



GREEN STAR - EDUCATION V1

FACT SHEET & BUSINESS CASE



THE GREEN STAR – EDUCATION V1 RATING TOOL ASSESSES THE ENVIRONMENTAL ATTRIBUTES OF NEW AND REFURBISHED EDUCATION FACILITIES IN EVERY STATE ACROSS AUSTRALIA.

The tool can assign a Green Star rating to the education facility on the basis of design potential.

The Green Star - Education v1 rating tool was developed to assess the entire building through to fitout, as education facilities are delivered as integrated fitouts. This differentiates it from other Green Star rating tools, which address base building and fitout separately. The tool can also be used to rate the environmental merits of an education facility at post-construction phase (known as As Built).

The intended audience for the Green Star – Education v1 rating tool consists primarily of state governments and owners of private education facilities. The tool enables these parties to minimise the environmental impacts of their developments and to capitalise on, and receive recognition for, their design initiatives.

TOP:
Bond University Mirvac School of Sustainable Development
 6 star Green Star - Education PILOT

WHY BUILD A GREEN EDUCATION FACILITY? ♦



A HEALTHY AND PRODUCTIVE PLACE TO LEARN

Conventional education buildings are typically designed to meet only minimum standards in building codes. The result is facilities that are not necessarily designed to provide comfortable, productive or healthy work environments for students and teachers.

In contrast, one review found that green schools and universities in the United States had delivered:

- a 41.5 per cent improvement in the health of students and teachers (such as reduced incidence of asthma, 'flu, respiratory problems and headaches)
- up to 15 per cent improvement in student learning and productivity
- up to 25 per cent improvement on test scores due to good lighting and ventilation.

The Heschong Mahone Daylighting Study of more than 21,000 students showed a dramatic correlation between daylight school environments and student performance, including:

- 20 per cent faster progression in maths
- 26 per cent faster progression in reading
- increased performance of 5-10 per cent when students had window views.

FRESH AIR BRINGS FOCUS

The University of Melbourne's new 5 Star Green Star home for the Faculty of Business and Economics, The Spot, delivers 100 per cent fresh air rates, provides individual thermal control of workspaces and has reduced volatile organic compound exposure through the use of low VOC paints, carpets and sealants. Each of these improvements will help enhance student wellbeing and deliver improved educational outcomes. According to Chris White, the University's Executive Director of Property & Campus Services, "the central environmental focus of the project was IEQ due to its capacity to improve learning outcomes."

A BETTER PLACE TO TEACH

Green schools improve the health and wellbeing of our teachers, as well as our students. Teachers spend up to 90 per cent of their day indoors, so they benefit from buildings with natural daylight, fresh air and access to views. Research also indicates that teachers are happier when they have the ability to control their environment, through temperature and lighting settings.

Green schools regularly report reductions in teacher turnover. Greening America's Schools: Costs and Benefits estimated that teacher retention in green schools translates into a financial savings of about \$4 per square foot over a 20 year period.

Rates of absenteeism also decrease in green schools. The improved air, lighting and indoor environment in green school buildings have a positive effect on the health of teachers. This leads to fewer sick days and consequently, reduced costs and better outcomes for schools and teachers.

SUSTAINABLE SUCCESS

Australia's first Green Star - Education Design v1 primary school, the 4 Star Green Star Peregian Springs State School on the Sunshine Coast, is already reaping the benefit of its sustainability status. It has attracted the highest pre-enrolment of any school in Queensland. Principal Gwen Sands says that "it is a pleasure to work in a school which has been built to the highest environmental standards. Studying and working in this facility encourages both our staff and students to act in a more sustainable manner and will help improve learning outcomes for our students."

IMAGE:

Wangaratta High School
4 star Green Star - Education PILOT

LOWER OPERATING COSTS

In the United States, a comprehensive study found that while green schools can cost one to two per cent more than conventional schools to build, the return on investment was 20 times more than the cost of going green.

Green schools consume 32 per cent less water and 33 per cent less energy than conventionally designed schools. Efficient lighting, heating and cooling, better insulation, greater use of daylight and natural ventilation, as well as water-saving features, all reduce energy and water consumption and, consequently, utility costs.

Lower energy and water costs, improved teacher retention, and lowered health costs save green schools about four times the additional cost of going green. For an average conventional school, building green would save enough money over a 20 year period to pay for an additional full-time teacher, or 200 new computers, or 5,000 new textbooks.

Financial savings to the broader community are significantly larger, and include reduced cost for public infrastructure, lower air and water pollution, and a better educated and compensated workforce.

SAVING \$180,000 EACH YEAR ON ENERGY

Melbourne University's The Spot, used 46 per cent less energy in its first year than comparable buildings across the rest of the University. According to the report, "the whole building's energy use is considered to be exceptional". This translates to savings of over \$180,000 per annum compared to the average of equivalent buildings on campus, a saving which will more than discount the sustainability premium of 5 per cent, before productivity benefits are even calculated.

HANDS-ON LEARNING OPPORTUNITIES

Green schools inspire and engage students with environmental issues. A

green school is an interactive teaching tool, educating the next generation of sustainable leaders through hands-on learning. Principals and teachers report that they have been able to incorporate learning on energy use, climate change, water resources and sustainability into the students' everyday lives at green schools.

A LIVING LABORATORY

The Bond University Mirvac School of Sustainable Development was one of six education facilities in Australia to pilot the Green Star Education rating tool. A 'living laboratory' and self-guided building tour have been created to teach students, staff and the community about the environmental attributes of the facility, such as the building's solar passive design and orientation, building services, cyclist amenities, water treatment system and energy generation.

IMAGE:

Coomera Rivers State School
6 star Green Star - Education Design v1



IMAGE:

Leongatha Learning Centre, Central Gippsland Institute of TAFE
5 star Green Star - Education Design v1

AN ENVIRONMENTALLY FRIENDLY FACILITY

On average, green schools use one third less energy than conventional schools, saving thousands of tonnes of greenhouse gases each year. The Greening America's Schools: Costs and Benefits report estimates that green schools reduce their contribution of:

- Nitrogen oxide, a principal component of smog, 1 by 544.3 kg
- Sulphur dioxide, a principal cause of acid rain, by 589.7 kg
- Carbon dioxide, the principal greenhouse gas, by more than 265,350 kg.

SMART AND SUSTAINABLE SOLUTIONS

Innova21, the University of Adelaide's new building for the Faculty of Engineering, Computer and Mathematical Sciences, was first project in Australia to achieve a 6 Star Green Star – Education v1 rating. The use of geothermal energy storage is expected reduce the building's cooling related CO2 emissions by 58 per cent, while the natural gas-fired tri-generation plant - which supplies all of Innova21's electricity, heating and cooling requirements - will deliver a 60.3 per cent reduction in peak electrical demand.



'FUTURE PROOFED' ASSETS

A number of state governments have already mandated minimum Green Star standards for all government office buildings – with other building types expected to follow suit. By incorporating sustainable features now, schools are future proofing for changes in the regulatory environment, and ensuring they will not be at a disadvantage in the future. What's more, by integrating green principles into their buildings, they are leaving the community with a lasting legacy.

GREEN FOR FUTURE GENERATIONS

Wangaratta High School in north-eastern Victoria was awarded a 4 Star Green Star – Education PILOT rating in August 2009 for Stage One of its three part redevelopment plan, becoming the first Green Star-certified school in Australia. Principal Heather Sarau has said that "the building and surrounds are spotless and there's no graffiti anywhere. The students tell me that they feel obliged to work harder in such an adult environment. I think that this is the future of secondary education."

ATTRACTING AWARDS AND GRANTS

The Royal Institution of Chartered Surveyors' report, Green Value: Growing Buildings, Growing Assets (2006) found that green building practices are more likely to attract grants, subsidies and other awards that demonstrate environmental stewardship, increase energy efficiency and reduce greenhouse gas emissions.

GREEN ENHANCES PRESTIGE

Operating from green facilities can attract new customers, clients and broaden community appeal. The Bond University Mirvac School of Sustainable Development in Queensland, which operates from the first 6 Star Green Star-rated educational facility in Australia, has identified a number of significant benefits of its green credentials, including attracting international students and developing research partnerships with other prestigious universities around the world. These benefits, alongside the environmental ones, have resulted in a sustainable financial return on their investment.

KEY ATTRIBUTES ✦

GREEN STAR EVALUATES THE GREEN ATTRIBUTES OF BUILDING PROJECTS BASED ON NINE CATEGORIES, INCLUDING ENERGY AND WATER EFFICIENCY, INDOOR ENVIRONMENT QUALITY AND MATERIALS.

The Green Star – Education v1 rating tool has many credits in common with the other Green Star tools available but has also been made unique to the education sector.

The following is a list of the key ‘sector specific’ credits that differentiate the Green Star – Education v1 rating tool from other Green Star tools:

- [Buildings as a] Learning Resource;
- Maintainability;
- Unoccupied Areas;
- Stairs;
- Efficient External Lighting;
- Centralised Energy Systems;
- Transport Design and Planning;
- Potable Water Use in Laboratories;
- Recycled Content & Reused Products and Materials;
- Flooring;
- Joinery; and
- Loose Furniture.

Another major difference is a customised energy calculator for the education sector. While the Green Star – Office suite of

rating tools incorporates the NABERS Energy Rating, an equivalent does not exist for the education sector.

The GBCA worked with the tool sponsors and other industry representatives in research which resulted in the customised Energy Calculator, Energy Calculator Benchmark Methodology document, and the Energy Calculator Guide.

The Green Star – Education v1 Energy Calculator assesses all education facilities equitably, independent of size or location, based on their predicted greenhouse gas emissions during operation

CERTIFICATION ✦

Green Star ratings will be awarded as outlined below:

The rating tools have been developed to be equitable across building sectors. This means a 5 Star Green Star – Education v1 project will demonstrate a similar level of industry leadership as 5 Star Green Star – Office v3 project.

Projects cannot achieve ratings of 1, 2 or 3 Stars at certification, as these ratings represent minimum, average and good practice, whereas Green Star aims to recognise and reward best practice and above.

THESE RATING TOOLS HAVE BEEN DEVELOPED TO BE EQUITABLE ACROSS BUILDING SECTORS.



4 Star Green Star Certified Rating

Weighted score of 45-59
Signifies 'Best Practice'



5 Star Green Star Certified Rating

Weighted score of 60-74
Signifies 'Australian Excellence'



6 Star Green Star Certified Rating

Weighted score of 75-100
Signifies 'World Leadership'

CATEGORIES AND CREDITS IN GREEN STAR ✦

GREEN STAR - EDUCATION V1



MANAGEMENT

- Green Star Accredited Professional
- Commissioning Clauses
- Building Tuning
- Independent Commissioning Agent
- Building Users' Guides
- Environmental Management
- Waste Management
- Building Management and Control System
- Learning Resources
- Maintainability



INDOOR ENVIRONMENT QUALITY

- Ventilation Rates
- Air Change Effectiveness
- Carbon Dioxide Monitoring & Control & VOC Monitoring
- Daylight
- Thermal Comfort
- Hazardous Materials
- Internal Noise Levels
- Volatile Organic Compounds
- Formaldehyde Minimisation
- Mould Prevention
- Daylight Glare Control
- High Frequency Ballasts
- Electric Lighting Levels
- External Views



ENERGY

- Conditional Requirement
- Greenhouse Gas Emissions
- Energy Sub metering
- Lighting Zoning
- Unoccupied Areas
- Stairs
- Efficient External Lighting
- Shared Energy Systems
- Peak Energy Demand Reduction



TRANSPORT

- Provision of Car Parking
- Fuel Efficient Transport
- Cyclist Facilities
- Commuting Mass Transport
- Transport Design and Planning



WATER

- Occupant Amenity Water
- Water Meters
- Landscape Irrigation
- Heat Rejection Water\
- Potable Water Use in Laboratories
- Fire System Water



MATERIALS

- Recycling Waste Storage
- Building Re-use
- Recycled Content and Reused Products & Materials

- Concrete
- Steel
- PVC Minimisation
- Sustainable Timber
- Design for Disassembly
- Dematerialisation
- Flooring
- Joinery
- Loose Furniture



LAND USE & ECOLOGY

- Conditional Requirement
- Topsoil
- Re-use of Land
- Reclaimed Contaminated Land
- Change of Ecological Value



EMISSIONS

- Refrigerant ODP
- Refrigerant GWP
- Refrigerant Leaks
- Insulant ODP
- Watercourse Pollution
- Discharge to Sewer
- Light Pollution
- Legionella



INNOVATION

- Innovative Strategies and Technologies
- Exceeding Green Star Benchmarks
- Environmental Design Initiatives

CATEGORY WEIGHTINGS

| | ACT | NSW | NT | QLD | SA | TAS | VIC | WA |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Management | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| IEQ | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% |
| Energy | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% |
| Transport | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| Water | 15% | 15% | 13% | 17% | 18% | 13% | 18% | 17% |
| Materials | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| Land Use & Ecology | 5% | 5% | 7% | 3% | 3% | 7% | 3% | 4% |
| Emissions | 5% | 5% | 5% | 5% | 4% | 5% | 4% | 4% |

The Innovation Category is not subject to an environmental weighting factor as the innovation could fall under any number of Green Star categories. More information and additional guidance on the weightings for the Green Star – Education v1 rating tool can be found on the GBCA website.

SPONSORS

Platinum

Department for Administrative and Information Services (SA Govt)

Gold

QLD Department of Public Works (QLD Govt)

CONTACT

Green Building Council of Australia

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www.gbca.org.au

For specific enquiries about education:

education@gbca.org.au

For help on how to market your Green

Star project: marketing@gbca.org.au

For information on membership of the

GBCA: membership@gbca.org.au

To register your Green Star project:

greenstar@gbca.org.au



PROJECT DATA:

Location

North Terrace Campus, Adelaide

Size

14,497m2 GFA

Owner

University of Adelaide

Architect and Interior Designer

Design Inc

Services Engineers

Umw Lai and Bestec

ESD Consultant

Umw Lai

Structural Consultant

Aurecon

Landscape Architect

Outlines

Quantity Surveyor

Currie and Brown

BUSINESS CASE INNOVA 21

TOP:

Innova 21

6 star Green Star - Education Design v1

INNOVA21, THE UNIVERSITY OF ADELAIDE'S NEW BUILDING FOR THE FACULTY OF ENGINEERING, COMPUTER & MATHEMATICAL SCIENCES, WAS AWARDED A 6 STAR GREEN STAR - EDUCATION V1 RATING IN MAY 2010.

This makes it the first project in Australia to achieve a 6 Star Green Star – Education v1 rating, as well as the first university in Australia to achieve a rating under the Green Star - Education v1 tool.

The eight storey building incorporates a range of environmentally-sustainable features complementing the design that helped the University achieve its rating as a world leader.

Professor James McWha, Vice Chancellor of the University of Adelaide said "Achieving a 6 Star Green Star rating demonstrates the University of Adelaide's environmental aspirations and commitment to world leadership in providing sustainable learning spaces for our students".

COOL STRUCTURES

Innova21 boasts an array of features which will help improve learning outcomes for students and reduce the environmental impact of the building.

One of these features is the project's innovative use of the building's foundation piles for geothermal energy storage. This system uses the thermal mass of the earth beneath the building to provide an efficient source of cooling for the building after hours.

The system involves reticulating chilled water, produced by the building's tri-generation plant, through pipework embedded within the foundations. This cools the ground, and in effect enables the building to 'store' energy to cool areas, such as data rooms, after hours, when the tri-generation plant is turned off. Cooling the building in this manner is more efficient as it allows most cooling potential to be produced using the tri-generation plant's absorption chiller, which uses waste heat to produce chilled water, rather than less efficient electric chillers.

The use of Geothermal Energy Storage is an Australian first and is calculated to reduce the building's cooling related CO2 emissions by 58 per cent.

AN ENERGY ISLAND

The natural gas-fired tri-generation plant - which supplies all of Innova21's electricity, heating and cooling requirements and will help deliver a 60.3 per cent reduction in peak electrical demand - is another innovative feature. Due to local planning laws, the plant has been designed to run in island mode, which means it is isolated from the grid. This posed a number of design challenges but was deemed worthwhile due to the significant operational, environmental and life-cycle savings offered by the plant.

Tri-generation installations typically convert around 75 to 85 per cent of the energy source into electrical power and useful heat. This compares favourably with conventional power generation which has a typical delivered energy efficiency of only around 30 to 35 per cent. This is particularly important in South Australia

where the majority of power is generated by coal-fired power plants.

Costs for the plant were further offset by reducing the need for traditional plant infrastructure such as back-up generators and separate boilers and chilling units.

DESIGNED TO EDUCATE

Innova21 has also been designed to be used as a learning resource itself. As the building will be used primarily to teach engineering students, it was decided that one measure of the building's effectiveness would be how well it could further the understanding of those students. To achieve this, a secondary building management system (BMS) was designed and installed which allows students to interact directly with the building's controls and operations function, while keeping their actions separate from the primary BMS. This enhances students' understanding of sustainable design and allows them to gain 'real world' experience in modifying building controls without adversely affecting the running of the building.

Innova21 was awarded one innovation point for each of these building features.

SUSTAINABILITY ALL ROUNDER

Jeremy Kwan, Senior Project Director at the University of Adelaide, reports that "Green Star requirements were integrated into all elements of design, construction and building operation."

Other sustainability features of Innova21 include 100 per cent fresh air delivery, which has resulted in visitors and regular building users alike commenting on the high air quality, a 500,000L water tank which harvests water from around the campus for use in the building's cooling towers and toilets, and high levels of recycled content incorporated into construction materials.

The project initially planned to install a blackwater treatment system, however investigation showed that it was better suited to a campus-wide application. As

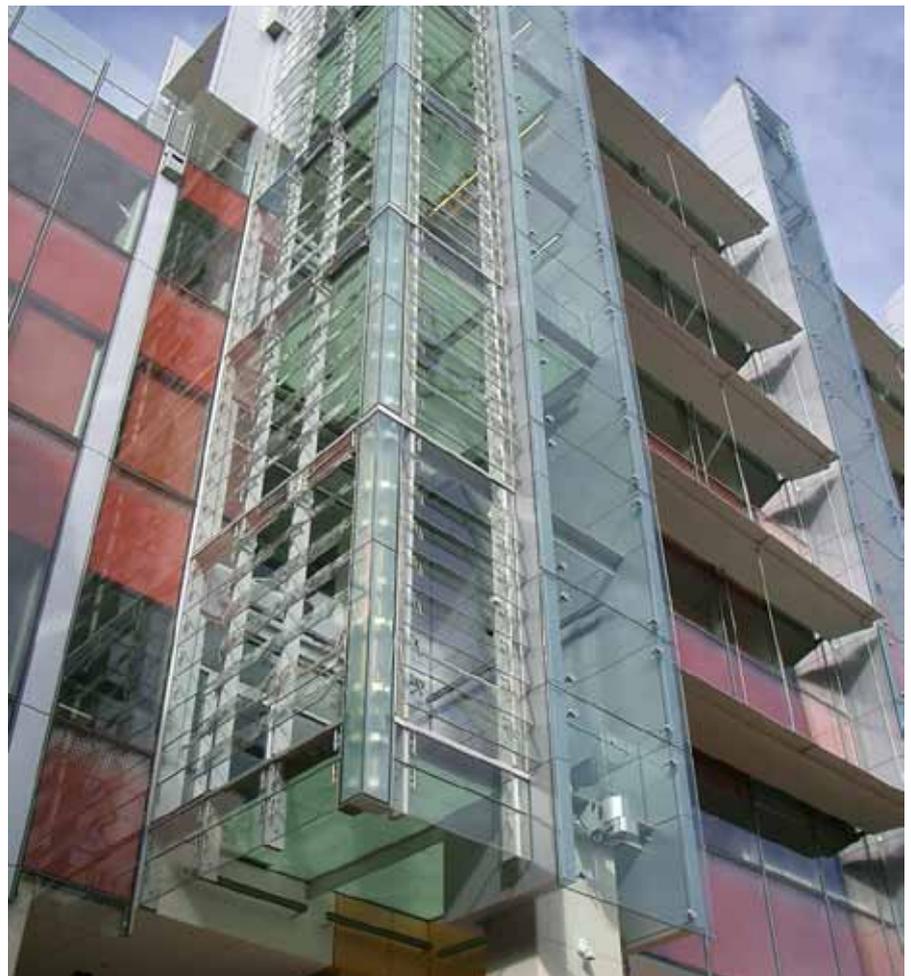
such, the University has now entered into an agreement with SA Water to connect the University to the Glenelg Adelaide Pipeline, a commercial treatment scheme.

According to Kwan, "occupants are overwhelming in their support of the Innova21 building and the goals and aspirations we set out to achieve. We are now promoting our achievements through campus tours, university open days and through public broadcast media releases. We believe our 6 Star Green Star rating will benefit University of Adelaide students and help create a better environment."

TOP:

Innova 21

6 star Green Star - Education Design v1



OTHER ESD INITIATIVES FEATURED IN THE PROJECT:

Energy

- BATISO hydronic slab cooling to maximise the thermal mass and reduce energy consumption
- Thermal chimneys, use of thermal buffer spaces
- Heat rejection from the computer server rooms via geothermal loops incorporated into the basement diaphragm wall
- Low E double glazed curtain wall
- Programmable DALI lighting system
- Provision for wind turbines in the building's structure

Indoor Environment Quality

- Underfloor air distribution system using 100 per cent fresh air
- Optimised daylight and views to the external environment

Materials

- Materials and furniture, fittings and equipment were selected for their low environmental impact, and minimal PVC, VOC and formaldehyde content.

IMAGE

Innova 21

6 star Green Star - Education Design v1

Credit: Diana Snape

