Total VOC limits specified in the table below.

Test protocol	Maximum VOC Content (g/litre)
ASTM D5116 – Total VOC limit	0.5 mg/m^2 per hour
ASTM D5116 – 4 – PC (4-Phenylcyclohexene)	0.05 mg/m^2 per hour
ISO 16000/EN 13419 – TVOC at three days	0.5 mg/m^2 per hour
ISO 10580/ISO/TC 219 (Document N238) – TVOC at 24 hours	0.5 mg/m^2 per hour

Composite Wood Products

All engineered wood products shall have formaldehyde emissions that meet the E0 levels shown in the table below.

Provide certification of the quantities of all engineered wood products delivered to site, and manufacturer/ supplier certification to demonstrate compliance with the specified emissions limits.

Timber

At least 95% (by cost) of all timber used in the building and construction works shall be certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification, such as Australian Forest Standard (AFS) or Forest Stewardship Council (FSC); or is from a reused source; or is sourced from a combination of both.

Any certified timber used in the project shall be supplied in accordance with the Chain of Custody (CoC) rules of the respective forest certification scheme (e.g. relevant CoC certificates or invoices including a relevant CoC code or serial number).

Steel

At minimum of 95% of all steel used must be from a Responsible Steel Maker with ISO 14001 Accreditation.

For reinforcing steel, at least 60% of all reinforcing bar and mesh shall be produced using energy-reducing processes in its manufacture (measured by average mass by steel maker annually). Reinforcing steel includes reinforcing bar and mesh used in concrete reinforcement in the building structure. This includes steel in situ, stressed, and pre-cast concrete applications.

Concrete

At least 30% of the concrete in the Portland cement used in the project should be reduced by replacing concrete with substitute materials such as fly ash, recycled aggregate, hemp (hempcrete), or wood chips (durisol).

The reduction will be measured by mass across all concrete used in the project compared to the reference case.

PVC

At least 90% of all common uses of PVC in the project shall be either PVC products sourced from manufacturers which meet the Best Practice Guidelines for PVC in the Built Environment; OR are products that do not contain PVC.

Common uses of PVC products for this project include cables, pipes, flooring, and blinds.

Best Practice PVC products and suppliers can be found via the BEP PVC Product Registry: http://www.vinyl.org.au/bep-pvc-product-registry

A. Specifications

Sustainability Specifications

Insulation

All insulation used shall have an Ozone Depleting Potential (ODP) of zero in both its manufacture and composition. Insulation covers building services (i.e. refrigerant pipe work, ductwork, hot & cold-water pipes, water tanks, etc.) and building fabric including; walls, roofs, floor, window frames, doors, cavity closures and lintels.

Product Certification

All products and materials used in construction shall be selected in accordance with the following requirements.

Third Party Certification

Preference shall be given to the selection of construction materials which have a third-party green certification.

The following products as a minimum shall be selected to have a third-party green certification:

- Internal blinds
- Flooring
- Carpets

These products shall be certified in accordance with one of the certification schemes assessed against the GBCA Framework for Product Certification:

- Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS) v1.2
- Ecospecifier GreenTag GreenRate v3.2
- Australasian Furnishing Research and Development Institute, Sustainability Standard for Commercial Furniture - AFRDI Standard 150
- Good Environmental Choice Australia (GECA), including six standards

Environmental Product Declarations (EPD)

Preference shall be given to the selection of construction materials which have an Environmental Product Declaration (EPD) certified in accordance with ISO 14025.

The following products as a minimum shall be selected to have a certified EPD:

- Internally applied paints
- Plasterboard

The manufacturer of the products shall have an EPD for the product/material certified in accordance with ISO 14025 and published on the EPD website.

Product Stewardship

Preference shall be given to the selection of construction materials where the manufacturer of the products provides a contractual agreement to take back the product at the end of its service life for reuse, recycling or reprocessing.

Recycled Content

Preference shall be given to the selection of construction materials which are recycled or have a recycled content. Post-consumer recycled content is preferred. These may include:

- Steel products
- Timber products
- Carpets
- Insulation
- Concrete and aggregates

Furniture

Purchasing of internal furniture must be through selection of low emission internal finishes and furniture. Where furniture is replaced, it shall have an approved Eco-Rating which may include:

- Good Environmental Choice Australia (GECA)
- Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS) v1.2
- Ecospecifier GreenTag GreenRate v3.1
- Australasian Furnishing Research and Development Institute, Sustainability Standard for Commercial Furniture - AFRDI Standard 150
- The Institute for Market Transformation to Sustainability (MTS) Sustainable Materials Rating Technology standard version 4.0 - SMaRT 4.0

Alternatively and where an approved Eco-Rating is not in place, the supplier must be able to document compliance with the following:

- Eco Preferred Content >20% by mass
- Durability >15 Years
- Product Stewardship Commitment
- ISO 14001:2004 certified manufacturing process covering waste minimisation, energy, emissions and waste minimisation.
- Modular in Design
- Designed for disassembly

Refrigerant

Refrigerants must be selected based on the lowest available Global Warming Potential (GWP) at the time of tender/procurement. The following maximum GWP limits must be met:

- **Chillers:** GWP <10
- **Air to water heat pumps:** GWP <50
- **Reverse-cycle DX – VRF systems:**
  - <50kWr: GWP <700
  - >50kWr: GWP <10
- **Reverse-cycle DX – packaged systems:**
  - <50kWr: GWP <700
  - >50kWr: GWP <10

All refrigerants must have an Ozone Depleting Potential (ODP) of zero. Do not use CFCs and HCFCs. Use natural refrigerants where available

A. Specifications

Sustainability Specifications

Lighting

Lighting has a lumen efficiency of >120 lumens per watt.

All lights are flicker free.

All lighting systems shall be provided with daylight control and the ability to independently switch lighting in zones no larger than 100sqm in area.

Preference shall be given to the use of LED light sources. Under no circumstances will the use of tungsten filament or halogen light sources be permitted.

The lighting design must accurately address the perception of colour in the space. The project team shall support their justification by ensuring their selection complies with the guidance provided in Table 7.2 in AS 1680.1:2006.

Lighting levels must be appropriate to the tasks performed in the space. For office spaces, this should be in accordance with Table 3.1 of AS1680.2. For other workspaces not covered by office spaces, this should be in accordance with Table 3.1 of AS1680.1.

All lighting systems shall be provided with daylight and/or occupancy sensors.

HVAC

All HVAC system compressors shall have a minimum Coefficient of Performance (COP) of 3.7 and a minimum Energy Efficiency Ratio (EER) of 3.24.

All split air conditioning units shall have the highest available energy star rating at the time of purchase.

All refrigerants used in the project are to have an Ozone Depletion Potential (ODP) of zero.

All ducted air conditioning systems shall include an automatically controlled economy cycle allowing additional outside air to be used for free cooling when ambient conditions allow.

All existing ductwork proposed for re-use shall be inspected and thoroughly cleaned of all dust and debris prior to re-commissioning.

Consideration must be given to the use of widened temperature set points, and alternative temperature set points in summer and winter seasons in order to reduce the size of HVAC plant required, and to reduce associated ongoing energy consumption.

Metering and Monitoring

Appropriate metering must be installed on all new buildings and where possible in refurbishment works, to enable energy and water use to be monitored.

In a building with a large floor plate, energy meters should be provided separately for lighting consumption, and other power consumption.

Any items with an energy use greater than 20kVA should be separately metered.

Appliances/Equipment

All energy consuming appliances and equipment (e.g. fridges, TVs, and computers) shall be selected to have the highest available rating under the Australian Government's "Energy Rating" labelling system at the time of purchase.

Appliance	Minimum Energy Star Rating
Bar Fridge	Not preferred – Minimum 2.0 Star if no other option
Clothes Dryers	7.0 Star – Heat pump dryers only
Refrigerators	4 Star
Freezers	3.5 Star
Dishwashers	3.5 Star
Television	4.0 Star (Tier2)
Commercial Clothes Washing Machines	4 Star
Household Clothes Washing Machines	3.5 Star

Water Fixtures

All fixtures and fittings installed to have the following minimum water efficiencies, as measured using AS/NZS6400:2005 Water-efficient products-Rating and labelling:

Appliance	Minimum Water Star Rating
Toilets	4.0 WELS
Urinals	5.0 WELS
Taps	5.0 WELS
Showers	3.0 WELS
Dishwashers	4.0 WELS
Household Clothes Washing Machines	4.0 WELS
Clothes Washing Machines	4.5 WELS
Household Clothes Washing Machines	3.5 Star

TAFE Infrastructure NSW
Level 2, Building A, 1 Mary Ann Street,
Ultimo NSW 2007
PO BOX 707, Broadway NSW 2007
02 9338 6600
tafensw.edu.au