

ACT First 6 Star Education

Gold Creek Primary School Environment Centre achieves ACT's first 6 Star Green Star – Education Design v1 certified rating

The new Environment Centre at Gold Creek Primary School has been awarded a 6 Star Green Star – Education Design v1 certified rating by the Green Building Council of

Australia, the highest certification level possible under the Green Star environmental rating system for buildings. The Environment Centre is the first education building in the ACT to achieve a 6 Star Green Star - Education Design v1 certification. This level of certification was achieved by designing the building to be 'energy positive', which means it generates more energy than is consumed on site, along with various other environmental design initiatives to reduce its environmental impact.



PROJECT AT A GLANCE

ACT's First 6 Star Green Star - Education Design v1 certified rating which represents "World Leadership" in environmentally sustainable design

'Energy Positive' building, designed to generate 50% more energy from solar power than it consumes, an abatement of almost 9,000kg of CO₂ emissions each year

Naturally ventilated using operable windows and motorised louvers to maintain internal comfort

14.35kW Building Integrated Photovoltaics (BIPV) system to produce 20,792kWh of electricity

135,000 litre rainwater storage to reduce water consumption by over 80%

"In achieving a 6 Star Green Star - Education Design v1 certified rating, the Gold Creek Primary Environment Centre has raised the bar for sustainable design in education facilities right around Australia." - Romilly Madew, Chief Executive Officer, Green Building Council of Australia

The Environment Centre at Gold Creek Primary School was selected by the Education and Training Directorate (ETD) to be a lighthouse environmental project for the ACT Building Education Revolution (BER) scheme and has achieved a 6 Star Green Star - Education Design v1 certified rating.

Set the challenge of designing Australia's first energy

positive education building in Canberra's varying climate, the project team focused on reducing the energy load of the building. This was achieved through passive solar design, reducing heat gain, and using natural ventilation for cooling, while still providing the required thermal comfort conditions for staff and students.

The reduced energy load was then met by integrating PV into the

building's roof material. Instead of an over-engineered solution, the team met the challenge with relatively simple systems. Meeting the challenge of designing the first 6 Star Green Star - Education Design v1 primary school building in Australia meant that sustainable strategies were adopted, including reduce landfill waste in construction and operation, reduced energy and peak energy, conservation of water, and using sustainable building materials.

Design Evolution

The Environment Centre maximises the available natural energy for cooling, reduced heating, and lighting using the following passive design features:

- Longer Northern and southern façades with opening on either side;
- Short Eastern and Western façades with no openings to reduce internal heat loads;
- External shading of northern glazing to block the summer sun and reduce heat gain into the building;
- Motorised ventilation louvers below the windows and operable windows allow natural ventilation and improved thermal comfort for occupants; and
- 'Thermal chimney' designed to improve the natural

ventilation by using convection of air heated by passive solar energy.

The building's integrated design approach to reducing internal loads is vital to reducing the total

"This building is a great demonstration of how sustainable an education building can be" said Warren Overton, Managing Director of Viridis E3. "The integration of good design with smart technologies has delivered significant environmental benefits and we hope that many more buildings can learn from this project."

energy consumption of the building.

Energy Positive

The Environment Centre is naturally ventilated with no mechanical air conditioning system installed. The winter heating requirements are met by a 28.9kW gas fired boiler and double panel low temperature radiators to heat the internal spaces.

The Centre has installed a 14.35kWh Building Integrated Photovoltaic System (BIPV) on the northern facing roof which connects to the grid through an inverter.

Energy modelling of the Environment Centre estimates the facility will consume 8,643kWh (9,161kgCO₂-e) of electricity and 61,024MJ (4,028 kgCO₂-e) of gas annually. The photovoltaic system

installed on the roof produces 20,792kWh (22,039kgCO₂-e) of electricity annually which is provided into the grid. Therefore, in addition to generating enough energy to be energy neutral building, the building abates an

additional 8,850kgCO₂ of emissions per year, or 67% greater than energy neutral, making the building substantially energy positive. The project was awarded the maximum available points (20 points) under the Greenhouse Gas Emission Green Star credit, plus an additional 2 points for the innovation of exceeding the credit's maximum benchmark.

A building monitoring system controls the ventilation louvers and heating system to maintain comfortable conditions and monitors the energy consumption of the building as well as the electricity generation from the solar panels. This information is conveyed to building users on an LCD display within the centre to help educate students about their building and behaviour.

Motion detectors in each zone are linked to the building monitoring



system to reduce the heating and lighting loads in unoccupied zones.

Water Conservation

Potable water used for irrigation, community garden and toilets in the Environment Centre has been reduced by installing 3 tanks of 10kL capacity each above ground and a 105kL underground rainwater tank. It is expected that enough rainwater can be captured on site to more than meet the needs of these uses.

The Centre has also installed a 1,000L grey water collection tank with a submersible pump which redirects the waste water from the basin areas to an efficient drip irrigation system that waters the orchard area of the site.

Efficient tap and toilet fittings and fixtures are used throughout the environment centre to reduce potable water use. The efficient

“May + Russell Architects are extremely excited with the 6 Star Green Star Design certification achieved on the new Gold Creek Primary School Environment Centre. We hope the building acts as a beacon of learning for students and the local community on the environmentally sensitive design and construction initiatives that are possible and achievable through a combination of vision, design and construction.”
– Senior Architect, Jeremy Mather

fittings and fixtures along with the rainwater and greywater system installed are expected to reduce the water consumption from 0.33L/m² per day down to only 0.06 L/m² per day which equates to a saving of potable water of over 80%.

The building management system monitors the water consumption of the building. This information is to be conveyed to building users on an LCD display within the centre to help educate students about their building and behaviour.

Other Environmental Initiatives

Reduced Construction Waste

Construction waste management was targeted to divert over 80% of construction waste from landfill.

Building Integrated Photovoltaic

A Building Integrated Photovoltaic (BIPV) system was installed which has a dual function as the roofing material and energy generation system, reducing the standard roofing materials required and therefore the costs of the solar system.

Sustainable Building Materials

The project targeted the use of more sustainable materials, including concrete with reduced cement quantities, reduced PVC, and recycled content in block work.

Improved Air Quality

Use of low Volatile Organic Compound (VOC) adhesives, sealant, paints, and carpets were targeted to improve the indoor air quality for building users.

Night Heat Purging

Night purging, a feature which uses the low overnight external temperatures to pre-cool the building, assists to maintain comfort conditions during daytime without the need for air conditioning.

Automated Systems

The heating and natural ventilation systems are fully automated, requiring no manual intervention from occupants. Manual overrides are provided on a timer system for after-hours use.

Lighting Systems

Instead of providing single light switches for large spaces or multiple rooms, separate light switches are provided to minimise lighting loads within the centre.

The lighting system within the building has been designed to minimise over illumination, which can result in eye strain for the building users and wasted energy, while still providing the required lighting levels for comfort and safety. The standards state minimum lighting levels that should be achieved to maintain the comfort and safety of the building users. The system also

includes the use of movement sensors and daylight dimming to further reduce energy consumption.

External lighting has been designed to minimise light pollution into the night sky and meet required lighting levels without over illuminating the external spaces.

Energy and Water Sub-Metering

Energy and water meters have been installed throughout the building to assist in the monitoring of the building's consumption. Comparing the metered readings to expected usage targets will help identify any overuse within the centre and isolate the system causing the losses.

Raising the Ceiling

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Australia.” - Romilly Madew, Chief Executive Officer, Green Building Council of Australia.

The project’s approach in first using passive design solutions to reduce the building’s base loads and then intelligently using active systems to achieve the best

possible sustainable solutions results in the significant reduction in energy, greenhouse emissions, waste and water use and is an example of how buildings can be designed and built to more sustainably use precious resources.



Location

Kelleway Ave, Nicholls, ACT

Total Floor Area

222m²

Owner/Developer

ACT Education and Training Directorate

Project Manager/Builder

G.E Shaw & Associates

Architect

May + Russell Architects

ESD Consultant & Energy Modeller

Viridis E³

Mechanical, Electrical & Fire Consultant

GHD, Canberra

Hydraulic, Civil and Structural Consultant

Sellick Consultants

Independent Commissioning Agent

Phoenix Engineering