

***Sustainability Rating Tool
for Higher Educational
Facilities in Australia***

 **UniRate**

Chenguang Fu	5080126
Connie Steers	5112343
Erin Gonthier	3461344
Hannah Hungers	5058598
Xiaowen Dai	5124840
Yusi Li	5106504
Yuwei Wang	5105032

CONTENTS

ABOUT	5
CATEGORIES	6
SCORECARD	7
RATING	8
PROCESS	9
CREDITS & CRITERIA	10
MATERIALITY & RESOURCES	11
ENERGY	15
SUSTAINABLE SITES	19
LOCATION & TRANSPORTATION	23
WATER EFFICIENCY	26
INDOOR ENVIRONMENTAL QUALITY	30
INNOVATION	34
CONCLUSION	37
REFERENCES	38



“

A green building incorporates design, construction and operational practices that significantly reduce or eliminate its negative impact on the environment and its occupants. Building green is an opportunity to use resources efficiently while creating healthier environments for people to live and work in. Green buildings can also significantly reduce construction and performance costs.

GBCA (2016)

”



ABOUT

UniRate is specifically equipped to rate individual buildings and is more appropriate than any other currently available rating tool in that UniRate will further emphasise social sustainability, transportation, location and site sustainability which are key to university buildings and generally less prioritised on other types of sites.

We maintain the arguments put forward by Johnston, Everard, Santillo and Rob ert (2007) in that "a sustainable building must eliminate contribution to the following:

- The concentrations of materials extracted from the Earth's crust
- Systematic increases in concentrations of substances produced by society
- Systematic physical degradation of nature
- Conditions that systematically undermine people's ability to meet their needs."

Additionally, to perform at the highest level, the building must also perform in a restorative way, which encourages the regeneration and healing of the natural environment as in the strategies outlined by David Baggs (2010) as well as contributing to ethically responsible social structures which do not discriminate or inhibit members of society to participate to their maximum individual ability, and encourages them to do so.

UniRate specifically applies to new university buildings within Australia and scores will be applied across a range of circumstances to consider the project through design, construction and predicted operation phases (as 3 separate achievable ratings). Ratings on new buildings last for 5 years before the building is required to be assessed against actual performance to maintain a rating.

As thought leaders in society, universities and tertiary institutions have a unique position and opportunity to become industry leaders in this area and should be held to a higher standard. It will be introduced as a mandatory tool for new construction in Higher Education campuses, assisting in the identification of ethical and sustainable practises and standards within each institution.

Older buildings may be submitted for operational rating on a voluntary basis, although this will be considered best practise as a campus rating scheme will be made available once 75% of buildings on a particular campus have been rated. This will be an evenly distributed average of each buildings' rating 'report card', as well as considering further requirements to be developed, such as site movement and safety.

CATEGORIES

GOALS ARE PROVIDED FOR EACH CREDIT, TO ENSURE THE DIRECTION OF THE BUILDING FOLLOWS THE OVERALL AIMS OF THE RATING SCHEME. IN THE ABSENCE OF AWARDING POINTS, IF THE CREDIT AIM HAVE BEEN ACHIEVED THERE IS A POSSIBILITY OF OBTAINING FURTHER POINTS THROUGH THE INNOVATION CATEGORY.



ENERGY



**SUSTAINABLE
SITES**



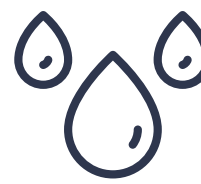
**INDOOR
ENVIRONMENT
QUALITY**



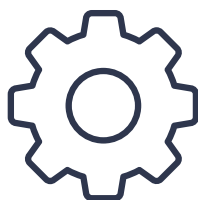
**MATERIALS &
RESOURCES**



**LOCATION &
TRANSPORTATION**



**WATER
EFFICIENCY**



INNOVATION

SCORECARD

CATEGORY	CRITERIA	POINTS	TOTAL
MATERIALS & RESOURCES	Building life- cycle impact reduction	6	15
	Building product disclosure and optimisation	2	
	Construction demolition and waste management	2	
	Local materials	3	
	Safety of materials and resources	2	
ENERGY USE	Multiple Stages' Energy Auditing	6	20
	Saving Energy Design	9	
	General Energy Consumption Data Comparison	5	
SUSTAINABLE SITES	Sustainable sites	6	18
	Land use & ecology	8	
	Adaptability	4	
LOCATION & TRANSPORT	Location	4	10
	Transportation	6	
WATER EFFICIENCY	Outdoor water use reduction	2	9
	Indoor water use reduction	5	
	Specialised water use reduction	1	
	Metering	1	
INDOOR ENVIRONMENTAL QUALITY	Enhanced indoor air quality	4	18
	Acoustic comfort	2	
	Indoor pollutants	2	
	Lighting comfort	4	
	Thermal comfort	2	
	Visual comfort	4	
INNOVATION	Innovative Practice	4	10
	Exceeding Credit Benchmarks	3	
	Industry Excellence	3	
TOTAL		100	

RATING

THIS TOOL WILL RATE PROJECTS ACROSS 7 CATEGORIES, EACH WITH SUBCATEGORIES THAT WILL TOTAL 100 POINTS FOR ONE OF 5 LEVELS OF CERTIFICATION



90-100



80-89



70-79



60-69



50-59

PROCESS

ELIGIBLE BUILDINGS

Eligible buildings will meet the minimum requirements for each category including:

- Sustainable sites
- Baseline water consumption
- Provision of fresh (outdoor) air
- Artificial lighting quality

FEES

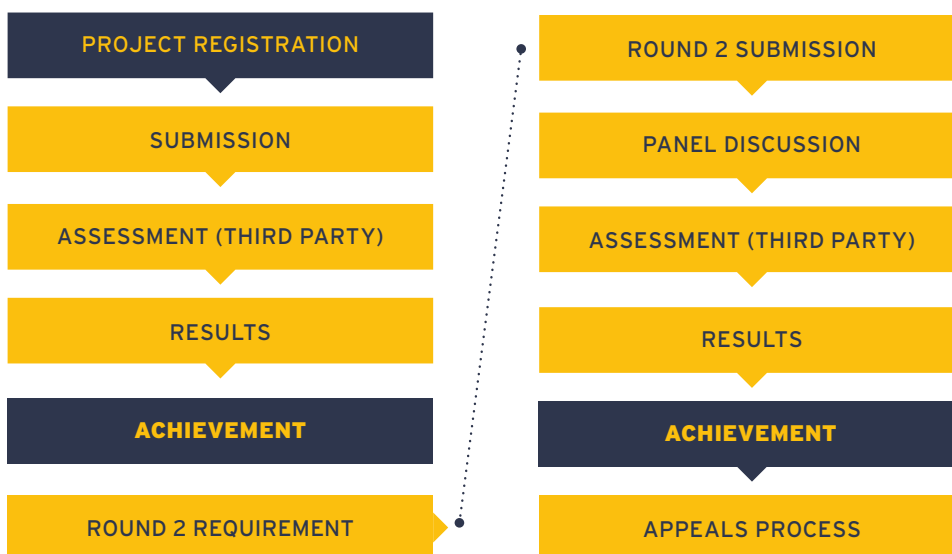
Certification fees are to be paid at project registration. These fees will cover a case coordinator, spot assessment (for each category once, before a further charge will be incurred), certification and award. The awarding of a certification will allow the University to display that certification across all of their material.

CATEGORIES AND CREDITS

- Aim of credit
- Credit Criteria
- Compliance Requirements
- Documentation Requirements

Please Note, the aim of the credit can be used as a guide where credit criteria may not be achievable. Through working with a Course Coordinator, credits may be achieved through innovative practices. This is to drive research and innovation through higher educational facilities, and to share this knowledge with the wider industry.

CERTIFICATION PROCESS FLOWCHART





CREDITS & CRITERIA



MATERIALS & RESOURCES

AIM OF CREDIT

The 'Materials and Resources' category aims to minimise the waste from building occupants as well as construction and demolition waste. The four preferred strategies for reducing waste are source reduction, reuse, recycling, and waste to energy. The proposed project is encouraged to select low-impact materials and reduce waste generated or make full use of the waste generated by effectively recycling.

CREDIT CRITERIA

Building life-cycle impact reduction	6 POINTS
Building product disclosure and optimization	2 POINTS
Construction and demolition waste management	2 POINTS
Local materials	3 POINTS
Safety of materials and resources	2 POINT
<hr/>	
TOTAL	15 POINTS



MATERIALS & RESOURCES

BUILDING LIFE-CYCLE IMPACT REDUCTION

Demonstrate reduced environmental effects during initial project decision-making by reusing existing building resources or demonstrating a reduction in materials use through life-cycle assessment.

BUILDING AND MATERIALS REUSE

POINTS FOR REUSE OF BUILDING MATERIALS

Reuse or salvage building materials from off site or on site as a percentage of the surface area. Include structural elements (e.g., floors, roof decking), enclosure materials (e.g., skin, framing), and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems).	Percentage of completed project surface area reused	Points
	25%	1
	50%	2
Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project. Materials contributing toward this credit may not contribute toward MR Credit Material Disclosure and Optimization	75%	3

BUILDING AND MATERIALS LIFESPAN ASSESSMENT

Material should be able to maintain its performance across the entire project life cycle, including the ability of resisting moisture, termites and contamination.

POINTS FOR BUILDING LIFESPAN

For new construction (buildings or portions of buildings), conduct a life-cycle assessment of the project's structure and the proposed building should have at least 60 years' lifespan.	Building lifespan	Points
	60 years	1
	80 years	2
	100 years	3



MATERIALS & RESOURCES

BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION

BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION

	Criteria	Points
Environmental product declaration	To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. to reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.	1
Raw material source and extraction reporting	Use raw material from suppliers that have released a report which include raw material supplier extraction locations, a commitment to long-term ecologically responsible land use, a commitment to reducing environmental harms from extraction and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria.	1

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT GOALS

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials. Develop a construction waste management plan and identify opportunities to deal with non- hazardous construction materials.

POINTS FOR WASTE MANAGEMENT

Percentage of diverted waste	Points
Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.	1
Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams.	2



MATERIALS & RESOURCES

LOCAL MATERIALS GOALS

The selection of materials is encouraged to use at least 50% of local resources. Using materials that manufactured within the region not only reduce environmental impacts from transport, but benefits the local economy and business.

POINTS FOR LOCAL MATERIALS

Percentage of local materials	Points
50%	1
75%	2
100%	3

SAFETY OF MATERIALS AND RESOURCES GOALS:

Safety is a significant part due to the huge stream of people in educational facilities. To protect human health, materials should not contain volatile organic compound and carcinogenic substances. Moreover, materials that have fireproof properties are necessary to avoid fire hazard.

DOCUMENTATION REQUIREMENTS

Supporting documentation supporting the project's compliance with each of the above credit criteria may be submitted in the following formats:

- Reused elements table and calculations
- Description of LCA assumptions, scope, and analysis process for baseline building and proposed building
- Life-cycle impact assessment summary showing outputs of proposed building with percentage change from baseline building for all impact indicators.
- MR building product disclosure and optimization calculator or equivalent tracking tool
- EPD and LCA reports or compliant summary documents for 100% of products contributing toward credit
- MR building product disclosure and optimization calculator or equivalent tracking tool
- Corporate sustainability reports for 100% of products contributing toward credit
- MR Construction and Demolition Waste Management calculator or equivalent tool, tracking total and diverted waste amounts and material streams



ENERGY

AIM OF CREDIT

The aim of energy use credit based on a holistic perspective, addressing energy use reduction, energy-efficient design strategies, and renewable energy sources. Accounting for approximately 40% of the total energy used today, buildings are significant contributors to these problems. In order to cut down carbon emission and the dependence of non-renewable resource. The UniRate supports the goal of reduced energy demand through credits related to reducing usage, designing for efficiency, and supplementing the energy supply with renewables.

CREDIT CRITERIA

Multiple Stages' Energy Auditing	6 POINTS
Energy Saving Design	9 POINTS
General Energy Consumption Data Comparison	5 POINTS
<hr/>	
TOTAL	20 POINTS



ENERGY

MULTIPLE STAGES' ENERGY AUDITING GOALS:

- To narrow the construction standard related to the energy design
- Reinforce the importance of energy saving in the building phase
- Encouraging the conception of eco-effective and eco-efficient building construction
- To make sure the positive building energy saving records could be kept

3 PHASES:

1. Pre-design stage: It mainly points to the Whole-Building Energy Simulation no later than the schematic design. (2 points)
2. Under Constructing Phase: It emphasizes the eco-effective and eco-efficient construction process. (1 point)
3. Post-occupancy and Maintain Phase: Commissioning Process of identifying all energy resources that serve building and do the related modified measures. (3 points)

POINTS FOR MULTIPLE STAGES' ENERGY AUDITING

Energy	Criteria	Points
The Whole-Building Energy Simulation	An energy model completed in the design phase of the project will enable the metering system to be integrated into design drawings and project specifications.	2
Eco-Effective and Eco-Efficient Construction Process	Determine the type and quantity of advanced meters necessary to capture all individual end uses that represent 10% or more of the building's total annual energy consumption.	1
Advanced Energy Metering to identify all energy resolutions that serve building	Determine the type and quantity of advanced meters necessary to capture all individual end uses that represent 10% or more of the building's total annual energy consumption.	2
Maintenance Plan for Building	Having the regular inspection and maintenance	1



ENERGY

ENERGY SAVING DESIGN GOALS:

- To encouraging the energy saving technologies are used in the building construction
- To reduce the dependency of non-renewable energy resource exhaust
- Pursuing to achieve the positive goal of energy saving by comprehensive design

POINTS FOR ENERGY SAVING DESIGN

Energy	Criteria	Points
The mainly type of energy resource	To consider the building main type of electricity come from. If it is from the renewable resource plant, the score could be added	1
Secondary renewable energy use, such as PV panel or geothermal energy	Use renewable energy systems to offset building energy costs. Calculate the percentage of renewable energy with the following equation: Renewable energy = Equivalent cost of usable energy produced by the renewable energy system/Total building annual energy cost	1 = the renewable energy >1%
Green roof or wall design	Green roofs and living walls in the built environment offer significant environmental, economic and social benefits.	1
Building envelope, glazing: vertical fenestration	The building achieve the >90% window using the glazing technology and using the positive natural lighting design.	1
Natural ventilation design	The building adopt natural ventilation strategy and effectively reduce the air conditioning load.	1
Thermal Isolation Performance	To judge the building thermal isolation performance	1
Surrounding planting	The planting area higher than 15% of building gross area	1
Interior lighting energy saving	Using the energy saving bulb and the interior lighting energy saving design. Such as acoustic reaction light switch.	1
HVAC equipment and Water pumping system selection	Adopt the high-efficiency HVAC systems and energy saving equipment, such as the non negative pressure water supply equipment.	1



ENERGY

GENERAL ENERGY CONSUMPTION DATA COMPARISON GOALS:

- To encouraging the energy saving design be used on the building construction
- To stimulate the use of energy from the renewable resources

In the section of Final Energy Consumption Data Comparison, the integrated energy saving result would be looked important as the final outcome of the energy saving endeavor. The building general electricity consumption data will be compared with the similar type of building.

POINTS FOR GENERAL ENERGY CONSUMPTION DATA COMPARISON

Energy	Criteria	Points
General energy consumption data comparison	A percentage improvement in the proposed building performance rating compared with the baseline	1 point: >5% 2 points: >15% 3 points: >25% 4 points: >35% 5 points: >45%

DOCUMENTATION REQUIREMENTS

Supporting documentation supporting the project's compliance with each of the above credit criteria may be submitted in the following formats:

- Execute functional testing
- Develop construction checklists
- Building envelope plan
- Green Star registration
- Owner's project requirements (OPR) and basis of design (BOD), as well as the review of the OPR, BOD and project design
- NIBS Guideline 3-2012 for Exterior Enclosures provides additional guidance
- The commissioning authority (CxA)
- ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC&R Systems
- EA Credit Advanced Energy Metering
- Prescriptive Compliance: Advanced Buildings™ Core Performance™ Guide
- The Interior HVAC and Water system equipment selection
- The General Energy Consumption data



SUSTAINABLE SITES

AIM OF CREDIT

The aim of the sustainable sites credit is to focus on restoring project site elements, integrating the site with local and regional ecosystems, and preserving the biodiversity that natural systems rely on as well as ensuring a future proof internal configuration of spaces.

CREDIT CRITERIA

Sustainable Sites	6 POINTS
Land Use & Ecology	8 POINTS
Adaptability	4 POINTS
<hr/>	
TOTAL	18 POINTS



SUSTAINABLE SITES

SUSTAINABLE SITES GOALS:

- To reduce pollution from construction activities
- To protect the health of vulnerable populations
- To assess site conditions before design to evaluate sustainable options and inform related decisions about site design
- To conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity
- To create exterior open space that encourages social and physical interaction as well

POINTS FOR SUSTAINABLE SITES


Sustainable Sites	Criteria	Points
Construction activity pollution prevention	Erosion and sedimentation control plan for all construction activities	1
Site Assessment	Complete and document a site survey that includes the following information: Topography, Hydrology, Climate, Vegetation, Soils, Human use, and Human health effects	1
Habitat protection/restoration	Using native or adapted vegetation, restore 50% of all portions of the site	1 = restoring 30% of the site 2 = restoring 50% of the site
Open/public space	Provide outdoor space greater than 30% of the total site area. A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have overhead vegetated canopy.	1
Public Access	At least three of the following types of spaces in the school are available for shared use by the general public: · auditorium; · gymnasium; · cafeteria; · one or more classrooms; · playing fields and stadiums;	1



SUSTAINABLE SITES

LAND USE AND ECOLOGY GOALS:

- Minimize the effects on microclimates and human and wildlife habitats
- Reducing heat islands
- Remediating environmental contamination

POINTS FOR LAND USE & ECOLOGY		
Land Use & Ecology	Criteria	Points
Sustainable sites	No wetlands/forest/agriculture sites etc are negatively impacted	Conditional Requirement
Ecological value	Impact on flora and fauna, endangered/threatened/vulnerable species, ecological value, green roof	1 = not worse when you started 2 = some procedures in place
UHI	Plant trees for shading etc OR Meet the following criteria: 	1 = 50% of site plan must address UHI 2 = 75% of site plan must address UHI 3 = Meeting requirements of alternate criteria formula
Contaminated and hazardous sites	Sites listed by the EPA as contaminated: Conduct a site assessment of any contaminants. If any are found, appropriate remediation plans and implementation are required for EPA	1 = Site Assessment 2 = Remediation of contamination
Reuse of land	Reuse and refurbishment of buildings where appropriate	1



SUSTAINABLE SITES

ADAPTABILITY GOALS:

- Increased flexibility and adaptability of spaces
- Buildings that have been designed, constructed and maintained with thought of how they might be easily altered to prolong their life

POINTS FOR ADAPTABILITY

Adaptability	Criteria	Points
Long span spaces (open plan capable)	Majority of internal floor spaces are column free	1 = 95% of internal areas are column free 2 = 9*% of internal areas are column free
Flexible internal partitions	Ability for addition or contraction, to suit new uses or patterns of use. Internal partitions require little time and cost to be altered in any way	1
Plumbing	Plumbing locations including bathrooms, kitchens and labs are located near each other within a core to allow wet area flexibility	1

DOCUMENTATION REQUIREMENTS

Supporting documentation supporting the project's compliance with each of the above credit criteria may be submitted in the following formats:

- EPA Assessment
- Extracts from the development application
- Zoning plans
- Wetland management plan
- CV of ecologist
- As Built drawings showing the areas that were previously developed land at the time of purchase
- Green Star registration
- Aerial photographs showing the areas that were previously developed land at the time of purchase
- Contamination report or site assessment
- Certificate from the environmental auditor or relevant authority confirming that the site has been decontaminated
- Confirmation that a hazardous materials survey has taken place
- Hazardous materials survey
- Hazardous materials management plan
- Clearance certificate confirming that hazardous materials have been stabilised and/or removed and disposed of
- Application for to public to use University spaces



LOCATION & TRANSPORTATION

AIM OF CREDIT

Since our research is based on a higher educational scale (in NSW), Location and Transportation category is found to be more crucial for both students and staff. When considering about the LT category, we should think about it from a more sustainable site with regard to surrounding environment, transportation accessibility, infrastructure and facilities etc. And how these factors can be well applied in Universities is what we should focus on.

CREDIT CRITERIA

Location	4 POINTS
Surrounding Environment	(3 POINTS)
Distance to Commercial & Business District	(1 POINTS)
Transportation	6 POINTS
TOTAL	10 POINTS



LOCATION & TRANSPORTATION

SURROUNDING ENVIRONMENT

Surrounding environment is vital in rating system for Universities because it has great impact on the direct impression of a building or a university. Good surrounding environmental can provide a better studying and working environment which can result in the improvement of the teaching quality as well as the appropriate living style. It is a virtuous circle that good environment can encourage people to behave better, while better behavior can contribute to good environment.

POINTS FOR SURROUNDING ENVIRONMENT

Surrounding Environment	Criteria	Points
Community environment	<ul style="list-style-type: none">- Distribution and quality of residential buildings- Accessibility of basic service and infrastructures (hospitals, restaurants, markets, etc)	1
Security	<ul style="list-style-type: none">- Police record and crimes documentary- Existing security measures- Accidents record	1
Green environment	<ul style="list-style-type: none">- Plant coverage ratio- Waste disposal- Sustainable engineering	1

DISTANCE TO COMMERCIAL & BUSINESS DISTRICT

Too far away from commercial or business districts can be very inconvenient both for working and living. However, too close to those districts would result in higher expense. This factor could be evaluated on how many commercial & business districts are around the university and the distances to each of them.

POINTS FOR DISTANCE TO COMMERCIAL & BUSINESS DISTRICT

Commercial and Business District	Criteria	Points
Multiple commercial and business districts	<ul style="list-style-type: none">- The number of commercial & business districts nearby- Distance to each commercial & business district- Availability of multiple choice of transportation to each commercial & business district	1



LOCATION & TRANSPORTATION

POINTS FOR TRANSPORTATION

Transportation	Criteria	Points
Public Transportation	<ul style="list-style-type: none">- Multiple choice(bus, train)- Distance to bus & train station- Interval time of every coming bus- Availability of buses near each gate of the university	2
Car parking	<ul style="list-style-type: none">- Enough parking space- Hourly charge- Car park share	2
Green vehicles and relative infrastructure	<ul style="list-style-type: none">- Safe and comfortable bicycle networks both in and off campus- Bicycle storage space- Charging station for electric cars	1
Pedestrian paths	<ul style="list-style-type: none">- Safe paths for pedestrian- Walking easiness of the paths (upslope and down ramp)	1

DOCUMENTATION REQUIREMENTS

Supporting documentation supporting the project's compliance with each of the above credit criteria may be submitted in the following formats:

- Holistic public transportation guide & map around the campus
- Surrounding virescence report
- Surrounding crime records and traffic accident records
- Utilization rate of parking lot
- Detailed report of surrounding residential buildings
- Detailed report of surrounding retail stores
- Bicycle storage report



WATER EFFICIENCY

AIM OF CREDIT

The aim of the water efficiency credit is to address water holistically, considering outdoor use, indoor use, specialised use, and metering. This section is mainly based on the “efficiency first” approach to water conservation. Therefore, each criteria will look at water efficiency and reduction in potable water usage first. Then, the credits will additionally recognize the nonpotable and other sources of water. Some possible design solutions include incorporating native landscapes to reduce the need for irrigation, installing water efficient fixtures, and reusing wastewater for nonpotable water demands.

CREDIT CRITERIA

Outdoor Water Use Reduction	2 POINTS
Indoor Water Use Reduction	5 POINTS
Specialised Water Use Reduction	1 POINTS
Metering	1 POINTS
<hr/>	
TOTAL	9 POINTS



WATER EFFICIENCY

OUTDOOR WATER USE REDUCTION GOALS:

To reduce outdoor water consumption.

POINTS FOR OUTDOOR WATER USE

Outdoor Water Use	Criteria	Points
The calculation of baseline water consumption is done according to Water Budget Calculation. Adequate reduction in water consumption with respect to the baseline will earn credits	Percentage reduction from baseline 50%	1
	Percentage reduction from baseline 100%	2

INDOOR WATER USE REDUCTION GOALS:

To reduce indoor water consumption.

POINTS FOR INDOOR WATER USE

Indoor Water Use	Criteria	Points
The calculation of baseline water consumption is done according to Water Budget Calculation. Adequate reduction in water consumption with respect to the baseline will earn credits	Percentage reduction from baseline 25%	1
	Percentage reduction from baseline 30%	2
	Percentage reduction from baseline 35%	3
	Percentage reduction from baseline 40%	4
	Percentage reduction from baseline 50%	5

BASELINE WATER CONSUMPTION OF FIXTURES AND FITTINGS

Baseline water consumption of fixtures and fittings	Baseline
Toilet (water closet)	6 lpf
Urinal	3.8 lpf
Public lavatory (restroom) faucet	1.9 lpm at 415 kPa, all others except private applications
Private lavatory faucets	8.3 lpm at 415 kPa
Kitchen faucet (excluding faucets used exclusively for filling operations)	8.3 lpm at 415 kPa
Showerhead	9.5 lpm at 550 kPa per shower stall



WATER EFFICIENCY

SPECIALISED WATER USE REDUCTION GOALS:

- To conserve water used for cooling tower.
- To control microbes, corrosion, and scale in condenser water system.

MAXIMUM CONCENTRATIONS FOR PARAMETERS IN CONDENSER WATER

Parameter	Maximum level
Ca (as CaCO ₃)	1000 ppm
Total alkalinity	1000 ppm
SiO ₂	100 ppm
Cl ⁻	250 ppm
Conductivity	2000 uS/cm

Calculate the number of cooling tower cycles by dividing the maximum allowed concentration level of each parameter by the actual concentration level of each parameter found in the potable makeup water. Limit cooling tower cycles to avoid exceeding maximum values for any of these parameters.

POINTS FOR SPECIALISED WATER USE

Specialised Water Use	Criteria	Points
Cooling tower water use	Maximum number of cycles achieved without exceeding any filtration levels or affecting operation of condenser water system (up to maximum of 10 cycles)	1



WATER EFFICIENCY

METERING GOALS:

- To support water management
- To identify potential opportunities for additional water saving by tracking water consumption

POINTS FOR METERING

Metering	Criteria	Points
Water Metering System	<p>Permanent installations of two or more of the following water subsystems:</p> <p>Irrigation: Meter water systems serving at least 80% of the irrigated landscaped area.</p> <p>Indoor plumbing fixtures and fittings: Meter water systems serving at least 80% of the indoor fixtures and fitting</p> <p>Domestic hot water</p> <p>Boiler</p> <p>Reclaimed water</p> <p>Other Process water</p>	1

DOCUMENTATION REQUIREMENTS

Supporting documentation supporting the project's compliance with each of the above credit criteria may be submitted in the following formats:

- Water source and controls calculations
- Alternative water source calculations (if applicable)
- Plumbing system design drawings (if applicable)
- Alternative water narrative
- Cutsheets, manufacturers' information
- Indoor water use calculator
- Potable water analysis results
- Potable water analysis narrative
- Cycles of concentration calculations
- Nonpotable water calculations
- Water treatment calculations
- Nonpotable water analysis (if using 100% non- potable water)
- Water metering strategy narrative



INDOOR ENVIRONMENT QUALITY

AIM OF CREDIT

This section will focus on the interior conditions within tertiary institution buildings, with the aim of improving the quality and amenity to all occupants of these buildings. This category rewards projects that not only reduce emissions and environmental impacts, but that provide healthy and comfortable teaching, learning and work spaces as well. Thus, environments designed for teaching and learning should not be distracting or detract from course content in any way, and will maximise students' productivity, skills and abilities.

The majority of points awarded in this section reflect the unique challenges faced in tertiary education building programs, so that acoustic, lighting and visual comfort credits have the most weighting. The total number of points available within this category is 18.

For this section, it will be necessary to determine differences in occupation patterns within the building in question. This will be determined by defining each space as primary, secondary or tertiary spaces. These spaces are defined as follows:

PRIMARY SPACES: Spaces designed for regular human occupation, which are usually used and/or occupied for two hours or longer.

SECONDARY SPACES: Spaces designed to be occupied for 2 hours or less.

TERTIARY SPACES: Spaces that are not designed for human occupation, unless being accessed occasionally for short periods of time for repairs, maintenance or storage retrieval.

CREDIT CRITERIA

Acoustic comfort	4 POINTS
Enhanced IEQ	2 POINTS
Indoor pollutants	2 POINTS
Lighting comfort	4 POINTS
Thermal comfort	2 POINTS
Visual comfort	4 POINTS
<hr/>	
TOTAL	18 POINTS



INDOOR ENVIRONMENT QUALITY

ACOUSTIC COMFORT

POINTS FOR ACOUSTIC COMFORT

Acoustic Comfort	Criteria	Points
Acoustic separation	Where design sound levels within all primary spaces are 10% lower than recommended in Table 1 of AS2107-2000	1
	Where design sound levels within all primary AND secondary spaces are 10% lower than recommended in Table 1 of AS2107-2000	2
Reverberation	Reverberation times match or are lower than the recommended reverberation times shown in Table 1 of AS2107-2000	1
External noise protection	Noise arising from noise sources exterior to the building within both primary and secondary spaces are mitigated	1

ENHANCED INDOOR AIR QUALITY

POINTS FOR ENHANCED INDOOR AIR QUALITY

Enhanced Indoor Air Quality	Criteria	Points
Provision of fresh (outdoor) air	Tertiary spaces must provide fresh air at the rate specified by AS1668.2- 2012:	Minimum compliance
	Primary and secondary spaces must provide fresh air at a rate 50% greater than the rate specified in AS1668.2- 2012. Both must use the occupancy-based minimum using the design occupancy quantity.	
Ventilation System	Entry of outdoor pollutants is mitigated, and design of the system is optimised for easy operation and cleaning.	1
Airborne pollutant mitigation	All spaces demonstrate that sources of pollutants (print/ copy machines, etc) are removed; or Pollutants are exhausted directly outdoors.	1



INDOOR ENVIRONMENT QUALITY

INDOOR POLLUTANTS

POINTS FOR INDOOR POLLUTANTS

Indoor Pollutants	Criteria	Points
Formaldehyde Minimisation	95% of engineered timber products meet or fall below TVOC requirements*	1
Interior finishes	95% of finishes meet or fall below TVOC requirements, minimising harmful pollutants, emissions and fumes as much as possible	1

*Plywood, MDF, LVL, and article board must be below 1mg/L emissions;
High Pressure Laminates and Compact Laminates must have less than 1mg/m²/hr.

LIGHTING COMFORT

POINTS FOR LIGHTING COMFORT

Lighting Comfort	Criteria	Points
Artificial Lighting Quality	Lights are flicker-free and accurately render colours within all spaces	Minimum compliance
Illuminance And Glare Reduction	General Illuminance must comply with best practise as defined by task within each space in accordance with Table 3.1 in AS1680.2-2008; and Light fixtures must be obscured by some physical means to reduce glare, or calculation of Unified Glare Rating (UGR) must not exceed 18 (AS1680.1-2006) when calculated using the method in AS1680.1-2006 section 8.3.3.	1
Surface Illuminance	An average surface reflectance for ceilings of at least 0.75; and the lighting system is designed so that the ceiling area has an average surface illuminance of at least 30% of the lighting levels on the working plane.	1
Localised Lighting Control	Occupants' ability to control lighting in their immediate area in primary and secondary spaces;	1
	Specific task lighting available in all staff offices.	1



INDOOR ENVIRONMENT QUALITY

THERMAL COMFORT

POINTS FOR THERMAL COMFORT

Thermal Comfort	Criteria	Points
Majority Thermal Comfort	80% occupant satisfaction with thermal environment in each primary and secondary space; i.e. Thermal modelling shows PMV levels are within +/- 1 as according to ASHRAE 55- 2013	1
Enhanced Thermal Comfort	90% occupant satisfaction with thermal environment in primary and secondary space; i.e. Thermal modelling PMV levels are within +/- 0.5 as according to ASHRAE 55- 2013	1

VISUAL COMFORT

POINTS FOR VISUAL COMFORT

Visual Comfort	Criteria	Points
Daylight Glare Control	95% of all windows in primary and secondary spaces are shaded by any one of a combination of blinds or shading devices, and shade the working plane for 80% of usual occupied hours.	1
Daylight Provision	provision of daylight to 60% of area within primary spaces	1
	provision of daylight to 40% of area within secondary spaces	2
Access To Quality Views	Provision of at least 1 window at eye level in primary spaces to enable occupants to achieve long-range views.	1

DOCUMENTATION REQUIREMENTS

Supporting documentation supporting the project's compliance with each of the above credit criteria may be submitted in the following formats:

- NABERS ratings
- Daylighting, acoustic, thermal and air change modelling
- Design drawings showing sizing of mechanical ventilation units, shading devices and exhaust fans
- Design drawings showing localised lighting control and lighting schedules and layouts
- Schedule of all fittings, fixtures, furniture and finishes with product codes and names
- Emissions testing results for each 'Indoor Pollutants' credit
- Plans and corresponding elevations showing sizing and location of windows for view access
- Reports showing comparison or compliance with relevant ASHRAE or Australian Standards



INNOVATION

AIM OF CREDIT

Innovation is core to the UniRate philosophy. By championing innovative design and development within the higher education industry, UniRate is securing the future of the sector as a global leader within the sustainable development space. UniRate's Innovation category does this by making additional credit points available for projects operating at exemplary performance levels and which surpass current rating criteria. Through awarding credit points for innovation, UniRate pushes Project Teams to increase their building's performance and, in turn, support the industry by promoting innovation in technology, design and construction practice.

CREDIT CRITERIA

Innovative Practice	4 POINTS
Exceeding Credit Benchmarks	3 POINTS
Industry Excellence	3 POINTS
TOTAL	10 POINTS



INNOVATION

INNOVATIVE PRACTICE:

UniRate's Innovative Practice points are designed to promote research and investment in sustainability solutions that adhere to the Four Capital Model of Sustainability (Ekins, Dresner and Dahlström, 2008). To achieve these points, a project must address issues relating to a range of environmental, human, physical and social capitals specific to the higher education industry. This affords UniRate the opportunity to award points to projects that endeavour to create new criteria not contained within the current Rating Tool. By promoting this approach, industry can assist in the evolution of UniRate.

The UniRate Innovative Practice criteria currently comprises of 16 approved project innovations:

- Climate Change Adaptation and Resilience
- Climate Change Risk Analysis
- Community Involvement
- Public Space Activation
- Contractor Education
- Culture and Heritage Integration
- Art and Design Excellence
- Real-time Energy use Display
- Energy Metering Integrity
- Budgeting Transparency
- High Performance Site Office
- Market Intelligence and Research
- Marketing Excellence
- Material Life Cycle Assessments and Impacts
- Reductions in Construction and Demolition Waste
- Social Sustainability

In addition to the options stated in the above list, the opportunity exists for project teams to nominate new Innovative Practice credit options specific to your project. These nominations will be reviewed by your project assigned UniRate Assessor.



INNOVATION

EXCEEDING CREDIT BENCHMARKS:

To be awarded additional points under this criterion, the project must go over and above the UniRate benchmarks outlined previously in this Rating Tool document. The achievement must exhibit significant improvements on the benchmark in order to be allocated the point. Exceeding Credit Benchmark points are generally awarded by reaching or exceeding the next percentage threshold. The following mandatory steps must be adhered to for the application for point to be considered.

1. IDENTIFY AND OUTLINE THE TARGET CRITERIA

During the design phase, select the benchmark credits the Project intends to pursue and outline the level to which the benchmark will be exceeded. For information relating to credits where this particular innovation criteria is allowed, please contact your project assigned UniRate Assessor.

2. TARGET PLANNING AND IMPLEMENTATION

Record and document the corresponding design processes and specifications required to ensure that benchmarks are exceeded in keeping with that which is outlined in step one. Provide mandatory documentation as noted in the benchmark credit criteria.

INDUSTRY EXCELLENCE:

The pursuit of Industry Excellence rewards projects that innovate current sustainable design processes or technologies to become best practice examples in the global built environment space. This category also recognises the efforts of Project Team's leading the industry in the development and implementation of sustainability principles across the wider higher education industry in both a national and international context. The project must undertake initiatives that significantly contribute to broader industry transformations towards sustainable development in Australia and the world.

DOCUMENTATION REQUIREMENTS

Supporting documentation supporting the project's compliance with each of the above credit criteria may be submitted after consultation with your case coordinator.

CONCLUSION

Green building has become a hot-spot all over the world. All regions are considered with their own situation, and made different standard, they are different but connecting with each other. But we found that educational facilities is not what they concern. Therefore, based on LEED, we make this UniRate to be the specific rating system for the educational facilities in UNSW and we know this UniRate is far from perfect. We hope our work could catch more attention on the sustainability of educational facilities cause the sustainability of educational facilities around the world is really potential. There are many different problems due to the difference of economic and construction development level. We hope our UniRate could bring the designers around the world inspiration and make more rating systems about educational facilities. To evaluate the existing rating system and improve the rating system will guarantee to lead the whole society maximizes reducing building energy consumption and the impact on the environmental.

THE FUTURE OF UNIRATE

UniRate is designed to be flexible and work with Innovative practices as much as possible. As it is currently developed UniRate rates new University buildings, but there is room for it to be further developed to apply to the operating processes of existing buildings, and to then further be developed to rate an entire site under a Campus rating.

REFERENCES

Baggs, D (2010), 'Beyond Carbon Neutrality: Strategies for reductive and restorative sustainability', Environment Design Guide, no. 64, 1-9.

Ekins, P., Dresner, S. and Dahlström, K. (2008). The four-capital method of sustainable development evaluation. Eur. Env., 18(2), pp.63-80.

Gosling, J, Naim, M, Sassi, P, Iosif, L and Lark, R (2008), Flexible buildings for an adaptable and sustainable future -. In: Dainty, A (Ed) Procs 24th Annual ARCOM Conference, 1-3 September 2008, Cardiff, UK, Association of Researchers in Construction Management, 115-124.

Green Building Council Australia (2015), Green Star Design & As Built, version 1.1, submission guidelines, retrieved 1 September, 2016 from <<http://new.gbca.org.au/green-star/rating-system/design-and-built/>>

Johnston, P., Everard, M., Santillo, D., & Robèrt, K.-H. (2007), 'Reclaiming the definition of sustainability', Environmental Science and Pollution Research International, vol.14, no.1, pp. 60-66. DOI: <http://dx.doi.org/10.1065/espr2007.01.375>

Schmidt, R (2010), "WHAT IS THE MEANING OF ADAPTABILITY IN THE BUILDING INDUSTRY?", <<http://adaptablefutures.com/wp-content/uploads/2011/11/Schmidt-et-al.-2010b.pdf>>

U.S. Green Building Council (2013), LEED Reference Guide for Building Design and Construction.

