life cycle

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#23 NEXT EDITION

A LOOK INSIDE BARANGAROO'S BLUE CHIP TENANTS.

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Cover Image Canberra College Cares

Comments, feedback and letters to the editor are encouraged: lifecycle@ndy.com

Correction: Edition #21 of Lifecycle featured a story on Mater Private Hospital in Springfield Queensland. The Collaborative Team list on page 30 omitted one of the key contributors to the project, PDT Architects.

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Introduction.

Much of my life is spent travelling.

When I'm not crossing continents to visit NDY offices, I enjoy visiting foreign locations with my family. And during my travels, I'm constantly reminded of the profound impact of engineering on our lives.

Mobile device technology allows me to make my travel arrangements, confirm bookings, make payments and select my seat before a flight.

There are the roads, tunnels and bridges that provide safe and effective transportation routes over land with intelligent traffic management systems that allow our cities to function and thrive, and help me to reach the airport, as efficiently as possible.

Our airports, and the aircraft that frequent the terminals, are, in themselves, masterful pieces of coordinated engineering.

As I wait to board a flight, I can seamlessly complete work or communicate with the world on my mobile devices, or simply relax and enjoy the latest entertainment, through an invisible network of wireless and cloud solutions.

In flight, I can look down over the built environment, at the schools and universities educating our leaders of tomorrow; hospitals performing life-saving procedures; commercial buildings keeping the wheels of industry turning; stadiums showcasing acts of human achievement; wind farms producing clean renewable energy; and data centres housing the information that allows much of our daily activity to proceed with efficiency and reliability.

Everything we manufacture, build, use, and rely upon, has an engineer's fingerprints on its design.

For me, engineers are often unsung heroes, quietly making a meaningful difference to our lives in every imaginable way. Some wonderful examples are captured in this edition, each a clear and tangible expression of NDY's own purpose - Making Spaces Work.

Enjoy the read.

Stuart Fowler
CEO

Twitter: **@swf_engineer**

MAKING SPACES WORK IN CANADA

Tony Arnel, Global Director of Sustainability, Norman Disney & Young

PREVIOUS PAGE AND ABOVE: The NDY Sterling Cooper designed Fairmont Pacific Rim rejects heat to sea water to eliminate cooling tower chemical usage.

RIGHT: As the tallest building in Vancouver, the NDY Sterling Cooper team designed a ground source heat rejection/recovery system.

With almost 10 million sq m of certified green building space, Canada is one of the world's most mature green building markets.

Canada certified almost 35 million sq m of floor space in 2016 under the Leadership in Energy and Environmental Design (LEED) rating system, and the total number of LEED-certified projects now exceeds 2,900.

Canada is a linchpin in the $1 trillion global green building market – and is a valuable contributor to jobs and economic growth throughout the nation.

The Canada Green Building Council's Green Building in Canada report, published in 2016, found that sustainable building generates $23.6 billion in GDP and supports almost 298,000 direct jobs. What's more, Canada's portfolio of LEED buildings certified over the decade to 2015 will generate $63 billion in GDP over their lifetimes and create more than 700,000 jobs.

Promising to prioritise action on climate change during his election campaign, Prime Minister Justin Trudeau has committed to an ambitious 2030 target to slash greenhouse gas emissions by 30 per cent below 2005 levels. The Canadian Government has also developed the Pan-Canadian Framework on Clean Growth and Climate Change, which outlines an approach to price carbon pollution and measures to increase technological innovations that support Canadian businesses in a global low-carbon economy.

Leadership at the city level is also taking shape. The City of Vancouver passed its Zero Emissions Building Plan in August 2016, which requires that all new construction emit zero operational carbon by 2030. The Passive House building standard is being used as a framework to fulfil the plan, and the number of Passive House Canadian buildings has accelerated rapidly.

Vancouver's Deputy Mayor, Councillor Andrea Reimer, drove the award-winning Greenest City Action Plan, making Vancouver a global leader in environmental action.

"The Greenest City Action Plan is a broad, long-term strategy to make Vancouver the greenest city in the world by 2020," Reimer says.

WE ARE PARTICULARLY FOCUSED ON DOUBLING THE NUMBER OF 'GREEN JOBS' IN OUR CITY. WORLDWIDE, GREEN JOBS ARE OUTPACING OTHER KINDS OF ECONOMIC DEVELOPMENT THREE TO ONE, AND WE THINK THIS MAY BE A KEY TO OUR CITY'S FUTURE GROWTH.

– **ANDREA REIMER** Vancouver's Deputy Mayor

"Specific goals include reducing our ecological footprint, vehicle traffic, greenhouse gas emissions and waste going to landfills. We are also encouraging bike, foot and public transit trips and local food production, improving air and water quality – and of course greener buildings.

"We are particularly focused on doubling the number of 'green jobs' in our city. Worldwide, green jobs are outpacing other kinds of economic development three to one, and we think this may be a key to our city's future growth."

On the other side of the country, the City of Toronto continues to work with building owners, managers and the development industry to ensure that buildings achieve high energy performance and low environmental impact. The Better Buildings Partnership has helped facilitate more than 2,500 retrofit projects, representing a gross floor area of 52 million sq m in floor space.

The economic impact of this has been extraordinary. More than 60,000 'person years' of employment have been created, with cumulative cost savings of almost AUD $380 million. More than 3.8 million MWh of electricity has been saved, and 690,000 tonnes of emissions – the equivalent to powering 72,000 average homes for a year.

In 2016, NDY expanded into Canada by acquiring the established mechanical engineering firm, Sterling Cooper. With an office in Vancouver, this acquisition enhances NDY's market-leading position as a global sustainability specialist.

CaGBC's President & Chief Executive Officer Thomas Mueller says "NDY has a solid reputation for leadership in sustainability" and is "delighted to welcome NDY into the fold as a member" of what is now the world's second largest green building council.

Mueller says Canada has "just 13 years to reach aggressive national and international commitments to climate change" but that the size and scope of LEED-rated projects around the country and the upcoming release of a net zero carbon standard for Canada mean the industry is ready to "hit the ground running and do our part in the countdown to 2030."

CANBERRA COLLEGE CARES PROVIDES A FUTURE FOR YOUNG PARENTS AND THEIR CHILDREN

The Canberra College Cares facility is designed to provide a harmonious blend of occupant wellness, security, and specialised educational capabilities, to enable students with children to continue their education, and provide realistic job outcomes.

Students range from early teens to mid twenties, and their children are pre-birth to school age. The facility provides for the comfort, security and safety needs of this cohort, along with their educational requirements.

Pregnant and parenting students face enormous challenges in continuing their education. Coping with the added responsibility and demands on their time makes attending school an incredibly difficult task. Jan Marshall, is the Deputy Principal and coordinator of the CCCares program, and she has long championed the welfare of these students, providing the necessary drive and momentum that helped the previous facility succeed.

"We began in the early 2000's when we had a facility that catered for students who were not achieving success in the mainstream school system," says Marshall. "What we found was that the amount of young pregnant women who were being referred to the program or coming to us for support grew rapidly – much faster than we expected."

The success of the program meant the facility soon exceeded capacity, creating the need for a bespoke building that was designed to support and enable the students and staff.

"The old premises was so successful that we outgrew it," says Marshall. "We have constant enrolments and welcome any student who wants to join us on the same day, and they often stay with us for several years. This means that we have to be very flexible with our program, and the facility needs to be able to cope with that."

GOVERNMENT RECOGNITION

The ACT government recognised that the students who used the program were taking the opportunities that were presented to them, and approved the plan to build a state of the art facility that supported the needs of parenting students, and their child.

The space is designed to generate a feeling of "belonging" for students, creating a safe and supportive space that they can feel connected to. Providing students with a sense of ownership and contribution is a method to create this belonging.

"Each student is responsible for various tasks along with their studies," says Marshall. "They might clean an area, work in the café or spend some time with the children in the childcare section. This is in addition to their studies, and encourages them to develop a balance between work and parenting."

A COLLABORATIVE DESIGN

With such a unique facility, creating a design that supported and enabled the students and their children was more than a matter of providing a functional building. Consultation and collaboration between service providers, the client and the students was an important factor in developing a bespoke facility.

"We spent a lot of time consulting with staff and students," says Shoba Cole, Senior Architect at May + Russell Architects. "We realised that we had to create a relatable – not institutional – feel to the building design. We wanted to create a funky and functional space for the occupants to enjoy and feel a sense of belonging and ownership. NDY really helped us to create a great space, including the lighting which was a very unique installation format."

May + Russell also provided a unique ceiling design that is highly decorative, but still supports the function of the space. "The ceiling was very complex and dynamic," says Sherry Xu, NDY's lead engineer on the project. "Ceiling height varies throughout the building, so May + Russell collaborated with us to provide extensive coordination of services in the ceiling."

"Access to services above the ceiling was also coordinated between architects and engineers to minimise number of access panels required, ensuring the complex ceiling features were highlighted, and that the functional aspects didn't detract from the visual appeal."

The lighting formed an integral part of the wellness goals of the fitout, providing the sense of comfort and blending natural and artificial light to put occupants at ease. Vivid colours and shapes were blended with the ambitious lighting designs to create a vibrant and unique space.

"The building is vibrant and alive," adds Marshall. "At any time, we have music in the background from jazz through to Disney music, there's beautiful smells coming from the kitchen and coffee machine, and there's kids laughter following you wherever you go around the building. It's just a lovely place to spend your day."

PREVIOUS PAGE:
The exterior combines playful colours and structural elements with practical shading.

THESE PAGES:
The architects vision was for fun and functional spaces providing users with a sense of belonging and ownership.

ONE BUILDING, THREE SPACES

The building is divided into learning sections, study areas and the children's space.

The learning area incorporates the study spaces, as well as purpose built facilities for specific learning disciplines, such as Hair and Beauty salons, Hospitality kitchens and a café.

The study area is an open workspace for students to work collaboratively or on their own, in a way that is comfortable for them.

The third area is the children's space. This is the unique space that provides the students with the support facilities that they need, such as integrated childcare, three playrooms for different aged children, a medical suite for visiting health care professionals and a shared dining area. This space had to function as a welcoming and nurturing environment to the children, while ensuring that they are kept safe and secure during their parent's class times.

EMPOWERING THE FACILITY

Construction of the new building provided several challenges. The most difficult obstacle involved providing the necessary power to the building. The Canberra College substation was not up to the task of handling the extra load required from the new building, with the long cable distance and voltage drop causing problems with the building's power supply.

"The substation was a challenge," says Sherry Xu. "The substation wasn't putting enough voltage through to the building, so we worked with the electricity supplier to get the substation voltage upgraded, and the building now has a reliable power supply."

The upgraded electrical infrastructure also benefitted the entire campus, providing a power supply that could handle the maximum load, with additional capacity.

SAFE AND SECURE

Security was a major factor in the building, both to protect children from accessing potentially dangerous areas, and ensuring that only authorised people had access to the space.

"When children are involved, safety is a primary consideration, says Xu. "We worked with the consultants and CC Cares to design a system that provides a secure environment, without feeling like it was a restrictive institution.

"Balancing the security aspect with a pleasant feel was a tough challenge, but the 'airlock' style entry and the need to be admitted from the inside were integrated into the design in a way that didn't detract from the welcoming feel of the entrance area."

The end result it a well-appointed facility that feels like a home to staff and students. The benefits to the students are immense, offering them the opportunity to develop marketable skills in a supportive environment, as they find the balance between a career and family life.

ABOVE AND BELOW:
Spaces have been designed for flexibility including group learning, childcare facilities and shared amenities.

KEY COLLABORATIVE TEAM

CLIENT ACT Government Education Directorate

ARCHITECT Shoba Cole from May + Russell Architects

BUILDER Richard Crookes

STRUCTURAL AND CIVIL ENGINEER Mott MacDonald

ENGINEERING SERVICES NDY

SUPERINTENDENT Xact Project Consultants (Lyndell Roberts)

NDY SERVICES

- Communication
- Electrical
- Mechanical
- Security

FOSTERING A LEGACY IN LONDON

200 Gray's Inn Road is the work of renowned architect Sir Norman Foster, with a design that proved generations ahead of its time. But updating classic buildings to suit modern office requirements - while staying true to the original design intent - requires skilful consideration.

Located in the heart of London this property was built in 1990 by ITN as its headquarters and broadcasting hub. The challenge for the owner, architect and design team embarking on a phased refurbishment of the building, was to modernise the fitout to ensure original design intent whilst ensuring 24/7 operations for Britain's largest independent news broadcaster.

"200 Gray's Inn road was first conceived by ITN as their purpose built headquarters," says Ian Cartwright, Project Manager for Great Portland Estates. "The Foster + Partners design proved to be a unique scheme for an office building. Compared to most modern buildings, the structural loadings and floor to ceiling heights are completely different to the normal standards for offices today."

Making the most of the design meant bringing the features of the building to the fore. Once the existing services were stripped out, a surprising discovery was made – a coffered slab. This unexpected element meant a shift in the design approach.

"Once we discovered this coffered slab the client brief changed," says NDY Senior Mechanical Engineer, Ragz Padayachi. "The principle focus became exposing the soffit to make a feature of the ceiling and to have exposed services throughout. This meant we had to go back to the drawing board and change the services strategy."

The key to exposing the soffit was to opt for a displacement system for ventilation and cooling. The redesign meant that the mechanical services had to be moved to the outer extremities of the building, exposing the soffit, and reducing the noise and vibration being transferred into the broadcasting areas.

The 24/7 nature of ITN also meant that installing the services while the building was in operation required careful planning and minimal disruption of business operations.

Energy efficiency was also highlighted as a target by the client, which was addressed using simple but effective design elements. Glazed windows and walls reduced the amount of heat that could enter or escape the building, and LED lighting was installed throughout, providing reduction in waste heat and energy usage.

The fire strategy was a further challenge for the design team. The original exposed sprinkler system detracted from the ceiling features, so removing unnecessary portions of the system was identified as an area for improvement.

"We undertake modelling of the refurbished floors to look at the risks of fire spread," says Richard Sherwood, NDY Fire Section Manager. "By doing this, we are able to show that the existing smoke control systems adequately mitigated any risk, and we were able to remove the sprinklers from certain feature areas."

The refurbishment extended beyond the base building design, updating the tenancy fit outs to reflect the requirements of a modern office environment.

NDY was engaged by Warner Brothers and MetaPack to complete a fit out design for their tenancies that took advantage of the architectural features in their space, while also providing them with the services infrastructure that they required.

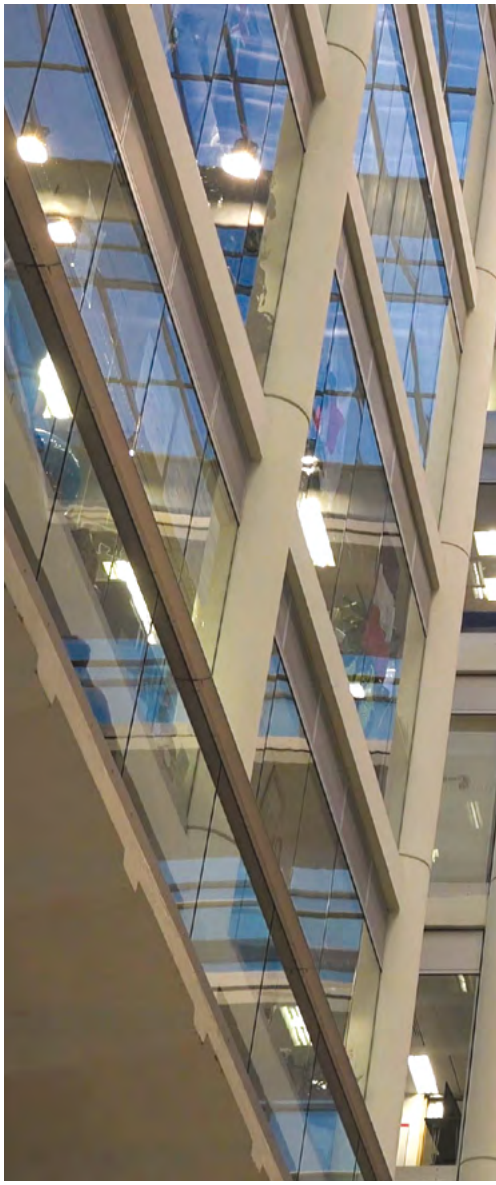
"The nature of work undertaken by Warner Brothers means there are specific requirements for highly rated acoustic offices and meeting rooms," says Ben Martin, NDY Mechanical Project Engineer. "As a result we altered the base build system to suit the needs of Warner Brothers.

"The MetaPack fit out was very open plan, which suits the base build system well, however, we had pockets of high-density areas where we had to supplement with cooling to create an innovative solution by collaborating with the architect to implement the system," adds Ben.

That collaboration allowed the refurbishment to achieve the functional and technical goals of the project, while still providing the aesthetic that emphasised the features of the structure.

"The relationship between architecture and engineering is key in this building," says Ian McArdle, Principal of Ian McArdle Architects, the architecture firm behind the refurbishment. "We couldn't ignore engineering, in fact we embrace engineering and bring it into the design so all the services you see that are exposed, it's a whole view of architecture."

This holistic approach to the refurbishment of 200 Gray's Inn Road has resulted in a space that supports occupants activities and wellbeing.



RIGHT AND FAR RIGHT:
200 Gray's Inn Road is home to global media brands Warner Brothers and ITN/ITV

"WE EMBRACE ENGINEERING AND BRING IT INTO THE DESIGN... IT'S A WHOLE VIEW OF ARCHITECTURE."

- Ian McArdle, Architect


student
accommodation

SMART BUILDING FOR SMART STUDENTS

The University of Melbourne is a highly regarded tertiary education provider, offering a range of courses from Undergraduate to Postgraduate qualifications. They have long been at the forefront of providing educational excellence, and this commitment extends to their student accommodation.

NDY was tasked with designing a range of engineering solutions that enhanced the amenity for students, while taking into account key sustainability and environmental requirements. The new student residential building, also known as "The Village", provides students with accommodation that supports their studies, while allowing them to enjoy university life.

IMAGES COURTESY OF WATPAC AND ALISON MCWHIRTER

Sustainable Living

The University of Melbourne places a strong emphasis on preparing for the future, and the student accommodation was no exception. Sustainability was a strong requirement for the design.

There were several innovative approaches that improved the sustainability rating of the building, including photovoltaic panels on roof that offset the need for mains power in the building. Other features include rainwater collection to supplement the water supply for the pool and irrigation needs of the building, providing bicycle parking in lieu of car spaces, and an innovative solar chimney.

The solar chimney incorporates a metal chimney on the roof, which is exposed to the sun. As it warms, an updraft pulls air through the ventilation ducting, providing a very energy efficient air circulation solution.

To allow for fresh airflow without opening the whole window, small trickle ventilators were installed. Occupants can control their position, to create airflow without the associated loss of heat energy from an open window.

The corridors contained similar motorised louvres for airflow, which are operated by the Building Management System (BMS) based on external environmental conditions.

The energy efficient LED lighting in corridor and circulation spaces use motion detection to provide light only when they are in use, while a clever feature is a convenient "master off" switch for each apartment, which allows students leaving their room to turn off all the lights and power to their apartment with one switch.

Government regulations required a 4.5 Star Greenstar rating, but the building achieved a 5 Star "as-designed" rating, exceeding expectations.

Enhanced Learning Environment

Each floor of the building has an open lounge area, where students can mingle and relax. This is kept acoustically isolated from the student's rooms by using clever insulation materials and extra-thick wall paneling. A music room for the students was also provided with acoustic paneling to reduce echo and improve the sound characteristics of the space.

The ventilation was also carefully planned, so that the air movement didn't create distracting noises and whistles. This was done by determining the optimal airflow, as well as providing vibration-minimising materials and insulation around the duct work, and the machinery.

The result is an environment where the students can be studying in their room, without being disturbed by others making noise in the common areas.

A monitor at the ground floor reception displays building utility usage to promote lower energy usage and educate students on consumption.

PREVIOUS PAGE:
The formal structured design of the exterior integrates with the surrounding period architecture.

ABOVE AND RIGHT:
The interior has an abundance of natural light and energy efficiency features.

Safe and secure

The building also promotes security for the residents. With efficient lighting throughout the space linked to motion sensors, all areas in use can remain well lit while still maintaining the energy and cost saving measures that are required.

Fire safety is a priority for all student accommodation, and substantial attention was given to this for the Leicester Street building. The behaviour of smoke and fire in the building was modelled, and smoke spill systems and addressable detection designed to suit.

With so many students, the risk of false alarms (such as from burning toast) was addressed with an alarm acknowledgement facility installed in all the apartments, which allows the occupant to cancel a false alarm within 60 seconds.

A learning environment for the future

Planning for future needs is vital for buildings that are expected to perform well for their lifecycle. The design incorporates robust, reliable solutions and technology that enhances the communication, sustainability and security of the learning space, with potential for future adaptability. By enabling students to work in an environment that caters to their needs, the Leicester Street building is empowering the students of the University of Melbourne as they work towards a valuable qualification, and a promising future.

Key collaborative team

CLIENT
Campus Living Villages

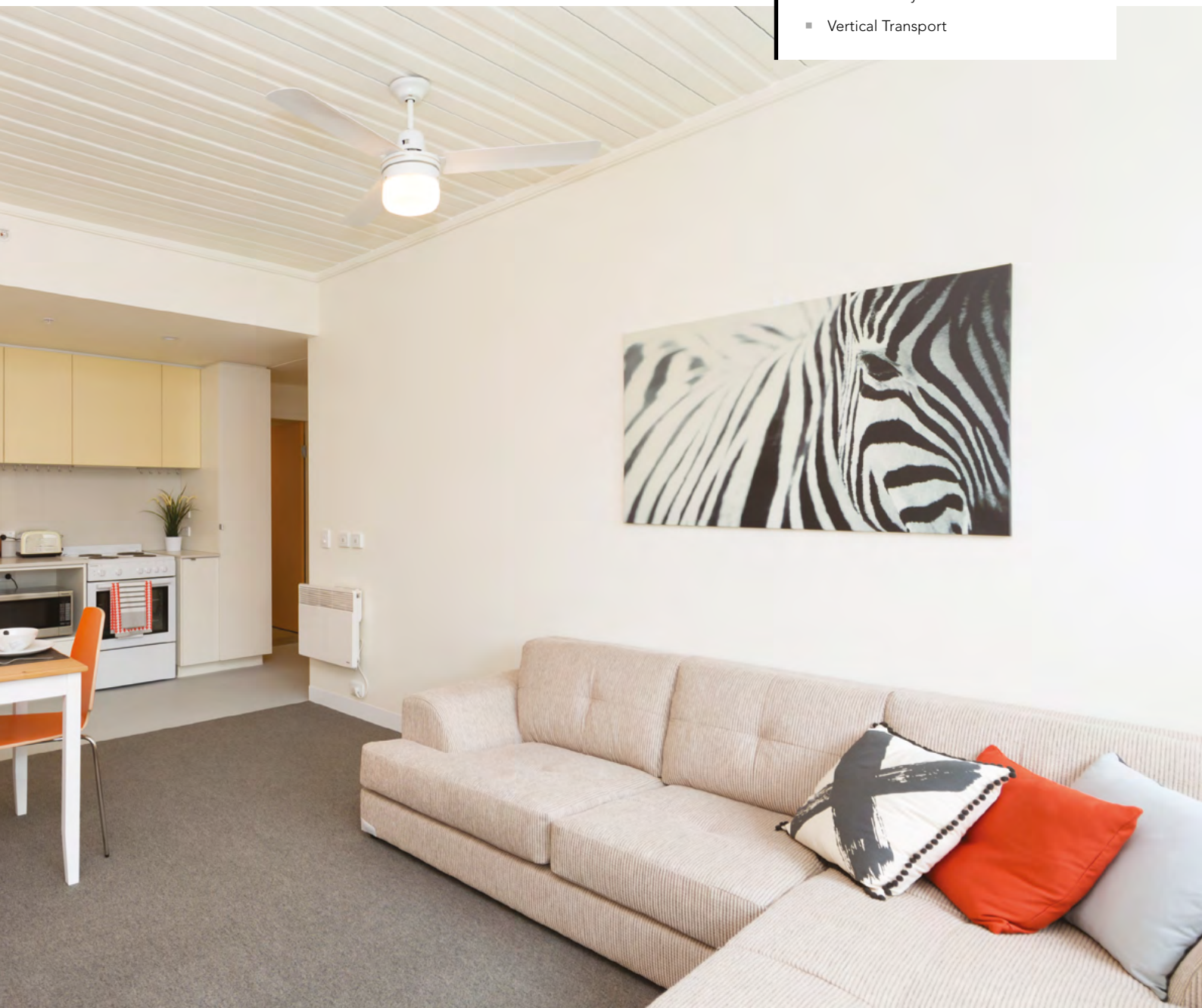
ARCHITECT
Architectus

BUILDER
Watpac

ENGINEERING SERVICES
NDY and CJ Arms (Hydraulics)

NDY services

- Acoustics
- Electrical
- Fire detection and fire protection
- ICT
- Mechanical
- Security
- Sustainability
- Vertical Transport



GLOBAL SWITCH HONG KONG

FLICKING THE SWITCH ON ENERGY EFFICIENCY

GLOBAL SWITCH HONG KONG

GLOBAL SWITCH SYDNEY EAST

GLOBAL SWITCH SYDNEY EAST

NDY has an excellent long term and continuing working relationship with leading carrier and cloud neutral data centre provider Global Switch with whom we have been delivering projects over many years in London, Sydney, Singapore and more recently Hong Kong. We are currently collaborating with Global Switch in delivering innovative, resilient and energy efficient new build data centres in both Sydney and Hong Kong.

Global Switch Sydney East's LEED Gold certification for Stage 1 is evidence of the company's ongoing commitment to energy efficiency and sustainability through world class and best design principles. These same principles have been applied to their Hong Kong facility located in Tseung Kwan O, which is also targeting LEED Gold certification, as well as a Hong Kong Green Building Council's BEAM Plus Platinum rating. It will deliver one of the most energy efficient data centres in Hong Kong and will be the first in Hong Kong, to implement an ISO-parallel bus based diesel rotary UPS scheme.

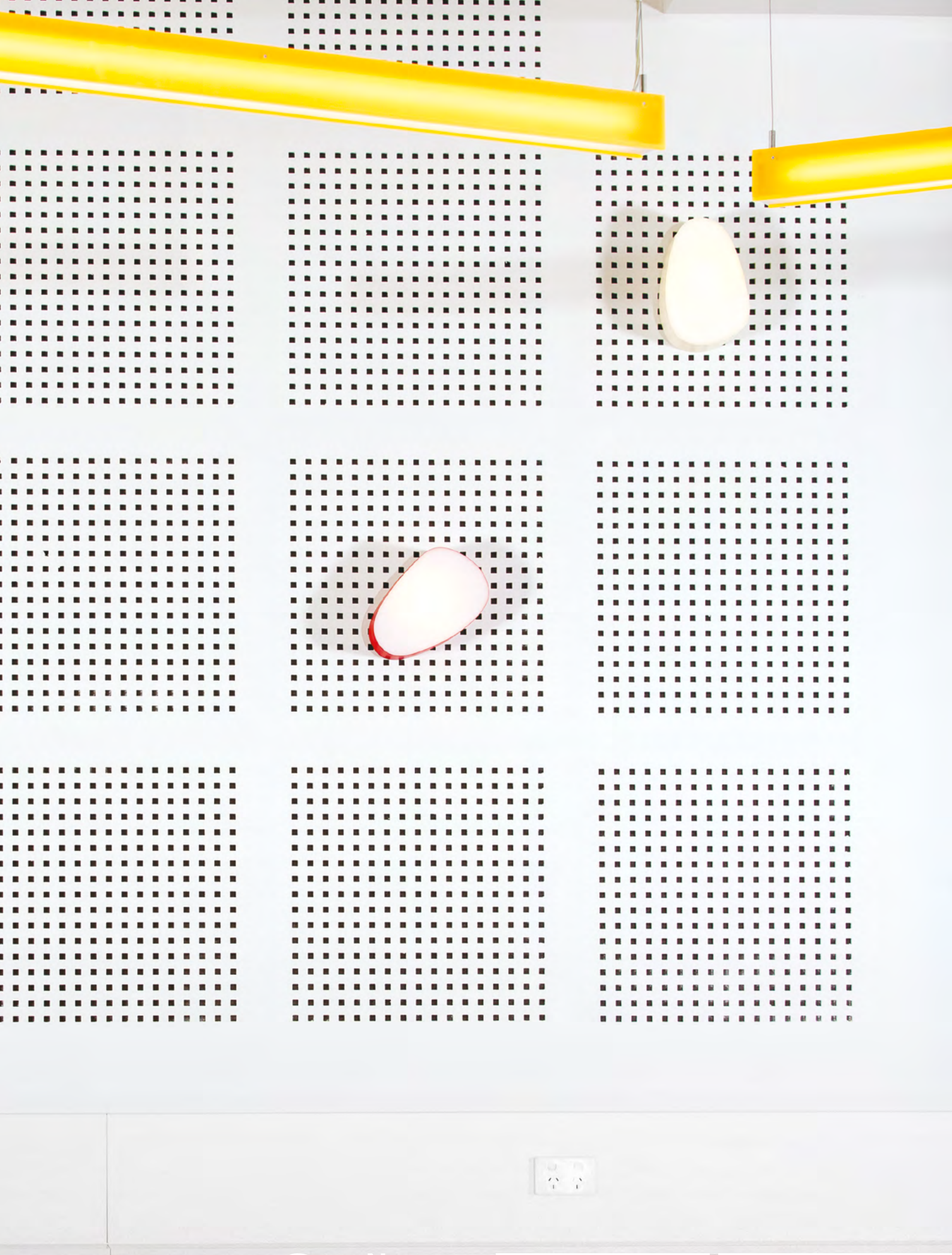
The IP Bus solution shares the load across the DRUPS units to maximise efficiency, whilst avoiding single points of failure. The High voltage distribution is utilised through the building to minimise cable losses. Other parts of the electrical system are designed to minimise losses such as the implementation of LED lighting systems. Although the savings associated with each of the LED solutions – as a percentage of the overall load are relatively small – the total energy savings are significant due to the sheer scale of the facility.

The energy savings possible with the optimisation of cooling solutions is tough given the Hong Kong environmental conditions, which are not conducive to so called 'free cooling' solutions possible in Northern Europe. In a data centre of this scale, it is essential that the cooling solution provides excellent energy performance as the facility scales in both load and physical footprint. In conjunction with Global Switch, the NDY team carried out a detailed technology review to provide a solution that provides an innovative energy efficiency solution for a facility of this type.

The project is now well into construction and NDY are working as an integral part of Global Switch's team in ensuring that the facility is built in line with the brief requirements, equipment is selected to minimise total cost of ownership, delivers against the energy efficiency goals and that it provides a facility that can be easily operated, maintained and expanded in the future. As part of this process, NDY are also providing BIM Management services. In this role, NDY are managing the requirements of the BIM model and are supervising the BIM process, to deliver a coordinated, data rich model that will aid the construction process and will – at the completion of the project – be used in the operational management of the data centre.

NDY has established a local entity in Hong Kong as a result of this Global Switch project. NDY Hong Kong is led by Wui-Kiat Wong, who relocated from our data centre team in Sydney. Wui-Kiat is an Uptime Institute Tier Accredited Designer and is recognised as a leader in critical infrastructure design. In delivering this project, we have partnered with local consultancy Ferrier Chan & Partners.

Our wider Hong Kong based team have been supported by the NDY Global Mission Critical Team, allowing us to bring the knowledge of subject matter experts to this landmark project regardless of their location.



CC Cares, Canberra, Australia

Norman Disney & Young
A TETRA TECH COMPANY

Lifecycle explores issues that take a holistic approach to the built environment and corporate social responsibility.

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