

THE PEAK OF EFFICIENCY

DEVELOPER : Plumbing Industry Climate Action Centre
MAIN CONSTRUCTION COMPANY : Hutchinson Builders
ARCHITECT : FMSA
STRUCTURAL ENGINEER : Miglic Macleod
CONSTRUCTION VALUE : \$30 million



The Plumbing Industry Climate Action Centre (PICAC) Narre Warren was built on behalf of the plumbing, fire protection and HVAC industries, to train plumbing and HVAC apprentices, and pre-apprentices. The building includes a ground source heat pump – closed loop geothermal system with integrated hydronic heating, and thermomass precast panels to ensure a net zero energy rating is achieved.

Hutchies are leaders in constructing innovative building design across many development sectors.

PICAC Narre Warren has set new standards in transforming energy hungry structures into environmentally friendly places to live and work which are designated net zero energy – generating all the power, heating and cooling required to run the building onsite. The structure is Victoria's first education and research facility which meets this transformative objective and is one of the first of its kind in Australia.

Hutchies were awarded the project in mid-2017 and began an extensive 12 week value management period followed by a 12 week design period. The first construction work began in mid-December 2017 and practical completion of the project was achieved in 24 April 2019. The company has now been engaged to do further fitout works.

Marcel Van Vliet, Project Manager for Hutchies, said that an average of 10 Hutchies employees were directly employed on the development, with another five indirectly involved. "Our team worked with a great group of contractors and subcontractors to bring this state-of-the-art

building to fruition. It was exciting to be part of this project which will set new standards for building energy efficient structures in Australia."

The PICAC Narre Warren campus facilities include a 100 seat auditorium, 12 training rooms, confined spaces and roof access training, administration offices and welding and gas fitting facilities.

Marcel said that some of the unique features of the building enabling the net zero energy target to be achieved included a 280 kW PV system consisting of 781 panels and 9 inverters as well as the introduction of a full scale geothermal system which was upgraded from an initial idea of a token educational system. The geothermal bore field was integrated within the structural foundation screw piles of the building thereby gaining a secondary function from the piles and possibly establishing an industry first in Australia.

"This initiative saved half the drilling costs for the project as approximately half of the 3,000m of vertical pipe was installed without any extra drilling," Marcel said. "We were able to eliminate all gas for heating and cooling to the building except for training and testing



purposes. In recognition of the creativity of the design, the project was awarded \$500,000 of government funding under the ARENA Programme which is focused on the provision of power systems from innovative technologies that are non-traditional."

The plumbing industry gave exceptional support to the PICAC project, with suppliers donating smart toilets, vacuum toilets, syphonic drainage systems and a large amount of pipe and plumbing fixtures.

Another unique feature of the centre is the way plumbing systems are demonstrated. A significant effort was made to display plumbing workmanship which was challenging because most plumbing is underground and within walls.

"We built a number of floor and wall displays so that trainees can have a visual demonstration of how systems work. A fully visual glass plant room was constructed in the middle of the building with all equipment on full display," Marcel explained.

The success of this project from Hutchies perspective is that it will generate new enthusiasm for careers in the plumbing industry and see hundreds of apprentices receive training in the latest plumbing technology. They also received further direct benefit with the contract to build another centre for the same client in Beenleigh Queensland.

"The interest in the building industry about incorporating geothermal technology into new developments has also been stimulated by the PICAC at Narre Warren," Marcel said. "We have received enquiries about being involved on other geothermal projects as a result."

For more information contact Hutchinson Builders, 70-72 Cecil Street, South Melbourne VIC 3205, phone 03 9282 9500, email info@hutchinsonbuilders.com.au, website www.hutchinsonbuilders.com.au

Below Cooke & Dowsett ensured the net zero energy target was met through their design innovations and solutions.



Cooke & Dowsett are leaders in the field of commercial and industrial plumbing. The company have built a strong reputation for delivering complex design and construction projects, with their client list including many Tier 1 and mid-tier contractors.

Cooke & Dowsett played a key role in the construction of the Plumbing Industry Climate Action Centre (PICAC) Narre Warren campus which has set new standards in sustainable building. It is the first net zero energy education and research facility in Victoria. All the energy required to support the operation of the building will be generated onsite through the incorporation of a number of renewable energy technologies.

Cooke & Dowsett were engaged in the PICAC project right from the early planning stages. The company's internal hydraulic design team were heavily involved in the design innovations and solutions for the facility to ensure that the net zero energy target could be met through the use of renewable energy resources and systems.

These included solar hot water utilising a Rotex thermal system, an AVAC vacuumed sewerage plant, rainwater and storm water re-use systems, building management systems and Caroma Smart Command bathroom products. As a special feature, perspex panels have been installed to provide a transparent view of the plumbing works, enabling a clear view for training apprentices.

As the project developed, their registered plumbers and apprentices became involved alongside the company's project manager and project administrators. As a result of the enthusiasm showed by their team, the rest of the industry responded in a massive show of support with over \$600,000 in products donated by suppliers and manufacturers throughout the project.

"PICAC Narre Warren will be of enormous benefit to the plumbing industry," said Directors, Chadd Cooke and Scott Dowsett. "The purpose of the PICAC training centre is to be the breeding ground for our industry's apprentices, plumbers, designers and business owners, taking us into an exciting future with new technology which is constantly evolving. We are immensely proud to have been an integral part of the project."

PICAC Narre Warren is a unique project, one very close to the corporate philosophy of Cooke & Dowsett, it focuses on providing world class training for the highly skilled plumbing trade. Course offerings range from entry level and pre-apprenticeships to the Certificate III in plumbing. Other lines of study include occupational health and safety training and specialised courses, including medical gas and gas appliance servicing.

The facility will be shared by PICAC, Master Plumbers Association, PPTEU and the International Association of Plumbing and Mechanical Officials (IAPMO) which is one

of the world's leading plumbing product certification agencies. PICAC's students and the whole plumbing industry will benefit from this cooperation as IAPMO's new research centre and product testing laboratory will be based in the facility

Formed in 2008, Cooke & Dowsett has developed into a national organisation capable of servicing clients in all states and territories.

Cooke & Dowsett has successfully completed many major commercial plumbing projects ranging from the new PPP Bendigo Regional Hospital, RACV Cape Schanck Resort in Victoria and the Grand Central Shopping Centre Toowoomba in Queensland. Their current contracts include the Victorian State Netball and Hockey Centre (Kane Constructions), the Joan Kirner Women's and Children's Hospital (Lendlease) and the Inner City School at Fortitude Valley in Brisbane (Hutchinson Builders).



For more information contact Cooke & Dowsett, 25 Mc Gregor's Drive, Keilor Park VIC 3042, phone 03 9365 7000, email info@cookedowsett.com.au, website www.cookedowsett.com.au



Below Geothermal Industries Australia (GIA) drilled 28 vertical bores and installed 2,500m of energy pile piping.

Harnessing the Earth's stored energy for sustainable cost efficient heating and cooling of buildings of all sizes is a rapidly growing field. At the forefront of delivering this technology is Geothermal Industries Australia (GIA), a specialist in ground sourced thermal energy projects.

When the PICAC at Narre Warren was in the early planning and design stages, it was apparent that installing geothermal energy systems in the centre had many advantages. These systems will not just make a substantial contribution to the net zero energy objective for the structure, but also provides an ideal demonstration of the way geothermal systems work to thousands of future students and apprentices who will use the centre.

GIA recognises that education in geothermal technology and the benefits is paramount. The PICAC provided the perfect opportunity for GIA to make a contribution to the education process by giving back to the industry and creating a demonstration and teaching facility. As a result, they generously donated and constructed multiple educational displays throughout the centre that will allow students and members of the public to see first hand how the technology works.

The company was involved from the early stages of the project, selected to initially drill a test hole to 100m for a thermal conductivity test to assess the suitability of the site. Thermal data was then collected over a 48 hour period and formed the basis of an appropriate design for the geothermal system at the centre.

During the drilling of the test well, it became apparent that the swelling clays extended to a greater depth than anticipated. This presented a challenge, however by sourcing a different drilling technology which involved adding a new specialised Commachio drill from Italy to their fleet, GIA was able to drive casing past the troublesome zones and completed each borehole by the intended schedule.

Throughout the install of each of the 28 bores, GIA achieved a 100% success rate of getting each ground heat exchanger installed to depth on the first attempt. In addition to drilling the 2,800m of vertical bores,

GIA also installed 2,500m of energy pile piping including grouting with an enhanced thermally conductive grout.

The PICAC demonstrates how geothermal energy can tie in with other leading clean energy technologies like water heat recovery, solar hot water heating, solar photovoltaic panels and geo-exchange.

The project is also an excellent display of the efficiency and environmental benefits associated with harnessing the stored energy and replenished thermal energy underneath the earth's surface.

"I am certain that people from all sectors of the building industry, the energy sector, all levels of government and the wider community will want to see the system in operation," said Managing Partner and General Manager at GIA, Clint Patzack,

"There is a genuine business case supporting geothermal energy as a source of heating and cooling. We are going to see an increase in interest in this proven technology in Australia, particularly as energy costs from traditional sources continue to escalate and the focus on clean energy increases," Clint added.

Their systems are completely flexible and applicable for both residential and commercial situations. The systems can be installed in new buildings or retro fitted to existing buildings.

GIA takes an integrated approach to system design by working collaboratively with all stakeholders and provides a solid business case for any project.

"Our solutions ensure builders, developers, municipalities and end users stay ahead of the capital curve. By leveraging geothermal energy resources, a building becomes a thermal energy asset that has the ability to harvest, store and reuse renewable energy," Clint concluded.

For more information contact Geothermal Industries Australia, 52 Gaine Road, South Dandenong VIC 3175, phone 0437 973 583, email info@geothermalindustries.com.au, website www.geothermalindustries.com.au



Below DRD Concrete & Excavations (Aus) laid 4,000m³ of concrete on the suspended first level floor and another 4,000m³ at ground level.

Leading Melbourne concrete contractor DRD Concrete & Excavations (Aus) was an obvious choice to undertake the major construction challenge of providing all structural concrete for the PICAC Narre Warren. DRD Concrete has worked alongside the PICAC's contracted builder Hutchinson Builders, on several significant projects and has developed a trusted working relationship. This was invaluable in the construction process of this unique building which is the first net zero energy building of its kind in Australia.

PICAC Narre Warren was a typical job in terms of size for the company. "Our MD at the time the PICAC started was Bob Russell and under his leadership the company developed a working plan to optimise the way we prepared the site, planned for the concrete deliveries and managed the many pours that had to take place," said Managing Director, Bodie Brown. "On the ground floor alone, 4,000m³ of concrete were required." The first level was a suspended slab and also required 4,000m³ of concrete.

Other notable aspects of the project were the 192 screw piles at 13m deep which doubled as a geothermal heat source for the building. The PICAC facility is the first in Australia to utilise building foundation screw piling to source geothermal energy for the buildings heating and cooling requirements. Together with 28 geothermal bores drilled to 100m, the 220 wells are used for the Ground Source Heat Pump (GSHP) system to heat and cool the building. The GSHP system integrates thermal heat loops within the structural screw piles for geothermal heat exchange. Once the heat loops were installed, DRD Concrete completed the process of filling the screw piles with concrete.

Another challenging aspect of PICAC Narre Warren project was the requirement to construct 60 columns on angles.

"During the heaviest part of the programme, we had 10 to 12 of our team on the job full time for three months, lightening off to seven to eight people once the major work had been completed," said Bodie. DRD Concrete has a usual complement of 20 employees with a team of subcontractors available as required.

DRD Concrete was very proud to have been involved in a significant project providing

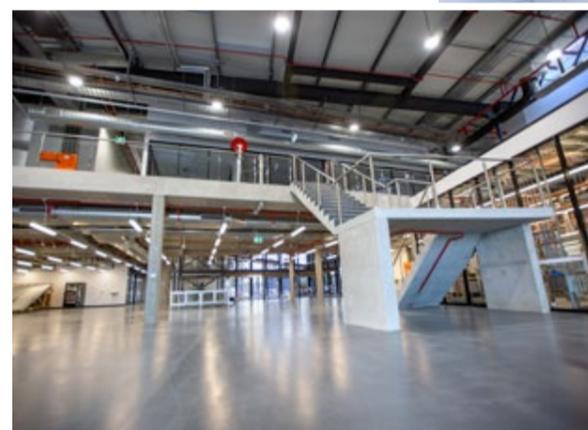
world leading facilities to produce highly trained tradespersons for years to come. "The PICAC facility also marks a milestone in building design delivering environmental goals which is definitely the way of the future. We also enjoyed working alongside Hutchinsons on yet another project, further developing our strong working relationship," Bodie said.

DRD Concrete & Excavations (Aus) was established in 2009 and has grown to become a leading operator with extensive capabilities in all types of concrete construction. The company's method of operation is to have their entire team work in an inclusive, cooperative and supportive manner on every construction project undertaken.

The experience and capability of their multi-skilled team is underpinned by company owned and operated plant and equipment. In circumstances where a large contract is being undertaken, DRD Concrete utilises their strong links with other major concrete construction businesses to supplement its own equipment resources.

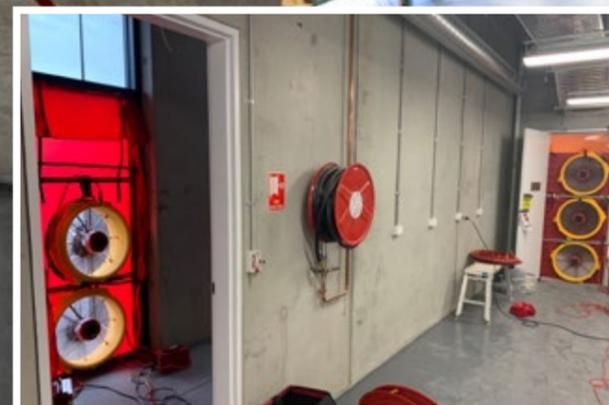
The company works with most of the major Tier 2 builders in and around Melbourne and takes on projects from \$100,000 up to around \$10 million. Recent projects have included the Armstrong Creek East Community Hub in Geelong with Hutchinsons, the Knox Operations Centre with Melbeco and a major Woolworths development Heidelberg.

For more information contact DRD Concrete & Excavations (Aus), 4 Astro Court, Hallam VIC 3803, phone 03 9796 5937, email drdconc@westnet.com.au



Below Techniblock created a world first dual purpose screw pile, achieving structural and geothermal objectives.

Below Efficiency Matrix ensured the building envelope is as airtight as possible to assure a net zero energy status.



Techniblock is Australia's leading screw piling company specialising in screw piling, bored piers, underpinning and foundation repairs.

Established in 1989, they have completed many complex assignments ranging from large industrial sites and infrastructure projects to small residential builds. One of their recent projects at the PICAC Narre Warren set new benchmarks for innovative screw piling.

Piling General Manager, John Ozgec, said that the challenge at the PICAC was to create a world first dual purpose screw pile that achieved the structural and geothermal objectives of the project. "In partnership with Project Manager, Marcel Van Vliet of Hutchison Builders and General Manager, Clint Patzack from Geothermal Industries, we set out on a mission to design, test and commission a screw pile suitable for both foundation stability and geothermally adequate to support the ground source heat pump system."

In total, 606 screw piles were installed to depths varying from 13m to 18m and 28 piles were installed to a depth of 100m. The creatively designed screw piles were manufactured at

Techniblock's purpose built facility in Melbourne's western suburbs. From concept to creation, the piles used local resources, materials and expertise, representing a real win for local manufacturing.

"It is without a doubt one of the most unique screw piling projects ever completed," said John. "Techniblock has unrivalled expertise and experience gained over 30 years in the piling and foundation industry. We are proud to have been associated with this leading edge project which will undoubtedly be the forerunner to many similar developments as the construction industry seeks to make buildings more energy efficient."

The ground source heat pump system is a major contributor to the PICAC achieving net zero energy status, with all the energy required to run the Centre, including heating and cooling, being generated onsite.

For more information contact Techniblock, 2/981 Mountain Highway, Boronia VIC 3155, phone 03 9720 7700, email office@techniblock.com.au, website www.techniblock.com.au

The team at Efficiency Matrix specialises in airtightness testing for commercial and residential buildings. They provided their services for the innovative PICAC Narre Warren to reduce the carbon footprint and also improve the overall comfort and build quality.

Managing Director, John Konstantakopoulos, said that to ensure the net zero energy status of the centre, it was absolutely essential that the building envelope be as airtight as possible.

"We conducted regular inspections and testing as the building progressed and were able to report the day after each inspection utilising our inhouse developed software. Once the building was completed, we conducted a whole building test to produce a final report on the airtightness of the entire centre."

Efficiency Matrix is working with building owners who are responding to the realisation that it makes excellent economic sense to reduce air loss from stack, wind and mechanical operational effects which in turn maximises thermal efficiency and reduces energy costs, while improving the ambient temperature and humidity for building occupants.

"Another significant benefit is improving the longevity of a building. Less condensation means less degradation of the structure," said John.

The company has a highly skilled team of five employees who can provide a turn-key solution for improving building airtightness. They are a fully ATMA accredited company to perform airtightness testing to AS/NZS ISO 9972 'Thermal Performance of Buildings'. Efficiency Matrix can audit for building airtightness and insulation consistency, articulating where holes are located and recommending a course of remediation. Reporting includes a predicted leakage rate if issues are not remediated. They also have a wide range of products they can supply to improve thermal efficiency.

Efficiency Matrix has been in business for 10 years and from their Melbourne head office they can service clients around Australia. Some of the local major projects they provided their services to include the Melbourne Quarter, Carlton Connect and Caulfield Grammar Aquatic Centre.

For more information contact Efficiency Matrix, 14 Ondine Drive, Wheelers Hill VIC 3150, phone 1300 027 874, email sales@efficiencymatrix.com, website www.efficiencymatrix.com



Below DM Formwork provided their formwork services for the suspended slabs on the first floor of the centre.



DM Formwork is a leading formwork operator in the Melbourne area, with particular expertise in large projects involving suspended slabs, walls, columns, stairs and complex designs. The company's skills and experience were called upon to provide formwork services at PICAC Narre Warren.

The company's main role at the centre was installing the formwork for the extensive suspended slab for the first floor. "The main challenges we faced, as usual, were a tight schedule and the high standards required as a lot of the concrete underside is going to be seen," said Director, Murray Beljon. "In order to meet the builder's deadline, we used a team of 15 to 20 employees to ensure completion on programme, which we achieved in eight weeks." A scaffold construction system was used to ensure high safety standards.

DM Formwork have been in business since January 2006 and have assembled a skilled team of 60 employees who undertake formwork projects in the commercial, industrial and residential sector. At times of peak demand, staff complement increases to around 100 people.

The majority of DM Formwork's activity is in the multi-storey residential sector in inner city Melbourne and surrounding suburbs,

but as PICAC Narre Warren illustrates, the company has a versatile approach enabling it to undertake a diverse range of formwork assignments.

"PICAC Narre Warren is just one of the major works that we have recently undertaken," said Murray. "In the last 12 months we have also completed our largest ever contract at The Mark in Glen Huntly Road Elsternwick. This mixed use development built by the Hacer Group involved a large Coles Supermarket, Liquorland store, 173 residential apartments above and 3-levels of car parking space." Work on this project involved a total of 45,000m² of formwork for a number of suspended slabs as well as other in situ construction including walls and stairs.

For more information contact DM Formwork, Lot 29/5 Technology Circuit, Hallam VIC 3803, phone 03 8786 3819, email info@dmformwork.com.au

Below Close Commercial Services installed 3,200m² of Askin Xflam panels on the roof and 2,500m² of interlocking metal cladding to walls.

Below EBS utilised their ISOtherm sectional doors on PICAC Narre Warren, providing superior insulation and precise sealing.



Close Commercial Services were chosen to supply and install the roof panelling and wall cladding for the Plumbing Industry Climate Action Centre (PICAC).

Managing Director, Jason Close said that approximately 3,200m² of Askin Xflam fully insulated panels were installed on the roof, providing a weather tight and extremely thermally efficient outcome. "This was very important in a building rated as net zero energy. The Askin product was ideal and offered a reduced installation cost as well as a superior spanning and thermal capability."

The walls required 2,500m² of interlocking metal cladding which was insulated with sarking, tapes and flashings to ensure airtightness.

"With a variety of colours and architectural themes to accommodate, this was a challenging project but we were very proud to be involved in the PICAC project, having worked in the commercial roofing and cladding sector for over 25 years," Jason said.

For more information contact Close Commercial Services, 4/30 Network Drive, Carrum Downs VIC 3201, phone 03 9770 8416, email info@closecommercial.com.au, website www.closecommercial.com.au



Envisage Systems P/L (EBS) designed, supplied and installed thermally efficient sectional doors at the innovative PICAC Narre Warren.

EBS proved that it is possible to get superior thermally efficient and appealing customised sectional doors at the price of roller shutters when they supplied and installed ISOtherm doors for PICAC Narre Warren, even though the customer originally specified thermal roller shutters for this project.

The EBS ISOtherm sectional doors were the ideal solution to maintaining thermal integrity in the net zero energy building. The 60mm thick ISOtherm door panels are three times thicker than the originally specified thermal roller shutters. They provide superior insulation, while precise sealing helps to eliminate drafts and preserve warm or cool air as required.

The PICAC project was unique; each of the six large EBS doors had to be individually designed due to the architecture of the Centre. "We had to come up with a customised solution for each of the door openings, then manufacture individual elements for precise installation," said Managing Director, Darren Zimsen.

The look of ISOtherm sectional doors complemented the façade of the innovative building. To suit various building exterior designs, these doors come in a broad range of colours and run smoothly and quietly.

Based in the Melbourne, the Australian owned company, has a network of representatives capable of servicing EBS products across Australia and New Zealand. They take pride in the precise and durable engineering of all their products, a result of their strong connection to Germany. The company specialises in the manufacture of thermally efficient high speed roller and overhead sectional doors for use in a comprehensive range of industrial applications.

To complement their extensive range of industrial doors, EBS recently expanded the product offering to include safe and easy to operate, quality hydraulic dock levellers. "We work with European and North American companies to supply our customers with complete entrance solutions. Our one-stop-shop offering also includes dock shelters, lights, vehicle restraints and buffers," said Darren.

For more information contact EBS, 4/83 Boundary Road, Carrum Downs VIC 3201, phone 1800 877 888, email contact@ebssolutions.com.au, website www.ebssolutions.com.au

Below GeoExchange Australia designed, supplied and installed the ground source heat pump (GSHP) system.

Below Outstanding Plastering installed indoor plastering, internal partitions and suspended ceilings.



A major contributor to the PICAC Narre Warren project was GeoExchange Australia. They designed, supplied and installed a ground source heat pump (GSHP) system for the heating and cooling requirements of the centre.

Combined with onsite renewable energy generation, the highly efficient GSHP system has enabled the PICAC facility to achieve a net zero energy rating.

The GSHP system consists of 28 boreholes drilled to a depth of 100m and 192 energy piles installed at a depth of 13m. Together, the 220 wells access a constant 19°C ground temperature that provides the buildings heat source in winter and its heat sink in summer. They also provide thermal storage. Heating and cooling is distributed through the building via a combination of hydronic heating and forced air.

Yale Carden, Managing Director of GeoExchange, said that his company was involved during the earliest concept discussions, through the feasibility studies and on to construction and commissioning. “GeoExchange Australia stresses the importance of design as an integral part of a successful system. It is particularly important for

GSHP systems as they integrate with the natural environment and in many ways are an extension of it. Understanding the relationship between the buildings heating and cooling requirements and the thermal capabilities of the ground is critical to the success of a GSHP system,” said Yale.

GeoExchange has been involved in a number of award winning commercial and residential projects. “Every project we undertake is unique and exciting in its own right. We apply a proven technology to achieve sustainable, long term and low maintenance solutions to the challenge of balancing a comfortable living and working environment for low ongoing cost,” said Yale.

For more information contact GeoExchange Australia, 100 Walker Street, North Sydney NSW 2060, phone 1300 088 177, email enquiries@geoexchange.com.au, website www.geoexchange.com.au

Outstanding Plastering focuses on ensuring the highest standards and quality of internal plastering, partitions and suspended ceilings on commercial projects. PICAC Narre Warren is just one stand out example of the work undertaken by the company.

For PICAC Narre Warren, Outstanding Plastering was engaged over a period of nine months with their team ranging from 10 to 20 onsite at any time. They completed all the indoor plastering, internal partitions and suspended ceilings.

“One of the challenges for us was to ensure that all our work met the airtightness targets for the building. The airtightness was regularly tested, so we worked with the builder and specialists to achieve the necessary targets,” said Managing Director, Peng Cheng Zhang.

The PICAC will accommodate training for hundreds of apprentices in the plumbing, fire protection and HVAC industries. As a zero net energy building, it incorporates many of the innovative technologies features that will be widely adopted in the future, like geothermal heating and cooling, solar PV panels and hot water heating, thermally broken windows and thermomass precast panels.

“It was an exciting project to be involved in, with the PICAC being a net zero energy building,” said Peng.

Another challenge for Outstanding Plastering was the design of the theatre within the PICAC Narre Warren. The perimeter had a series of curves which required special treatment, with a series of fans and returns. “We do have a very experienced team within our total complement of almost 40 employees so we can deal with these challenges,” explained Peng.

Outstanding Plastering covers the entire Melbourne greater metropolitan area and has completed many major commercial projects. “We welcome enquiries from builders and developers, with no project being too big or small,” said Peng.

For more information contact Outstanding Plastering, phone 1300 083 817, email info@outstandingplastering.com.au