

# A FORCE IN SUSTAINABLE DESIGN

The \$30M Global Change Institute Building will include 4 Levels plus a basement with a gross floor area of 3,680 m<sup>2</sup>. The building will essentially be an extension of the existing Steele Building on the UQ St. Lucia Campus.

CLIENT : The University of Queensland  
MAIN CONSTRUCTION COMPANY : McNab Constructions  
PROJECT END VALUE : \$30 Million  
COMPLETION : July 2013  
ARCHITECT, INTERIOR, LANDSCAPE : HASSELL  
STRUCTURAL / CIVIL ENGINEER : Bligh Tanner  
QUANTITY SURVEYOR : Rider Levett Bucknall



**The Global Change Institute Building at The University of Queensland (UQ) is a pioneering force in sustainable design practice and research.** The 4-storey building, designed by Hassell Architects, is an extension of the existing heritage-listed Steele Building on the UQ St Lucia Campus. It will act as a hub for the development of new technologies and research into global issues such as population growth and climate change.

This highly innovative building will also be Australia's first tertiary education building to achieve net zero energy output- by targeting a "Zero Carbon and Zero Energy" strategy. Bill Boyd-Law, General Manager of Construction at the University of Queensland, says pioneering such state-of-the-art technologies has been challenging. "The sustainability features supported by the University to accommodate spatial requirements and the degree of risk to experiment with new construction materials and systems has inherent issues."

Initiatives undertaken to meet this goal include the use of a sub-basement labyrinth system, which will draw cool air throughout the building. Other features include the use of solar power, solar comfort cooling and operable layered facades to control light and air flow. A special roof made of ethylene tetrafluoroethylene (ETFE), controlled by pneumatic action, will also help to mediate light interception in a large public atrium, which will feature a living green wall and waterfall.

In addition, the building will house a central control, monitoring and display facility, directly linked to UQ's renewable energy systems and the 1.22MW solar array, Australia's largest solar flat-panel photo-voltaic grid electricity generator. The PV solar array reduces the St Lucia Campus's peak electricity consumption by 6 per cent and carbon emissions by 1.14 kt CO<sub>2</sub>e per annum.

The primary aim of the 3680m<sup>2</sup> building will be to demonstrate sustainable technological research and trial sustainable building solutions.

Spaces include meeting rooms, seminar rooms and ad-hoc meeting spaces, as well as a main exhibition zone, which is designed to show groups new sustainable technologies.

The building has been cleverly designed to allow a connection to the outdoors from most

areas. Level 2 has seminar and small group working rooms from which the courtyard space can be accessed as a breakout and informal meeting area.

The headquarters and offices for the Global Change Institute staff are on level 3 and consist of open plan work spaces and a board room. Staff can break out onto the balcony that overlooks the courtyard space.

The basement level houses a battery store, rainwater storage tank, solar inverters, building air handling equipment and other special technologies including a grey water treatment system. There is a platform from which people can view these new technologies in action.

As part of its sustainable philosophy, the building houses open, paperless multi-space learning and office environments. In an effort to promote energy efficient travel to the University, bike storage and additional shower facilities are also included in the building's design.

There have been a number of challenges in the design and construction of the GCI building, which has required ongoing communications between all parties involved.

This includes building material selections and campus-wide initiatives to address the Living Building Challenge requirements. That is, a building that makes a positive contribution to climate and ecology as an energy provider with zero carbon and waste footprints. The University funded an additional research team and consultants to directly deal with the Living Future Institute at a high level to negotiate alternative approaches that can benefit the project and campus more directly.

Furthermore, the integration of fire separation and heritage requirements into the adjoining heritage listed Steele Building has been a challenge. According to Mr Boyd-Law, this has been addressed by the University "allowing specialized fire engineering and heritage consultants to work collaboratively with the architect to develop options and details, negotiating and eliminating existing constraints, to allow best design outcomes."

*For more information contact The University of Queensland Brisbane, St. Lucia, QLD 4072, phone 07 3365 1111, website [www.uq.edu.au](http://www.uq.edu.au)*

# STRUCTURAL STEEL AND ARCHITECTURAL STEEL SPECIALISTS

**Bridge Fabrications is a family-owned business operating from Rocklea, Brisbane. The company services South East Queensland for architectural and structural steel projects.**

Founded in 2001 the company has grown to become an important player in the structural steel marketplace. During the course of business, directors David and Anthony Ridout found that there existed a need in the market for a boutique steel fabricator, which was capable of producing high quality architectural steel for the Brisbane marketplace.

With highly skilled project managers, draftsman and foremen on board, Bridge Fabrications has grown from a small family run business into a medium sized structural steel business. Projects undertaken range from refurbishments to large portal sheds, with the company specialising in medium sized structural steel projects.

The company has invested in cutting-edge technology to ensure all projects are accurately cut and fabricated to exact standards. Using modern 3D software, each project is managed from the saw through to being delivered on site.

The Global Change Institute (GCI) was an intricate project that demonstrates the company's ability to transform complex architectural visions into reality. It involved an extremely high level of coordination and detailing to ensure the design intent could be realised.

The building showcases the craft of structural steel, which is a feature trade within the building. Bridge Fabrications worked on the building's main and atrium roof, two sets of stairs and level 3 walkway, the greenwall, plus the loading dock canopy- and has employed a number of new and innovative products and processes throughout.

The structure is made from 100% Australian steel and all products are Greenstar-accredited and where possible, locally sourced. This is unique to this project and is markedly different from other construction projects in Brisbane.

The building's atrium roof is made from an ETFE (Ethylene tetrafluoroethylene) membrane, which is currently the first application of this type of structure in Australia. This technology was previously used at the Water Cube Swimming Pool that was built for the 2008 Beijing Olympics.

Bridge Fabrications' Anthony Ridout explains this technology, whereby "essentially, temperature controlled air is pumped through a plastic membrane pillow roof creating a temperate climate below and by adjusting the amount of air trapped inside, brightness can be adjusted as the pillow is inflated or deflated. To meet the challenge of ensuring the ETFE would work as designed, it was critical that all steel components in the fabrication and erection of the atrium roof were perfect to the millimetre."

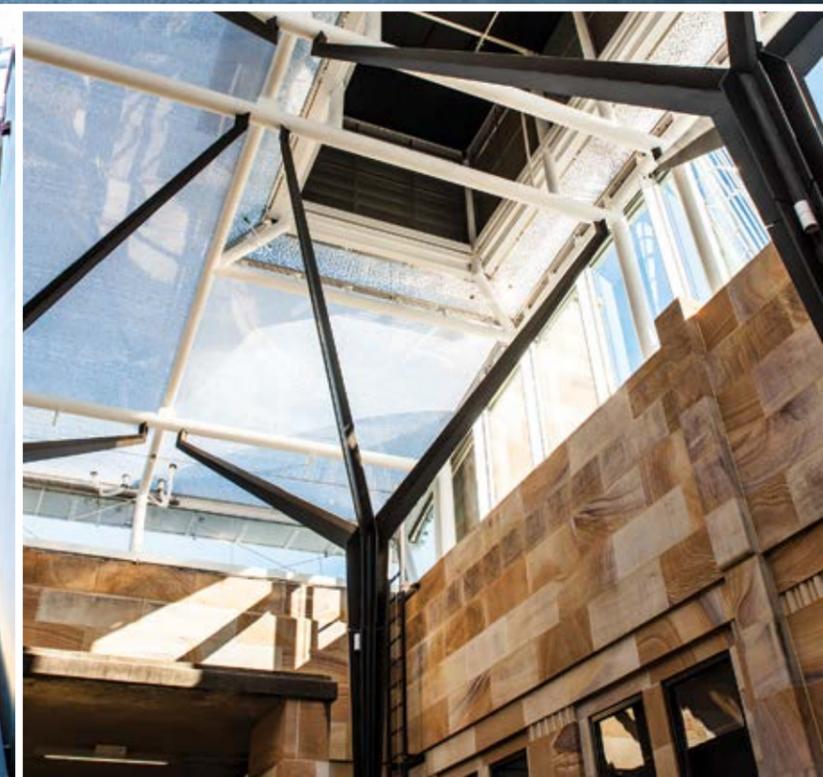
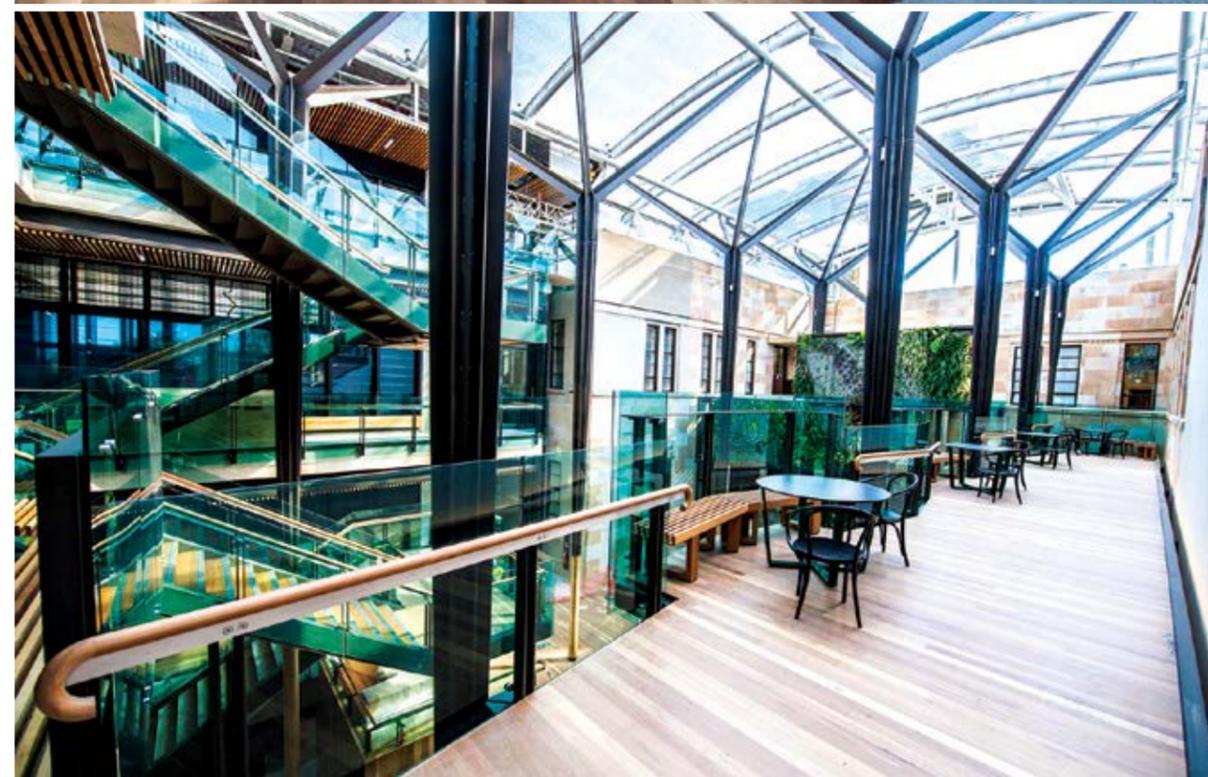
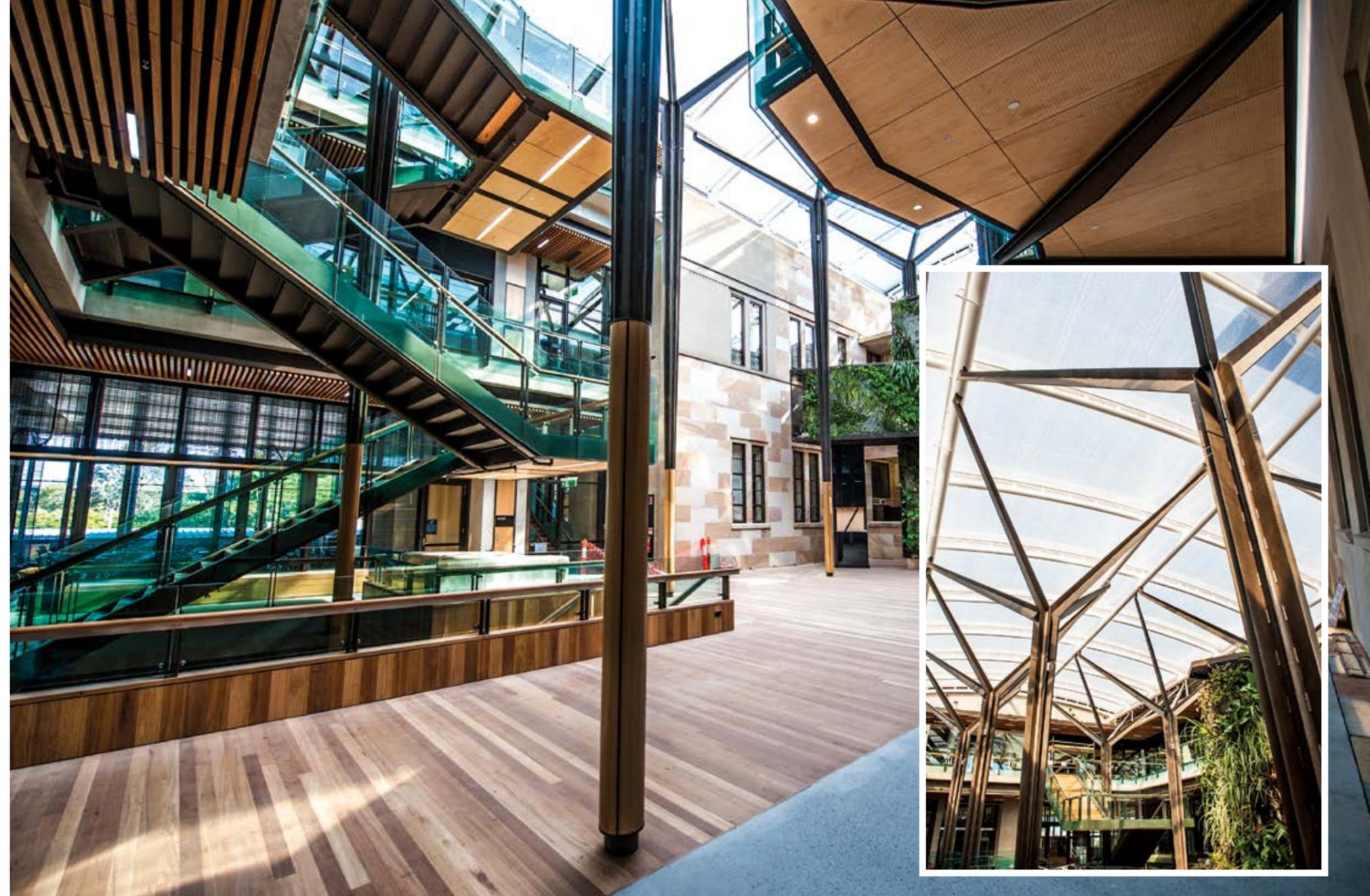
Upon application of the ETFE membrane to the steelwork in January 2013, Anthony says, "the installers commented on how well the steelwork was made, installed and stated that in only 20% of cases worldwide does the steelwork fit in the way it was designed. Bridge Fabrications workmanship fell into the 20% category and not one piece of atrium steelwork needed modification. This is testament to the detailing, fabrication and erection excellence of the steelwork at GCI and demonstrates Bridge Fabrications commitment to high quality workmanship."

In addition, to ensure high precision, robotic plasma cutting and etching was utilised to minimise errors in fabrication by robotically marking beams to enable millimetre perfect fabrication of beams and cleats.

The company has been involved with refurbishments ranging from the highly visual Eagle Street Pier redevelopment, to the creation of the new RSPCA headquarters in Wacol, Brisbane, as well as the Ipswich Rugby Club.

Bridge Fabrications is committed to excellence in engineering and service, with the GCI project again demonstrating professionalism and the use of quality steel products.

*For more information contact Bridge Fabrications, PO Box 272 Archerfield QLD 4108, phone 07 3373 8777, fax 07 3875 2556,*





Interactive display located outside the Global Change Institute main plenary room



## THE WORLD'S SMARTEST SUSTAINABILITY SYSTEMS

## EXCELLENCE IN DRAFTING & DOCUMENTATION THROUGH TECHNOLOGY

MaxCAD began operations in 1989, providing computer aided drafting services to the mechanical services industry in Brisbane. They have since added programming services and software development to their business, as well as diversifying into other states, working on major projects in most Australian states and territories.

MaxCAD's main role on the University of QLD - Global Change Institute project was to prepare fully co-ordinated workshop drawings for the mechanical services and air conditioning.

The team also prepared detailed workshop drawings with dimensional set out for both the electrical services and hydraulics services. As Andrew Dunn, Managing Director of MaxCAD explains: "This is unusual in that electrical and hydraulics contractors rarely produce detailed drawings, making co-ordination of the services very difficult, if not impossible. Because we were producing drawings for all trades at the same time within the one office, we were able to use 3D modelling techniques to properly co-ordinate the trades and perform clash detection to resolve problems before they happened on site. This then resulted in a much faster build time on site. It also means that there were very few changes

on site so the as installed documentation at the end of the project is more accurate."

Central to MaxCAD's success is the use of their MEPtrix software for the preparation of 3D models, providing quick and effortless detailing of the 3D information in 2D format. They have found that early drawing preparation and effective co-ordination using 3D modelling techniques are highly beneficial to the overall project.

Maxcad have worked on many significant projects in the past including the new Paediatric Department at Prince Charles Hospital, the Latrobe University Institute for Molecular Science and the Australian National Library refurbishment in Canberra. Currently they are providing services for developments including Perth International Airport extension, Rockhampton Hospital and the Bond University School of Architecture building on the Gold Coast.

*For more information contact MaxCAD Drafting Services Pty Ltd, Unit 33, 27 South Pine Road Brendale QLD 4500, phone 07 3205 7644, website [www.maxcad.com.au](http://www.maxcad.com.au)*

In bringing together some of the most advanced innovations in renewable energy and sustainable technology, the Global Change Institute (GCI) at University of Queensland will be using systems developed by Johnson Controls to maintain optimum functioning of everything from mechanical systems through to energy management. Over 18 months, Johnson Controls designed, engineered, manufactured, supplied, installed and commissioned the building's automation and control systems, which now connects to one of the largest BMS systems in the Southern Hemisphere.

"The challenge was the integration of multiple services together to give an energy-neutral building," said Johnson Controls Queensland Systems Branch Manager, Mark Chiles. "All our systems had to integrate into the IT system, which required extensive liaison with the University. Programming and commissioning took four months, and Johnson Controls will maintain a long-term involvement with the GCI through the initial period of fine-tuning, and provide a 24/7 assistance service on an ongoing basis. "The systems we design are part of the growing trend towards alternative and efficient technologies. We have been partnering with the University of Queensland for more than 20 years, and our other recent projects have included the Advanced Engineering Building and the Centre for Advanced Imaging. "

Elements which have been integrated into the GCI's state-of-the-art BMS include free-energy comfort conditioning; window louvres and thermal chimney; ventilation systems; chilled water in-slab cooling; solar thermal

hot water; hydraulic systems; CO2 and VOC monitoring; ETFE Atrium roof control system; lift systems; electrical systems and infrastructure systems. The METASYS® Control system incorporates both hardware and software elements, with a mix of automated functions, such as solar-responsive sunshade movements, and directly controllable functions, like room booking. Every system's data is accessible to the authorised UQ staff via secure web browser, enabling rapid response to any detected issues.

Sustainability is a core value of Johnson Controls, a global company which began in the USA and brought the world the first electric room thermostat in 1885. For the past four years they have been named as one of the world's most ethical companies by the Ethisphere Institute, in recognition of their commitment to best business practices, environmental sustainability and corporate responsibility.

World-wide the company has 168,000 employees, all engaged in creating and delivering the technology which has made a positive difference to the sustainability and efficiency of more than one million commercial buildings across the globe. Each year, we are involved in more than 100 renewable energy projects including solar, wind and geothermal technologies. Our solutions have reduced customers' carbon dioxide emissions by more than 20 million metric tons and generated savings of \$7.5 billion since 2000.

*For more information contact Johnson Controls Australia, 4/101 Newmarket Road, Windsor, 4030, phone +61 (7) 3630 3010 (direct), email [mark.chiles@jci.com](mailto:mark.chiles@jci.com), website [www.jci.com](http://www.jci.com)*



## MECHANICAL AND ELECTRICAL SERVICES

Medland Metropolis is a unique building services engineering company committed to engineering excellence, offering independent design advice for environmental, mechanical, electrical, fire, hydraulic and vertical transportation design. Medland Metropolis recently designed the mechanical and electrical services for The University of Queensland's Global Change Institute (GCI). A building of firsts the GCI Headquarters Building itself will be used as a research tool, designed to target a minimum 6 Star Green Star Education Design and As-Built Rating.

Achieving Net Zero Carbon and Energy outcomes was a key aspiration leading to the design of a 145Kw solar array, 139Kw on site leading edge battery storage system, latest LED lighting technology and comfort cooling system. GCI is the first education building in a sub-tropical climate, to be cooled using a three stage desiccant, heat recovery solar air cooling

system. Radiant slab cooling and chilled water heat pumps using R290 refrigerant gas also provide further cooling. The Building Management System is responsible for coordinating the automated window louvers, natural ventilation, comfort cooling, solar array, battery power storage and eco power outlets, whilst also gathering monitoring data for further building research.

As a finalist in the AIRAH 2012 Awards of Excellence for the mechanical solar cooling, the building already presents itself as a beacon for World Class sustainability. Also targeting Living Building Challenge accreditation, it is hopeful to be joining only a handful of buildings around the world, to be recognised as a truly world leading building.

For more information on Medland Metropolis, phone 07 3391 9800 or visit [www.medland.com.au](http://www.medland.com.au).

Uni of QLD - Global Change Institute facade  
Left - Interior

