

SUBMISSION TO THE SENATE FINANCE AND PUBLIC ADMINISTRATION LEGISLATION COMMITTEE INTO THE EMERGENCY RESPONSE FUND BILL 2019

25 September 2019

Universities Australia welcomes the opportunity to make a submission to the Committee on the *Emergency Response Fund Bill 2019* and the *Emergency Response Fund (Consequential Amendments) Bill 2019*. Universities Australia is the peak body representing Australia's 39 comprehensive universities in the national interest. A number of our members have also made submissions and we commend these to you for consideration.

Our comments are made in relation to the clauses of the *Emergency Response Fund Bill 2019* and the *Emergency Response Fund (Consequential Amendments) Bill 2019* that give effect to the closure of the Education Investment Fund.

Australians are resilient. Our communities battle bushfire, drought, cyclones and other natural disasters with courage, and Australians rally to help those communities recover from emergencies and disasters with compassion and generosity. Government plays a crucial role, standing with communities and providing support as they respond and recover from emergencies. Universities Australia supports this role of Government.

However, Universities Australia argues that a mature country such as Australia can and does support multiple priorities. Ensuring Australia has the infrastructure to enable quality research and education is amongst those priorities.

As an advanced nation we should be able to invest in both research infrastructure that helps us understand and address emergencies, as well as an emergency response fund. The world-leading research supported by EIF infrastructure includes work on climate change, natural disasters and human behaviour — all of which are vital to successful emergency responses. University research can help Australia tackle the cause of natural disasters.

Closure of the Education Investment Fund (EIF) would abolish the last remaining program to fund the development and refurbishment of critical research and teaching infrastructure in the tertiary education sector.

Australia needs a long-term, strategic fund for investing in education and research. While ad hoc allocations have been welcome while the EIF has been frozen, they are not a reliable basis on which to build and maintain infrastructure for the world-class post-secondary system Australians deserve.

Recommendation

Universities Australia calls on the Committee to recommend against closure of the Education Investment Fund.

BACKGROUND

The Australian Government has announced its intention to close the Education Investment Fund (EIF) and re-purpose the \$3.95 billion. Universities Australia strongly opposes this proposal noting that the EIF is the last remaining scheme to support capital investment in tertiary education infrastructure.

The EIF is one of four 'nation-building funds' established in 2008 during the Global Financial Crisis. It replaced the Higher Education Endowment Fund (HEEF), established by the Howard Government in 2007 to fund higher education infrastructure in perpetuity.

Higher Education Endowment Fund (HEEF)

In 2007, the Government contributed a total of \$6 billion to HEEF from the Budget surplus to create an endowment fund to guarantee the building and maintenance of world class tertiary education facilities, regardless of the state of the national economy. At the time, Treasurer Peter Costello declared the HEEF would be:

*"...a perpetual fund to generate earnings for capital works and research facilities in our institutions of higher learning"*¹

Treasurer Costello stated that the HEEF's earnings:

*"... will be dedicated to building first class institutes of learning — first class by world standards — and put our Institutes of Higher Learning on a secure footing for ever."*² [Emphasis added]

To abolish the Fund would be a substantial breach of this vision and commitment.

Education Investment Fund (EIF)

The *Nation-building Funds Act 2008* (the Act) established the EIF, with effect from 1 January 2009. According to the Act, the purpose of the EIF is to fund higher education infrastructure, research infrastructure, and vocational education and training infrastructure.

As at 30 June 2019, the status of the Fund was as follows:³

Total Credits	\$6 484 m
(Plus) Actual Net Earnings	\$1 665 m
(Equals) Total Credits and Actual Net Earnings	<u>\$8 148 m</u>
(Less) Total Commitments	\$4 196 m
(Equals) Uncommitted Balance	\$3 952 m

The EIF has provided funding for research and teaching infrastructure across the country in both higher and vocational education. Universities invested in campus renewal through the EIF, creating innovative, world-class learning spaces, as well as expanding and renewing Australia's capital stock of research infrastructure.

¹ Costello, P, 2007. 'Budget speech 2007-08', Hansard, House of Representatives, Canberra, p.55.

² Ibid.

³ Department of Finance, 2019, 'Nation-building Funds Financials', <https://www.finance.gov.au/investment-funds/nation-building-funds/financials/>, retrieved 19 September 2019.

Well over 100 individual projects were funded across the country through direct EIF funding rounds and from programs funded by the EIF, including the Super Science initiative and the \$500m Higher Education Teaching and Learning Capital Fund.

Projects ranged in diversity from major health and science facilities such as the Centre for Obesity, Diabetes and Cardiovascular Disease at the University of Sydney to building the RV Investigator, the CSIRO's state-of-the-art marine research vessel, to crucial regional projects that facilitate higher education access and attainment.

EDUCATION AND RESEARCH INFRASTRUCTURE – THE PATH TO JOBS AND GROWTH

Abolishing the EIF would remove the last dedicated federal funding for university infrastructure.

The EIF should be retained as an enduring and sustainable program to enable universities and vocational providers to continue to invest in productive infrastructure throughout the troughs and peaks of the budgetary cycle.

Universities need to invest in new infrastructure to make major contributions to Australia's economic and social well-being, keep pace with the changing higher education landscape and maintain competitive advantage in a global market.

The value-add of EIF

The HEEF/EIF has been a highly successful program that has enabled the establishment and renewal of critical teaching and research infrastructure in both higher and vocational education.

It has enabled investment in metropolitan, regional, rural and remote communities right around the country – from Charles Sturt University's National Life Science Hub, to Swinburne University's Factory of the Future, to James Cook University's Science Place for Northern Queensland at Townsville, to investments in vocational education infrastructure in locations including Darwin, Dubbo, Echuca and Port Hedland.

Case studies of projects brought to life by the EIF are provided at Attachment 1.

EIF funds have been critical to leveraging other sources of funding, attracting co-investment from universities, State Governments, philanthropists and others in creating new and innovative industry opportunities.

For example, Deakin University's Carbon Nexus project, with funds contributed by the Victorian State Government and CSIRO, has created a world-leading industry hub in Geelong, Victoria, to develop and produce carbon fibre composites. The project has created 1900 jobs and attracted an influx of international investment. This is but one project that has led the renewal of the local economy after the departure of car manufacturing.

The EIF investment in La Trobe University's Institute for Molecular Science (LIMS) supports the work of around 400 La Trobe academics, research fellows, postgraduate students and support staff. It has 60 research and support laboratories and over 3,000 square metres of teaching facilities. It also has two important regional nodes, in Bendigo and Albury-Wodonga. The focus of LIMS is on six areas of research strength: cancer, infection and immunity, neurobiology, molecular design, molecular imaging and molecular sensing. It has two embedded companies, Hexima Ltd (developing plant-derived proteins and peptides for application as human therapeutics and the genetic modification of crops) and AdAlta Ltd (developing the next generation antibody platform, the i-body, to deliver high affinity and specific biologics against a variety of therapeutic and diagnostic targets).

National economic benefits

Deloitte Access Economics found that university education added around \$140 billion to the economy in 2014 and provides more than a ten-fold return on the Commonwealth's total investment in higher education.⁴ It would be difficult to identify a more economically productive infrastructure investment than teaching and research facilities at universities.

Opportunities for Rural, Regional and Remote Australia

The recently released National Regional, Rural and Remote Tertiary Education Strategy final report (the Napthine report) makes important points about investing in rural, regional and remote education and research. In 2011-12, the EIF did just this, with a dedicated rural and regional round that invested \$312.6 million in regional New South Wales, Victoria, Northern Territory, Tasmania, Queensland and South Australia.

The Napthine report's first recommendation says that improving access to tertiary study options for students in RRR areas should include addressing problems with student access to affordable, reliable, high-speed internet services.

The EIF funded a number of projects that extended digital infrastructure into the regions. For example, the Australian Research and Education Network received \$37 million from the EIF. This funded 12 projects where fibre was built or lit, leading to outcomes including:

- the connection of several Queensland TAFEs, including the Brisbane TAFE and TAFEs in regional Queensland towns including Rockhampton, Cairns and Mackay;
- the connection of Queensland cultural institutions including the Queensland Museum and the State Library of Queensland;
- the connection of a number of schools in outer-metropolitan areas of Brisbane and Perth;
- connection of the Central Region TAFE (formerly Durack TAFE) in Geraldton, WA;
- opening up of connections in Western Sydney in partnership with the Parramatta City Council, including to the Parramatta Library; and
- provision of ultra-high-speed broadband to over a dozen NSW hospitals.

In the Regional and Rural Round, the University of South Australia secured \$18 million for its Centre for Regional Engagement (Mt Gambier and Whyalla). \$7.5 million of this grant was used to deliver high-speed fibre connections to Mount Gambier and Whyalla Campuses that allowed the fastest internet speeds of any region in Australia, making UniSA students the best-connected students in any regional city in Australia. It means the university's digital learning strategy, which blends online and face-to-face teaching, gives students access to the same curriculum, the same resources and the same academics as students in the city Materials and Minerals Science Learning and Research Hub.

The Napthine report found that:

"...halving the metropolitan and RRR attainment rate gap by 2030 would increase GDP by around 0.6 per cent by 2050. In today's dollars, that would be around \$11 billion, however, in 2050 terms, when the full projected impact of halving the gap is likely to be felt, this would be an estimated \$25 billion".⁵

In addition to investing in South Australia, the EIF has invested in building access and attainment in the Hunter Region, in VET infrastructure in Darwin, and in science education in northern Queensland.

⁴ Deloitte (2015), 'The Importance of Universities to Australia's Prosperity', Canberra.

⁵ National Regional, Rural and Remote Tertiary Education Strategy Final Report, p17

It makes sense economically, socially and for individuals for Australia to invest in rural, regional and remote locations as well as in our metropolitan centres. The EIF has demonstrated its value as a vehicle for that investment and the seed money that attracts further investment and jobs.

Collaboration with Industry

Modelling by Cadence Economics confirms that formal collaborations between Australian businesses and universities generate an impressive \$10.6 billion a year in revenue directly for the firms who partner with universities. The benefits to our national economy are even greater. By the time that flows through the economy, these collaborations are contributing \$19.4 billion a year to Australia's income. This research also found a strong return on investment to companies of \$4.50 for every \$1 invested in collaborative university research in Australia.⁶

There is concern about the drop in Business Expenditure on Research and Development (BERD). Latest figures show BERD has fallen to its lowest level investment in research and development has fallen to its lowest level as a percentage of our economy since 2003 before the mining boom. It fell from 1.0 to 0.9 per cent between 2015-16 and 2017-18. BERD is now at its lowest level in four decades relative to the size of our economy – just 1.79% of GDP (compared with the OECD average of 2.38%).⁷

Supporting infrastructure that, in turn, supports industry and university collaboration makes an important contribution to Australia's economy.

Data from the Australian Bureau of Statistics confirms around 16,000 Australian businesses have formal partnerships with a university. That would translate to an average of 410 industry partnerships at each of our 39 universities. If that could be lifted to 24,000 collaborating businesses — a 50 per cent increase — it would benefit those companies' operations, balance sheets and shareholders. It would also benefit Australia's economy even more substantially, helping to increase that \$19.4 billion contribution to closer to \$30 billion a year.⁸

International Education and Research

International education is one of Australia's great success stories. It has taken six decades of careful nurturing, investment by higher education providers and government, and thoughtful national policy to build an industry that is now valued at \$37 billion a year. Education is Australia's third largest export. Only exports of iron ores and concentrates (valued at \$63 billion) and natural gas (valued at \$43 billion) are larger.

Australia is tipped to surpass the United Kingdom sometime this year to become the second most popular destination for international students behind the United States of America.

Australia's international education industry supported over 247,000 Australian jobs in 2018.⁹

Universities provide top quality education and experiences to international students, with student satisfaction rate overall of 89 per cent.¹⁰ One of the key reasons students say they come to Australia is because of the expertise of lecturers and academic staff.

High-quality infrastructure is a major part in recruiting global talent and keeping local talent here. The academic labour market is highly international and competitive. Australian universities compete for global

⁶ Universities Australia 'Clever Collaborations', p4

⁷ Australian Bureau of Statistics, 8104.0 Research and Experimental Development Businesses, Australia, 2017-2018

⁸ Universities Australia 'Clever Collaborations', p4

⁹ Australian Government Department of Education and Training, Research Snapshot March 2019 'Jobs supported by international students studying in Australia'

¹⁰ Australian Government Department of Education and Training, 2018 International Student Survey Results

talent, people who then contribute to the economic prosperity of all Australians. With investment, Australia-based academics can stay linked with their international counterparts, and undertake collaborative research that contributes to global knowledge and prosperity.

Staff at the Institute for Photonics and Advanced Sensing (IPAS) at the University of Adelaide are working on the Cherenkov Telescope Array project. Along with international investigators, they are building experience in a range of cutting-edge techniques and challenges, including fast electronics, big data, optics and atmospheric physics. IPAS received \$28.8 million in EIF funding. It brings together experimental physicists, chemists, material scientists, biologists, experimentally driven theoretical scientists and medical researchers to create new sensing and measurement technologies. As well as working on innovations in health, the environment, mining and defence, IPAS has launched six start-ups, and 40 per cent of its income is connected to industry.

Research investment

The Australian Government commissioned and received two reports in 2015 on universities' infrastructure needs: one on research infrastructure, and one on infrastructure in general.

The Research Infrastructure Review, chaired by Mr Philip Clark AM, found that:

“The investment required [in research infrastructure] over the next decade is approximately \$6.6 billion.”

The panel proposed to fund this through a new Australian National Research Infrastructure Fund (ANRIF). The panel argued that 8-10 per cent of the Commonwealth's research outlays should be invested in research infrastructure.

The Higher Education Infrastructure Working Group recommended that the Government develop a long-term plan for infrastructure (covering both teaching and research), based on an evaluation of the impact of the EIF.

These reports underscore the need for Australia to continue to invest, for the long-term, in higher education infrastructure.

The Napthine report also addresses research infrastructure in the regional, rural and remote Australia. It found that:

“Regionally-based tertiary education providers play a key role in supporting research and development activities tailored to the needs of their region. Across countries in the Organisation for Economic Co-operation and Development (OECD), universities are increasingly taking a leading role in developing their regions and facilitating economic transition through investment in research and skills development in key growth sectors.”¹¹

IMPACT OF ABOLISHING THE EIF

Closing the EIF would mean a slow and inevitable decline in the quality of laboratories, classrooms and lecture theatres that support the sector's contribution to Australian society and our economy. A Government-appointed panel estimated that 33 universities already have a backlog of \$4.1 billion in deferred maintenance and refurbishments.¹²

¹¹ OECD (2007) 'Higher Education and Regions: Globally Competitive, Locally Engaged'. OECD, Paris.

¹² Higher Education Infrastructure Working Group Final Report, 2015, pp. 9-10

State Auditors-General have noted universities' declining operating margins with concern. The net operating result of the sector has declined by 7 per cent since 2009. As just one example, the Queensland Audit Office reports that universities' capital spending has fallen by 48 per cent over five years, mainly because of reduced capital funding. It identified capital funding as the greatest financial risk for Queensland universities.

CONCLUSION

Without Commonwealth support to invest in crucial research infrastructure, the capacity of Australia's universities to collaborate with industry, and contribute to local, national and global challenges will be severely restrained.

If universities cannot invest in critical campus renewal, Australia's competitive advantage as an education provider of choice in our region will diminish. Australia's highly successful higher education system relies heavily on its reputation for quality. Modern, well-equipped, fit-for-purpose teaching and research facilities are a key part of that.

ATTACHMENT 1 – SELECTED PROJECTS FUNDED BY THE EIF

ACT

CHEMICAL SCIENCES HUB – ANU - \$90M

The Chemical Sciences Hub was made possible through the EIF. As Stage 2 of the ANU Science Transformation Project, the hub included two new chemistry buildings, a new science teaching building, and a combined ANU Colleges of Sciences workshop. Facilities cater for the disciplines of physical chemistry, biological chemistry and synthetic chemistry and include eight wet laboratories for undergraduate students studying chemistry and biosciences.

In addition, the hub houses several 150-seat and 50-seat flexible learning spaces, outdoor teaching areas, and analytical and instrument laboratories. Completed in 2013, the complex increased ANU student capacity in chemistry, increased the number of work-ready science graduates, and is channelling high-quality science education to students across Australia's tertiary and secondary sectors.

Key Achievements:

- A significant increase in undergraduate and postgraduate numbers in chemistry, attributable to the new facilities and infrastructure available.
- The new buildings and their quality infrastructure and equipment are a significant factor in attracting new, young, dynamic academic staff to the Research School of Chemistry, including:
 - Dr Lara Malins, who specialises in the development of designer peptides for therapeutic use, was awarded an ARC Discovery Early Career Researcher Award, and awarded a Young Tall Poppy Award in 2019.
 - ARC Future Fellow Dr Nicholas Cox from the ANU Research School of Chemistry has been awarded the Robin Hill Award from the International Society of Photosynthetic Research for his work in Germany to develop new methods to investigate the mechanism of biological water oxidation, a major step in photosynthesis.
 - Dr Colin Jackson, whose work combines the disciplines of biology, physics and chemistry, was awarded ACT Scientist of the Year in 2015.
 - Simon McKenzie and Henry Orton have received nationally competitive Westpac Future Leaders Scholarships to undertake PhD study based in laboratories in the Chemical Sciences Hub.
 - The outstanding research environment has led to increased success of Discovery Early Career Researcher Awards and Future Fellowships in chemical sciences for ANU: in the last three years, Dr Nicholas White, Dr Pu Xiao, Dr Larissa Schneider, Dr Lara Malins, Dr Ganna Gryn'ova, Dr Jamie Hicks and Dr Christoph Nitsche have all been successful in these highly competitive national schemes. A significant part of the selection criteria is on quality of research environment to deliver the proposed research. These researchers represent an outstanding talent pipeline for new scientific discovery and innovation for Australia.
- An international study led by ANU will help underpin the development of next-generation medical treatments and industrial applications such as removing pesticides from waterways.
- ANU has received significant support from the ACT Government and Australian Renewable Energy Agency to research cutting-edge battery storage technologies, which would not be possible without the new laboratory facilities that are key to the Chemical Sciences Hub.
- As reported on the ABC news on 16 Jan 2017, a Canberra teenager who discovered a way to detect previously undetectable steroids in athletes has been announced as a finalist in the BHP

Science and Engineering Awards. Miss Rose Weller worked with a research team at the ANU to develop the idea. She is the first school student in 15 years to be invited to conduct post-graduate studies at the university with the help of mentor Bradley Stevenson, a research fellow at the School of Chemistry.

THE NATIONAL CENTRE FOR SOCIAL AND ECONOMIC MODELLING (NATSEM) INTERNATIONAL MICROSIMULATION CENTRE - UNIVERSITY OF CANBERRA - \$11M

The EIF contribution facilitated construction of a new building, allowing NATSEM to extend its approach to important new areas of public policy, such as climate change, transport and infrastructure.

For over 20 years, NATSEM has been, and remains, one of Australia's leading economic and social policy research centres, and is regarded as one of the world's foremost centres of excellence for microsimulation, economic modelling and policy evaluation. NATSEM specialises in analysing data and producing models so that decision makers have the best possible quantitative information on which to base their decisions. The Federal Government relies heavily upon its modelling through Treasury, Social Services and Employment to understand how policy impacts on families – both example families (cameos) and the broad impacts on different socioeconomic groups across the country.

NATSEM undertakes independent and impartial research. It aims to be a key contributor to social and economic policy debate and analysis Australia-wide and throughout the world through expert economic modelling of the highest quality, and supplying consultancy services to commercial, government and not-for-profit clients.

Through its research NATSEM is an active contributor to social and economic policy debate and its research receives extensive media and public attention.

NSW

INTEGRATED AGRICULTURAL EDUCATION PROJECT (IAEP) - UNIVERSITY OF NEW ENGLAND - \$29M

The University of New England, in partnership with CSIRO and the NSW has developed a \$40 million Integrated Agricultural Education Project, leveraging funding from the EIF. This project comprised five separate components:

- agricultural education building (Armidale NSW);
- new Animal Husbandry Facility;
- refurbishment and upgrade of lecture theatres - Development of the SMART Farm education facility; and
- upgrade to the Tamworth regional study centre (Tamworth NSW).

Key outcomes of this project include:

- increased world class tertiary education opportunities through the provision of globally connected facilities in regional and rural communities;
- substantial output in terms of research impact and commercialisation of research in animal genetics;
- providing students with opportunities to connect with their peers across regional areas where programs on participation and retention are likely to see positive results; and
- increased industry and community participation, providing sustainable pathways for the development of geographically diverse relationships.

HEARING HUB - MACQUARIE UNIVERSITY - \$40M

The Hearing Hub is an initiative of Macquarie University, generously funded with \$40 million from the EIF together with an \$80 million investment from the university. The Hub has made it possible to bring together leading researchers and health care organisations to drive research, education and innovation to improve the lives of people with hearing, communication or mental health disorders. The partners include:

- the Commonwealth's Hearing Australia, the nation's leading hearing specialist and largest provider of Government-funded hearing services, and its world-recognised research division, the National Acoustic Laboratories (NAL);
- Cochlear Limited, whose world headquarters are located adjacent to the Hub;
- The Royal Institute for Deaf and Blind Children (RIDBC) and its associated cochlear-implant service, the Sydney Cochlear Implant Centre (SCIC); and
- The Shepherd Centre.

The Cooperative Research Centre, The HEARing CRC, celebrating its 25th anniversary this year, was also an integral partner within the Hub.

All of these organisations are working together to address one of Australia's major health problems—by 2050, one in four Australians could have hearing loss, which is currently estimated to cost the Australian economy \$15 billion each year in health services and lost productivity.

The Hearing Hub has outstanding technologies and research facilities that enable collaborative research. These include one of the world's most advanced laboratories for brain research. That research is being used to continually improve clinical best practises for patients at the Hub's clinics in speech and hearing, reading, emotional health, and psychology as well as in the work of the Hub partners.

There are a total of eight clinics located at the Australian Hearing Hub. These clinics include the MQ Health Speech and Hearing Clinic, Centre for Emotional Health, Macquarie University Reading Clinic, Psychology Clinic at MQ Health, Australian Hearing, Royal Institute for Deaf and Blind Children (RIDBC), SCIC Cochlear Implant Program, an RIDBC service and The Shepherd Centre.

With everything in one place, clients receive first-class clinical evaluation, testing and diagnosis from leading practitioners.

Key Achievements:

- A major achievement has been in the way that technology has been utilised by clinics at the Hearing Hub to improve access to education and health care services. Through the eight clinics located at the Hearing Hub, clients receive first-class clinical evaluation, testing and diagnosis from leading practitioners all in one place.
- The Hearing Hub brings together researchers and clinicians to collectively identify, explore and develop hearing research, technology and application ideas into reality in the areas of neurophysiological measures in hearing and machine learning applications for hearing and hearing technology.
- Through online and over-the-phone programs, clinics have made treatments more accessible so that children and adults in regional and remote areas can receive world-class healthcare in their home.
- The Hearing Hub also gives Macquarie students the unique opportunity to work alongside experts in all aspects of hearing health, providing an unrivalled learning experience.
- Visitors from around the world are amazed by the Hearing Hub and by the potential of the work done here to affect the lives of people everywhere.

NEWCASTLE INSTITUTE FOR ENERGY AND RESOURCES (NIER) - NEWCASTLE UNIVERSITY - \$30M

The objective of the NIER project has been to build and establish a world-class facility and to create a critical mass of leading researchers across disciplines. The Institute undertakes innovation research for next generation energy and distribution solutions and for minimising energy usage in the resources sector.

NIER comprises extensive mineral, chemical and related technical laboratories, offices, industrial-scale pilot plant workshops and research demonstration units. The project has also included the design and construction of an additional state-of-the-art research building housing laboratories and additional office space.

The construction of this research infrastructure and subsequent capacity for industrial-scale research projects ensures NIER is well-equipped to contribute to industrial transformation with research focused on high performance, low emission and innovative technologies critical for economic growth and environmental sustainability.

Key Achievements:

- Professor Jameson revolutionised a mineral separation process first invented in 1905, to develop the Jameson Cell, a froth flotation device that has netted Australia more than \$36 billion in exports of fine coal and minerals.
- The Cell has also been used for industrial and environmental applications including extracting oil from tar sands in Canada, cleaning up industrial wastewaters in Newcastle and other locations in Australia, and removing blue-green algae from waterways in inland Australia.
- Professor Moghtaderi and his 30-strong research team are currently working on delivering safe, new methods of managing ventilation air methane (VAM) generated by underground coal mines.

NORTHERN TERRITORY

TRADE TRAINING CENTRE – CDU – \$27M

Funding from the EIF for Vocational Education and Training infrastructure development has assisted Charles Darwin University in addressing skills needs and economic change in the Northern Territory. The centrepiece of the \$27 million funding was a new 6000 square metre trades training facility on Casuarina Campus. The facility supports changes to the training profile in the Northern Territory and addresses shortages in mechanical, civil and green skills areas, building and construction trades, electro-technology, process engineering and specialised areas relevant to the NT's major projects commencing in the short and medium term. The training facilities contributed to the university's development of a sustainable, energy and resources-focussed North Australian Precinct, leveraging investment in engineering education and the North Australian Centre for Oil and Gas.

The following qualifications and skills sets are delivered through the Centre:

- Test and Tag
- Electrical Skills Maintenance
- Electronic Assistant
- Certificate II in Split Air conditioning and heat pump services
- Certificate II in Electronics and Communications
- Certificate II in Electrotechnology (Career Start)
- Certificate III in Electrotechnology
- Certificate III in Electrical Fitting
- Certificate III in Air-conditioning Refrigeration
- Certificate III in Instrumentation and Control
- Certificate IV in Electrical Instrumentation
- Certificate III in Plumbing
- Certificate III in Roof Plumbing
- Certificate IV in Plumbing Services – Operations & Northern Territory
- VTP 179 – Polywelding Training Program

- Commission and maintain hot and heated water temperature control devices
- White Card (Construction induction)

Short courses are also delivered in the Centre to a range of a range of different student cohorts undertaking fee for service programs and/or Indigenous programs.

In 2016 more than 1000 students undertook training in this facility. Based on industry trends, it is expected that these numbers will grow in the future. Forty-two lecturing, administrative and managerial staff work in this building.

The Trades Training Centre also is a focus for relevant events including trade industry nights where industry representatives, students and lecturers gain insights into areas of mutual interest.

International and domestic delegations tour the centre and always provide positive feedback about the facilities and training simulators operating in the complex. The comfortable classrooms are equipped with modern technology with the capability to stream lessons over the internet to students studying at remote sites.

The project funding also included space refurbishment adjacent to the training facility to create a language and skills development and assessment centre, providing targeted pathways and support for Indigenous and recent migrants and refugees to participate in major projects and related employment opportunities. CDU has subsequently entered into a contract with VETASSESS to enrol and assess international candidates seeking Australian qualifications.

Learner support is heavily integrated throughout the Trades Training Centre delivery programs. The VET Learner Support Team (LST) assesses all new apprentices at their commencement to determine the levels of support required for individual students and cohorts. Additional in-class lecturer support is provided for modules identified as requiring high numeracy skills or where complex theory commonly causes difficulty for students, and students identified as requiring high levels of support are provided with ongoing support and mentoring throughout the duration of their study.

Indigenous students are provided with assistance in student admission, enrolment, application and course information including the development of individual learning plans, tutorial support, educational pathways and progression from VET to higher education.

THE AUSTRALIAN CENTRE FOR INDIGENOUS KNOWLEDGES AND EDUCATION – CDU - \$30.7M

Approximately 30 per cent of the Northern Territory's diverse population are Indigenous Australians. In 2010, Charles Darwin University (CDU) and the Batchelor Institute for Indigenous Tertiary Education (BIITE) collaborated to establish the Australian Centre for Indigenous Knowledges and Education (ACIKE), which was successful in attracting EIF funding to establish a suite of initiatives.

The ACIKE partnership was established with a clear goal of directly contributing towards an expansion of the collective capacity of both education providers to deliver positive outcomes in partnership with Indigenous peoples and communities..

Initiative 1

As a landmark building, the ACIKE Precinct showcases the significance of Indigenous histories, knowledges, cultures and values within both CDU and BIITE. It has also provided a vital space to host important ceremonial occasions and strategic events, including the first Welcome to Country ceremony for a Vice-Chancellor of CDU and numerous local, national and international forums. The ACIKE Precinct houses CDU's first Larrakia Academic-in-Residence, an important component of an historic Memorandum of Understanding signed to strengthen the relationship between CDU, the Larrakia Nation Aboriginal Corporation and the Larrakia Development Corporation.

The ACIKE partnership provides a strategic focal point to strengthen:

- The position of First Nations peoples in the operations of CDU; and
- The relationship between CDU and BIITE in jointly developing opportunities and strategies for achieving improved results in Indigenous Higher Education attraction, retention and success.

Infrastructure throughout the ACIKE Precinct includes:

- high tech flexible teaching spaces used by both CDU and BIITE;
- the Office of Indigenous Student Services, providing dedicated access to tailored supplementary funding programs and support;
- purpose-built exhibition spaces showcasing numerous art exhibitions throughout the year, including the annual Gurindji Art Exhibition and CDU's Northern Editions print exhibition; and
- office accommodation for co-location of Indigenous related fields, approximately 60 staff, and expertise including CDU's School of Indigenous Knowledges and Public Policy.

Initiative 2

In addition to the ACIKE Precinct, a complementary component of the project was the construction of culturally appropriate student accommodation on Casuarina Campus. This accommodation facility (Building 14) was specifically designed for short term stays required by Indigenous students enrolled at CDU and/or BIITE. The purpose-built accommodation allows for culturally appropriate practices to be applied, including the separation of all accommodation and facilities by gender. Each year, the accommodation is accessed by a wide range of Indigenous students and when possible, relevant Indigenous stakeholders and prospective students.

Initiative 3

The final part of the proposal saw the purchase of two new trailers which were converted into Mobile Adult Learning Units (MALUs). The MALUs are stationed in communities for training delivery to Indigenous students located in regional and remote communities. The arrival of the MALUs in these communities is highly anticipated and directly contributes to ongoing Indigenous enrolments and completions, particularly in the Central Desert region.

QUEENSLAND

QUEENSLAND'S FIRST DUAL SECTOR UNIVERSITY – THE TRANSFORMATION OF CQUNIVERSITY

This ground-breaking transformation, finalised in 2014, brought together higher education and TAFE sectors through a merger of CQUniversity and Central Queensland TAFE.

The creation of Queensland's first dual sector university would not have been possible without the significant injection of \$73.8 million in funds from the Commonwealth's Education Investment Fund (EIF) and Structural Adjustment Fund (SAF).

This injection of EIF funding leveraged \$120 million of Queensland Government assets to create the biggest regional university in Australia, with more than 2,000 staff and 35,000 students across 19 locations.

The dual sector university provides people living in the region seamless access to the full range of post-school education and training options and allows them to "skill up" for the unique workforce needs of the region.

Some students use pathways from VET into higher education, while degree students can access additional trade qualifications to ensure they are employable and comprehensively skilled.

CQUniversity has close links with the community and local industry and is in the best place possible to provide highly trained, work-ready graduates for the region.

Key infrastructure projects made possible through EIF include: Rockhampton Health Clinic (Stage 2 - \$14m); Mackay City Campus refurbishment (\$10.2m); Mackay Engineering Building (\$16.6m); and Interactive learning spaces and systems (\$9.5m)

SCIENCE AND TECHNOLOGY PRECINCT (SCIENCE AND ENGINEERING CENTRE) - QUT - \$75M

The Science and Engineering Centre (SEC) brings together teaching and research in science, technology, engineering and mathematics in a world-leading model and dynamic community hub. \$75 million in EIF funding enabled QUT to leverage an additional \$155 million of funding towards the delivery of a science and engineering innovation precinct that has transformed QUT's Gardens Point Campus.

The SEC houses the Institute for Future Environments (IFE) which is working to solve some of the world's most pressing problems, from tackling global food security to managing scarce natural resources. It brings together more than 300 scholars from the fields of science, technology, engineering, mathematics, business, education and law to partner with government and industry to seek solutions collaboratively.

Moreover, IFE hosts some of the nation's most advanced analytical capabilities across imaging, omics, spectrometry and spectroscopy in a \$30 million research facility. This research infrastructure has been pivotal to quality research programs reflected in three current ARC Laureates as well as servicing more than 30 SMEs per annum across several different industry sectors. This strong foundation has also allowed QUT to position itself as national leader in research at the pilot-scale, playing major a role in development of new export markets such as hydrogen.

The SEC building is focal point for engagement with the public and school students. As one of the world's largest digital displays, the CUBE has been instrumental in communicating the STEM agenda and to inspire the next generation of innovators and problem solvers.

The EIF investment was a crucial element of the SEC project. Even within the relatively short period of time there has been significant dividends and a promising horizon of major societal impact.

NATIONAL IMAGING FACILITY – UQ

The National Imaging Facility (NIF) is an Unincorporated Joint Venture (UJV) that was established in 2007, with six founding partners. It has received substantial funding through the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS), with co-funding from Australian and State Government agencies and partners to the UJV to provide state-of-the-art imaging capabilities for the imaging of human, animals, plants, and materials through three main themes of:

- Molecular Imaging and Radiochemistry;
- Human Imaging; and
- Animals, Plants, and Materials Imaging.

With a range of world-leading imaging technologies and highly specialized expertise, NIF develops advanced imaging solutions to drive innovation.

The \$40.2 million EIF investment in 2010 was leveraged to a \$106 million project which built the Centre of Advanced Imaging, added five new partners, and established NIF as a powerhouse of research using imaging technologies. This made \$150 million of world-class technology available to the Australian research community, supporting research of more than 500 scientists.

In addition to the initial NCRIS funding, the Education Investment Fund (EIF), and the ongoing commitment of Commonwealth in NIF operational funding as part of National Innovation and Science Agenda (NISA), NIF was awarded \$53 million by Commonwealth Government through NCRIS in 2018, following the 2016 Research Infrastructure Roadmap and 2017 Research Infrastructure Investment Plan. This provided further leverage on NIF previous investments to further expand the national capability of NIF capability over the next 5 years.

ADVANCED ENGINEERING BUILDING – UQ

The Advanced Engineering Building (AEB) is an iconic building for teaching and research in engineering. It enhances UQ's ability to deliver practical active-learning styles for engineering students, and maximise global research opportunities enabling UQ to respond to major shifts in the challenges facing the world.

The Advanced Engineering Building, incorporating the Centre for Advanced Materials Processing and Manufacturing (AMPAM) at the St Lucia campus was seeded by a \$15 million investment from the Queensland Innovation Building Fund,=. The Commonwealth contributed a further \$50 million through the EIF, the University added \$62 million of its own strategic resources and private philanthropy contributed a further \$2.5 million.

SOUTH AUSTRALIA

REGIONAL CONNECTIONS: CENTRE FOR REGIONAL ENGAGEMENT (MOUNT GAMBIER AND WHYALLA) - UNISA - \$18M

A new campus in Mount Gambier, opened in 2016, enabled the University to enrol almost 260 students in undergraduate programs in social work, nursing, foundation studies and primary/early childhood education.

The new Mount Gambier Learning Centre is part of UniSA's \$22 million Regional Connections project, which aims to revolutionise the student learning experience and enhance access to higher education programs for regional students across South Australia.

The University secured \$18 million in total funding from the Federal Government, \$10.5 million of which was invested into the new building and \$7.5 million used to deliver High Speed Fibre connections to Mount Gambier and Whyalla Campuses. This allows the fastest internet speeds of any region in Australia and makes UniSA students the best-connected students in any regional city in Australia.

PARTICIPATE@UNISA - \$30M

The Participate@UniSA EIF grant allowed the University of South Australia to build the Jeffrey Smart Building, which supports new models of learning and spaces that stimulate and foster creativity and innovation. The \$85 million project included \$30 million in EIF funding.

MATERIALS AND MINERALS SCIENCE LEARNING AND RESEARCH HUB

At the heart of UniSA's Mawson Lakes campus, a centre of innovation and activity in Adelaide's northern suburbs, is the University's \$50 million Materials and Minerals Science Learning and Research Hub. The centrepiece of this hub - the Materials and Minerals Science Building - sets new benchmarks for collaborative learning, research, innovation, sustainability and excellence. This building was officially opened in August 2012 following the awarding of a \$40m EIF grant in 2008.

TASMANIA

CREATIVE FUTURES TASMANIA – UTAS - \$37M

A \$90 million creative industries and performing arts development is being developed in Hobart, co-located with and enhancing Hobart's historic Theatre Royal.

Creative industries are vital to Tasmania's economy. More than 9,000 Tasmanians are directly employed in the creative industries, and many more are indirectly employed through the tourism, hospitality and retail sectors.

The new development will include the Theatre Royal, the University of Tasmania's Conservatorium of Music and the Creative Exchange Institute, and a new research institute with a focus on performance, design and creativity.

The project is a partnership with the University and the Commonwealth and Tasmanian governments, and will include performance venues and public spaces.

INSTITUTE OF MARINE AND ANTARCTIC STUDIES (IMAS) – UTAS - \$45M

IMAS aims to improve understanding of temperate marine, Southern Ocean and Antarctic environments, their resources, and their roles in the global climate system through research, education and outreach.

Since receiving \$45 million from the EIF to build new facilities on the Hobart Waterfront, the Institute has tripled in size since 2010, and now has 190 staff and 185 PhD students.

The Australian commercial wild fishery industry is valued at \$2.18 billion, with Tasmania having a 26 per cent share of this. IMAS fisheries research supports the long-term sustainable harvest of wild marine resources, and its aquaculture research is aimed at delivering significant increases in production while minimising environmental impacts. Key partnerships and projects foster links between industry and IMAS.

VICTORIA



MANUFACTURING TECHNOLOGY TRAINING CENTRE – FEDERATION UNIVERSITY - \$18M

Manufacturing is the third largest category of employment in the Central Highlands of Victoria and the major driver of regional growth and development. This \$18 million EIF project has created the leading manufacturing training site in western Victoria. The Centre offers a wide range of programs in manufacturing technology, mechatronics, robotics, computer automation and welding metal fabrication.

There are four classrooms and approximately 4,700 square metres of floor space throughout the building. The introduction of state-of-the-art learning technology addresses an area of skills shortage within the region by providing job-ready graduates who are familiar with current industry practice.

The investment has helped with the diversification of the region's manufacturing base by creating smarter, more innovative manufacturing technologies.

The Manufacturing Technology Training Centre is a vital resource in maintaining, growing and leading manufacturing technology in western Victoria and has been crucial to the vocational training needs of the region.

INSTITUTE FOR MOLECULAR SCIENCE (LIMS) - LA TROBE UNIVERSITY - \$64.1M

Launched in 2009, the LIMS complex has more than 60 research and support laboratories, advanced research equipment, a 200-seat auditorium, and over 3,000 square metres of teaching facilities. Around 400 La Trobe academics, research fellows, postgraduate students and support staff are based at the Institute. LIMS also has two important regional nodes: many of its scientists work at La Trobe's Bendigo and Albury Wodonga campuses. The focus of LIMS is on six areas of research strength: cancer, infection and immunity, neurobiology, molecular design, molecular imaging and molecular sensing.

LIMS also has two embedded companies:

- Hexima Ltd, who are developing plant-derived proteins and peptides for application as human therapeutics and the genetic modification of crops; and
- AdAlta Ltd, who are developing the next generation antibody platform, the i-body, to deliver high affinity and specific biologics against a variety of therapeutic and diagnostic targets.

LIMS has an important collaboration with the Olivia Newton-John Cancer Research Institute that facilitates the sharing of knowledge, skills, research, training and facilities. LIMS is known for its research, but it is also a training centre, providing students and early career researchers with access to the latest equipment and exposure to high impact research projects.

Key Achievements:

- Emeritus Professor Nick Hoogenraad AO and Dr Amelia Johnston led an international research team that discovered the cause of cancer cachexia, a condition that kills up to one third of late-stage cancer patients.
- Dr Ivan Poon and Georgia Atkin-Smith captured the death of a human white blood cell for the first time.

- Dr Karen Harris and Professor Marilyn Anderson AO, together with collaborators at the University of Queensland, identified and produced the key enzyme that can turn small proteins known as linear peptides into more robust and chemically stable circular ones. The discovery makes the peptides a leading candidate for future pharmaceutical drug design.
- LIMS Stone Fellow in Chemical Biology, Dr Donna Whelan, built a highly specialised microscope to assist with her research into fundamental biology and DNA damage in diseases such as cancer.
- Dr Brian Abbey and Professor Keith Nugent, also members of the ARC Centre of Excellence for Advanced Molecular Imaging, collaborated with the Deutsches Elektronen-Synchrotron and the Center for Free-Electron Laser Science in Germany on the first-ever megahertz crystallography experiments.

CARBON NEXUS - DEAKIN UNIVERSITY - \$37M

Deakin's Future Economy Precinct, located at Deakin University in Geelong, is nurturing advanced manufacturing expertise in future fibre, light weighting, batteries, big data and smart systems. The precinct is now home to a growing number of start-up companies and industry partners such as the multi-million-dollar carbon fibre composite wheel manufacturer Carbon Revolution.

The precinct – a 540-hectare site – has led to the creation of over 1900 high-tech, high-value knowledge economy jobs, through industry partnerships and co-location opportunities, and is a key part of Deakin's plan to support industry-led advanced manufacturing and smart system growth in the Geelong region.

Carbon Nexus

Unique in the global south and considered best-of-breed globally, the Carbon Nexus facility is at the heart of Deakin University's Future Economy Precinct, delivering globally significant, university-based, industrial-scale research, supporting the growth of a new smart-tech carbon fibre industry in Australia.

Carbon Nexus was funded as part of a \$103 million joint Deakin-CSIRO initiative – including \$37 million in EIF funding and \$10 million from the Victorian State Government. The project was delivered on time and on budget opening in 2015.

Carbon Nexus is the world's most advanced carbon fibre and composite research facility:

- with the only PAN precursor wet spinning line in the Southern Hemisphere;
- offering R&D services over the entire value chain from precursor development to composite manufacturing; and
- providing access to a team of globally-recognised, high-technology materials experts.

The EIF investment is already providing a return on the initial investment, such as:

- novel intellectual property that has been developed by Deakin staff; and
- new IP and technology which is set to substantially reduce the energy and capital investment required for carbon fibre production opening the gate to more affordable light-weighting across many industries.

Key Achievements to date

- Carbon Nexus IP is set to dramatically cut the cost of carbon fibre manufacturing globally.
 - It joined forces in 2017 with LeMond Composites in a \$58 million deal that enables manufacture of carbon fibre with up to 75 percent less energy thus making the process faster and cheaper.
 - This will make carbon fibre accessible to a wider range of everyday products including cars, bikes, boats, bridges and laptops, in addition to existing aircraft and aerospace applications, opening up light-weighting to a vast range of manufacturing.
- LeMond Composites is planning to invest \$44 million in a carbon fibre manufacturing plant in Geelong which will create 110 jobs with other spin off companies intending to relocate to be closer to supply.
- Carbon Revolution is a unique case study for the future of advanced manufacturing.
 - Currently employing 150 people and set for major expansion, Carbon Revolution, nurtured by Deakin from start up to major disruptor, produces the world's first one-piece carbon fibre composite wheels and supplies these as parts to the global automotive and aerospace industries.
 - Located at Deakin Geelong, it collaborates closely with Carbon Nexus to develop improved and lower cost carbon fibre for the manufacture of its unique wheels.
 - When the current, proposed expansion is complete, Carbon Revolution will have a workforce of over 600 high skilled advanced manufacturing workers.
 - The relationship with Deakin means that undergraduate and postgraduate engineers and scientists work in a modern, high tech advanced manufacturing environment on real problems relevant to their future careers.
- Located at the Geelong Future Economy Precinct, the \$13.2m ARC Research Hub for Future Fibres leads the development of future fibre-based materials, ranging from short polymer fibres for the medical, textile and industrial sectors, to carbon fibre composites for the automotive industry.
 - Led by Deakin's Institute for Frontier Materials, the Hub also involves Swinburne University of Technology and five industry partners: HeiQ Pty Ltd, Carbon Revolution Pty Ltd, Quickstep Automotive Pty Ltd, Draggin Jeans Pty Ltd and the Ear Science Institute Australia Inc.
- Quickstep Holdings, also co-located, is Australia's largest independent manufacturer of carbon fibre composites and recently established an automotive division and global R&D centre on-site at Deakin in Geelong to be adjacent to Carbon Nexus.
- Victorian company Furnace Engineering will benefit from export opportunities generated through its long-term research collaboration with Carbon Nexus. The manufacturer and supplier of Carbon Nexus' high-temperature furnaces project-managed the installation of the facility's pilot and research lines. It will also manufacture the specialised carbon fibre production machinery for the LeMond plant.
- Carbon Nexus has so far trained 14 PhD students – creating the next generation of world-class carbon fibre researchers.