



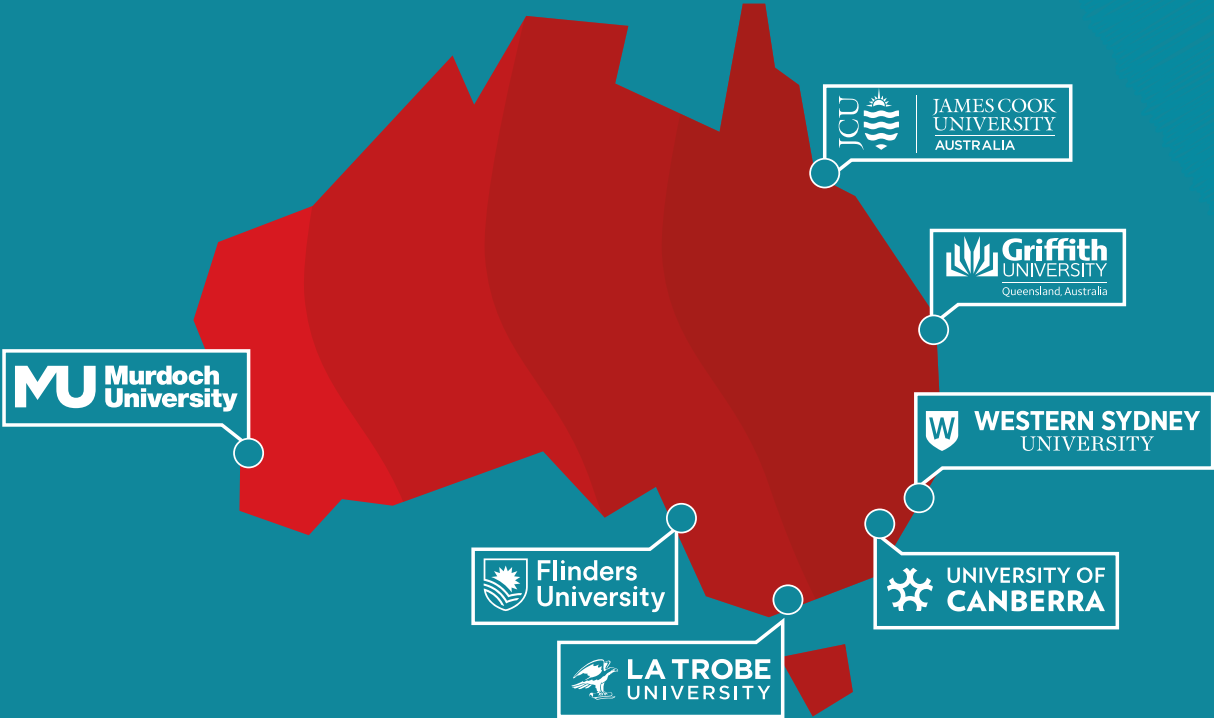
Innovative
Research
Universities



Sustainable Universities
and Communities

Contents

| | |
|---|----|
| Chair’s welcome | 3 |
| Executive Director’s welcome | 4 |
| Data snapshot | 5 |
| IRU member sustainability case studies | 9 |
| Quality education | 10 |
| Gender equality and reduced inequalities | 14 |
| Sustainable cities and communities | 19 |
| Climate action | 23 |
| Partnerships for the goals | 28 |
| Working towards a more sustainable future | 32 |
| The way forward | 37 |



Acknowledgement of Country and respect for First Nations cultures

The IRU recognises First Nations people across Australia as the Traditional Owners of the unceded lands upon which our campuses sit today. We believe that education and research play an important role in reconciliation, recognition, justice, and First Nations advancement.

Chair's welcome

For more than 20 years, Australia's Innovative Research Universities have been collaborating for inclusive education, research with impact, and a stronger voice in public policy.

These shared values are no better exemplified than in our joint commitment across the IRU to sustainability for our students, campuses, communities, and the country.

The *IRU Sustainable Universities and Communities* report brings together operational and strategic best practice at IRU member universities. It highlights our success in a number of case studies and provides a data-informed record of the progress we have made.

From our earliest origins in the 1960s, IRU universities were among the first in Australia to include inter-disciplinary environmental studies in our course offerings. Our operational and research expertise

in sustainability is world-class, and this is demonstrated by the outstanding results many of our members have achieved in recent world university rankings.

However, universities cannot affect the step change in sustainable outcomes required to meet the nation's needs and aspirations on our own. As this report demonstrates, we work best in partnership, and our universities are uniquely placed to collaborate at the local, regional, national and global levels.

For example, James Cook University and the University of Canberra, together with partners from Australia and overseas, have co-founded the new Australian Research Council (ARC) Training Centre in Plant Biosecurity, which aims to train and support researchers to prevent and respond to pests and diseases that threaten Australia's environment and economy.

In order to future-proof our institutions and communities on the pathway to a net-zero world, we welcome further opportunities to work with policy-makers and communities to develop the necessary frameworks and new funding models.

We are proud to share our successes to date and commit to working in partnership for a more sustainable, equitable and innovative future.



Professor Simon Biggs

Chair, Innovative Research Universities
Vice-Chancellor and President,
James Cook University

Executive Director's welcome

Through their teaching, research, partnerships and operations, universities are making significant contributions every day to the future of their communities and the world. However, many of these positive impacts are still not fully captured in the ways that universities are evaluated.

In recent years, international university rankings have started to focus more on impact and on sustainability. This expanding sense of the social value of the university is welcome, but we know that there is still much that rankings cannot capture – for example, the role of the university in its local community and the contribution to place-based partnerships, and the importance of partnership with Indigenous communities to support progress towards self-determination.

Recent years have also seen a growing focus on the UN Sustainable Development Goals (SDGs) as a way of charting progress at local, national and global levels. Agreed by all UN member states in 2015, the 2030 Agenda for Sustainable Development and the SDGs highlight key areas for focus. All of

the member universities in the Innovative Research Universities (IRU) group committed to the SDGs prior to 2020 and are continuing to prioritise work in these areas in their strategies to 2030 and beyond.

This report highlights best practice across the IRU universities, celebrating the success and impact of our students, our researchers and our universities as partners in their communities. It maps IRU research against the SDGs and highlights areas of strength to guide and inform future initiatives. We welcome opportunities to further strengthen partnerships for sustainability and impact.



Paul Harris
Executive Director,
Innovative Research Universities.

Sustainable Universities and Communities

Data snapshot

Mapping IRU research to the Sustainable Development Goals (SDGs):

IRU research is contributing to all of the SDGs. However, over the last five years, the average of total research outputs across the IRU has been greater than the Australian average and global average for the following SDGs:

1. No poverty
4. Quality education
5. Gender equality
10. Reduced inequalities
13. Climate action
14. Life below water
15. Life on land
16. Peace, justice and strong institutions
17. Partnerships for the goals

(based on 2017-2022 data from the COKI Academic Observatory)



Tracking the policy impact of IRU universities – citations of research publications in policy documents mapped against the SDGs.



In total, **82,059 policy documents** worldwide cited research from IRU universities relevant to the **Sustainable Development Goals (SDGs)**.

In particular, policy-makers have relied on research released by IRU universities in relation to:

SDG 3 (Good Health and Well-being) with **16,556 citations**,



SDG 15 (Life on Land) with **4,567 citations**



and SDG 13 (Climate Action) with **4,411 citations**.



(Data provided by Overton.io)

All IRU universities have committed to the Sustainable Development Goals.



26 buildings on IRU campuses were Green Star or LEED-compliant green buildings, or equivalent, in mid-2024.



All IRU universities diverted at least 20% of their waste from landfill in 2022.



161 electric vehicle chargers were available on IRU campuses in mid-2024.



campuses

IRU members have

56 campuses in Australia and around the world

19 metro campuses

4 international campuses

33 regional and rural campuses

student equity

In 2022, the domestic IRU student cohort was

31,693

low SES students

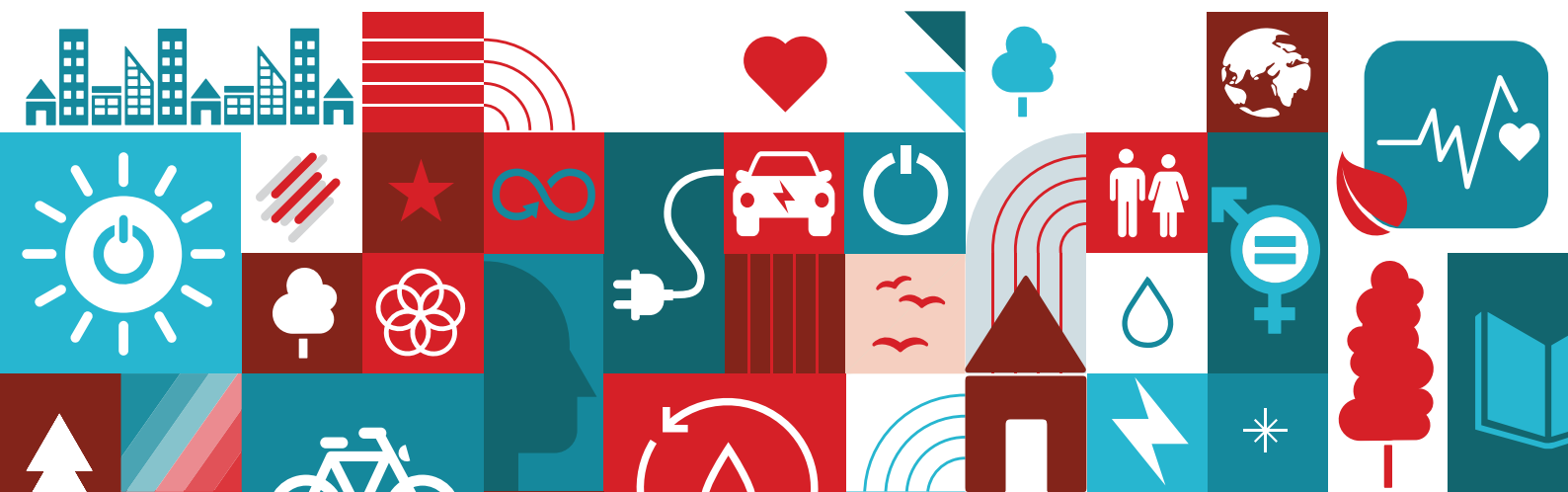
3,996

First Nations students

29,273

regional & remote students

In 2023, IRU members educated **17%** of all domestic undergraduate students in Australia



IRU universities produced 9,164 megawatt hours in renewable energy (wind, solar etc.) in 2022.



All IRU universities are using recycled water, including captured rainwater e.g. in buildings or for irrigation.



IRU universities owned a fleet of 216 electric and hybrid vehicles in mid-2024.



The majority of IRU universities are planning to be carbon neutral by 2030.



gender equity

In 2022, **171,258** students were enrolled at IRU universities and

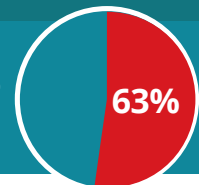
108,682 female students were enrolled at IRU universities.

In 2023, **11,339** female STEM (Science, Technology, Engineering and Maths) students graduated across all levels of study.

In 2023, IRU universities employed **16,805** staff



including **10,656** female staff



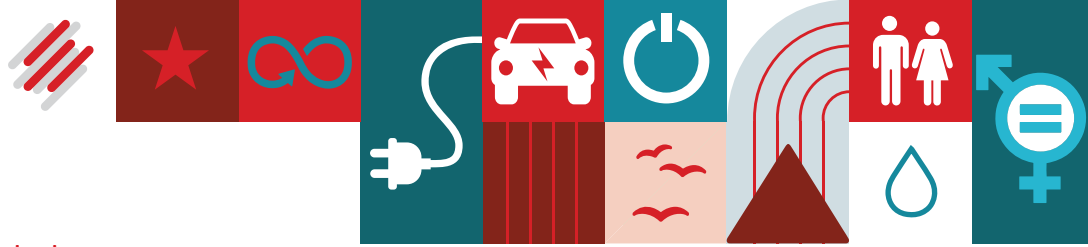
rankings

In 2024, all IRU universities that participated in the **Times Higher Education (THE) Impact Rankings** were among **top 200 universities in the world**.

In the **QS Sustainability Ranking 2024**, 5 out of 7 IRU universities were ranked as among the **top 200 universities in the world for sustainability**.

In terms of single scores for individual Sustainable Development Goals participating IRU universities were in the **top 10 in the world** in the **Times Higher Education (THE) Impact Rankings (2024)** for **Gender Equality, Zero Hunger, Reducing Inequalities, Clean Water and Sanitation, Good Health and Wellbeing, and Partnership for the Goals**.

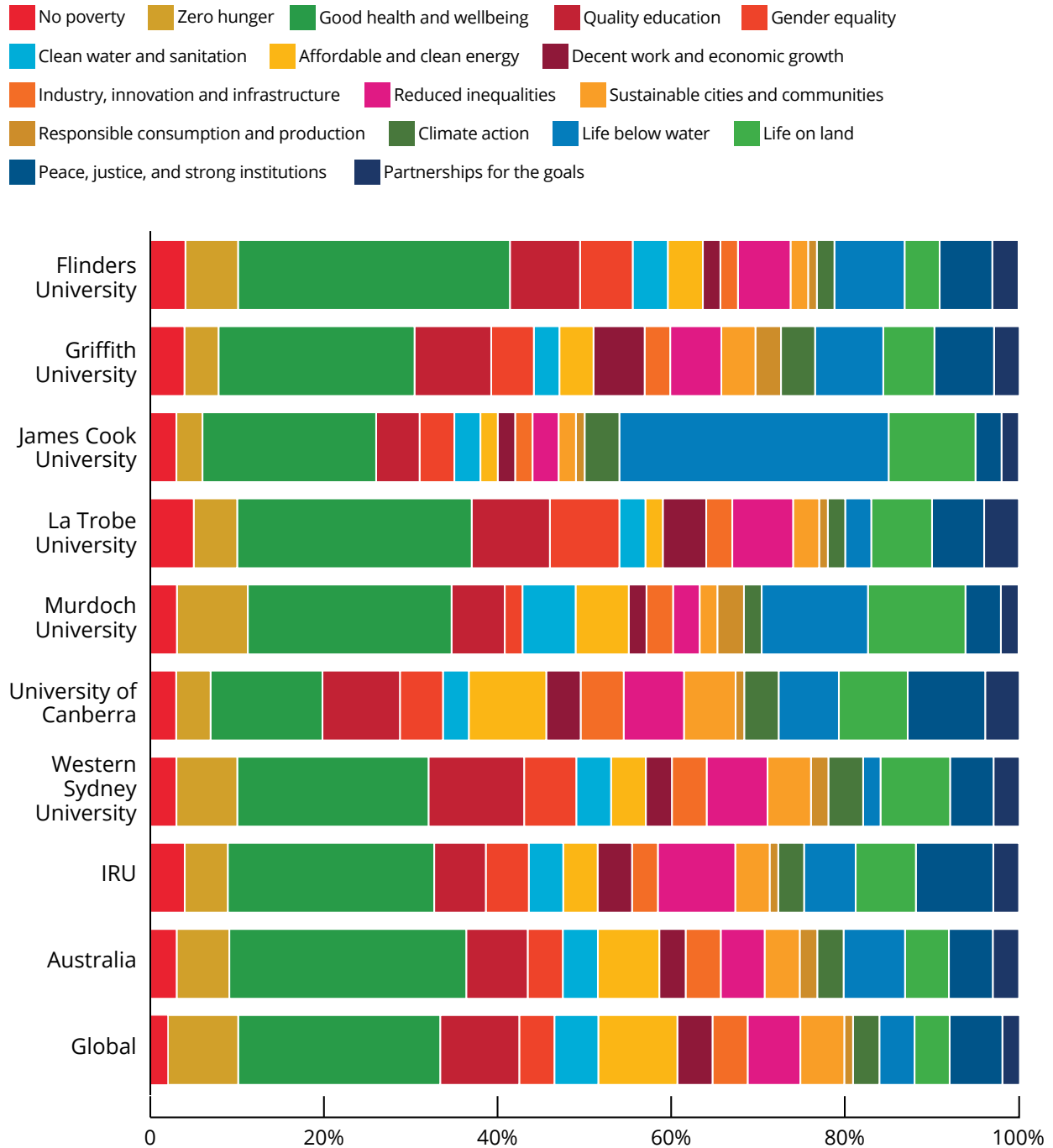




IRU research and the SDGs

Research outputs by Sustainable Development Goals (SDGs) for each IRU member university, for all IRU universities and compared with Australia and the world. Each research output is assigned to only one SDG in this chart.

(Based on 2017-2022 data from the COKI Academic Observatory)



IRU member sustainability case studies



Innovative
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Universities





Quality education

Sustainable Development Goal 4 (SDG 4) encourages individuals and institutions to strive for inclusive and equitable, quality education and promote lifelong learning opportunities for all. Our universities are among the best in the world for teaching, with James Cook University, La Trobe University, Murdoch University and Western Sydney University being awarded at least 5 QS Stars for Education in the QS World University Rankings 2025.

IRU universities are offering a wide range of innovative extracurricular initiatives that provide students with additional hands-on skills to boost their employability. Western Sydney University offers its students free entrepreneurship training and development via the Venture Makers Innovation Challenge program, and James Cook University's students are invited to further develop their skills in the ecological and sustainable fields by participating in the TropEco program.

The University of Canberra is trialling innovative partnerships between students and educators. This includes a recent project where a student designed an award-winning inclusive courtyard that is now being used by the university's students, staff and visitors.





Pitching for a better future



A key role of a modern university is to solve emerging problems and develop innovative solutions. The *Venture Makers Innovation Challenge* is a training and development program that puts Western Sydney University students in the driver's seat. Delivered by Launch Pad, Western's technology business incubator, the program focuses on building an entrepreneurial culture for sustainable social change.

During the intensive one-day event, Western's students are coached by experienced mentors from startups across various sectors as they work on pressing issues such as mental health or accelerating to net zero.

In a recent Innovation Challenge, students investigated new ways to disrupt education and improve access, participation and success for all learners. The students defined a critical problem for education, formulated innovative solutions, used cutting-edge tech tools to design a relevant product or service and competed in a pitch fest for a prize pool of \$8,500.

The winning team proposed an artificial intelligence-based tool to analyse the interests and strengths of primary school students and suggest career paths in which they would thrive. The runner-up team pitched a program that would bridge the knowledge gap between traditional and non-traditional systems of education.

During the event, Western's students learned about conceptual design, pitching ideas and how to embed the Sustainable Development Goals into their projects. The experience provided students with transferrable skills such as entrepreneurial thinking, problem solving and collaboration to create impactful solutions for sustainable and inclusive communities.



Student sustainability skills with TropEco internships



JCU's Brandan Espe training TropEco interns in how to carry out a BioCondition survey (a vegetation condition assessment).

James Cook University's (JCU) TropEco Intern program allows students to engage with a variety of environmental and sustainability volunteering activities that provide hands-on skills. It is particularly engaging for international students.

Launched in 2012, the TropEco Intern program at JCU offers students immersive practices in a broad range of ecological and sustainability experiences.

The program is constantly oversubscribed and currently facilitates 25 students annually, providing them with opportunities to engage in GIS mapping, plant identification, fauna surveys, food garden work, and ecological restoration. Students choose to join wildlife surveys, tree planting, GIS mapping of campus biodiversity, growing tropical food crops, and creating water-wise native landscapes.

Student interns encourage a culture of sustainability in their peers through outreach,

educating students on reducing waste, recycling, and travelling sustainably. Students receive a certification recognising their achievements at the end of the program.

The Threatened Species program, a popular component of TropEco, enables students to conduct field research in the Dry and Wet Tropics, contributing to State of Condition reports and developing recovery strategies for threatened species. A recent highlight was the relocation of the endangered plant, *Kunzea truncata*, unseen since its discovery in 1991.

Promising TropEco interns are given opportunities to attend meetings with the Queensland State Government and contractors, often leading to employment offers. Interns transitioning to JCU casual assistants in the final six months of their degree have consistently secured employment before graduation.

TropEco Interns make a significant contribution to environmental and sustainability outcomes at JCU while taking home practical skills for a sustainable career path.

A whiptail wallaby, and *Kunzea truncata*, a recently rediscovered threatened species.



The HUB: A sustainable courtyard made by and for students



The HUB (photo by Hugh Swann)

Bachelor of Landscape Architecture (Honours) students were recently tasked to redesign a courtyard at the University of Canberra as a part of their second-year studies. The best design was constructed and won an award at the 2023 Australian Institute of Landscape Architects ACT Awards.

The students of the 3D Landscape unit were tasked to transform a plain and unattractive courtyard – also known as the HUB – into a vibrant space with seating and shade. The redesign assignment was run as a competition, with the winning design taking various needs into account, such as providing spaces for studying and for casual chats, as well as outdoor seating for a café.

The winning design incorporated raised planters, trees, pavers and communal tables tailormade for easy wheelchair access, with space that allowed easy flow through the courtyard for students, staff and visitors. It also adhered to the sustainability goals of the university through the use of native plants and re-using existing pavers to help cut down on building waste.

In cooperation with the student, the design was finalised and documented for construction by a University of Canberra lecturer and turned into reality by a local landscaping company. The

student was involved in the project from the initial design through to finish of construction.

The redesigned HUB recently took out an Award of Excellence in the Health and Education Landscape category at the ACT Landscape Architecture Awards, proving that these kinds of collaborations are beneficial for students, universities and the community alike.



The HUB (photo by Hugh Swann)



Gender equality and reduced inequalities

Inequality continues to exist among and within countries, and individuals and organisations are encouraged to contribute for positive change.

Western Sydney University has committed to the United Nations Sustainable Development Goals since 2017. The university has recently been recognised as number one in the world for gender equality (SDG 5) in the Times Higher Education (THE) rankings, due to initiatives such as Women in STEM Education (WiSE), increasing the representation of women in leadership roles and conducting extensive research into women's issues.

In Western Australia, Murdoch University's Ngangk Yira Institute for Change is working towards positive change for First Nations families, such as by using horses for Equine Assisted Learning, which improves the mental health of First Nations children.

Reducing inequalities is also about closing the gap for people living with disabilities or people living in remote regions. Griffith University's design students are now codesigning products and tools that make everyday life easier, and James Cook University's dentistry students have connected with First Nations children and adults for better oral health.





Number one for gender equality

5 GENDER
EQUALITY



Photo by Sally Tsoutas

While the world continues to fall behind Sustainable Development Goal 5's aim to achieve gender equality by 2030, Western Sydney University has been leading the way in the university sector supporting women and gender-diverse individuals to succeed.

In 2024, Western Sydney University was ranked by Times Higher Education as number one in the world for gender equality, and was in the top three for the previous six years. Additionally, the University has been recognised by the Workplace Gender Equality Agency as an Employer of Choice for Gender Equality for 22 consecutive years.

Ensuring that more people, regardless of their background, have the chance to study and succeed at university has been at the core of Western's mission for more than 35 years. The university invests in programs like *Women in STEM Education (WiSE)*, which is focused on fostering STEM industry connections and collaboration for students, as well as in a Gender Equity Fund that provides funding for gender equity and diversity-focused research and initiatives.

Western has a long history of increasing the representation of women in leadership roles, reducing the gender pay gap and promoting a better workplace. This endeavour is guided by industry best practice programs such as the *Science in Australia Gender Equity (SAGE)* initiative, for which the university won an Athena Swan Bronze Award in 2020.

Western's researchers are also bridging gaps by examining issues as diverse as the inclusive education curricula in Australian schools, safe housing for women escaping domestic violence, women's clinical experiences during childbirth and obstacles to female entrepreneurial success.

Through the lens of its strategy, policy and practical frameworks, Western provides a positive and inclusive experience for students, staff and researchers, and fosters a culture of equity, diversity and respect.



Photo by Sally Tsoutas

Working towards positive change for First Nations families



Professor Juli Coffin.

In the Noongar language, *ngangk yira* means ‘the rising sun’, but the word for sun also means ‘mother’. Murdoch University’s new Ngangk Yira Institute for Change focuses on working for and with Aboriginal families in Western Australia for the best possible health outcomes.

The Ngangk Yira Institute for Change consists of three research centres, all of which focus on discrete aspects of wellbeing and resilience. The Yorga, Maaman and Koolanga Research Centre aims to improve women’s experiences from pregnancy to parenthood, as well as their children’s early years.

The Yawardani Jan-ga Research Centre, in Broome and Halls Creek, focuses on Equine Assisted Learning (EAL) – also known as ‘horses

healing’. This research uses horses to develop and support the wellbeing and relationship skills of young Indigenous Australians.

The Coolamon Research Centre investigates the impact of environmental pollution and climate change on emerging infectious diseases and maternal and child health outcomes. This research is particularly beneficial to Western Australia’s remote communities, but also for the whole of Western Australia.

Co-designing meaningful research will ensure that Aboriginal and Torres Strait Islander people are empowered and healthy, and build more resilient families and communities. To effectively achieve this, the researchers collaborate with local Elders, clinicians, policy makers, health services and the wider community.

Driven by the mostly Indigenous researchers, and in partnership with the local Indigenous communities, the co-designed research aims to support empowered, healthy and resilient Aboriginal and Torres Strait Islander communities and help close the gap in Indigenous health outcomes in Australia.



Professor Rhonda Marriott, Hon. Ken Wyatt AM and Professor Fiona Stanley AC meeting up with local mums and bubs.

Co-designing solutions for people with disability



Attendees at the Design Café Pilot program (2023)

By placing people with disability at the centre of the design process, Griffith University brings fresh thinking to the creation of products that enhance the lives of people living with disability.

The world is not designed for people with disability. This presents daily challenges, but it can also inspire creativity and innovation. In 2023, Griffith University's Design Café pilot project brought together design students, engineers, 3D printing experts, occupational therapists, and, most importantly, people with disability to explore innovative solutions to the challenges of everyday life.

The pilot project resulted in the creation of items such as playing card holders and thumb loops for mobile phone charging cords. The project was so well-received by students and the community that Griffith University has since integrated disability-led design into their design curriculum as a new subject, Industrial Design Studio 2.

Since 2024, the new subject has been providing Griffith University's Bachelor of Industrial Design students with real-world experience, as they work for clients with disability. While the students learn to empathise with their clients and gain new perspectives about designing for disability, people with disability have the opportunity to share personal challenges and co-design useful solutions. These collaborations have resulted in

many practical, daily objects, including make-up brushes, pen holders, devices for picking up and holding cans, clothes pegs, protein shakers and easy-grip razors.

The student-created files of their designs and projects are available as free downloads from Griffith University's Inclusive Futures Design Library. People everywhere can use the files and take full advantage of the co-designed innovative aids to enhance their quality of life.



The panel of the Design Café, Ella Sabljak, Ryan Boyd, and Matt McShane.

Restoring the smiles of Yarrabah Shire



The gap between health outcomes for First Nations and non-Indigenous people in Australia is stubbornly wide. A pilot project by James Cook University (JCU), funded by the Australian Dental Health Foundation and Mars Wrigley Foundation, aims to provide better dental care for First Nations people in Yarrabah, a community to the south of Cairns.

Yarrabah has a population of around 4,000, and according to the Queensland Government oral health statistics, more than 100 people from the community were on a waiting list for non-urgent dental treatments in mid-2023.

In September 2023, JCU senior dentistry students, under the supervision of experienced qualified

dentists, travelled to Yarrabah in order to provide oral health education workshops and free dental examinations.

This was followed by a monthly shuttle bus, in partnership with the Gurriny Yealamucka Health Service Aboriginal Corporation, that brought First Nations people from Yarrabah to JCU's dentistry clinic in Cairns. Senior dentistry students provided basic treatments, including fillings, extractions and clean and polish procedures at no cost to Yarrabah-based concession card holders.

Some of the dentistry students themselves originated from rural backgrounds and were very aware how important access to dental treatment is for people living in rural and remote regions. They also emphasised that building rapport with their First Nations patients as well as learning about available dentistry services was a positive experience for students and clients alike.

JCU Dentistry students making a difference in the community.





Sustainable cities and communities

To achieve sustainable cities and communities, our towns and cities need to be inclusive, safe and resilient, and IRU universities contribute to this goal (SDG 11) in a variety of ways.

University of Canberra researchers have found evidence that more trees in Australian suburbs contribute to longer and healthier lives, while La Trobe University's researchers are using innovative approaches to encourage the local community to learn more about their environment and become citizen scientists.

Murdoch University has recently received an award for building the world's best academic building by drawing on cutting edge-technologies that are grounded in a tradition of learning going back thousands of years.



Children leaning against a tree trunk. Photo by Marcus Wallis on Unsplash.

Murdoch University: home to the world's best academic building



Murdoch University's new heart, *Boola Katitjin*, is located on Whadjuk Country in Perth's Southern suburbs. Boola Katitjin means 'lots of learning' in the Noongar language. The environmentally friendly design was key to winning the Higher Education and Research category at the World Architecture Festival, making it the world's best academic building.

The 180-metre-long timber and glass structure supports a tradition of learning that goes back thousands of years and connects Murdoch University to the history and the future of the land and people. The building's design connects physical and virtual participants via Technology Enabled Learning desks, which allow for innovative teaching and engagement with community and industry.

With 16,000 square metres of teaching space under one roof, Boola Katitjin is the largest

mass-engineered timber building in Western Australia. The reinforced timber was sourced from sustainable suppliers, and an incredible 93% of waste was diverted from landfill during construction.

Rainwater and stormwater are harvested, with excess water passing through a filtration tank before recharging the groundwater that is especially important during Western Australia's dry summers.

The building is fitted with a 450 kilowatt solar panel array, which, combined with other low energy systems, reduces its energy footprint by around 90% compared to other, similarly-sized buildings. These features contributed to Boola Katitjin becoming the first 6-star Green Star-compliant education building in Western Australia.

Boola Katitjin epitomises everything Murdoch University stands for – sustainability, equity, diversity and inclusion – and represents a significant step forward towards a more sustainable future for higher education infrastructure in Western Australia.



Living longer in the urban jungle



Melbourne from above (photo by Tom Rumble on Unsplash)

University of Canberra researchers have recently demonstrated that living in leafy localities contributes to a longer and healthier life. They also found that men benefit the most from living in a leafy suburb.

University of Canberra researchers have analysed satellite images of tree coverage in Australia's cities. With a resolution of 2 by 2 meters, even the smaller trees could be identified, which provided detailed data of Australia's least and most leafy suburbs.

The researchers compared the tree coverage data with mortality data for people living in these suburbs and found that leafier parts of the city were associated with a lower mortality rate than suburbs with fewer trees, after adjusting for socioeconomic status.

The results show that it holds especially true for men, indicating that 10% more trees in a suburb translates to 21 fewer deaths per 100,000 men and 3 fewer deaths per 100,000 women every year.

From a cost-benefit perspective, every tree costs around \$50 to \$100 per year to plant and maintain. This suggests that the value of the lives saved from additional tree cover is considerably higher than the cost of planting and maintaining additional street trees.

Walking through Canberra (photo by Michael on Unsplash)

The researchers recommend that, from a health perspective, developments that increase residential density should be preferred over converting tree-filled public parks into apartment complexes. They also suggest planting more trees in less advantaged suburbs, as more trees will not only result in less pressure on the health system, but will also have a positive impact on the residents' mental health and on the climate.



Citizen science at Nangak Tamboree Wildlife Sanctuary



Nangak Tamboree (photo by Nicholas Abbey)

In the Woiwurrung language of the Wurundjeri people Nangak Tamboree (*nan-nyack tam-bor-ee*) means respecting, sharing and looking after the waterway.

The 30-hectare Nangak Tamboree Wildlife Sanctuary is located at La Trobe University's Bundoora campus in Melbourne. Its waterways connect with the local creeks, attract wildlife and support native plants, and it is a living laboratory for students, staff and the wider community.

Over 500 species of indigenous plants and 355 native animals have already been recorded, including kangaroos, bats, the endangered White Skink, Gang Gang Cockatoos, Dwarf Galaxias fish, and three male emus.

But Nangak Tamboree is not a zoo. Behind the surrounding predator proof fence, there are no fences within the sanctuary. All animals are wild, but some are easier to spot than others.

This is why La Trobe University has been involving the community in biodiversity monitoring for

over 30 years. Typically, around 200–250 people a year participate in the Sanctuary's formal citizen science events, and in 2023, over 3,500 students from 62 schools participated in environmental education activities at Nangak Tamboree.

One of the most popular citizen science events is 'Breakfast with the Birds', where the citizen scientists head out at dawn with a guide to undertake a bird survey and then enjoy breakfast in one of the Sanctuary's outdoor huts.

In a collaboration with the Wurundjeri people, the Nangak Tamboree Wildlife Sanctuary is part of a wider initiative that will revegetate the university's lakes and moat systems, to sustainably protect the North-Eastern Melbourne region from the extremes of flooding and drought.



Banjo frogs (photo by Dave DeAngelis) and emus live in the Wildlife Sanctuary.



Climate action

Climate action (SDG 13) – combatting climate change and its impacts – is necessary to achieve a more sustainable future, and IRU universities are working towards taking pressure off the climate in a number of ways.

Flinders University has been a long-term contributor to the Bridgestone World Solar Challenge, building solar-powered prototype cars to highlight the applications of solar technology. The university has also planned and built an innovative solar grid that uses the university's electric cars as batteries on wheels that can provide instant access to free energy during peak hours.

In Western Australia, Murdoch University researchers have looked into innovative energy solutions and conducted a feasibility study that recommends solar-battery-hydrogen systems to wean remote communities off diesel-powered energy production.

Western Sydney University has demonstrated that universities can become climate-neutral, and the university is now going the next steps to become climate-positive before the end of the decade.



Becoming a climate and nature-positive university



Western Sydney University has worked towards becoming a climate neutral university for 10 years, and, in 2023, the university achieved this goal. The next goal for Western is to become climate and nature-positive by 2029.

‘Nature positive’ includes halting biodiversity loss and restoring nature to pre-2020 levels. ‘Climate positive’ means reducing greenhouse gases and removing more of them than the university produces.

To become carbon neutral, Western Sydney University switched to 100% renewable electricity, improved the energy efficiency of buildings and facilities, promoted sustainable transport options, and reduced waste.

To achieve a climate and nature positive future, the university will generate clean energy on-site, upgrade their plant and equipment, and work towards sustainable and ethical procurement. Key to achieving climate and nature positivity will be to embrace a circular economy and material recovery.

Becoming a climate positive and nature positive university also means working together as a community, and Western Sydney University has recently partnered with Greater Sydney Landcare to plant 15,000 native plants on its Hawkesbury campus.

A further 20,000 trees will be planted over the next two years. The trees will function as natural air-conditioning, lowering temperatures on the campus and will act as a carbon sink while providing shade and protection for native animals.

By 2029, Western’s campuses will lead the way in sustainable living that not only benefits students and staff, but also the communities in the region and beyond.



Batteries on wheels as drivers of change



Solar cells provide shaded parking and power for the university.

Flinders University's campuses collect climate-friendly energy from the sun and wind, and the university has recently added an innovative mobile energy storage system that can provide clean energy 24/7.

Flinders University's Bedford Park campus in Adelaide is powered by a 2.2-megawatt solar system, generating 20% of the campus' 100% renewable electricity supply. This system is connected to the campus electric vehicle (EV) charging stations, providing clean energy to students, staff and visitors.

In 2023, the provision and use of EV chargers at Flinders University nearly doubled compared to the previous year. These chargers annually facilitate over a million kilometres of zero-emissions travel, equivalent to 30 trips around the world and a reduction of over 100 tonnes of greenhouse gases.

As solar energy can only be generated during daylight hours, the university has recently installed 10 bidirectional vehicle-to-grid (V2G) chargers. These chargers enable compatible electric vehicles to function as mobile battery banks, feeding renewable energy back into the campus grid when needed.

Flinders University's fleet includes over 20 electric and hybrid vehicles, with 6 cars serving as mobile battery storage, collectively storing 280 kilowatt-hours annually.

The V2G project has paved the way for future regulatory approvals and demonstrated the demand and commercial viability for this technology.

This initiative is part of the South Australian State Government's \$3.2 million smart charging trials, aimed at promoting a more sustainable and EV-friendly future. The project has gained global recognition for its innovation and excellence in higher education engagement.



Flinders University's President and Vice-Chancellor Professor Colin J. Stirling connecting an electric car to a charger.

Climate-friendly microgrids in remote areas



Many remote communities around Australia are forced to generate power with diesel generators. A Murdoch University research team has examined if these communities could benefit from adopting more climate-friendly hybrid solar and hydrogen systems.

Funded by the Western Australian Government's Renewable Hydrogen Fund, Murdoch University's researchers planned and calculated the costs for hybrid solar-battery-hydrogen systems for the communities of Jinparinya and Warralong, in cooperation with Indigenous mining logistics company Cundaline Resources.

The researchers recommended a system that would turn excess solar energy into hydrogen during daytime and then into electricity when

needed in the late afternoon and evening. They calculated that even small seven-house communities like Jinparinya, that would need an 84 kilowatt solar system with 25 kg hydrogen storage, can benefit from a hybrid system.

They estimate that Jinparinya's microgrid, which would come at a cost of around \$440,000, can pay for itself in under seven years. Warralong's microgrid, that would provide power to 35 houses, a small clinic and a community centre, would have a payback period of five and a half years.

Based on these promising numbers, Murdoch University's researchers recommend that these stand-alone power systems should be installed in the regional and Aboriginal communities as soon as possible, which would also provide opportunities for local communities to partner with Cundaline Resources and the local councils.

Having access to clean power is not only key to transitioning to a carbon-neutral future but also provides additional economic opportunities by creating jobs as part of the infrastructure's construction, operation and maintenance.



Associate Professor GM Shafiullah from Murdoch University's Centre for Water, Energy and Waste.

The ultimate road trip in a solar-powered car



The 2023 Flinders Automotive Solar Team at the finish line in Adelaide.

The Bridgestone World Solar Challenge is a bi-annual solar-powered electric car event from Darwin to Adelaide. A Flinders University student team recently competed in the 3,000 kilometre challenge, proving that the electric vehicles equipped with solar cells can go almost anywhere.

The solar-powered car that competed in the race was developed by Flinders University undergraduate students over two years and supported by academics, industry and system specialists. The primary goal of the team was to plan and build a safe car that would drive as many of the 3,000 kilometres as possible.

The team entered the Bridgestone World Solar Challenge with their Investigator IV car as one of 11 cars in the Cruiser Class. The Cruiser Class is an energy efficiency trial and not a speed race.

The solar vehicle was equipped with 4.75 square metres of solar cells, that, mostly due to the weather, generated a maximum of 800 watts of a possible 1,100 watts while travelling through Central Australia.

During the race, Investigator IV had no breakdowns or unplanned stoppages and travelled with an average speed of around 80 kilometres per hour. The solar car also drove 2,500 kilometres over 6 days, which, the team

claims, is more than any other Cruiser Class car in the event.

Even though the solar-powered family car is still a few years off, Flinders University students proved that a solar-powered road trip is possible, and that it is a safe and environmentally friendly mode of transportation.



The Investigator IV during the 2023 race.



Partnerships for the goals

Sustainability can have many facets, and one of them is identifying and collaborating with partners to solve or remediate pressing issues for the benefit of the community.

IRU universities are partnering with government, business and the community in many ways. The University of Canberra collaborates with the Federal Government to manage water flow and temperature of a major Australian river in order to protect native Australian plants and animals.

Griffith University is working with the Carpentaria Land Council Aboriginal Corporation (CLCAC) in order to monitor the water quality of the Gulf of Carpentaria in Northern Australia, and La Trobe University's researchers are cooperating with cutting-edge private laboratories in order to control and potentially eradicate malaria.



Managing water flow to protect native species



Pelicans in the Cumbung Swamp (Lachlan River).

The Lachlan River rises in the Southern Tablelands district of New South Wales, and the river and the towns along it have been made famous by Australian poets Henry Lawson and Banjo Paterson. The Lachlan flows through the lands of the Nari Nari, Ngiyampaa, Wiradjuri and Yita Yita Nations, forming part of Songlines and Dreaming tracks.

During floods, native birds breed on the floodplains, wetlands and ancient river pathways of the Lachlan, native fish lay their eggs, and black box and river red gums soak up the water that helps them survive in drier conditions.

However, the Lachlan River experiences extreme variability in flow, and no two years are the same. When the floods do not bring sufficient water, additional environmental water needs to be added by the Commonwealth. This is monitored by the University of Canberra's Centre for Applied Water Science (CAWS).

Since CAWS' inception in 2014, University of Canberra's researchers have found that even small amounts of added environmental water can make a difference to strengthening native bird and fish populations. The researchers also found that in order to help native fish, such as golden perch and Murray cod, survive and reproduce, the temperature of the water also needs to be managed.

Canberra University's researchers have documented an increasing diversity of native plants in the Lachlan River catchment, proving that flow control and monitoring are crucial when it comes to protecting the diversity of life on the land and below the water in the region.



Angela Lanspeary and Gus McDonald from the Centre for Applied Water Science.

Breakthrough treatment for malaria



Malaria is a life-threatening disease that is spread to humans by some types of tropical mosquitoes. In 2022 alone, an estimated 249 million cases of malaria were counted in over 80 countries across the world, and an estimated 608,000 deaths from the disease were recorded.

Malaria cannot be cured, but it can be treated. Treatments dramatically increase the quality of life for malaria sufferers. However, one of the biggest challenges for researchers is that there are multiple, constantly changing and evolving malaria strains that make it difficult to develop effective anti-malarial drugs.

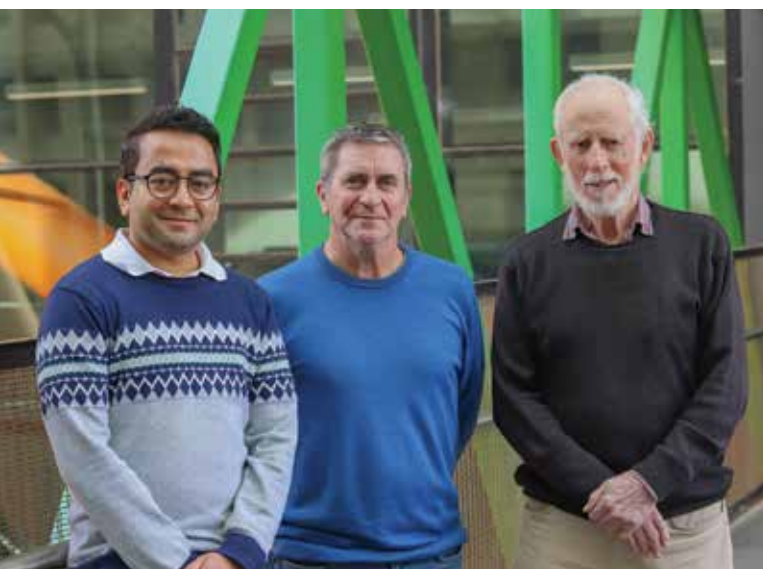
Researchers from La Trobe University and Melbourne-based AdAlta labs are aiming to

harness the power of a new kind of antibody-like proteins. AdAlta's i-bodies are inspired by antibodies found in Wobbegong sharks. They are one-tenth the size of other antibodies currently being tested in malaria treatments. At the same time, i-bodies have longer binding loops to target antigens. These binding loops make these molecules more effective, as they help the i-bodies to better connect with the malaria parasites and, eventually, to destroy them.

La Trobe University's researchers have found that i-bodies were effective against multiple malaria strains during two different stages of the malaria parasite's lifecycle. This is a promising finding, as this antibody can be a potent inhibitor of the parasite.

La Trobe's researchers expect their discovery will eventually result in a highly effective treatment that, in the near future, will contribute to controlling and potentially eradicating malaria around the world.

La Trobe's Dr Dimuthu Angage, Professor Michael Foley and Emeritus Professor Robin Anders (left to right) are looking to find better treatments for malaria.



Safeguarding waterways in Northern Australia



The Gulf of Carpentaria region is regarded as one of Australia’s iconic natural environments, with wetlands, lakes, rivers and streams full of wildlife and natural wonders.

However, in some areas there are concerns about water quality. This may be due to natural causes or human interference, which may have an impact on drinking water quality and on animals and plants living in the region.

In 2007, the Carpentaria Land Council Aboriginal Corporation (CLCAC) established a Land and Sea Ranger Program with 16 full-time Indigenous Rangers. Thanks to a collaboration with Griffith University, CLCAC Rangers now monitor the water quality across the southern Gulf of Carpentaria to the Queensland-Northern Territory border.

Griffith University researchers have trained the CLCAC Rangers in water quality monitoring methods and developed a program tailored for each of the ranger groups, while the rangers have identified suitable sites in the region.

The rangers collect and enter their measurements on-site into a database, making it quicker and easier for Griffith researchers and CLCAC to analyse the data and identify sites of concern. This is also crucial to detect long-term trends due to agricultural development, climate change and other factors.

CLCAC rangers were recently also being trained by Griffith University researchers to identify freshwater fish species in their waterways. This will lead to a comparison of environmental values of fish with cultural values. This project is funded within the National Environmental Science Program Resilient Landscapes hub.

The collaboration and knowledge exchange between Griffith University and the CLCAC Rangers contributes to a better understanding of the health of the waterways in the southern Gulf, and where human intervention is needed.





Working towards a more sustainable future

Universities exist to create knowledge and to share knowledge, training the citizens, leaders and researchers of tomorrow. Our universities are also involved in numerous collaborative projects that lead the way in terms of sustainability.

For instance, Flinders University researchers are making mining more sustainable by finding new ways to minimise harmful mining waste. A new collaboration between James Cook University, the University of Canberra and other institutions aims at training the next generation of biosecurity specialists and researchers, and La Trobe University is exploring new ways of sustainable living by building the University City of the Future.

These are only three out of many projects where IRU universities are collaborating to achieve a more sustainable future for everyone.



Making mining more sustainable



Column leaching helps researchers to identify what happens when water, acids, or other solutions pass through certain materials.

Mining is essential in the transition to a more sustainable future. Copper is used in solar cells, and rare earth minerals improve the performance of wind turbines.

A key challenge in mining is eliminating acidic water known as acid mine drainage. This has been a challenge ever since people began mining for ores. By extracting ores from the earth, compounds containing sulphur are exposed to air and water. This natural process can turn iron pyrite (also known as fool's gold) into sulphuric acid that can contaminate rivers and streams and is harmful for plants and animals.

A Flinders University research team is now examining how mine waste can be remediated. This is why the researchers are cooperating with 12 active and closed mines in Queensland, Tasmania, Western Australia, and elsewhere around the world. Researchers at Flinders University labs are also analysing tonnes of mine waste rock and tailings (left-over materials from the processing of mined ore).

As every mine is different and needs a bespoke approach, the researchers are analysing bacteria found in water flowing out of a mine. They are also looking for local materials that can help decrease acidity and the release of metals from the waste.

Column leaching helps researchers to identify what happens when water, acids, or other solutions pass through certain materials.

The Flinders University team aims to review and improve industry-standard test processes, innovate waste disposal planning and shorten the time frame for the neutralisation of acid mine drainage. This way, mine environments can be returned to their natural state as soon as possible, and the land can be reused for grazing, forestry or nature conservation. The \$10 million research project finishes in 2028 with researchers optimistic about the results.



Protecting Australia from invasive pests and diseases



The Australian National University, James Cook University, the University of Canberra and various partners have established the new Australian Research Council (ARC) Training Centre in Plant Biosecurity. National University leading the project and along with various Australian and international partners established the new Australian Research Council (ARC) Training Centre in Plant Biosecurity.

Plant disease and pest outbreaks can have devastating consequences for native species as well as for agriculture and forestry. This includes banana plantations affected by the Panama TR4 disease, myrtle rust on native trees, and yellow crazy ants in Australian farms and backyards.

With the correct training, biosecurity staff can help prevent or respond to pests and diseases that threaten the economy and the environment.

The new ARC Training Centre in Plant Biosecurity will offer PhD candidates and early career researchers next-generation training at the three universities and partner organisations.

The Centre's research focuses on new technologies to address biosecurity challenges, such as environmental DNA (eDNA) and image recognition with machine learning. The research projects will be co-designed with industry end-users, thereby making the research outcomes relevant to industry needs from the start.

The researchers will develop and apply their research as they complete placements in partner organisations, while also receiving training in cultural competency and biosecurity policy.

The goal of the joint training centre is to provide future leaders in plant biosecurity not only with technical skills but also with the skills to communicate, collaborate and engage with stakeholders from a variety of contexts, which will help protect Australia's valuable plants and animals for the years to come.



eDNA sampling (photo by Molly McShane)

Changing the way we design and use plastics



Photo by FlyD on Unsplash

In 2021, Australians used 3.8 million tonnes of plastic (152 kg per person), of which more than 40% was single-use. Only 12% of end-of-life plastics were recycled, and 84% were sent to landfill – more than 127 kg per person. Researchers in the Solving Plastic Waste CRC are now working towards changing this for the better.

The Solving Plastic Waste CRC is a 10-year Cooperative Research Centre (CRC) operating since mid-2024 and funded by the Federal Government. The CRC is a consortium of 40 partners, with Griffith University as the leading university partner, and it includes representatives from industry, government, and the not-for-profit sector.

The new CRC will transform the way plastic products are designed, manufactured and recycled while also reducing the impact of plastics on the environment. CRC researchers will improve designs for recycling machinery and work on new formulations that will make plastic easier to sort, compost or recycle.

Griffith University researchers, working with partners through the CRC, will develop new electrochemical, physical, and biological approaches to remove microplastics from agricultural soils, which will have a positive impact on crops and livestock.

An important aspect of the \$140 million project is to find new solutions that will help

Australian businesses transition to a carbon-neutral economy. This is why the CRC partners are cooperating with plastic manufacturers and processors, as well as with major brands, recycling companies, and with industry associations and councils.

The Solving Plastic Waste CRC will accelerate Australia's progress towards its targets of eliminating plastic pollution and conserving the environment for future generations while also growing a competitive, sustainable advanced manufacturing sector that creates new jobs.



A University City set to transform lives



The *University City of the Future*, located on La Trobe’s 235-hectare Bundoora campus, is an example of a new and sustainable way of living, working, learning and socialising in Melbourne’s north.

Once finished, the University City of the Future will provide education facilities for more than 40,000 students, sustainable housing for 12,000 students, staff and private residents, and access to reliable public transport infrastructure.

The University City of the Future will be a sustainable community, with La Trobe’s Bundoora campus recently re-certified as a 6-Star Green Star Community that will be powered, in part, by its own solar farm.

Another important aspect of the project is collaboration with government and community. For example, the already-completed Sports Park provides facilities for local, state and national sporting organisations, such as the Matildas, Australia’s national women’s football team.

The University City of the Future will also contain a new city centre with commercial, retail and cultural facilities, a health and wellbeing hub with childcare and aged care facilities and a health and wellbeing precinct which includes a 34-bed private hospital.

In terms of research and innovation, the university will house facilities such as the Centre for AI in Medical Innovation (CAMI), as well as a collaboration with German biotechnology company BioNTech that will support researchers to develop future mRNA-based treatments for life-threatening diseases such as cancer.

La Trobe University estimates that its sustainable University City of the Future will create more than 20,000 jobs and generate \$3.5 billion in Gross Regional Product (GRP). It will be a best-practice case study for successful sustainable growth made in Australia.



The way forward



Innovative
Research
Universities





Conclusion:

the way forward

The expansion of the Australian university system is a national success story, with high-quality education and innovative research embedded in communities right across the country.

The Australian Government states that global action to reduce greenhouse gas emissions will result in the “biggest and fastest economic transformation since the industrial revolution”. Universities are critical infrastructure for communities and governments on the path to a net zero future.

As the examples in this publication demonstrate, IRU member universities are ready to partner with communities, governments and industry on the next steps in this transformation. A successful Future Made in Australia will be a future that protects and values our unique environment and that ensures equitable access for all people and communities to the benefits of the new economy.

The National Science and Research Priorities, launched by the Australian Government in August 2024, also reflect these core drivers for Australia’s future. Their focus on transitioning to a net zero future, healthy and thriving communities, elevating Indigenous knowledges and protecting our natural environment will inform our future work to support a successful and resilient Australia.

A focus on sustainability will also support the ongoing development of partnerships in our region and around the world. The IRU universities have a particular focus on strengthening links across the Indo-Pacific region, and our partners from India to the Pacific Island Nations see the opportunities for even closer collaboration in education and research aligned with the Sustainable Development Goals.

IRU universities will continue to strive for a more sustainable, equitable and innovative future.



Innovative Research Universities

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