

UNSW SYDNEY

UNSW @COP30

Inclusive and transformational research and innovation for positive climate action



I am Country and Country is Me: By Bernadette 'B' Hardy Gamilaraay Dharug Artist & Associate Professor (Indigenous) UNSW

The storywork intricately depicts the contours of Mother Earth, specifically Gadigal and Bidjigal, Dharug, Dharawal, Ngurra*, forming the shape of a heart intertwined with the hands of the artists, symbolising the Aboriginal understanding of "I am Country and Country is me." In a conscious decision, almost all representations of water have been omitted from the map to vividly illustrate how it has been diverted underground and concealed within stormwater systems. Additionally, red lines denote the scars on Country near Sydney Airport, further highlighting the impact on the totemic kinship of whale, turtle, and dugong that inhabit Dharug and Dharawal Country. This emphasises the fact that displacing water only shifts the problem elsewhere and our non-human and more-than-human kin suffer. However, with heightened awareness, time, and resources, there exists the potential for collective action and care for Country.

The caring for Country leave initiative** could foster a deeper sense of connection and custodianship. The white ochre hands encircling the artwork represent those who have initially supported the Caring for Country initiative. This white ochre, is more than human, and originates from a sacred site on Dharug Ngurra, symbolising deep listening, action and custodianship. The custodian of the ochre, a woman deeply engaged with Traditional Custodians through a built environment process, is revered and nurtured, her spirit through B Hardy is being given voice towards healing. This signifies not just a commitment but also the intricate interconnectedness among humans, non-humans, and more-than-humans, offering avenues for climate impact towards improving life on the planet with the necessary space and time to do so.

Enabling four days of caring for Country as part of ADA*** academic and professional staff workload further solidifies these connections and commitments to environmental stewardship and custodial healing, fostering a profound sense of responsibility towards Country and its well-being.The provision of four days for each staff member to care for Country will help close the gap with Traditional Custodians, providing them with self-determination and further reinforce these connections and commitments to environmental stewardship and custodial healing.

*Traditional Aboriginal place names for Sydney's central, Eastern and Southern regions where the University of New South Wales is located.
**Caring for Country Initiative is featured on Page. 71 of this booklet
***UNSW's Faculty of Arts, Design & Architecture (ADA)

ICIP Statement: This storywork was created by Bernadette (B) Hardy of Studio hardyhardy, Dharug and Gamilaraay designer and Associate Professor at UNSW Built Environment (2024). It includes the use of Indigenous cultural knowledge led by Associate Professor Bernadette (B) Hardy (Dharug Gamilaraay), and Country as teacher (Dharug, Dharawal, Bidjigal, Gadigal). In respect of ICIP law and Cultural Law/Lore, please refrain from sharing imagery without permission.

The Storywork concept originates here:
https://indigenousstorywork.com/

Please scan the QR code to find out more about Caring For Country Initiative Massive Action

UNSW@COP30



UNSW is proud to be ranked among the world's top 20 universities – a reflection of our enduring commitment to excellence, equity and impact. For more than 75 years, our community has worked together to deliver transformative research, education and engagement that improves lives locally and globally.

In 2025, we launched our 'Progress for All' strategy, a bold reaffirmation of our mission to drive inclusive and transformational change. At the heart of this vision is a focus on climate change and sustainability — areas where UNSW continues to lead through innovation, entrepreneurship, collaboration and stewardship. Importantly, "Progress for All" underscores our commitment to delivering societal impact for our local and global communities.

As world leaders convene in Belém, Brazil for COP30 I am delighted to share this UNSW COP30 Capability Portfolio. This collection showcases Australia's and UNSW's strengths in climate science, renewable energy, and policy leadership, aligned with the United Nations Sustainable Development Goals. It is organised around three key themes:

1. Climate Science, Water and Marine Research
2. Renewable Energy Technology, Transition and Decarbonisation
3. Climate Adaptation, Policy and Justice

Among the many highlights - the PERC solar cell was developed at UNSW by Professor Martin Green and now powering 90% of solar panels worldwide – as well as the next generation of researchers building on this legacy in clean energy. The portfolio features groundbreaking work in ocean monitoring, advanced materials, sustainable fishing, human rights, geopolitical strategy, and forefronting Indigenous Knowledge, where the brightest UNSW minds are pioneering new climate innovations and initiatives from the lab to the market and benefiting communities.

At UNSW, we continuously seek out new opportunities to collaborate across border and across sectors to deliver real-world solutions. As you read this portfolio, I invite you to consider how we might partner together and build towards a cleaner, fairer and more sustainable future.



Professor Stephen Rodda
Pro Vice-Chancellor Industry & Innovation

Find out more and contact us here:

Index

Renewable Energy Technology, Transition & Decarbonisation

ACDC Research Group	8
ARC Research Hub for Photovoltaic Solar Panel Recycling and Sustainability (PVRS)	9
Arch_Manu: ARC ITTC Centre for Next-Gen Architectural Manufacturing	10
Australian Centre for Advanced Photovoltaics (ACAP)	11
Carbon Hills	12
CounterCurrent	13
DeCarice - Hydrogen Retrofit Technology	14
Exhalogen	15
Green Dynamics	16
Institute for Industrial Decarbonisation (IID)	17
Hello Again Solar	18
Integrated Energy Storage Solutions Research Hub	19
Lithium-ion Battery Recycling	20
Low-Cost and High-Power Hydrogen Fuel Cells	21
Next Generation of Mining - NextGenMIN	22
NSW Decarbonisation Innovation Hub	23
OMEGA-Si	24
OzAmmonia - Reducing NOx Emissions Catalytically	25
Particles and Catalysis Research Laboratory (PartCat Lab)	26
Powering a Reliable Solar Future	27
Quantum-Powered Photovoltaics	28
Reducing Embodied Carbon Emissions: How Low Can We Go?	29
Repairable Off-Grid Energy Futures	30
School of Photovoltaic & Renewable Energy Engineering (SPREE)	31
Semiconductor Manufacturing Powering a Breakthrough in Green Hydrogen	32
Solid-State Hydrogen Storage Technology Group	33
Tandem ART	34
The ARC Centre of Excellence for Carbon Science and Innovation (ARC COE-CSI)	35
Trailblazer for Recycling & Clean Energy (TRaCE)	36
UNSW Energy Institute	37
UNSW Nuclear Innovation Centre	38
UNSW Sustainable Materials Research and Technology (SMaRT) Centre	39
ZenQuo	40

Find out more and contact us here:

Climate Science, Water and Marine Research

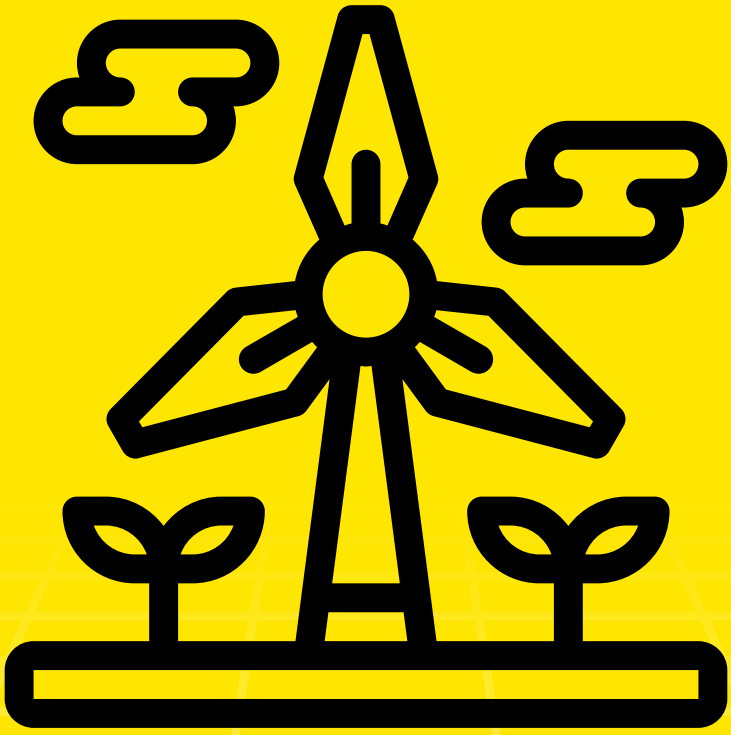
BioShelter	42
Centre for Ecosystem Science (CES)	43
Climate Change Impacts on Severe Convective Storms	44
Climate Change Research Centre (CCRC)	45
Ecological Statistics Research Group (Eco-Stats)	46
Ferrari Laboratory	47
Fresh Air Innovators and Fresh Air Friends	48
Graphene Oxide Membranes for Natural Organic Matter (NOM) Removal from Water	49
Greenhouse Gas Measurement and Modelling Team	50
Kelp Forest Alliance	51
Living Seawalls – Revitalising Marine Infrastructure	52
Ocean Circulation and Marine Heatwaves	53
Olivine Technologies	54
Peeking Below Marine Heatwaves	55
Red List of Ecosystems Research Group	56
Simulated Climate with AI for Local Extremes and Scenarios (SCALES)	57
Smart Fishing – The Indo-Pacific Fishing Vessel Observation Network	58
Unravelling Atmospheric Chemistry with Dynamics and Spectroscopy	59
UNSW Bushfire	60
UNSW Centre for Transformational Environmental Technologies (CTET)	61
UNSW Global Water Institute	62
UNSW Water Research Centre	63
UNSW Water Research Laboratory	64

Climate Adaptation Policy and Justice

Adaptive Design for Resilient Infrastructures	66
ARC Training Centre for Fire Retardant Materials and Safety Technologies	67
Arts-based Knowledge Translation Lab, Black Dog Institute	68
Asia-Pacific Development and Security Research Group	69
Australian Human Rights Institute	70
Caring for Country: Driving Climate Action Through Reciprocity	71
Centre for Sustainable Development Reform	72
City Futures Research Centre	73
Climate and Civil Society Research Cluster	74
DEFEND - Bushfire Containment Lines	75
Digital Frontiers Lab	76
EPIWATCH	77
FIRECOAT - Fire-Retardant Coating	78
FootprintLab	79
Gaawaadhi Gadudha – From Freshwater to Saltwater	80
Green Energy Statecraft	81
HowWeSurvive - AI Disaster Recovery Map	82
iFire - Interactive Visualisation of Fire Scenarios	83
Institute for Climate Risk & Response	84
International Centre for Future Health Systems	85
Kaldor Centre for International Refugee Law	86
Making Good Media: Making Irrestibile Visions of a Renewable Energy Future	87
National Heat Vulnerability Observatory	88
Project Halo	89
Rapid Urbanisation and Population Health (RUPH) Research Group	90
Research Centre for Integrated Transport Innovation (rCITI)	91
Sustainability Assessment Program	92
The Just Climate Transition Project	93
UNSW Centre for Social Impact	94
UNSW Cities Institute	95
UNSW's Collaboration on Energy and Environmental Markets (CEEM)	96
UNSW's Indigenous Land and Justice Research Group	97
Yuwaya Ngarra-li Partnership	98

Find out more and contact us here:

Renewable Energy Technology, Transition & Decarbonisation





ACDC Research Group

Saving the world by pushing solar technologies to their ultimate potential

Challenge

Australia will need more than 1 TW of reliable solar capacity to achieve a carbon-neutral economy by 2050. Faults and underperformance in solar installations waste billions of dollars in electricity each year worldwide.

Solution

The ACDC Research Group develops fast, non-invasive, AI-based inspection tools that deliver real-time insights into solar performance across their lifecycle. Designed to integrate seamlessly into existing processes, these tools improve quality control and reduce costs for manufacturers, enable predictive maintenance for operators and enhance end-of-life management for recycling companies. Globally, such innovations could save more than US$2b annually. The team also advances agrivoltaics systems to optimise land use and energy reliability.

Target customers/end-users

- manufacturers and operators seeking to improve reliability, reduce waste and lower costs in solar deployment and recycling
- research institutes and industry partners aiming to validate and scale emerging solar technologies.

Progress

- 50+ collaborations with major solar companies and research institutes, locally and internationally
- secured more than AU$15m in competitive research grants
- 20+ research awards over seven consecutive years.

The team develops advanced inspection systems and Artificial Intelligence (AI) tools to improve the reliability, efficiency and affordability of solar technologies across their lifecycle. Their research also investigates innovative applications that integrate solar energy with agriculture. Through global collaborations, selected solutions are already being adopted in the industry.



ARC Research Hub for Photovoltaic Solar Panel Recycling and Sustainability (PVRS)

Highly efficient, flexible, scalable and eco-friendly PV recycling technologies for future Australian industries

Challenge

This project helps reduce the volume of EoL PV panels in landfills in Australia through viable, eco-friendly recycling solutions in industry settings. It also helps address the ecological problems caused by toxic elements leached into the soil on the disposal of these elements in landfills, and benefits industries through the recycling and export of valuable materials.

Solution

The solution is a defined visual tool that can mimic the whole PV panel value chain, including: EoL PV panel recycling to materials (processes/reactors design and scale-up); treatment of off-gas and waste liquids from the recycling processes; recycled materials conversion to value-added products; technology evaluation, policy informing and industry standards; and new PV panel design for recycled materials reuse, ready recycling and improved reliability.

Target customers/end-users

- four confirmed industry partners in PV panel recycling and manufacturing
- national and local governments in the environment protection and technology translation sectors
- university and research institutes.

Progress

- AU$5m funding for research translation from the ARC
- 10 participating organisations confirmed for technology co-development and/or implementation
- prototypes for key recycling steps tested successfully in laboratory.

This project uses expertise across nine engineering fields. Two interlinked high-level scopes drive it: R&D into the end-of-life (EoL) PV recycling process, and PV panel degradation mechanisms and redesigns for ready recycling and high reliability. The work aims to transform the Australian PV recycling system.





Arch_Manu: ARC ITTC Centre for Next-Gen Architectural Manufacturing

Accelerating digital transformation processes within the built environment sector to meet critical sustainability goals

Challenge

The AEC sector consumes natural resources and energy at unsustainable rates and is responsible for a significant portion of national carbon emissions. Also, it has been slow to adapt digitisation. Consequently, the sector is plagued with performance and productivity problems, compromised efficiency and reduced international competitiveness.

Solution

Over the five-year life of the centre, its program of industry-embedded PhDs, national and international placements, sector-focused short courses and postdoctoral projects have grown knowledge, skills and capacity within the AEC workforce. It also delivers novel digital tools and frameworks to help drive the digital transformation of the sector. Arch_Manu features an interdisciplinary research cohort of 28 higher degree researchers and three postdoctoral fellows spread across three university nodes.

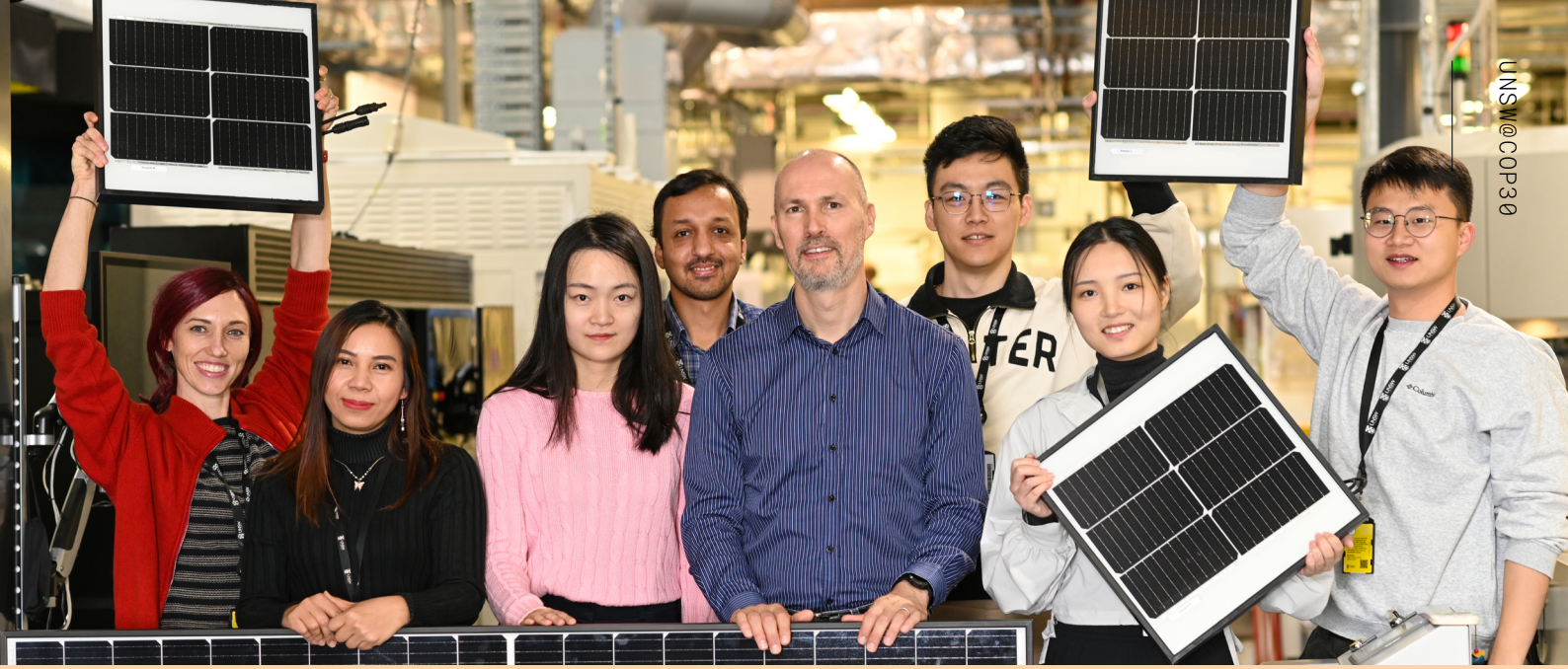
Target customers/end-users

- AEC sector professionals seeking sustainable, efficient and competitive practices
- industry, government and community stakeholders aiming to cut carbon, waste and resource use.

Progress

- established Continuous Professional Development (CPD) platform that delivered 44 of 156 CPD courses
- thought leader in AI architecture education
- delivered digital tools commercialisation and improved practices in digital and circular transition/transformation.

Arch_Manu brings together academics, researchers and industry experts from Architecture, Engineering, Management and Governance, Information Systems, Computer Science, Computational Design, Industrial Design and Construction Management to investigate how data and digital strategy can help the Architecture, Engineering, and Construction (AEC) Sector meet critical sustainability and productivity goals.



Australian Centre for Advanced Photovoltaics (ACAP)

Delivering ultra low-cost solar through a national collaborative research program

Challenge

Australia is uniquely placed to benefit from a renewable energy future. Our high solar potential means that low-cost solar energy will create new opportunities and industries to advance our economy – and drive global decarbonisation efforts. There is huge potential to advance solar technologies, and ACAP ensures Australia stays at the forefront of innovation.

Solution

ACAP's program brings together multidisciplinary teams from UNSW (lead), ANU, CSIRO, University of Melbourne, Monash, Queensland University and University of Sydney. Supporting 250+ researchers, ACAP invests in world-class labs, tools and capabilities. Programs span advanced silicon, thin-film photovoltaics, perovskite-silicon tandems, manufacturing readiness, sustainability, systems design and deployment.

ACAP develops testing protocols, durability assessments and scalable fabrication approaches aligned with industry needs. Industry programs, including the ACAP Industry Consortium and Emerging Leaders, provide pathways from research to commercialisation.

Target customers/end-users

- solar industry and manufacturers: adopting scalable, durable, efficient technologies
- policymakers and regulators: using ACAP's methods to drive informed decision-making
- research and innovation partners: shared facilities, expertise, collaborative programs.

Progress

- AU$200m+ in funding, with ARENA-led rounds, sustaining a decade-long solar research program
- UNSW ranked global #1 in photovoltaics research for quality and impact
- established ACAP Industry Consortium with tier-one partners.

ACAP brings together Australia's leading solar research institutions to advance solar photovoltaics. By coordinating activities and sharing world-class facilities, ACAP delivers impact far beyond individual efforts. With strong ties through industry partners, ACAP outcomes rapidly transform into real-world solutions.





Carbon Hills

Transforming waste biogas into clean biomethane for a circular, low-carbon energy future

Challenge

Biogas from organic waste contains methane and impurities that are often flared, wasting energy and emitting carbon. While upgrading biogas to biomethane can offset natural gas use, existing technologies remain too costly for utilities, limiting large-scale adoption and slowing progress toward clean energy and emission reduction goals.

Solution

Carbon Hills upgrades biogas to biomethane using patented biotechnology that captures biogas at the source and removes impurities with recycled materials from water utilities. The upgraded biomethane is sold to energy suppliers, boosting profitability and supporting Australia's 2030 Net Zero goals. Revenue comes from biomethane sales, technology licensing, and service contracts under BOO or EPC + Operate models.

Target customers/end-users

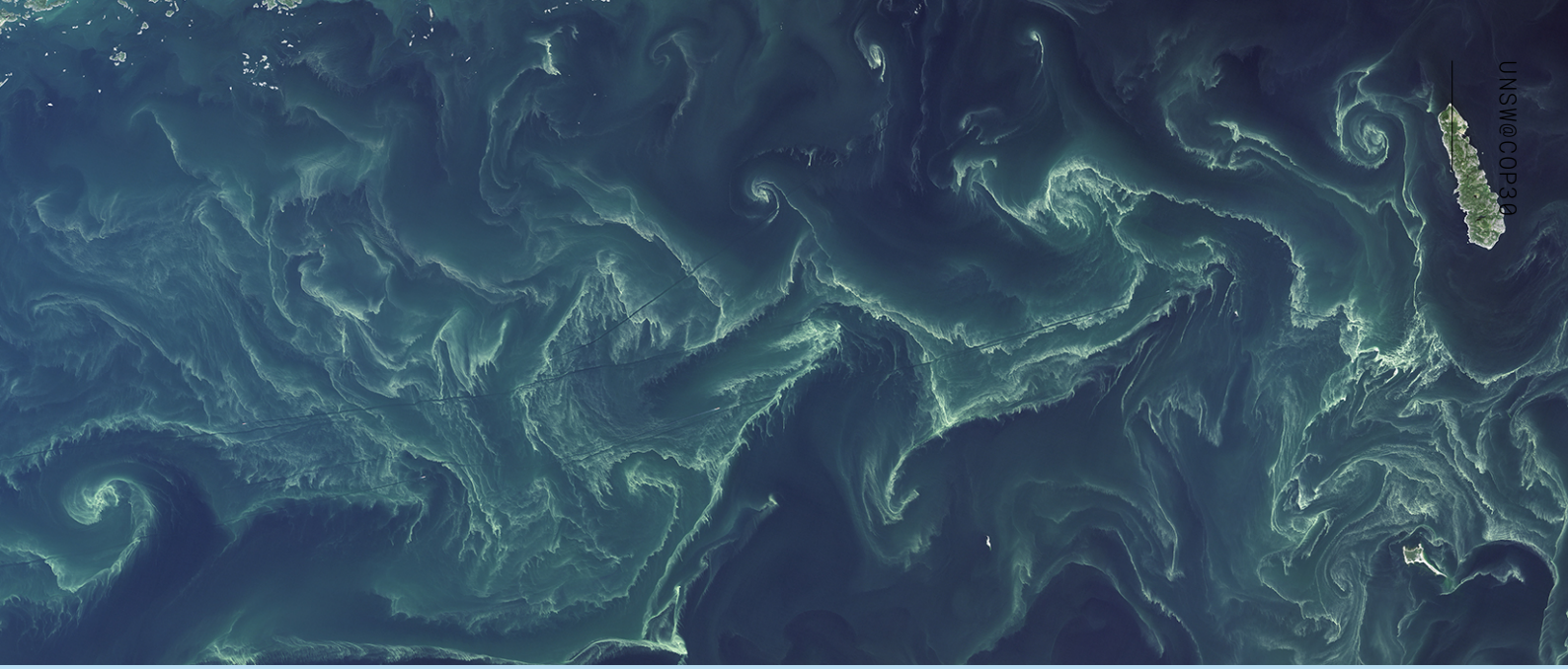
- water utilities seeking low-cost biogas upgrading and emission reduction
- energy companies integrating biomethane into existing gas networks
- government and industry partners supporting circular economy and decarbonisation initiatives.

Progress

- achieved TRL 4 with biomethane purity exceeding 95%
- established collaborations with major Australian water utilities
- secured AU$500K in industry funding to advance pilot-scale demonstration.

Carbon Hills unites microbiologists, engineers, and industry partners to advance biotechnologies supporting net-zero emissions by 2030. Its patented process transforms waste-derived biogas into clean biomethane using recycled materials. By cutting costs, the technology could generate over AU$13M annually from biogas produced at two of Australia's largest water utilities.

Spinout



CounterCurrent

Google Maps for the sea

Challenge

- 90% of all traded goods and more than 11 billion tonnes of cargo are shipped by sea each year.
- The shipping industry faces commercial and regulatory pressures to reduce its reliance on carbon-based fuels.

Solution

CounterCurrent has developed a novel AI-enabled ship routing system that harnesses ocean currents to cut fuel and emissions in the shipping industry. The system can be implemented in real-time without any modification to existing vessels or change in transit time, reducing fuel use by 10-25% and saving up to AUD9 million per ship, per year.

Target customers/end-users

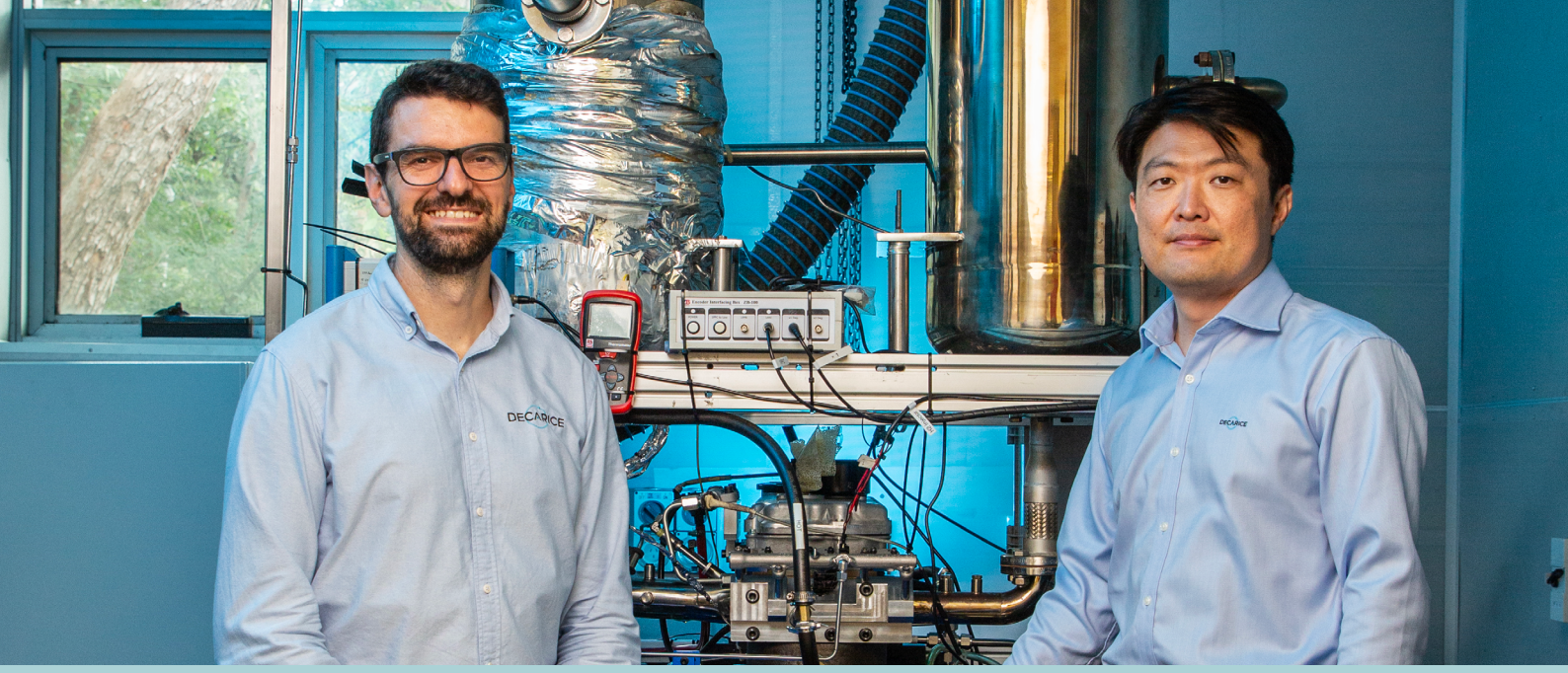
- dry bulk shipping sector – Australia is the fourth-largest user of ships globally and 91% of its trade is via bulk carriers.

Progress

- more than AU$1 million in non-dilutive grant funding to date
- featured in national and international news coverage
- first Australian start-up to receive the AWS Compute for Climate fellowship, providing up to AUD300K in advanced computing resources and access to AWS engineers to develop AI roadmap.

Spinout

Built on a decade of R&D, CounterCurrent is the world's first ocean forecasting system that combines advances in AI, satellite technology, and ocean forecasting to accelerate maritime decarbonisation.



DeCarice - Hydrogen Retrofit Technology

Displacing diesel through retrofit

Challenge

- heavy industrial operations rely on the power density and durability of diesel machines; however, they have also been given an imperative to reduce their carbon footprint.
- existing clean power technologies can be disruptive to core value creation due to factors such as uptime capability, access to power, and lifecycle cost.

Solution

DeCarice adapts diesel machines to run as hydrogen hybrids. The machine's engine is retrofitted with a UNSW-developed second injection system, which allows it to run on 95% hydrogen gas, creating a carbon benefit of up to 93% without compromising performance or durability.

The process involves minimal overheads and retains diesel-only capability. This flexibility uniquely connects the decarbonisation efforts of heavy industrial businesses with their operational realities.

Target customers/end-users

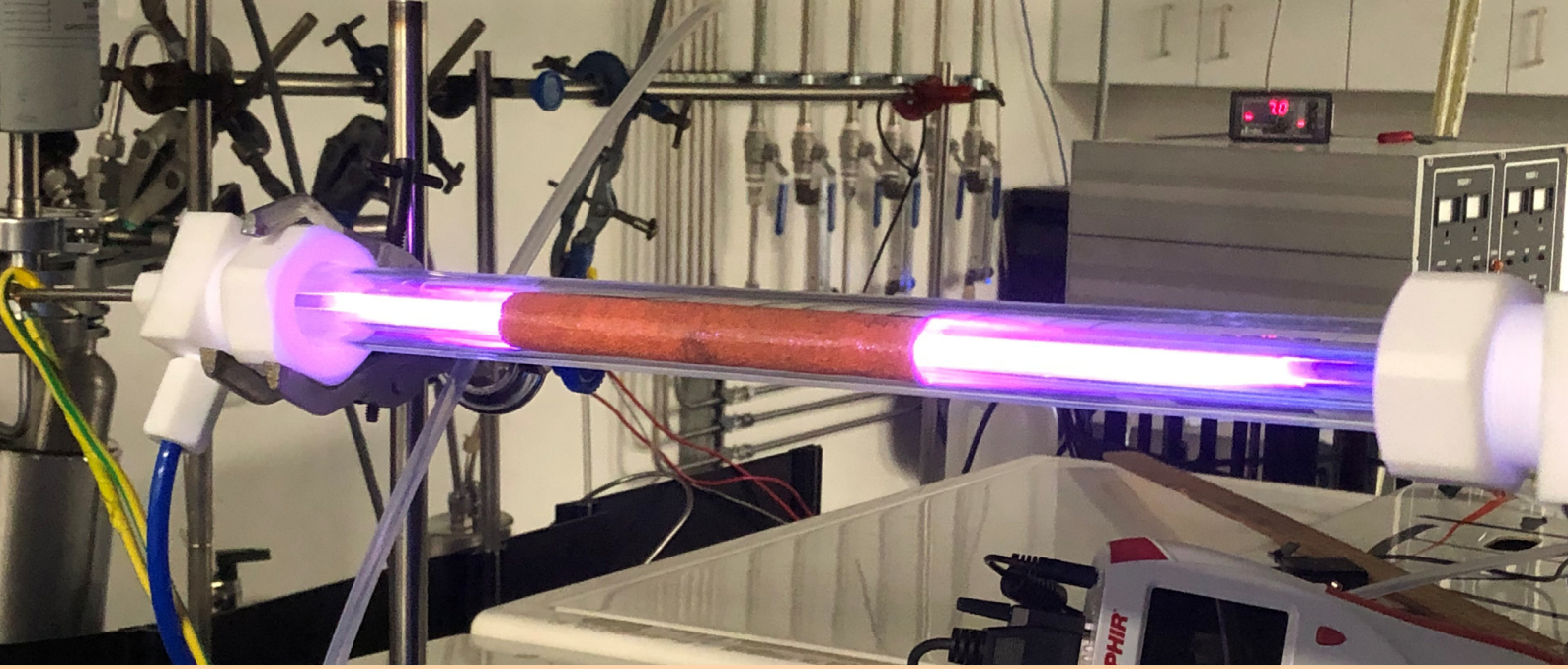
Industrial businesses operating large fleets of heavy duty, complex diesel machines, with substantial decarbonisation commitments and clear barriers to electrification.

Progress

- technology implemented in three distinct research engines at UNSW Engine Research Laboratory and emissions outcomes published in peer-reviewed journals
- AU$1.29 million raised in pre-seed SAFEs from venture capital
- four pilot projects in pipeline, domestic and international.

Spinout

World-class Australian technology with significant domestic and international market interest, a strong investor base, and a star team with broad engine research and industry experience.



Exhalogen

Building hospital-ready systems to cut anaesthetic greenhouse emissions

Challenge

Hospitals must deliver safe anaesthesia while slashing climate emissions. Waste anaesthetic gases escape through scavenging systems, burdening sustainability targets, accreditation, and budgets. Clinicians need a simple, reliable way to neutralise these gases without disrupting workflows. Facilities teams require measurable abatement, easy maintenance, and proof for audits and public reporting standards.

Solution

Exhalogen's system is a plug-in unit that treats waste anaesthetic gases at the source, fitting into existing scavenging lines and/or ventilation. The team co-designs with clinicians, engineers and facilities teams, then delivers hardware, training, and a dashboard for measured abatement. Hospitals adopt via pilots, service agreements and integration with sustainability reporting. Partnerships with procurement and maintenance providers support scaling, while data verification and safe by-products handling ensure compliance, minimal disruption, and long-term emissions reductions.

Target customers/end-users

- hospital sustainability and facilities teams
- anaesthetists and theatre staff
- health service executives/procurement and insurers.

Progress

- prototype tested in Laboratory Setting (TRL 4)
- seed funding from NSW Department of Health
- partnership between UNSW and Royal North Shore Hospital pain-management team.

Exhalogen turns lab science into plug-in hospital devices that neutralise anaesthetic gases. Co-designed with clinicians and engineers, the system fits workflows. Pilot evaluations with hospital sustainability teams indicate growing demand.

Spinout



Green Dynamics

Accelerating sustainable innovation with AI-driven material discovery and self-driving labs – faster breakthroughs, lower costs, real impact

Challenge

- slow and inefficient R&D: Traditional material discovery and development can take 5-10 years, requiring extensive trial and error.
- scalability and performance optimisation: Many clean energy materials fail to meet performance standards at scale.

Solution

- ByteScience: An AI agent specialising in material and chemical formulation and optimisation, delivering precise predictions with over 95% accuracy.
- ByteFactory: An AI-powered, self-driving lab platform that accelerates R&D cycles from 5–10 years to just 3 months. Built on the company's DARWIN/CheMiST foundational model and the world's largest materials science dataset, it enables rapid breakthroughs from concept to reality.
- Green Dynamics' technologies have been validated at 10-tonne industrial scales, optimising materials for photovoltaics, energy storage, and catalysis.

Target customers/end-users

- renewable energy firms
- chemical companies
- university R&D teams.

Progress

- strong early market validation: signed million-level contracts with global renewable energy leaders
- fast-paced fundraising momentum: raised several million USD from global investors within 16 months
- global leadership in AI for materials: DARWIN achieved the No.1 performance in the material design benchmark proposed by Lawrence Berkeley National Lab.
- flagship in renewable industry: world's first AI Scientist, delivering over 95% accuracy, a 100× speedup, and proven performance at a 10-tonne industrial scale.

Spinout

Green Dynamics is leading the future of chemical innovation in a USD200 billion market, with industry-level validation and a leading AI Scientist Agent-driven platform that accelerates breakthroughs and optimises material performance.



Hello Again Solar

Clean energy should stay clean from beginning to end

Challenge

- 2 million solar panels are retired every year
- Existing recycling technologies are expensive, polluting, or only profitable at >100MW/year – leaving solar asset owners, councils, and recyclers with no viable local solution except for landfill. This presents a significant challenge as regulatory pressure and ESG commitments intensify.

Solution

Hello Again Solar delivers the only high-recovery, chemical-free recycling technology that is profitable, even at small scale. Its patented laser process cleanly separates glass, silicon, silver, and copper from all panel types. Compared to cost-competitive alternatives at >100MW/year, it achieves the same recovery and economics with 10x lower emissions. Revenue comes from processing fees, material resale, and global tech licensing, providing a scalable, ESG-aligned solution for utility-scale farms, councils, and recyclers worldwide.

Target customers/end-users

- utility-scale solar owners and developers in Australia
- global waste companies seeking profitable, traceable, and sustainable solar panel recycling technology.

Progress

- contract with one utility-scale solar company
- six recyclers interested in licensing or co-investment
- grant application in progress to build a pilot in Sydney.

Spinout

Hello Again Solar is led by Australia's foremost PV recycling expert, offers patented technology, is first-to-market in a billion-dollar industry, and has growing industry interest.



Institute for Industrial Decarbonisation (IDD)

Linking sustainable development, green metals and follow-the-sun compute

Challenge

Without a global carbon price to support the costly transition to clean technologies, companies and nations must prioritise profitable pathways to green industry. IDD helps achieve this by coordinating research, translation and skills programs, national policy harmonisation, and integrated public/private investment strategies.

Solution

IDD is advancing:

- low-emission processes for pyro- and electro-metallurgy and mineral differentiation/sorting
- recovery of metals and rare earth elements from historical tailings and urban waste
- edge computing solutions developed with AI and data centre stakeholders
- integrated carbon accounting and certification
- AI-enabled business intelligence and scenario tools
- portfolio solutions for cheap and reliable bulk electricity supply.

Target customers/end-users

- hard-to-abate sectors
- government regulators
- investors and funding agencies.

Progress

- leadership of frontier research and translation programs in fields like next generation mining and green iron
- strategic analysis and recommendations for industry and government
- participation in national infrastructure, policy harmonisation and investment processes.

The Institute for Industrial Decarbonisation (IDD) is UNSW's flagship hub for interdisciplinary research aligned with industrial decarbonisation. It collaborates across engineering, science, law, business and policy to support the shift toward sustainable, globally competitive industry.



Integrated Energy Storage Solutions Research Hub

Advancing next-generation energy storage and integration tools to power Australia's renewable energy transition

Challenge

Australia's clean energy transition depends on reliable, affordable storage. The challenge is not only in developing technologies but in integrating them into grids, industries and communities – all while securing local supply chains and manufacturing to reduce reliance on imported solutions.

Solution

The hub co-develops energy storage technologies and system integration tools with industry partners, scaling from the lab to pilot. Its work combines prototyping, technoeconomic modelling and international collaboration to accelerate translation into real-world applications. By strengthening sovereign supply chains and supporting local manufacturing, the hub ensures advanced storage technologies can be adopted confidently across various grids, microgrids, heavy industries and community energy systems.

Target customers/end-users

- renewable energy developers and grid operators
- heavy industry seeking flexible integration of renewables
- remote communities and mining operations.

Progress

- leadership role in international flow battery consortium
- demonstrated that vanadium flow batteries deliver stronger long-term economic performance than other battery technologies
- established framework for adapting the aluminium smelting process to energy supply variability.

The Integrated Energy Storage Solutions Research Hub delivers advanced energy storage and integration technologies, co-designed with industry for rapid translation. The hub's innovations extend storage duration, reduce costs and build sovereign capability – making renewables reliable and competitive for communities, industry and the grid.



Lithium-ion Battery Recycling

Environmentally friendly, bespoke lithium-ion battery recycling solutions

Challenge

Lithium-ion battery recycling is a complex, dangerous and environmentally costly process.

The entire process, from transport to storage to recycling, carries the risk of fire and explosions. Chemicals used in the process are highly toxic and base elements must be converted before re-processing into battery active materials.

Solution

The team is developing methods to recycle lithium-ion batteries efficiently, as demonstrated for one specific chemistry. This process is environmentally friendly and cheap. It uses reagents found in swimming pools and hair salons, allowing it to make smaller recycling units. The process also allows for the extraction of battery active materials without the need for conversion or reprocessing, i.e., they can be used directly in lithium-ion batteries. This technology can significantly reduce recycling costs, steps, and processes, and add significant value.

Target customers/end-users

- grid-scale battery installations, which are typically operated by companies such as United, Origin and AGL.
- easily expanded to household storage units and electric vehicles.

Progress

- demonstrated process on 30 Ah lithium-ion cells used in grid-scale battery installations.

Spinout

The technology is a unique method to efficiently and safely recycle lithium-ion batteries. It can be expanded to suit many other lithium-ion chemistries.



Low-Cost and High-Power Hydrogen Fuel Cells

Conducting hydrogen fuel cell research in UNSW Chemistry

Challenge

Hydrogen fuel cells are a critical technology for Australia's emerging hydrogen economy, offering significant decarbonisation potential for hard-to-abate sectors such as aviation and heavy-duty transport.

These sectors demand high energy density and long operational lifetimes—capabilities that hydrogen fuel cells can provide with zero emissions at the point of use. However, widespread deployment has been limited by high material costs and relatively low power density compared to conventional alternatives.

Solution

To overcome the reliance on costly platinum-based catalysts, the team is developing a new generation of iron-based materials and new cell designs that offer a dramatically lower-cost alternative. Iron is abundant and significantly cheaper, opening a pathway to potentially reduce fuel cell costs by up to 50% in the long term.

Target customers/end-users

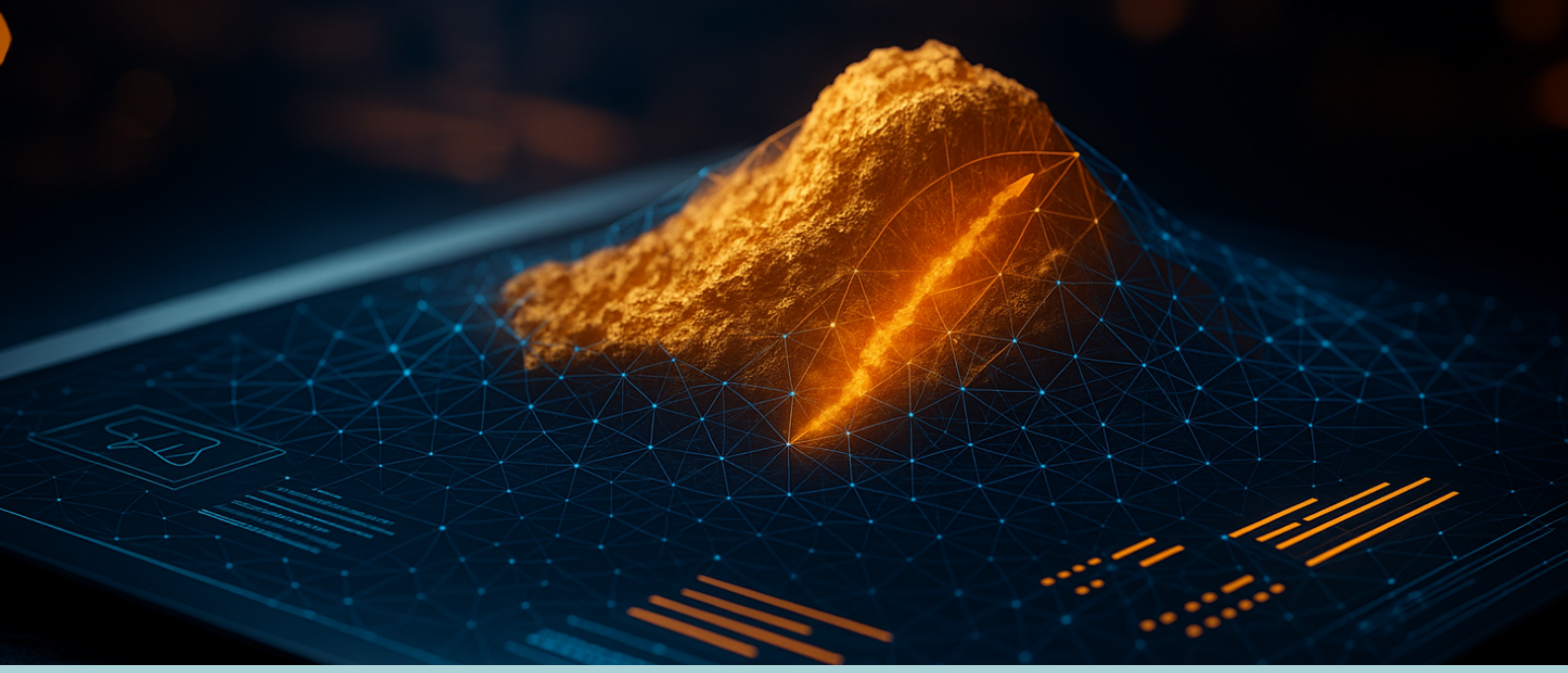
- aviation sector
- heavy-duty transportation
- back-up power/remote bower.

Progress

- three patents filed
- more than AU$1.1m in research translation funding and grant support from ARC Discovery, AEA Seed and UNSW Commercialisation Seed Fund
- drone integration on the way.

Hydrogen fuel cells are a critical technology for Australia's emerging hydrogen economy, offering significant decarbonisation potential for sectors such as aviation and heavy-duty transport. However, widespread deployment has been limited by high material costs and low power density compared to batteries. These are the challenges addressed by the research team.





Next Generation of Mining - NextGenMIN

Transforming mining with zero-waste, zero-emission and zero-[human] entry methods to supply strategic minerals

Challenge

The mining industry faces declining ore grades, environmental impacts, emissions and safety risks. NextGenMIN is developing technology-driven, renewable-powered methods to achieve zero-waste, zero-emission, zero-entry mining. This strengthens sovereign capability, creates skilled regional jobs, and supports Australia's net-zero transition while boosting global competitiveness in strategic minerals and green value chains.

Solution

The ARC Research Hub for NextGenMIN delivers an industry-led transformation framework integrating advanced technologies, renewable energy and automation to mining. Partnering with industry, academia and government, it aims to drive innovation, generate IP, create spin-offs and train the future workforce.

Its systems-focused approach accelerates adoption of zero-waste, zero-emission, zero-entry mining, ensuring lasting impact through workforce development, international collaboration and pathways to industrial demonstration. This positions Australia as a global leader in sustainable minerals supply and supports its net-zero transition.

Target customers/end-users

- mining companies, METS (mining equipment, technology and services) providers, and government agencies
- existing industry and government partners
- regional communities, policymakers and global value chains.

Progress

- AU$28.3m total funding
- 29 partners across industry, government, and national and international research institutions, and collaboration
- ongoing collaboration with CSIRO, NSW Government and NASA's Jet Propulsion Laboratory.

NextGenMIN aligns with national priorities to transform mining through innovation. It integrates advanced precision methods, digital systems, renewable energy pathways, and industry and university partnerships. Its goal is safer, zero-waste, zero-emission, zero-entray mining that strengthens Australia's global competitiveness and delivers sustainable value across critical mineral supply chains.





NSW Decarbonisation Innovation Hub

Developing the future of Australian decarbonisation technologies

Challenge

Decarbonisation is a global challenge. Developing solutions which underpin the community's ability to meet the challenge is at the core of NDIH's vision – from low-carbon materials to technologies and systems which enable net zero outcomes.

Solution

NDIH is a large-scale collaboration between research, industry and government working to accelerate decarbonisation. Its focus spans future low-carbon fuels, resilient energy systems, and the transition to a stable, low-emissions grid. The partnership also supports innovation across agriculture, buildings, transport and infrastructure – helping design the cities and industries of the future. Through integrated solutions, better design, and education and skills programs, NDIH aims to engage communities and drive lasting change.

Target customers/end-users

- community at large through an environmentally benign future
- professionals who lead design, planning, engineering, technology commercialisation and use
- governments and policy leaders.

Progress

- AU$30M seed funding with industry and government co-contributions
- ten universities and more than 80 industry/government partners
- tools, skills and training programs launched; advanced work on new technology.

The NSW Decarbonisation Innovation Hub (NDIH) is mapping pathways to move proven low-carbon technologies and materials from concept to commercialisation. Working with industry and government across NSW, it's advancing innovation in clean power and fuels, electrification, energy systems, primary industries, the built environment, infrastructure and transport.





OMEGA-Si

Boosting solar power efficiency with organic materials, uniting scientists and industry for global clean energy

Challenge

Solar manufacturers and energy providers face rising demand for cheaper, more efficient clean power. Silicon solar cells dominate the market but are stuck near their efficiency limit. This work addresses this bottleneck by introducing an organic layer that enhances performance, enabling the industry to deliver more electricity at a lower cost without requiring retooling.

Solution

OMEGA-Si provides a simple, additive layer of organic materials that integrates seamlessly with existing silicon solar technologies. This approach avoids costly factory changes while unlocking higher efficiency.

The consortium is sustained through strong industry partnerships, with leading manufacturers already engaged. This will ensure rapid adoption and long-term impact. Collaboration between scientists, engineers and companies drives continuous improvement and scalability.

Target customers/end-users

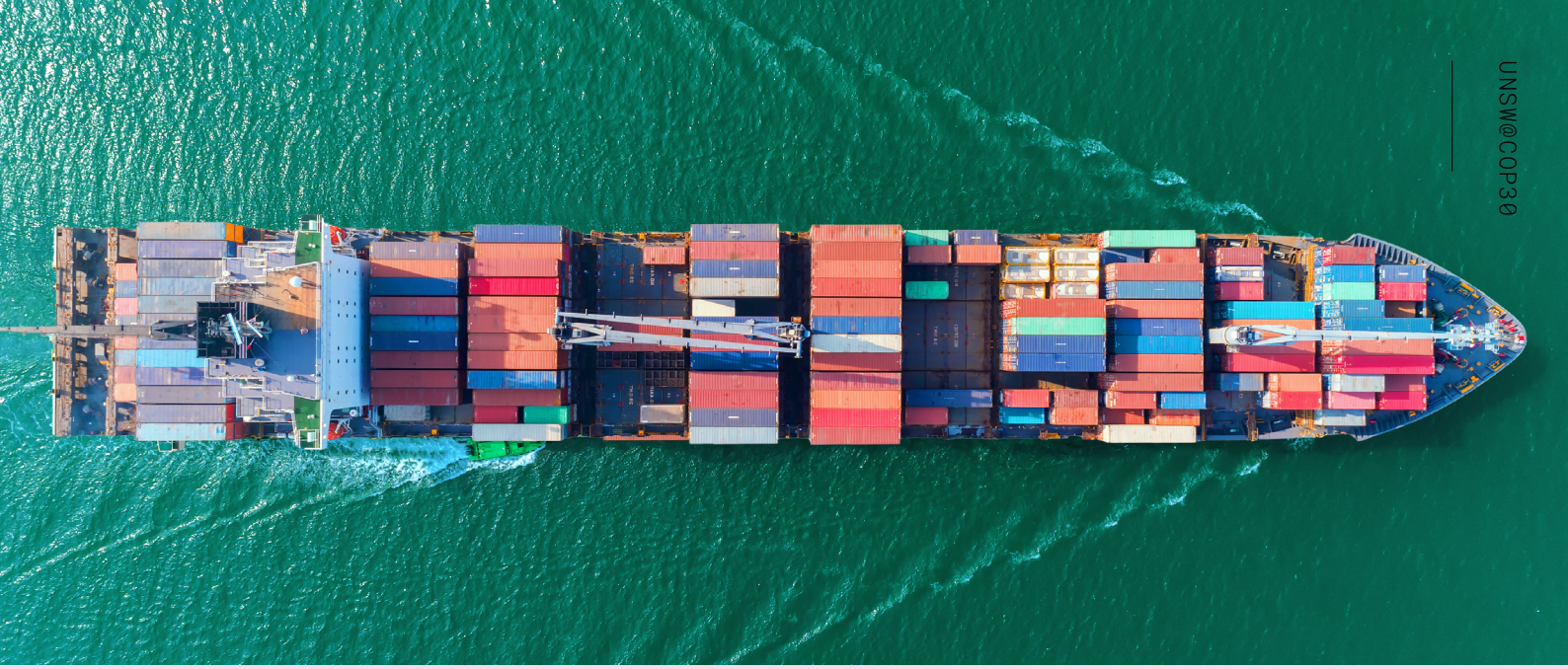
- global solar manufacturers seeking efficiency gains
- energy providers aiming for lower-cost clean electricity
- policymakers and investors supporting scalable renewable technologies.

Progress

- secured multimillion-dollar funding from the Australian Renewable Energy Agency
- formal support from the world's top five solar manufacturers
- filed three patent applications demonstrating industry relevance.

This project develops organic materials that boost the efficiency of silicon solar panels. By layering these molecules onto existing technologies, it will create affordable performance gains without the need for new factories. With formal backing from the world's largest solar manufacturers, its collaborative approach is quickly moving from lab to industry.





OzAmmonia - Reducing NOx Emissions Catalytically

Halving the cost of waste gas treatment by converting NOx emissions to a valuable fertiliser and fuel

Challenge

- NOx are harmful gases emitted by industries such as transport and chemical production. These industries face tightening regulations that exceed current technological limits, especially as renewable fuels, including hydrogen and ammonia, increase NOx emissions.
- existing solutions present cost and operational challenges.

Solution

OzAmmonia converts harmful NOx emissions into ammonia using its patented electrolyser system. Its technology prevents emissions at the source and turns them into a product with real market value. It also complies with current and future emissions regulations.

OzAmmonia generates revenue by licensing the technology to equipment vendors, who then manufacture and sell the systems to end users. Capturing 5% of the Chinese ceramic production market could yield revenue of AU$154 million and provide emitters with savings of over AU$18.5 million.

Target customers/end-users

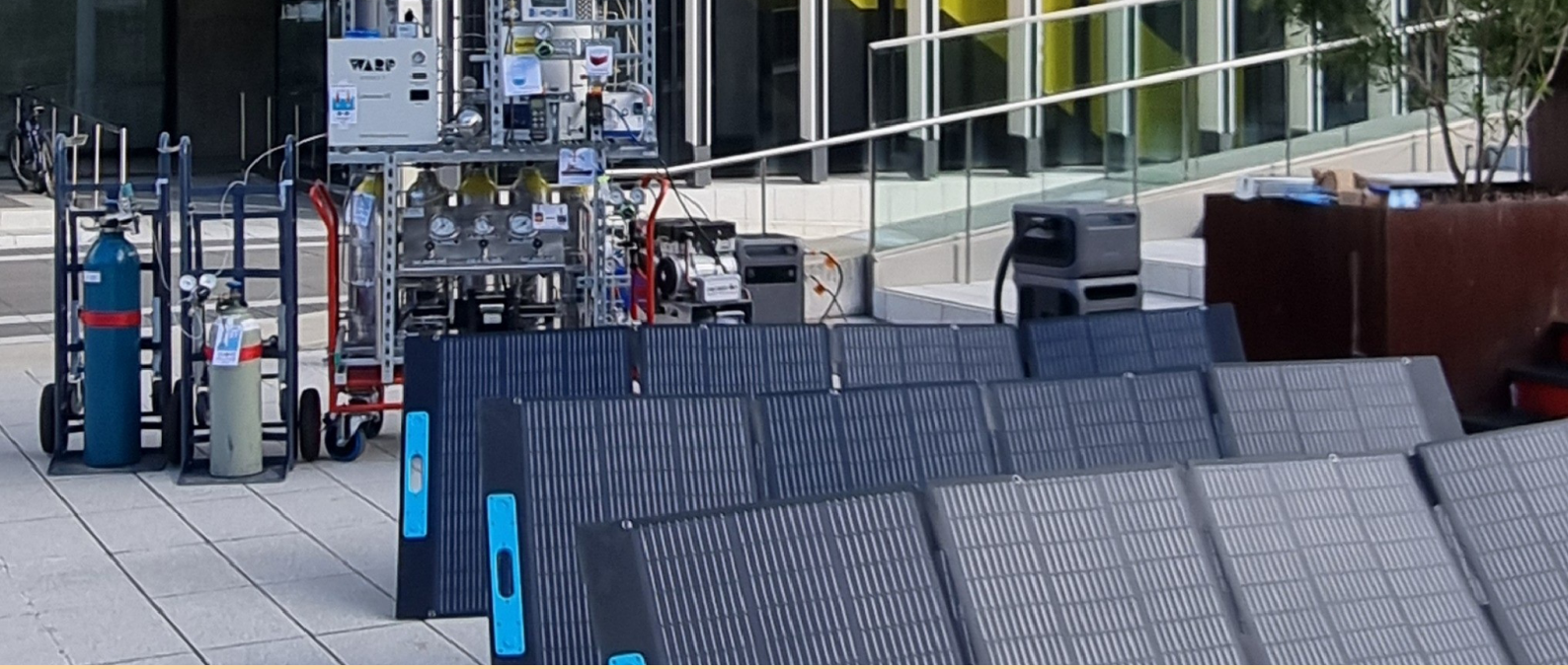
- stationary combustion (coal, diesel, natural gas)
- shipping and transport
- chemicals production
- upcoming hydrogen and ammonia combustion - in conversation with potential customers such as Wartsila and Monalisa Tiles.

Progress

- secured over AU$3.5 million in undiluted funding
- reached TRL 4 with demonstration unit
- three LOIs signed for trial projects, including with Clarke Energy.

OzAmmonia has a track record of transitioning technology from lab to industry, including licensing technology to PlasmaLeap and developing systems for Rio Tinto and ATCO. Its patented electrolyser converts nitrogen oxide emissions into renewable ammonia and halves waste gas treatment costs. Cornering just 5% of the Chinese ceramic production market could yield AUD154 million in revenue.

Spinout



Particles and Catalysis Research Laboratory (PartCat Lab)

Empowering innovation to catalyse a sustainable future

Challenge

PartCat addresses global challenges in climate change, clean energy, industrial sustainability and environmental pollution by developing advanced catalysts and prototype systems for carbon dioxide conversion, hydrogen production, energy storage and environmental remediation.

Solution

PartCat uses an integrated materials-to-systems approach – designing catalysts, understanding reaction mechanisms, constructing working prototypes and assessing feasibility – to deliver clean energy and sustainable chemical solutions.

The pipeline bridges lab research with industrial application, accelerating real-world impact in hydrogen, carbon dioxide conversion and Power-to-X technologies. The lab also educates and instils the next generation of researchers with job-ready skills to tackle global energy and environmental challenges.

Target customers/end-users

- startups and technology innovators seeking scalable clean energy solutions
- clean energy companies driving hydrogen, fuels and chemical adoption
- government and policymakers shaping strategies for a sustainable, low-carbon economy.

Progress

- more than AU$100m in competitive research funding
- eight government reports and Power-to-X decision support tools for NSW
- established eight prototype systems for industry, with five startups translating lab innovations into commercial solutions.

PartCat Lab develops nanomaterials and catalytic technologies to convert renewable energy into hydrogen, fuels and sustainable chemicals. The lab translates research into impact through strong industry partnerships, shaping adoption and influencing policy for a sustainable future.



Powering a Reliable Solar Future

Identifying and tackling hidden solar weaknesses to safeguard affordable, long-term renewable power for all

Challenge

When high-efficiency solar panels fail early due to sunlight, heat or moisture stress, operators face rising costs and shorter system lifetimes. These setbacks undermine solar's role as the world's lowest-cost energy source. This project enhances durability and reduces waste and emissions while delivering cleaner, more reliable power for decades.

Solution

The project introduces accelerated testing that compresses decades of solar exposure into just days. This breakthrough reveals hidden weaknesses in next-generation solar, traces their root causes, and rapidly validates innovative solutions ranging from protective coatings to advanced manufacturing techniques. By supercharging the link between science and industry, the project delivers proven, cost-effective fixes that extend panel lifetimes and secure solar as the world's most affordable, sustainable energy source.

Target customers/end-users

- solar manufacturers enhancing panel durability through accelerated testing and validated innovations
- solar farm operators choosing technologies designed for long-term performance
- government agencies securing a dependable and sustainable energy system.

Progress

- AU$1.5m in research translation grant support, and research contracts signed with Tindo Solar and Canadian Solar
- one new cell testing standard developed, some of the team's published approaches used in 100+ GW production
- work informed the SEMI PV75-0823 standard plenary talk at the largest solar conference in 2025.

The research team built advanced testing methods that compress decades of outdoor stress into days, revealing how ultraviolet light, humidity and contaminants damage solar technology. These rapid insights are shaping new design strategies and informing international standards, with industry adoption showing clear global impact.



Quantum-Powered Photovoltaics

Supercharging solar technology by pairing quantum dots with silicon cells

Challenge

Decades of progress in photovoltaics have pushed silicon close to its theoretical efficiency limit. This project provides a scalable, low-disruption pathway to increase energy yield from solar without requiring new manufacturing infrastructure, enabling faster, more affordable expansion of renewable energy capacity.

Solution

The technology integrates a thin quantum dot layer with conventional silicon cells to capture additional solar energy beyond silicon's inherent limits. It is designed as a straightforward upgrade requiring no changes to existing manufacturing processes. Supported by major industry partners and scientific validation, it creates a commercially viable route to higher-efficiency solar at scale.

Target customers/end-users

- solar industry and manufacturers
- policymakers and investors
- energy utilities.

Progress

- secured million-dollar funding from leading solar manufacturers
- filed patent applications demonstrating strong commercial and industry relevance.

Solar is central to a clean energy future, but traditional silicon panels are close to their efficiency ceiling. This project enhances solar capture by layering quantum dots onto silicon cells, enabling higher performance beyond theoretical limits while retaining compatibility with existing manufacturing processes.





Reducing Embodied Carbon Emissions: How Low Can We Go?

Radically reducing embodied carbon emissions in Australia's buildings

Challenge

Buildings are responsible for 37% of all greenhouse gas emissions globally. For any new building, more than half of its emissions will be caused by its materials – this is called 'embodied carbon'. There is an urgent need to develop new building designs that meet the needs of our growing population, while also reducing embodied carbon.

Solution

This research has developed new designs that can reduce embodied carbon by up to 45% through smart architectural and material measures. This includes modifying the structural layout, using mass timber and reclaimed materials, and eliminating unnecessary finishes, such as carpet and suspended ceilings.

The research develops a new method and visualisation tool for architects to measure these emissions, track their changes over time and identify simple and verifiable ways to reduce them.

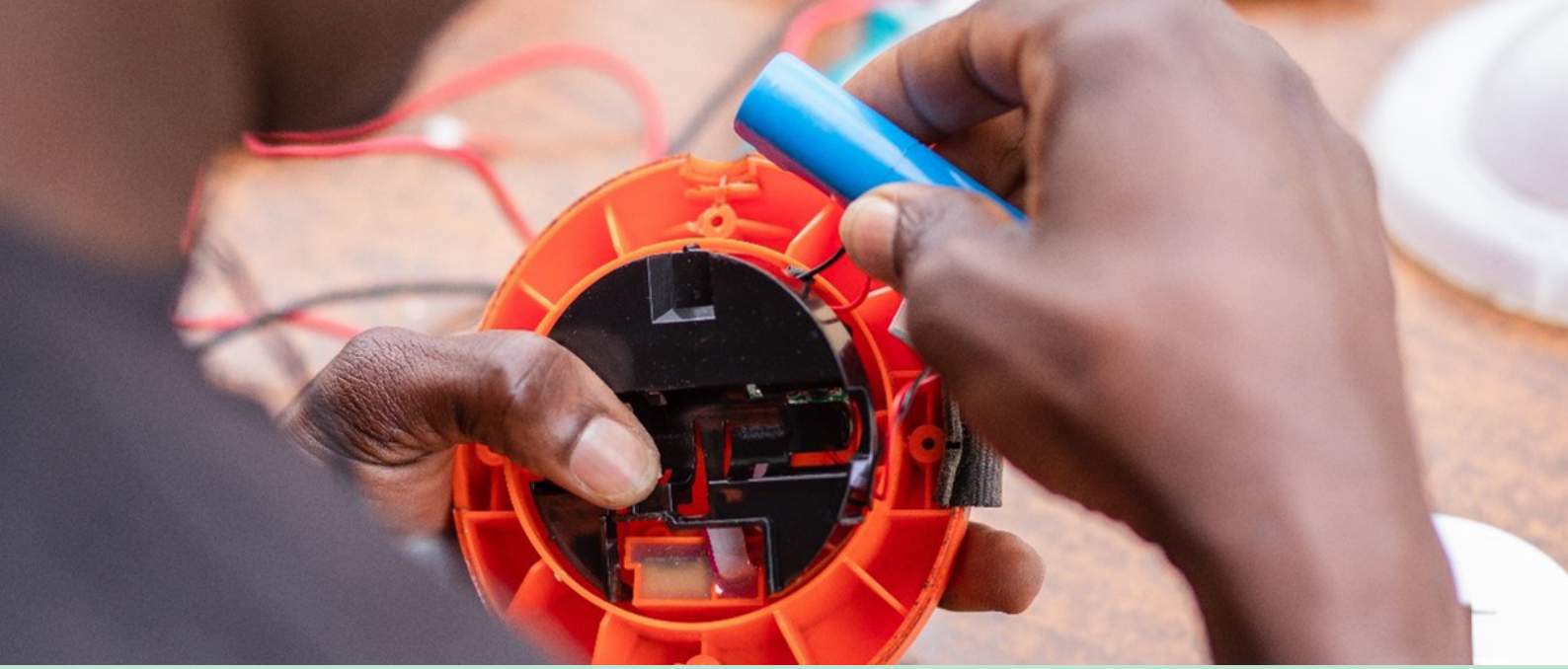
Target customers/end-users

- architects and designers
- developers and builders
- policymakers.

Progress

- the project was a collaboration with UTS, Terroir Architects and Cantilever Engineers
- ongoing collaborations with the Green Building Council of Australia
- AU$45k of grant funding received.

This project brought together architects, engineers and building scientists to test alternative design, material and technology strategies that reduce greenhouse gas emissions in new buildings. The results yield design combinations that reduce embodied carbon (emissions from building materials and construction) by up to 45%.



Repairable Off-Grid Energy Futures

Building solar repair systems across Africa and the Pacific to secure energy access

Challenge

Millions of households across Africa and the Pacific Islands rely on off-grid solar, but when products fail, families face costly replacement and growing e-waste. With limited repair pathways, energy access remains fragile. This program addresses the structural gap by embedding repair into education, community practice and policy systems.

Solution

The program creates repairable energy futures across two regions. In Malawi and Zambia, ARC-funded research – with industry partners SolarAid, Zuwa Energy and CLASP – maps solar e-waste flows, documents informal repair cultures and co-designs digital repair resources, including a Wiki.

In Vanuatu, DFAT-funded Fiksim Sola pilots embed repair skills into vocational and secondary curricula with national policy support. Together, these initiatives demonstrate how locally grounded repair ecosystems can sustain energy access, reduce waste and enhance livelihoods.

Target customers/end-users

- rural households in Africa and the Pacific using off-grid solar
- local repairers, schools and vocational centres embedding repair skill
- policymakers, non-government organisations and donors designing sustainable energy programs.

Progress

- AU$675k+ in research translation funding/grant support
- DFAT-backed Fiksim Sola pilots launched in Vanuatu
- published the ‘State of Repair’ report, shaping global sector debate.

Repairable Off-Grid Energy Futures develops scalable repair systems for off-grid solar in Africa and the Pacific. Funded by the ARC (Malawi and Zambia) and Department of Foreign Affairs and Trade (DFAT) (Vanuatu), the project demonstrates how embedding repair into schools, communities and policy can cut e-waste, reduce costs and strengthen resilience.





School of Photovoltaic & Renewable Energy Engineering (SPREE)

Research and training in solar and renewable energy for more than 50 years

Challenge

The transition to full decarbonisation involves multiple phases. With renewable generation now cost-competitive, the challenge shifts to distribution and integration of renewables into the grid, including harnessing the flexibility in energy storage and consumer energy resources. Considerable work remains to fully decarbonise hard-to-abate sectors like aviation and heavy industry..

Solution

SPREE combines breakthrough solar cell research with system integration expertise to accelerate global decarbonisation. We develop ultra-high-efficiency photovoltaics that reduce costs, new technologies that optimise operation and maintenance, modelling tools to plan and manage renewable energy grids, and market frameworks that de-risk investment. Since 2000, we have trained thousands of graduates through pioneering undergraduate and postgraduate degrees in solar and renewable energy engineering, and through our unrivalled industry partnerships, we translate laboratory innovations into commercial production while training engineers in both technical and market dimensions.

Target customers/end-users

- leading international solar companies advancing high-performance cell technology with sustainable manufacturing
- governments, utilities and businesses managing renewable integration
- our graduates hold senior technical positions in institutions driving the global energy transformation.

Progress

- AU$500M cumulative investment in solar PV fabrication equipment, including the world's only university silicon solar cell production facility for training and research
- global partnerships with renewable energy leaders from technology to deployment
- advanced sustainable energy access and efficiency across Pacific Island nations, supporting the UN SDGs

UNSW is the birthplace of modern silicon solar cells. The PERC and TOPCon photovoltaic architectures, were invented on campus in Sydney, and now dominate global solar manufacturing. SPREE is home to a broad and deep clean energy R&D capabilities, spanning basic physics, scalable engineering and policy reform.





Semiconductor Manufacturing Powering a Breakthrough in Green Hydrogen

A major advance in green hydrogen production emerging from semiconductor manufacturing

Challenge

Current green hydrogen technologies rely on scarce and expensive precious metals such as platinum, limiting affordability and deployment at scale. UNSW researchers have developed an alternative based on transition metal oxides, achieving >65% energy efficiency and production costs below AU$1.5/kg.

Solution

Transition metal oxides offer strong catalytic performance but are typically limited by poor conductivity. This innovation integrates catalytic sites with conductive pathways to overcome that barrier, outperforming noble-metal electrocatalysts. Crucially, it is compatible with thin-film deposition and photolithography—the same processes used in semiconductor fabrication — making the technology scalable, cost-effective, ultra-slim and lightweight for mass deployment..

Target customers/end-users

- hard-to-abate heavy industries (steel, cement, chemicals)
- transportation sector
- power utilities.

Progress

- ARC Laureate Fellowship
- several million dollars in Australian research grants.

This innovation adapts established semiconductor manufacturing techniques to achieve a step-change in green hydrogen production. By transforming the economics of clean hydrogen, it has the potential to accelerate large-scale adoption and support the global transition to a hydrogen-powered economy.



Solid-State Hydrogen Storage Technology Group

Novel hydrogen storage materials for zero-emission microgrid systems, onboard applications and cost-effective hydrogen transportation

Challenge

Current hydrogen storage relies on liquefied or compressed systems that are costly, energy-intensive and pose significant safety risks. Batteries face capacity limits, degradation and short lifespans. At the same time, electric vehicles demand excessive energy during ultra-fast charging and underperform in harsh environments – highlighting the urgent need for safer, more efficient energy solutions.

Solution

Storing hydrogen in solid-state materials offers a safe, low-pressure alternative to high-pressure gas, eliminating the risk of uncontrolled release and making hydrogen shipping highly competitive. This group has developed low-cost, lightweight materials with rapid adsorption and desorption capabilities at ambient conditions, making them suitable for use in hydrogen fuel cell vehicles. These innovations are transformative, enabling practical, scalable hydrogen storage solutions and accelerating the realisation of a sustainable hydrogen economy.

Target customers/end-users

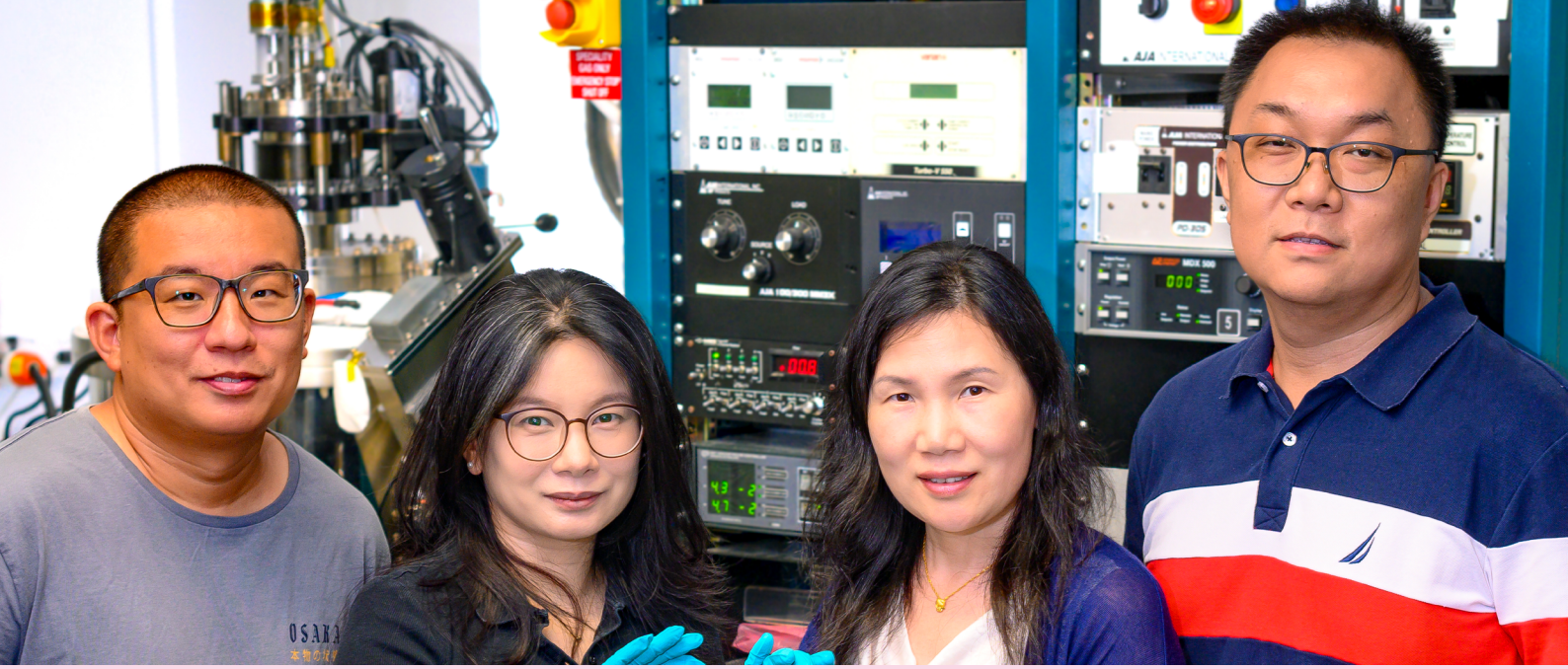
- green energy companies seeking industry-ready hybrid renewable energy systems
- defence agencies requiring renewable hydrogen power for remote military bases
- energy and shipping companies enabling large-scale hydrogen export from Australia.

Progress

- MOU signed with Hong Kong and China Gas Company Limited
- collaboration with Fraunhofer UMSICHT, FZ Jülich and Taiwan's National Central University
- EOIs from Chinese motor companies, BYD and Dongfeng Liuzhou Motor.

The group designs and develops advanced hydrogen storage materials for different applications. Examples include lightweight and porous nanomaterials for fuel-cell vehicles, and cost-effective, durable hydrogen storage alloys for stationary zero-emission fuel cell systems and hydrogen transportation. The work has attracted interest from public utilities, energy suppliers and governments.





Tandem ART

A simple and low-cost technology to fabricate high-performance tandem solar cells

Challenge

- high-efficiency tandem solar cells are recognised as the next generation of solar PV products, since current Si solar cells are approaching their theoretical efficiency limit.
- this in-demand tandem cell is not yet available on the market due to incompatibility and the difficulty of integrating subcells.

Solution

Tandem ART has developed a low-cost solution to fabricate tandem solar cells by integrating Si wafer cells with thin film cells. Its novel method transforms common insulating polymers into conductive polymers, which can then be used to bond subcells together to produce tandem cells. The technology removes constraints on subcell compatibility and significantly simplifies tandem cell fabrication, paving the way for accelerated commercialisation.

Target customers/end-users

- initially, PV rooftop/building-integrated/vehicle-integrated PV system distributors, who require high PV power output in a limited area
- in the long term, all kinds of PV power plant developers will benefit from further cost reduction of this tandem cell product.

Progress

- awarded an Australia Economic Accelerator (AEA) seed grant by the Department of Education
- successfully demonstrated prototype of tandem solar cells.

Spinout

Tandem ART's unique technology allows the upgrade of current Si cell production capacity into next-generation tandem products fabrication without major modification. Tandem ART members have strong expertise in PV materials and device development.



The ARC Centre of Excellence for Carbon Science and Innovation (ARC COE-CSI)

Transforming carbon science and innovation for a clean and sustainable future

Challenge

Greenhouse gas emissions from energy, transport and chemical industries are major drivers of air pollution and climate change. Achieving net zero requires shifting from fossil fuels and critical-mineral catalysts to renewable energy systems that use sustainable, widely available alternatives.

Solution

Catalysts are essential for the clean production of energy and chemicals to mitigate or eliminate carbon dioxide emissions. The ARC COE-CSI team is developing advanced metal-free carbon catalysts for clean energy technologies with zero emissions and for facilitating green chemistry that minimises carbon dioxide emissions. Carbon catalysts can be developed from carbon dioxide, biomass and other carbon-rich wastes without the geopolitical risks and costs associated with critical minerals.

Target customers/end-users

- scientists, students and embers of the public interested in advancing carbon science
- partners in the energy, materials and green chemistry fields
- government agencies and policymakers driving net-zero sustainability priorities.

Progress

- published 100+ high-impact papers since commencing in 2024
- established a network with 20 partners globally advancing carbon science and global impact
- brought together 100+ members driving carbon innovation and translation.

ARC COE-CSI is a multidisciplinary collaborative centre of world-leading experts in carbon materials, catalysis, renewable energy and green chemistry. The centre aims to create innovative carbon science and game-changing technologies for the clean production of energy and chemicals by using abundant sunlight, seawater and carbon waste feedstocks.



Trailblazer for Recycling & Clean Energy (TRaCE)

Fast-tracking net zero – from research to global markets.

Challenge

Universities are critical to driving innovation, change and sovereign capability. But too often, research commercialisation does not keep pace with market needs for timely solutions. Complex intellectual property frameworks, limited industry engagement, and insufficient incentives for researchers to translate discoveries hinder effective collaboration and slow national progress toward net zero.

Solution

TRaCE has created a new model to accelerate research commercialisation through 15 supporting initiatives that build the capabilities, skills, and ecosystems needed for global decarbonisation. The program supports innovation – from funding and expert guidance to startup acceleration, industry partnerships, and workforce development – translating discoveries into commercially viable solutions that will drive Australia's transition to net zero.

Target customers/end-users

- industry partners, startups, SMEs, and scale-ups developing clean energy and recycling technologies
- researchers and PhD students translating discoveries into commercial solutions
- investors and policymakers.

Progress

- supported 100+ companies and world-class technologies
- co-invested AU$98M in 33 R&D projects
- launched four first-of-a-kind programs, including seed investment and fast 'roadside' engineering assistance.

Delivered by UNSW and the University of Newcastle, the Trailblazer for Recycling and Clean Energy (TRaCE) is moving circular economy and clean energy technologies out of the lab and into global manufacturing.





UNSW Energy Institute

Translating research into technologies, policy and partnerships that support an equitable energy future

Challenge

Energy affects every major aspect of almost every human life, from healthcare to food production to transportation. The growing economic and social costs of a changing environment are fuelling the urgency for widespread transition from finite fossil fuel-based energy to cleaner, renewable resources that are readily available for all.

Solution

The UNSW Energy Institute unites deep expertise to create and amplify solutions for urgent energy challenges:

- flagship tools, such as SunSPOT, are helping households and businesses adopt solar and batteries.
- the UNSW Real-Time Digital Simulation Laboratory accelerates grid integration of new energy technologies.
- transdisciplinary experts are driving uptake of green fuels and commodities through technology spin-outs, such as OzAmmonia, and by supporting evidence-based policy including the Australian Government's AU$1B SunShot Program.

Target customers/end-users

- industry partners advancing clean energy technologies and systems
- policymakers supporting a future made in Australia
- businesses, households and communities adopting clean energy solutions.

Progress

- supported UNSW cleantech spinouts
- submitted evidence-based advice to national energy policy and government strategy inquiries
- convened 150+ stakeholders at the 2025 State of Energy Research Conference.

UNSW is globally recognised for its contributions in solar PV, energy storage, clean fuels, digital grids, and energy policy and markets. Through partnerships with industry, government and communities, UNSW research and technology is supporting a consumer-led energy transformation, helping to realise Australia's ambition to become a renewable energy innovation superpower.





UNSW Nuclear Innovation Centre

Advancing Australia's nuclear science and technology for global impact

Challenge

Australia is entering a new era of nuclear capability under AUKUS, creating urgent demand for a highly skilled nuclear workforce. The centre addresses this by preparing graduates and professionals with the technical knowledge, safety mindset and ethical grounding required for high-skill roles in nuclear science, engineering and stewardship.

Solution

UNIC delivers multi-level education and training across undergraduate, postgraduate and executive programs, integrating nuclear science, engineering and stewardship with ethics, policy and legal perspectives. The centre leverages industry and government partnerships, international collaborations and executive education to prepare subject-matter experts and workers. These pathways ensure graduates are job-ready, support workforce sustainability and translate research into real-world impact across defence, policy and industry settings.

Target customers/end-users

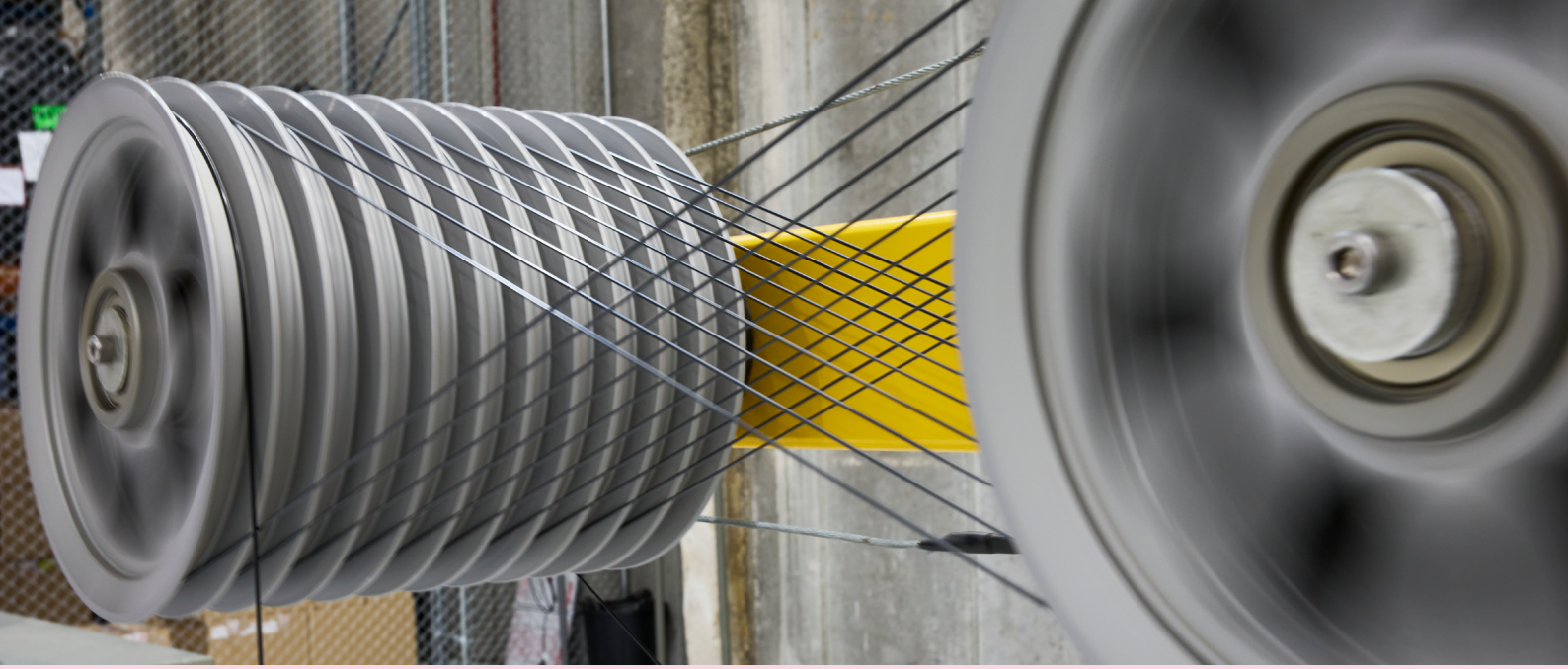
- students and professionals developing expertise in nuclear science, engineering and stewardship
- government and defence agencies preparing a skilled AUKUS nuclear workforce
- industry and international partners advancing research, training and workforce capabilities.

Progress

- AU$7.5m donation from Tyree Foundation
- attracted nuclear talent through collaborations with global partners
- established the Bachelor of Engineering (Honours) in Nuclear Engineering, Nuclear Minor, Atomcraft program and professional development courses.

The UNSW Nuclear Innovation Centre (UNIC) strengthens Australia's nuclear capability through workforce development, policy engagement and public outreach. It delivers nuclear engineering programs to defence personnel, informs government decision-making via OECD NEA forums, and engages the public through media, talks and events.





UNSW Sustainable Materials Research and Technology (SMaRT) Centre

Researching and developing technologies that transform waste into a new generation of 'green' materials and products

Challenge

Many of the natural resources and materials needed for batteries and other renewable energy technologies are becoming scarce and more costly (economically and environmentally). Recovering these materials from end-of-life products will be crucial to future global sustainability efforts.

Solution

SMaRT is advancing its work to create real-world impact via multiple collaborations involving industry, community organisations and government agencies. Combining the distinctive research capabilities of UNSW's academics, the SMaRT Centre has a track record of delivering research and technologies suitable for implementation, the latest being various Microfactorie™ technologies for which extensive future R&D initiatives are planned.

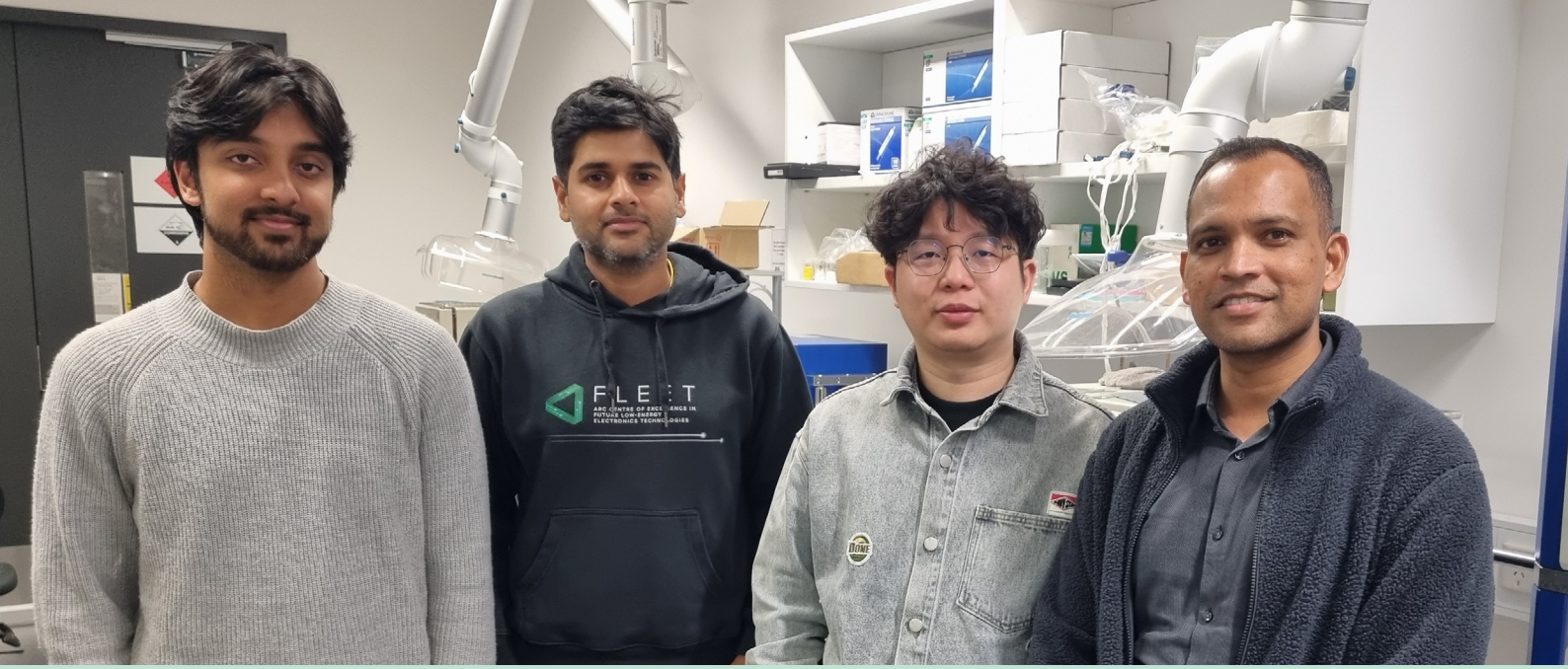
Target customers/end-users

- national and international research partners
- industry and governments across Australia.

Progress

- a collaboration between the UNSW SMaRT Centre and IT asset management company Renew IT has begun turning discarded hard plastics into 3D printer feedstock via SMaRT's first commercially-run Plastics Filament MICROfactories™
- developing a Green Aluminium MICROfactorie™ module at Jamestrong's aluminium can manufacturing facility in Taree, NSW.

The UNSW Sustainable Materials Research and Technology (SMaRT) Centre pioneers the 'science of microrecycling' to develop MicrofactorieTM and other technologies that recover and reform valuable materials from hard-to-recycle wastes into feedstock for remanufacturing. The aim is to create environmental, economic and societal benefits through a new circular economy.



ZenQuo

Powering the future with safe low-cost storage

Problem

- current battery solutions for solar storage are expensive, often costing over AUD1000/kWh, making them inaccessible for many homeowners and limiting broader adoption.
- safety is also a major concern, as lithium-ion batteries are flammable and pose fire risks, particularly in residential settings.
- ZenQuo addresses both these problems with a non-toxic, water-based battery at a quarter of the cost.

Solution

ZenQuo's battery utilises abundant, inexpensive, and non-toxic electrode materials based on zinc and manganese, along with an aqueous saltwater electrolyte, to provide a fully recyclable energy storage solution. With projected energy densities of 60-70 Wh/kg and 3000–5000 cycle life, it's ideal for residential and grid-scale storage. The business model includes direct sales and licensing to manufacturers and energy providers.

Target customers/end-users

- residential solar users
- grid operators.

Progress

- AUD1 million seed-funding including dilutable (VC) and non-dilutable (RACE2030 CRC, Australian Economic Accelerator).
- validated 1000+ cycle alpha prototypes at 60 Wh/kg
- IP filed: AU2022903850A0; PCT: WO2024124296A1.

Spinout

ZenQuo's team has deep battery and business experience, validated IP, and a clear path to commercialisation in Australia's AUD90M+ (~5%) residential battery market.

Climate Science, Water and Marine Research





BioShelter

Protecting and restoring inner city harbours with artificial seawalls while enhancing marine biodiversity

Challenge

BioShelter restores natural habitats for native species by improving the water quality of a harbour. This was demonstrated by its proof-of-concept research in 2019 in Sydney Harbour, and the first product implementation was completed for the new Sydney Fish Market in July 2025. Further projects are in development.

Solution

Each BioShelter is unique and custom-made for its marine ecosystem. Site-specific marine biology data representing the local biodiversity provide the 'design instruction' for the artificial seawall. BioShelter's software uses these data to generate computationally designed models that marine biologists can assess. The software also generates fabrication information for the robot to 3D-print the seawall using custom-made sustainable materials and provides feedback in the design state on fabrication time and cost of the installation.

Target customers/end-users

- local and state governments
- environmental organisations
- organisations that want to contribute to UN SDG 14 – Life below water and SDG 11 – Sustainable Cities and Communities.

Progress

- Bioshelter is in its fourth iteration and at Technology Readiness Level 6
- third iteration validated by a marine biologist as able to attract local marine species and foster oyster growth
- completed two pilot projects with Infrastructure NSW.

A growing number of people are living in coastal cities. With the increasing need for space, shorelines are moving outwards. This results in the destruction of habitats for marine life and diminishes biodiversity. BioShelter counterbalances this through artificial seawalls, computationally designed using site-specific marine biology data, fabricated by robots.





Centre for Ecosystem Science (CES)

Working with governments and communities to conserve and restore ecosystems

Challenge

Natural environments around the world face impacts from multiple pressures, leading to habitat degradation and species loss. Informed by ecological knowledge and a collaborative outlook, CES is developing systems to predict risk to ecosystems, manage landscape processes like fire, conserve and reintroduce threatened species, and implement sustainable aquaculture.

Solution

CES brings science and practice together to understand and protect ecosystems. Partnering with government, industry, NGOs and cultural groups, it uses cutting-edge analysis and hands-on fieldwork to deliver real-world solutions—from reintroducing the platypus to assessing ecosystems worldwide. Projects are co-designed to ensure impact where it matters most.

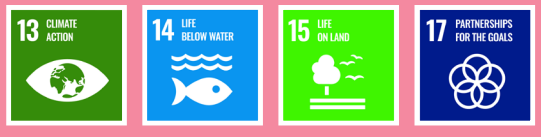
Target customers/end-users

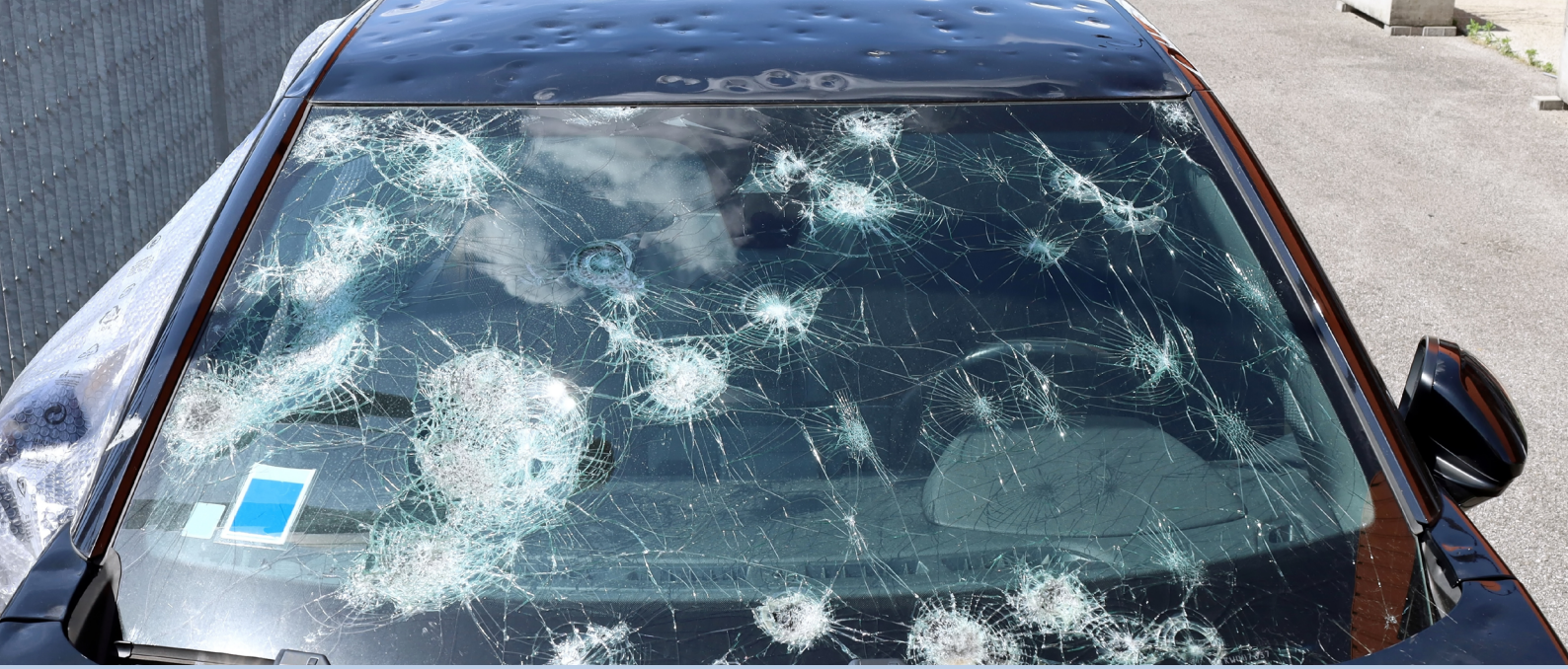
- government agencies and policy makers
- industry partners seeking collaborative approaches to ecosystem management and restoration
- NGOs and cultural groups focused on nature-positive outcomes.

Progress

- over AU$9M annual funding
- formal partnerships across government and industry
- global recognition including the International Cosmos Prize (2025) and Australian Museum Eureka Prizes (2022-2024).

A key global challenge is the need to protect, manage and restore our ecosystems under changing conditions. CES focuses on excellence in ecological science via collaboration with many government, industry and community partners as well as landholders, to inform management of the environment, while also training our future environmental leaders.





Climate Change Impacts on Severe Convective Storms

Research to help decision-makers understand current and projected future changes to thunderstorms and their impacts

Challenge

Climate change is affecting severe storms and their dangerous and costly impacts, including heavy rain, hail and extreme winds. However, the details of the expected changes remain difficult to quantify. This project helps to reduce uncertainty and provide decision-relevant information to quantify risks and inform adaptation and mitigation strategies.

Solution

The project uses a variety of methods to quantify risks and project changes across different scales. At the regional scale, dynamical downscaling is used to simulate the effects of global warming on specific hazards, such as hail. At a global scale, the project uses statistical relationships between large-scale atmospheric conditions and local hazard occurrences to project potential changes.

Target customers/end-users

- insurers and re-insurers
- decision-makers in government
- emergency management services.

Progress

- received industry support from two insurance-sector companies
- research outputs in active use in the insurance sector
- organised 2025 Science-Industry Workshop on Severe Convective Storms.

The project uses cutting-edge climate science, such as dynamical downscaling and statistical analysis of global climate models, to examine how thunderstorms are affected by global warming now and for the future.



Climate Change Research Centre (CCRC)

Researching the impacts and risks of climate change to create a better future

Challenge

Climate change is reshaping ecosystems, economies, and communities at unprecedented rates. Understanding and anticipating these shifts requires cutting-edge climate science that can untangle complex Earth system interactions—spanning the atmosphere, oceans, and land.

Solution

CCRC is a world-leading hub for fundamental and applied climate science. Its researchers specialise in atmospheric, oceanic, and terrestrial processes to understand climate dynamics, variability, and extremes. Through leadership in national and international research programs, CCRC generates the evidence base needed to inform effective climate policy.

Target customers/end-users

- government and policy bodies seeking science-based insights to guide climate risk governance, emissions reduction, and adaptation strategies
- academic, research, and professional learners pursuing advanced training in climate science.

Progress

- 130+ peer-reviewed journal articles per year
- leadership roles in national/international climate science programs
- collaborations with industry partners, government, NGOs, and 40+ global universities and research centres.

The Climate Change Research Centre (CCRC) hosts 30 research staff and over 20 PhD students. Its unique scientific diversity brings together world-leading expertise in all aspects of climate change, including physical, chemical, and biological processes and land, oceans, and the atmosphere.



Ecological Statistics Research Group (Eco-Stats)

Developing new technologies to understand ecosystems and their response to climate change

Challenge

Climate change poses an existential threat to our biodiversity. We need to understand current and future biodiversity trends to protect our natural assets. New monitoring techniques, using high-throughput and citizen-science technologies, have revolutionised this process. But to use new data for evidence-based decisions, we require new analysis techniques.

Solution

Eco-Stats develops and applies modern statistical tools to answer important ecological questions, harnessing technological advances across fields. Climate change is a spatio-temporal problem, so the team develops new pathways for spatio-temporal analysis applicable to very large datasets. For high-throughput data, Eco-Stats develops parallelisable approaches to analysis scalable to high-dimensional settings. For citizen-science data, it develops novel approaches to integrating data from multiple sources, to make better decisions using data from disparate sources.

Target customers/end-users

- policy-makers and land managers looking to make evidence-based decisions to protect or restore our natural ecosystems.

Progress

- competitive grants totalling over AU$9M
- technologies are widely used across disciplines (in 20,000+ citations, with 35,000+ software downloads annually)
- collaborations with government and academia across 10 countries.

The world is awash with data, but not with data analysis tools that use it effectively. Eco-Stats develops and applies statistical techniques to better understand our biodiversity assets, so we can make better evidence-based decisions concerning their management in a changing climate.



Ferrari Laboratory

Unlocking microbial innovation from Earth's harshest environments

Challenge

By analysing Antarctic microbes from Mars-analog sites, the team aims to identify the biological limits for life and discover new natural products for biopharma, biotechnology and space industries.

The team is also exploring the use of microbial communities as indicators of soil health, with applications in bioremediation and ecosystem conservation, particularly in drylands.

Solution

The team is harnessing the power of extreme microbes to solve real-world and off-world challenges. These fungi and bacteria survive where almost nothing else can—revealing new compounds with antimicrobial, anticancer, antifreeze and UV-protective potential. Their research not only helps monitor soil and ecosystem health but, through collaboration with NASA, is advancing planetary habitability models and new tools for detecting life beyond Earth.

Target customers/end-users

- biotech & pharma: novel compounds from extremophiles with therapeutic and protective potential
- space tech: biological models and enzymes for astrobiology missions.

Progress

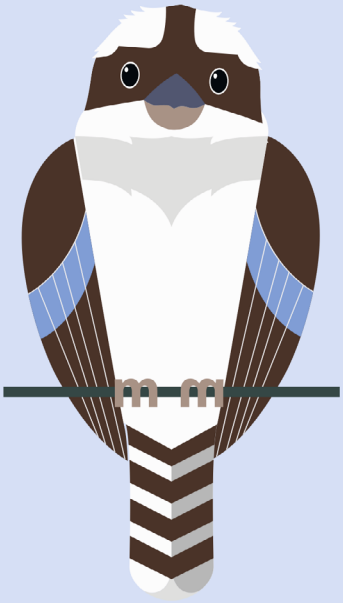
- research funding with US DoD and competitive grant funding from the ARC
- formal collaborative agreement with NASA
- key findings have gained widespread media attention and >5000 citations.

The Ferrari Lab research program leverages the extreme conditions of Antarctica to uncover microbial strategies for survival, with direct applications in biotechnology, environmental diagnostics, and planetary exploration.

Explore the vital role clean air plays in human health and the environment.

Empowering students to tackle bushfire and air quality challenges through creativity, innovation, and real-world problem-solving.

View Lessons



Fresh Air Innovators and Fresh Air Friends

Bringing educators, researchers, and communities together to create cleaner air

Challenge

Poor indoor and outdoor air quality affects health, learning, and productivity. Schools, communities, and policymakers struggle to measure and improve local air conditions. The work of these teams provides practical tools, data, and collaborative strategies that help them identify issues, act effectively, and achieve tangible environmental and health benefits.

Solution

The projects offer a collaborative air quality improvement system combining easy-to-use monitoring tools, data-driven insights, and tailored action plans. By partnering with schools, local governments, and community groups, the teams are able to integrate solutions into existing programs and policies. Long-term sustainability comes from building capacity, sharing resources, and forming ongoing partnerships that embed clean air practices into everyday operations.

Target customers/end-users

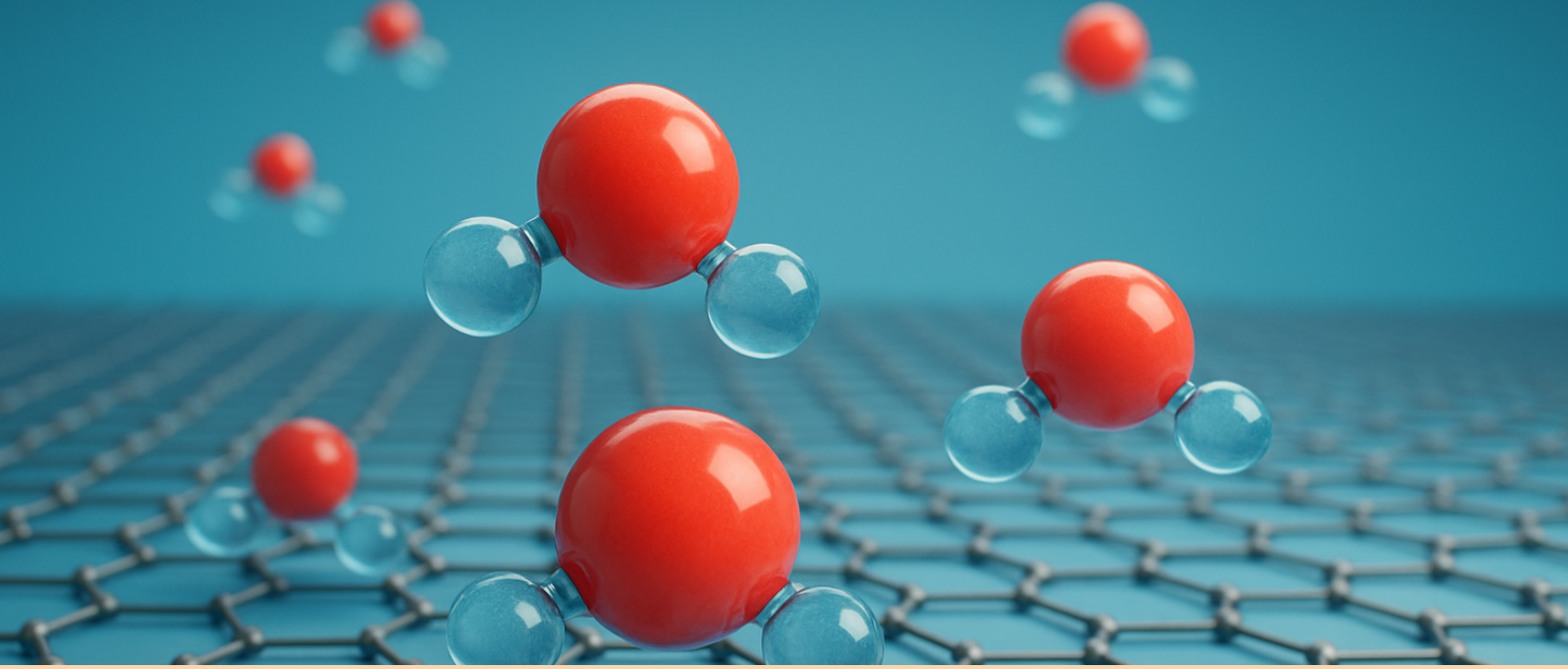
- schools and educators improving learning environments
- local governments seeking community health gains
- policymakers and funders supporting scalable, evidence-based air quality solutions with strong public engagement potential.

Progress

- AU$400K from the NSW Chief Scientist and Engineer Natural Hazard Award
- AU$250K to redevelop and integrate Clean Air Schools and Fresh Air Innovators
- AU$60K from the National Environmental Science Program.

These projects unite experts and communities to turn air quality research into practical solutions. Using a collaborative, hands-on approach, the projects have sparked school and local group engagement, leading to visible health and environmental improvements and growing interest from policymakers seeking proven, community-driven methods.





Graphene Oxide Membranes for Natural Organic Matter (NOM) Removal from Water

Delivering safe drinking water with new membrane technology for real-world applications

Challenge

Natural organic matter (NOM) in drinking water creates compliance and cost pressures for utilities. Current treatment options are capital-intensive and inefficient. Graphene oxide membranes provide a durable, low-pressure alternative that integrates with existing systems. With industry partners preparing for pilot trials, this innovation is moving closer to real-world deployment.

Solution

In partnership with Sydney Water, the team co-patented a unique process for cross-linking tunable graphene oxide membranes. These ultra-thin membranes deliver high water flow while removing more than 99% of natural organic matter at pressures below two atmospheres. Designed for durability, they withstand standard industrial backwash cleaning and can be integrated into existing treatment systems. With strong industry backing, the technology is now being prepared for pilot-scale demonstration.

Target customers/end-users

- municipal water authorities: ensure safe, compliant drinking water through effective NOM removal
- industry: low-pressure technology suited to existing treatment plants
- communities: reliable access co cleaner and safer water supplies.

Progress

- partnerships: co-patented with Sydney Water, demonstrating strong industry collaboration
- validation: lab testing achieved >99% NOM removal with high flux at <2 atm
- pipeline: industry partner advancing pilot-scale manufacturing.

This project addresses the problem of natural organic matter in drinking water, which can create harmful by-products. The team developed graphene oxide membranes which remove these contaminants at low pressures, using less energy than conventional methods. With strong backing from industry, the technology is now moving towards pilot-scale trials.



Greenhouse Gas Measurement and Modelling Team

Measuring greenhouse gas emissions to help industry and government verify inventories and identify mitigation targets

Challenge

Greenhouse gas emission estimates based on models and emission factors often lack precision. Ground and airborne atmospheric observations reduce uncertainty in carbon accounts and identify where emissions, especially methane, can be reduced or eliminated. This improves operational safety, strengthens sustainability reporting, verifies progress toward net zero, and delivers broader environmental benefits.

Solution

Recent advances in greenhouse gas measurement using ground- and airborne-based analysers, combined with refined atmospheric transport modelling, provide improved quantification of emission rates from diverse sources. Top-down atmospheric observations are ideal for identifying cost-effective mitigation opportunities, reducing uncertainty in greenhouse gas budgets, and delivering high-quality data to track sustainability goals. These innovations inform government policy, assist industry in improving safety and sustainability reporting, and demonstrate verified progress toward emission reduction and net-zero targets.

Target customers/end-users

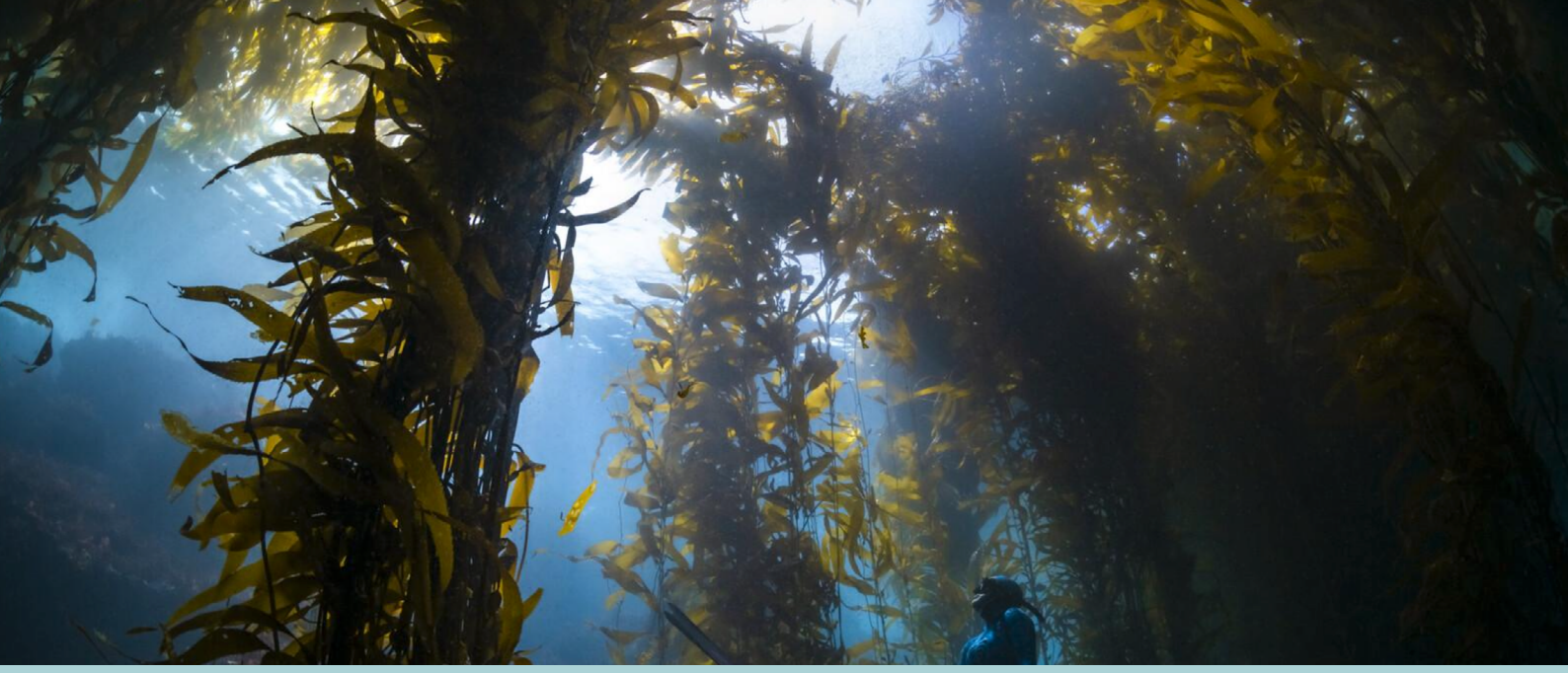
- government Departments
- agricultural Producers
- oil, gas, coal, and waste operators implementing verified best-practice emission-reduction methodologies.

Progress

- over AU$4M in research funding, support, and equipment grants
- partnerships with UNEP, NSW Government and Australian Government
- member of the Australia Government and State Government Advisory Committees.

This team develops and verifies ground and airborne methods to quantify emissions from fossil fuel, agricultural, and urban sources. Partnering with the United Nations Environment Programme, government, and industry, the team reduces uncertainty in carbon accounts, informs policy development, and accelerates verified progress toward national and global net-zero goals.





Kelp Forest Alliance

Protecting and restoring underwater forests across a third of Earth's coastline

Challenge

Kelp forests cover one-third of our coastlines, are connected to 750 million people, and capture millions of tonnes of CO2 annually. They are disappearing on every continent yet remain forgotten in global policy. To secure their future, we must protect and restore four-million hectares of these ecosystems by 2040.

Solution

KFA offers a coordinated system that connects global knowledge with local action. It provides open-access data, shared monitoring frameworks, and practical guidance that helps scientists, communities, and policymakers design and evaluate kelp protection and restoration projects. Its collaborative approach builds long-term capacity by integrating kelp stewardship into existing management systems, policy frameworks, and community initiatives, ensuring that conservation solutions are scalable, inclusive, and sustained beyond individual projects.

Target customers/end-users

- marine managers
- government
- communities and Indigenous groups.

Progress

- Global Kelp Forest Challenge to restore 4 million hectares by 2040
- world's first State of the World's Kelp Forests report
- 750+ member global Community of Practice.

The Kelp Forest Alliance (KFA) connects scientists, communities, and decision-makers to turn research into action for kelp recovery. With over 700 members in 27 countries, it is uniting with governments and practitioners worldwide to shape marine conservation policy and practice.



Living Seawalls – Revitalising Marine Infrastructure

Transforming how we build in our oceans to enhance biodiversity and climate resilience of infrastructure

Challenge

Living Seawalls tackles biodiversity loss from marine construction. As seawalls, pilings, and pontoons proliferate for protection, recreation and energy, they destroy habitats and support lower biodiversity due to their often flat, smooth surfaces that offer little refuge for marine life.

Solution

Living seawalls are modules that mimic features of natural shorelines (e.g., rock pools, crevices). They increase the habitat area for up to 150 species, including fish, seaweeds, shellfish and other invertebrates, and provide protection to organisms from high temperatures and predators. The modular nature of Living Seawalls' products means that they can be fitted to new or existing built structures of varying size, planted with native species, and fabricated from upcycled materials.

Target customers/end-users

- public and private entities from local and state government
- water-front property owners
- port managers and industry giants, such as Lendlease.

Progress

- over AU$1M in philanthropy and research grants
- more than 3,000 modules installed across the globe
- winner of 2025 Eureka Prize for Environmental Research.

Living Seawalls' work directly contributes to the UN Sustainable Development Goals: SDG 14 Life Below Water by enhancing marine biodiversity, SDG 13 Climate Action by building resilience to sea-level rise, and SDG 11 Sustainable Cities and Communities by creating greener infrastructure.

Spinout



Ocean Circulation and Marine Heatwaves

Marine heat wave predictions to secure our ocean economy

Challenge

Knowledge of Australia's exposure to marine heat waves is critical for guiding industry, government and communities on optimal management strategies for our ocean environment and marine industries. The siting of marine parks, aquaculture farms and reef restoration efforts is currently limited by inadequate knowledge of these costly marine threats.

Solution

This project will build a new modelling system that smoothly connects large-scale ocean models with detailed coastal models. It will simulate how the ocean works, both its physical movements and chemical processes, starting from global models that cover vast areas at 10 kilometre resolution and zooming in to more detailed models around Australia at about 1 kilometre resolution.

This significant innovation will deliver a global-first, two-way coupled coast-to-offshore ocean prediction system, linking large-scale offshore dynamics (e.g., global sea level) with processes at fine scales in the nearshore ocean, where coastal impacts occur.

Target customers/end-users

- marine-park managers (e.g., reef and coastal restoration, marine-park planning and siting)
- aquaculture industry (e.g., for planning the optimum location of aquaculture farms).

Progress

- pending application for ARC Centre of Excellence funding (EoI was shortlisted)
- national partnerships with government, industry and other stakeholders
- initial model configurations have been developed, run and tested.

Marine heat waves and ocean circulation changes are threatening our ocean economy via mass coral bleaching events, toxic algal blooms, aquaculture failures and transformation of our fisheries. This project will deliver new high-resolution downscaled predictions of marine heat waves and ocean circulation changes around Australia's marine estate.



Olivine Technologies

Using renewable energy to purify brackish water for remote and indigenous communities

Challenge

Access to safe water is a basic need for health and well-being, yet is still a vexing and persistent challenge, particularly for remote Indigenous communities. This team has enhanced membrane capacitive deionization (MCDI) technologies to remove salt from brackish water, with key improvements (cost, portability and sustainability) over competing technologies.

Solution

World-class and patented improvements to MCDI enables direct, scalable purification of brackish water sources. UNSW and Olivine's world-leading advanced power converter technology can effectively remove salts, hardness ions and other contaminants from brackish groundwater at low energy cost to Australian drinking standards. Alongside the prototypes, 'digital twins' that use virtual and augmented reality have been developed to assist in operator training and to remotely control, monitor and repair the units.

Target customers/end-users

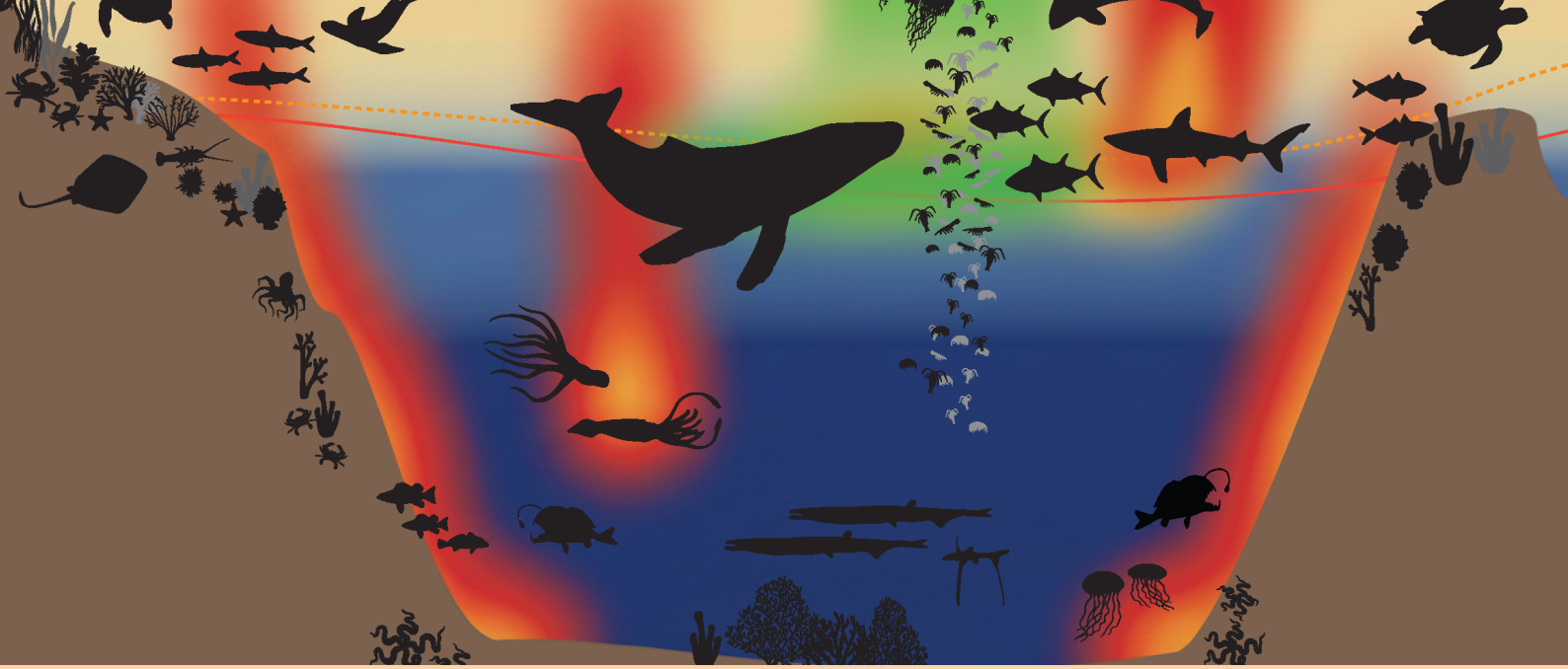
- remote and Indigenous communities
- government
- industry (mining, agriculture) working in isolated areas.

Progress

- more than AU$3M invested in product development
- successful trials in Australian and Chinese communities
- ongoing projects with water utilities and appliance manufacturers.

Olivine Technologies has developed a simple, portable and environmentally friendly technology called MCDI to make brackish water safe for human consumption. Its prototypes have been successfully trialled in Australia and China as a cheap and low maintenance solution for remote Indigenous communities to access to clean, reliable drinking water.

Spinout



Peeking Below Marine Heatwaves

Marine heatwaves extend deep underwater Revealing their hidden structure improves risk assessment and event prediction

Challenge

Life thrives throughout the ocean depths, yet most marine heatwave monitoring stops at the surface. This leaves deeper-living ecosystems and fisheries exposed to hidden extremes that satellites can't see. By uncovering these subsurface events, this research aims to close a critical blind spot for managers and industries.

Solution

This team developed the novel framework to classify and describe subsurface marine heatwaves, providing a clear language for comparing events across regions and depths. This approach makes hidden extremes visible, highlights their driving mechanisms and creates a foundation for early risk assessment. It also enables clear communication between stakeholders and scientists. Strong collaborations with fisheries and ecosystem scientists will ensure the framework can be integrated into monitoring and management systems.

Target customers/end-users

- researchers developing improved ocean forecasts
- ecological scientists evaluating ecosystem vulnerability
- fisheries scientists assessing resource risks and interacting with industry and other stakeholders.

Progress

- secured ARC Future Fellowship Project funding
- published multiple high-impact papers on subsurface/ extreme MHWs
- hosted interdisciplinary workshop with fisheries and ecosystem partners.

Using floating sensors, satellite records and state-of-the-art ocean models, this team reveals the hidden, subsurface structure of marine heatwaves. Its mechanism-first approach pinpoints how these extremes form and persist, informing early assessments of ecosystem risk through strong cross-disciplinary partnerships.



Red List of Ecosystems Research Group

Rigorous scientific foundations for a nature-positive agenda that supports ecosystem protection, management and restoration

Challenge

Ecosystems, vital to biodiversity and human wellbeing, are undergoing accelerated degradation, causing declines in biodiversity and natural capital. Climate change affects ecosystems globally, sometimes exacerbating the impact of other human-induced threats. The natural diversity and complexity of ecosystems make it difficult to estimate how severe these impacts are.

Solution

The research group leads the development of global standards to conceptualise the effects of climate change on ecosystems so that they can be reliably captured in ecosystem risk assessments. The group builds on international collaborations to fill gaps in the inventory of national ecosystems, uses conceptual models informed by ecosystem knowledge, develops ecosystem-specific and fit-for-purpose indicators to predict and project changes to ecosystems, and evaluates uncertainties and multiple scenarios to diagnose risk and identify pathways for recovery.

Target customers/end-users

- policymakers in the environment and natural capital domains
- national and state government departments
- civil society and non-government organisations working to sustain healthy ecosystems.

Progress

- frameworks adopted by International Union for the Conservation of Nature
- member of the global Red List of Ecosystems Partnership
- helping to implement the Kunming-Montreal Global Biodiversity Framework.

The research group develops conceptual frameworks and practical methods that inform ecosystem science. This approach is used to produce reliable assessments of risk under climate change to inform timely and effective conservation of biological diversity. The groups' research influences global and national policy on ecosystem conservation and management.





Simulated Climate with AI for Local Extremes and Scenarios (SCALES)

Pioneering AI-driven climate forecasting, and protecting Australia's homes, businesses, and energy future with actionable insights

Challenge

Australia's energy providers, insurers, and communities face growing losses from extreme weather and unreliable renewable generation. Existing climate models are too slow, costly, and coarse for timely decisions. The SCALES team delivers fast, detailed, and affordable forecasts that help users plan, protect assets, and maintain a reliable energy supply.

Solution

The SCALES team aims to combine AI with high-resolution climate data to create a cloud-based forecasting system that delivers fast, site-specific insights on extreme weather and renewable energy risks. Designed for seamless integration into existing industry and government platforms, SCALES supports long-term resilience planning through partnerships with energy providers, insurers, and policymakers, ensuring sustainability, scalability, and real-world impact across Australia's most climate-exposed regions.

Target customers/end-users

- energy providers and grid operators
- insurers and policymakers
- communities and businesses benefiting from disaster preparedness and energy security.

Progress

- published a pipeline replacing complex physics with neural networks in climate models
- partnered with Australia's largest energy distributor for pilot validation
- tested proof-of-concept (TRL 3) delivering rapid, high-accuracy forecasts.

The SCALES team develops an AI-powered system transforming climate data into fast, local forecasts of extreme weather and renewable energy risks. By partnering with utilities, insurance, and policymakers, the team conducts advanced research into practical tools that strengthen Australia's infrastructure, guide energy planning, and boost national climate resilience.

Spinout



Smart Fishing – The Indo-Pacific Fishing Vessel Observation Network

Uniting diverse communities to crowd-source real-time ocean data for shared socio-economic benefit

Challenge

Fishers, coastal communities and decision-makers lack reliable, fine-scale information about changing ocean conditions beneath the surface. This gap makes it hard for fishers to plan around warming waters, for industry to manage risk, and for governments to forecast and prepare for climate-driven extremes.

Solution

The Smart Fishing program provides a collaborative, low-cost system for collecting vital subsurface ocean data that is integrated into ocean models in real time. By equipping commercial fishers with simple sensors on their gear, the team generates real-time temperature records in areas where traditional monitoring is limited. Fishers gain direct access to their own data to support decision-making, while fisheries managers, researchers and policymakers use the shared dataset to improve models and forecasts.

Target customers/end-users

- commercial fishers
- coastal and First Nations communities and researchers – access knowledge to identify, understand and adapt to environmental change
- fisheries managers, industry, policymakers.

Progress

- AU$3m+ collaborative funding
- 70 vessels across nine Indo-Pacific nations, plus First Nations and citizen science partners
- data integrated into fishing dashboards and tested in government ocean forecasts.

This program unites UNSW researchers, fishers and citizen scientists to crowd-source subsurface ocean data. Low-cost sensors on fishing gear record and transmit temperatures in real time, and fishers access their own data to link catch with conditions. At the same time, communities, industry and researchers gain better models, forecasts and insights into warming trends.





Unravelling Atmospheric Chemistry with Dynamics and Spectroscopy

Predicting the environmental impact of atmospheric pollutants

Challenge

The team studies fluorinated molecules that contribute to climate change and PFAS pollution. Its work shows that some new industrial compounds, such as hydrofluoroolefins, can degrade into banned greenhouse gases and persistent pollutants – highlighting the need for rigorous environmental testing before large-scale use.

Solution

Using high-precision spectroscopy, the team uncovers how pollutants behave at the molecular level, e.g., how much they heat the atmosphere, how quickly they react, and whether they truly break down or cause new problems. By recreating atmospheric conditions in the lab, they test new compounds before industry adopts them, generating the data needed to refine and validate global climate models.

Target customers/end-users

- industry groups e.g. refrigeration and healthcare
- environmental and regulatory agencies
- chemical industry.

Progress

- >AU$1.2M in ARC funding since 2020
- reported in industry magazines, including R744 and HVAC+R News, and to representatives of WMO, European Commission, IUPAC and Honeywell, Inc., amongst others.

Fluorinated molecules are widely used as industrial refrigerants, anaesthetics or blowing agents, however, are known pollutants, especially in atmosphere. This team performs sophisticated experiments with light to understand how molecules degrade and absorb energy. Its research is shaping policy and the choice of future synthetic industrial gases.



UNSW Bushfire

Advancing bushfire science to improve firefighter safety, community resilience and environmental sustainability

Challenge

The increasing severity, frequency and destructiveness of wildfires present significant challenges to communities and ecosystems. UNSW Bushfire investigates extreme fire behaviour, associated processes and coupling effects to deepen understanding of these escalating threats and manage risk. It also focuses on the impact on firefighters, communities, public health and the environment.

Solution

UNSW Bushfire addresses the complex challenge of bushfires through a combination of fundamental and applied research on fire behaviour, developing scientifically robust mathematical models and simulations for integration into fire safety and risk management systems. These tools empower fire behaviour analysts, emergency services, policymakers and industry to make informed decisions.

The team collaborates with academia, end-users and industry to enable the sustainable integration of innovations into existing systems, strengthening community resilience and safety.

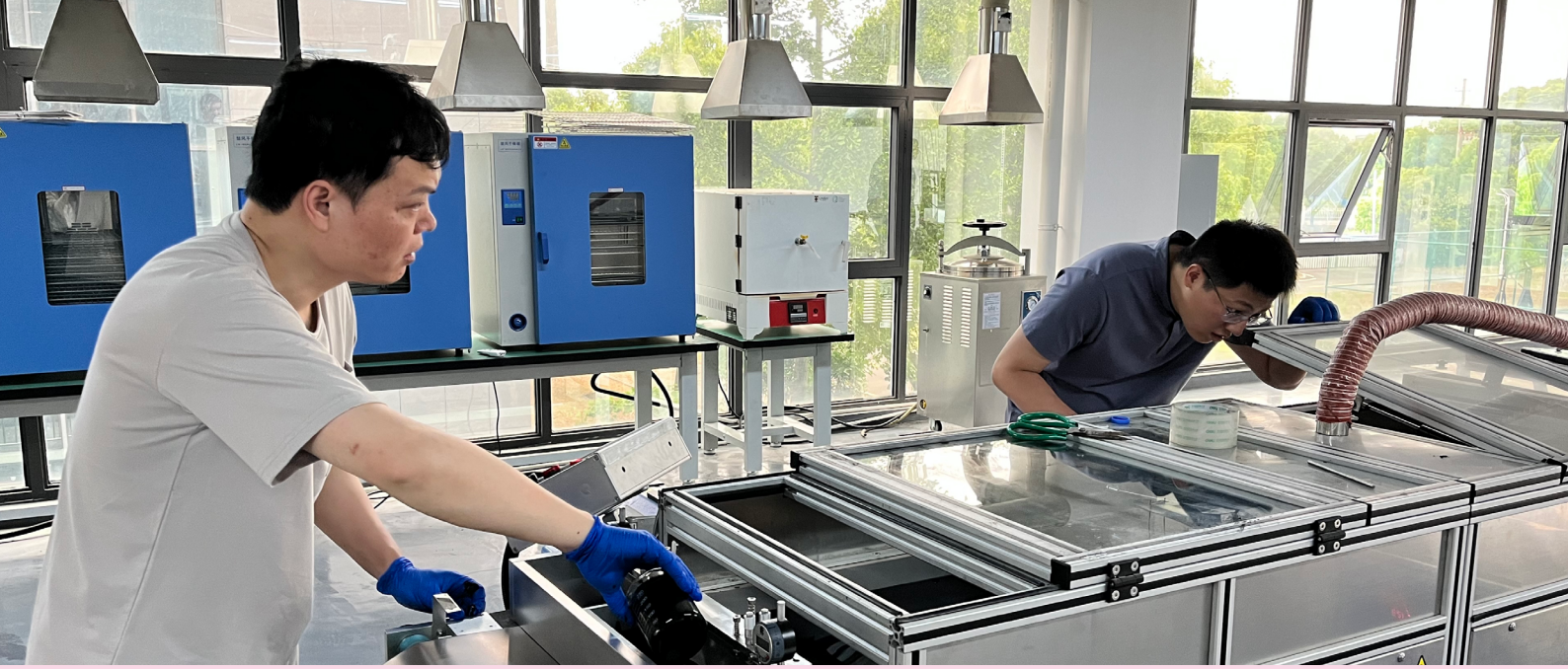
Target customers/end-users

- academia
- fire services, government, policymakers, suburban land agencies, Defence
- insurance and reinsurance companies.

Progress

- AU$4m+ in funding from industry, government and philanthropic partners
- publications in leading scientific journals, such as Science and Nature
- global partnerships with Los Alamos National Laboratory (USA), the Australian Himalayan Foundation and the European Network on Extreme Fire Behaviour.

UNSW Bushfire's research focuses on dynamic fire propagation, extreme fire development, severe fire weather events, fire behaviour modelling, bushfire risk at the wildland-urban interface, and more. UNSW Bushfire is also a national professional education and training provider for government and industry partners.



UNSW Centre for Transformational Environmental Technologies (CTET)

Bringing ideas to life to make our planet a better place to live

Challenge

University innovations are often developed at laboratory scale, where conditions are controlled and outputs are limited. Scaling these breakthroughs for real-world use demands interdisciplinary skills, manufacturing expertise, iterative development and funding. In Australia, gaps in infrastructure, manufacturing capability and skilled personnel hinder the transition from prototype to mass-market product.

Solution

CTET provides a proven pathway to scale UNSW innovations from TRL 1–3 to TRL 7–8 through product development-driven R&D, bridging the gap from lab to market. It offers local staff with deep technical and business operations expertise, prototyping and pilot-scale testing facilities, and strong industry partnerships for scale-up and commercial alignment.

CTET also develops AR/VR digital twins to fast-track engineering design, reduce development risk and optimise cost efficiency for real-world deployment.

Target customers/end-users

- water utilities and environmental companies
- water and wastewater plant operators
- membrane suppliers.

Progress

- AU$7.8m funding and global recognition, including the 2020 WAITRO Innovation Award
- developed AI-based ‘MBR-Net’, adopted by Beijing Origin Water and featured on the cover of Environmental Science & Technology
- created low-energy desalination and electrochemical technologies, delivering sustainable water solutions and advancing circular economy in industrial processes.

CTET enables joint R&D between Australian and Chinese partners, providing technical solutions in water treatment, resource recovery and environmental sustainability. Located in Yixing, China, this translational research centre develops long-term strategic partnerships with research organisations, researchers and industry, and invests in areas where it can make the most difference.



UNSW Global Water Institute

Tackling the challenges and opportunities facing water and related sectors

Challenge

Water is at the heart of climate change, connecting to nearly every part of the environment, economy, and society. The institute addresses diverse issues associated with water governance and security, healthy oceans and coastlines, and safe water – providing access and equity for all – with key strengths in policy and nature-based solutions.

Solution

The institute's flexible and adaptable approach allows it to work with a range of global stakeholders, including a survey of the world's water leaders to determine challenges and risks to achieving SDGs. GWI-members have consulted for UN-Water Expert Group to estimate global freshwater requirements of climate mitigation measures. In Timor-Leste and Fiji, GWI facilitates innovative nature-based programs such as Project Halophyte to improve water security, restore tidal flows, and revitalise mangrove ecosystems for local communities.

Target customers/end-users

- communities
- ecosystems
- economies

Progress

- bolstered global policy development through UN endorsed surveys and UN reports
- strengthened partnerships across the Pacific and Timor-Leste
- co-led nationally significant work on food and water security with Aboriginal communities.

UNSW-GWI focuses on solving real-world water challenges through research, innovation, and collaboration. Its partnership-driven approach brings together experts from different fields to develop practical solutions. The institute works closely with communities, governments, and industry to conduct world-class research that feeds into policies, technologies, and on-ground programs with real impact.





UNSW Water Research Centre

Powering the future with safe low-cost storage

Challenge

Communities face increasing risks from water scarcity, pollution and extreme weather events. These challenges pose a threat to public health, infrastructure and ecosystems. WRC addresses these issues by developing solutions for water security, flood and coastal resilience, and sustainable resource management, ensuring reliable water systems in the face of climate variability and population growth.

Solution

WRC integrates advanced modelling, monitoring and treatment technologies to manage water resources sustainably. Its approach combines deep knowledge of environmental systems, numerical and physical modelling, methods to leverage new and innovative water data as well as water and wastewater treatment innovations. Utilities, policymakers and industry adopt these methods. Long-term partnerships with government and industry ensure solutions are embedded in infrastructure planning, regulatory frameworks and operational systems for lasting impact.

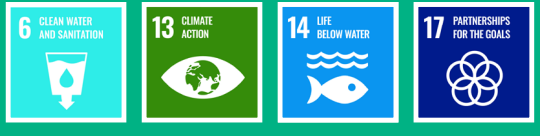
Target customers/end-users

- government agencies responsible for water and environmental policies and infrastructure
- water utilities and environmental regulators
- industry partners seeking sustainable water management solutions.

Progress

- developed PFAS degradation catalysts and advancing understanding of ‘forever chemicals’ in water systems
- nature-based solutions for urban flood, water security and green infrastructure planning
- optimised membrane bioreactors for wastewater reuse.

The UNSW Water Research Centre (WRC) conducts multidisciplinary research in water and environmental engineering to improve the sustainability of aquatic and atmospheric environments. Through industry and government partnerships, it develops innovative tools and strategies that influence policy and practice, ensuring resilient water systems, infrastructure for communities and the environment worldwide.





UNSW Water Research Laboratory

Solving complex water engineering problems impacting communities and industries worldwide

Challenge

WRL develops innovative solutions for climate resilience, hazard forecasting, sustainable water management and infrastructure. Through multidisciplinary research and strong partnerships, WRL addresses coastal and flood risks, groundwater recharge, public health threats, and ecosystem challenges, delivering tools like early warning systems and nature-based designs to protect communities and infrastructure worldwide.

Solution

Key recent initiatives include a national early warning system delivering real-time forecasts of beach erosion and flooding, low energy input pipe fishways enabling safe fish migration, and a decision-support tool for managing pathogen dispersion risks in estuarine environments. These tools empower evidence-based decisions, strengthen emergency response, and support sustainable water management and industry, ensuring resilient communities and ecosystems in the face of climate change and population growth.

Target customers/end-users

- planning/policy makers in water management, monitoring, and evaluation
- state/local governments in early warning systems, eco-engineering, and wetland restoration
- industry partners in design and testing of nature-based solutions.

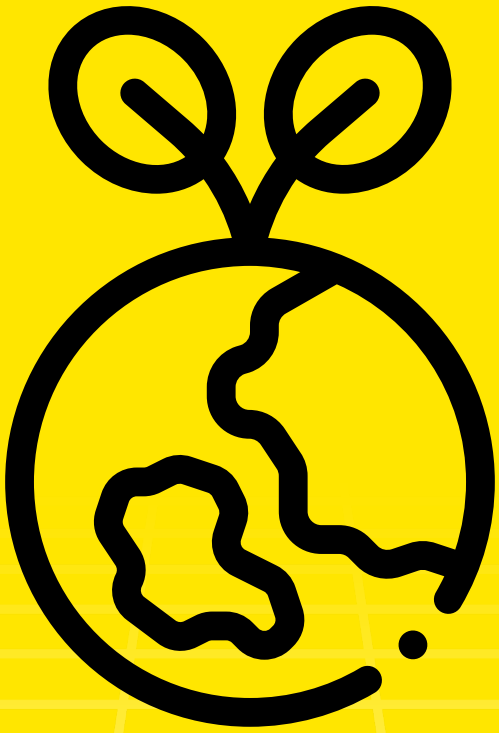
Progress

- beach monitoring technology recognised by UN and deployed in over 35 countries
- research included in national and Pacific guidelines
- innovative designs for coastal resiliency and climate adaptation.

The UNSW Water Research Laboratory (WRL) leads applied water engineering research, specialising in climate resilience, hazard forecasting, and sustainable design. For over 60 years, WRL has bridged industry and academia, delivering innovative solutions in coastal, estuarine, hydrology, and water systems through world-class expertise and partnerships.



Climate Adaptation, Policy and Justice





Adaptive Design for Resilient Infrastructures

Pioneering fire-safe and resilient building infrastructure

Challenge

The group addresses critical fire safety risks in structural, industrial and Li-ion battery fires through innovative fire safety design and engineering. Its research equips builders, industries and policymakers with advanced fire-resistant solutions, minimising losses and enhancing safety for communities and infrastructure.

Solution

The group delivers safer infrastructure by combining large-scale fire testing with advanced computational modelling. It designs and validates fire-resistant materials and building systems that meet and influence global standards. Through collaborations with international researchers and industry, it develops scalable solutions tailored for structural, industrial and Li-ion battery fire risks. This integrated approach ensures sustainable practices, strengthens community resilience, and accelerates the adoption of innovative fire safety technologies worldwide.

Target customers/end-users

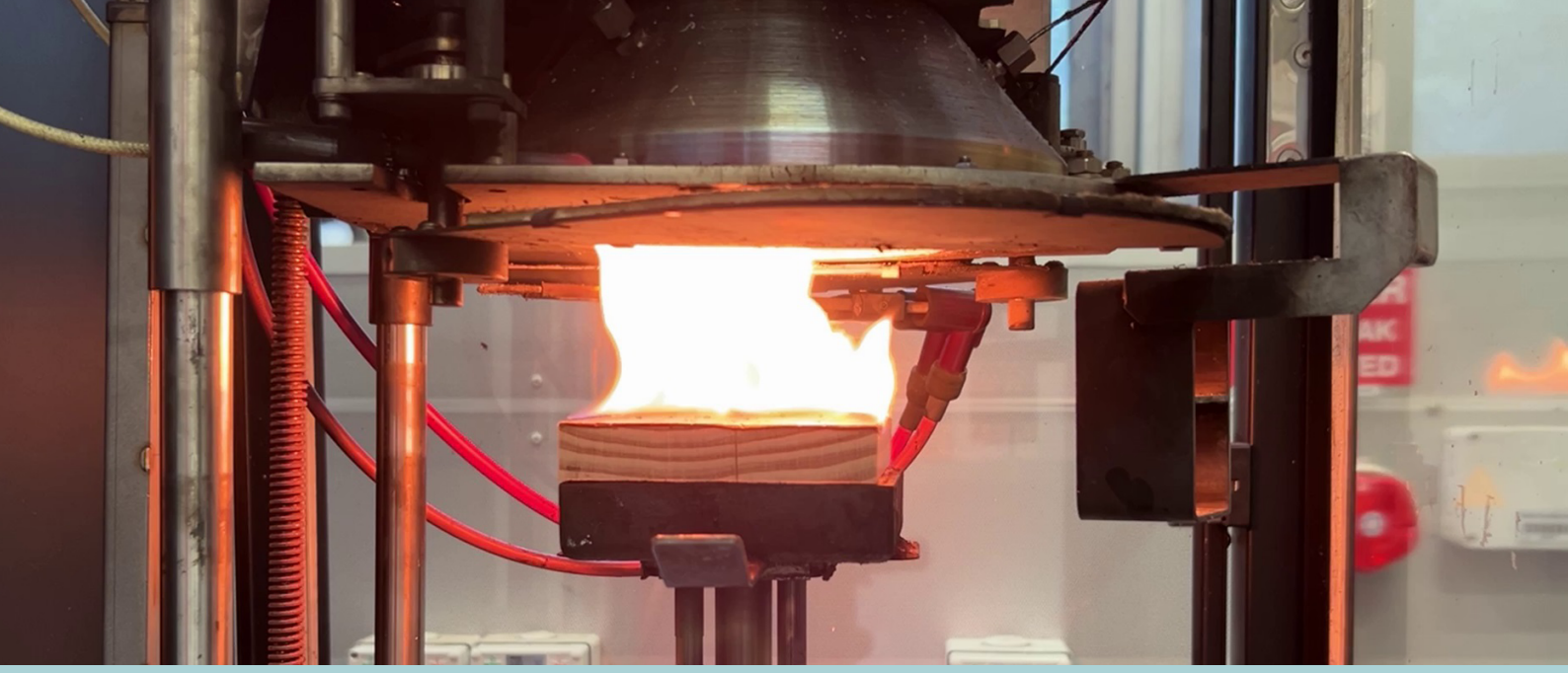
- builders adopting fire-safe materials
- policymakers shaping building codes
- industries seeking fire-resistant solutions.

Progress

- conducted fire safety tests for industry adoption
- collaborations with global researchers at WPI, Imperial College
- research informs Australian building codes.

This group advances fire-safe, resilient infrastructure through cutting-edge fire testing and computational modelling. It transforms research into safer buildings and materials, aligning with global standards. Its work gains traction through global research collaborations and industry partnerships, enhancing fire safety and protecting communities.





ARC Training Centre for Fire Retardant Materials and Safety Technologies

Protecting critical assets and infrastructure using advanced fire resilience technologies

Challenge

The centre pioneers the use of non-toxic and bio-based flame retardants such as chitosan and phytic acid, and nanomaterials (MXenes). A superior lightweight coating is developed by combining MXenes and bio-based flame retardants. The centre also develops reduced-scale and full-scale fire testing facilities to train fire engineers.

Solution

Layer-by-layer coating of MXenes with chitosan and phytic acid offers highly elevated fire protection levels, which use 30% to 40% less carbon compounds to achieve the fire-retardant properties.

Nano layers of MXenes promote charring, which offers a multi-layer insulating barrier and effectively deflects the fire's heat.

Measuring data in compartment fires assists in a better understanding of fire development and the onset of reaching flashover conditions.

Target customers/end-users

- ultra lightweight coating of Xenes and chitosan makes uniforms lighter and allow more mobility for Rural Fire Services volunteers to fight bushfires effectively
- external stakeholders, such as Fire & Rescue NSW, that require a fire database.

Progress

- secured ~AUD4.5M from ARC seed funding
- engaging external stakeholders such as Fire & Rescue NSW, Rural Fire Services and CSIRO.

Australia's increasing vulnerability to extreme weather conditions and frequency of devastating natural and man-made fires are major risks to new and existing assets and infrastructure. This centre – in partnership with government entities and companies – trains fire engineers and develops innovative fire protection and suppression technologies to mitigate fire threats.



Arts-based Knowledge Translation Lab, Black Dog Institute

Translating the mental health impacts of climate change into accessible, arts-based community engagement

Challenge

Climate change is intensifying feelings of anxiety, grief, and hopelessness, especially among young people and those in disaster-affected regions. Traditional mental health responses often overlook these emotional dimensions of the climate crisis. Deficit models of climate distress continue to disempower those experiencing valid concerns about an existential threat.

Solution

The AKT Lab focuses on creative, community-based approaches that build understanding, self-expression and connection, through collaborations with schools, art galleries, local councils, and mental health services. For example, co-designed initiatives like Creative Acts for Climate Feelings and Culture Dose for Kids offer young people evidence-informed creative activities that can foster wellbeing in the climate crisis.

Target customers/end-users

- educators and students engaged in climate or wellbeing education
- organisations developing climate adaptation and wellbeing initiatives
- health and policy stakeholders seeking accessible, engaging evidence or resources.

Progress

- AU$700K+ in research translation and arts-health funding
- partnerships with NSW Government, Art Gallery of NSW, and international research consortia
- programs across schools, galleries, and community wellbeing initiatives nationwide.

The Arts-based Knowledge Translation (AKT) Lab uses participatory artmaking and storytelling to collaborate with scientists, communities, and policymakers to address climate resilience, emotional wellbeing, and social connection across diverse populations.



Asia-Pacific Development and Security Research Group

Enhancing community resilience and healthy environments across Asia-Pacific through governance, public policy and disaster-risk solutions

Challenge

Across the Asia-Pacific, governments, non-government organisations and communities face pressing challenges of climate risk, inequality and insecurity. This research delivers evidence-based solutions – strengthening community resilience, advancing women's economic empowerment and shaping inclusive policies – designed for integration into existing systems and sustained through long-term partnerships.

Solution

This research provides practical solutions to significant challenges by strengthening climate action, human rights, and the empowerment of just and inclusive communities. Through policy and governance, it advances the SDG agenda with evidence-based approaches.

The team's capabilities also extend to nuclear policy governance and public opinion in the Indo-Pacific. Recognised with the 2023 Indonesian Government Culture Award, and working with partners including Gadjah Mada University, UTokyo, the International Society for the Third Sector, and the Oceanic Conference on International Studies (OCIS), this work ensures impact and long-term sustainability.

Target customers/end-users

- governments and policymakers adopting and funding evidence-based resilience frameworks
- non-government organisations and communities applying research for inclusion and development
- international organisations and peak bodies scaling solutions across the Asia-Pacific.

Progress

- future Fellowship on maritime security
- DFAT Indonesian Studies Leadership Award
- Defence and Security Plus Grants with King's College and Arizona State University.

This research group addresses Asia-Pacific challenges – including climate action, gender equity and geopolitical tensions – through three key themes: Sustainable Development Goals (SDG) and Social Inclusion, Environmental Futures, and Regional Security and Development. It generates insights that build community resilience, inform policy, and shape a sustainable and inclusive future.





Australian Human Rights Institute

Interdisciplinary research that advances practical human rights solutions and empowers the next generation of defenders

Challenge

Recent global challenges – climate change, armed conflicts, supply chain crises and rising inequality – threaten human rights, which are often viewed as obstacles rather than part of the solution. Limited, unpaid pathways into human rights discourage emerging talent, risking the loss of a generation of potential defenders committed to positive change.

Solution

The institute demonstrates how interdisciplinary research drives real-world impact by influencing government and industry policies, showing human rights advocacy is most effective when paired with rigorous evidence. Its Associates program unites 270+ researchers across all UNSW faculties. The Global Student Fellowship program provides paid placements with leading human rights and international development organisations. Alumni have secured roles with organisations such as Human Rights Watch, UN Migration, the World Food Programme and the World Bank.

Target customers/end-users

- government
- business/non-government organisations
- students.

Progress

- AU$300k+ in seed funding for 30+ human rights research projects
- 50+ students given paid human rights work experience
- 50+ industry partnerships and research collaborations, securing approx. AU$5m in grants and funding.

The Australian Human Rights Institute is where knowledge meets action. It prioritises applied, impactful and interdisciplinary research and empowers the next generation of human rights defenders by providing funded international fellowships for students to work with global human rights organisations.



Caring for Country: Driving Climate Action Through Reciprocity

Caring for Country Initiative is proactive and preventative climate action

Challenge

Connecting with and giving back to Country allows us to demonstrate real action towards climate change and all life within and across stolen and unceded land in Australia. Caring for Country is part of our collaborative and collective responsibility to care for the land and the community of all beings that support it.

Solution

The increasing challenges of human-induced climate change require grassroot, place-based actions to repair the ecological and socioecological networks of our local communities. Whilst 79% of Australians believe that climate change solutions can be found through collective community action, we know there is a volunteer shortage to undertake grassroots activities that move us towards climate action. The team has secured partnerships with several organisations including, Greater Sydney Parklands and Randwick City Council where staff can undertake active volunteering opportunities.

Target customers/end-users

- UNSW ADA Staff
- project partners – Environmental and volunteer organisations focused on landcare
- the broader community including the more than human-kin of the Sydney Region
- Country (The Sydney Region also known as Dharug Dharawal Ngurra by First Nations People of this place).

Progress

- the team have developed and launched the Caring for Country Initiative in October 2025. Staff in UNSW ADA will be able to undertake volunteering activities with partner organisations to help care for Country.
- two inaugural partner organisations have been onboarded with signed MOU's, four more planned for 2026.
- potential for 729 staff, X 4 days each per year to = 2,916 days or 8 years of giving back to Care for Country annually

Country relates to First Nations Peoples' cultural groups and the places to which they belong. Everyone is responsible for caring for Country. Country holds everything within the landscape… Earth, Water and Sky Country as well as people, animals, plants and the stories that connect them. The Caring for Country Initiative provides UNSW staff from the Faculty of Arts, Design & Architecture (ADA) with up to four workdays annually away from their desks to give back to Country through culturally and environmentally appropriate volunteer activities across Sydney (Dharug Dharawal Ngurra).





Centre for Sustainable Development Reform

Transforms evidence into policy, governance, and law reforms to create equitable outcomes for people and nature.

Challenge

With only 35% of Sustainable Development Goal targets on track, traditional approaches to sustainability challenges aren't working fast enough. Bold and intelligent reforms to laws, policies, institutions, and business practices are urgently needed to address climate change, biodiversity loss, and other sustainable development threats. Well-designed reforms can unlock new opportunities for people and planet.

Solution

The team's work focuses on three pathways:

- Development Beyond GDP: helping governments measure success with indicators that value people and planet, not just economic growth.
- Unlocking Zero-Carbon Transitions: creating legal and policy frameworks to accelerate clean energy and net-zero economies.
- Economies that Work for People and Nature,:designing systems that deliver equitable outcomes while protecting and restoring the natural environment.

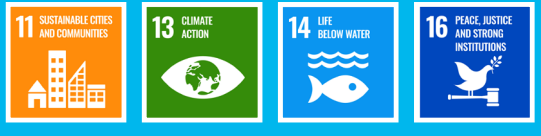
Target customers/end-users

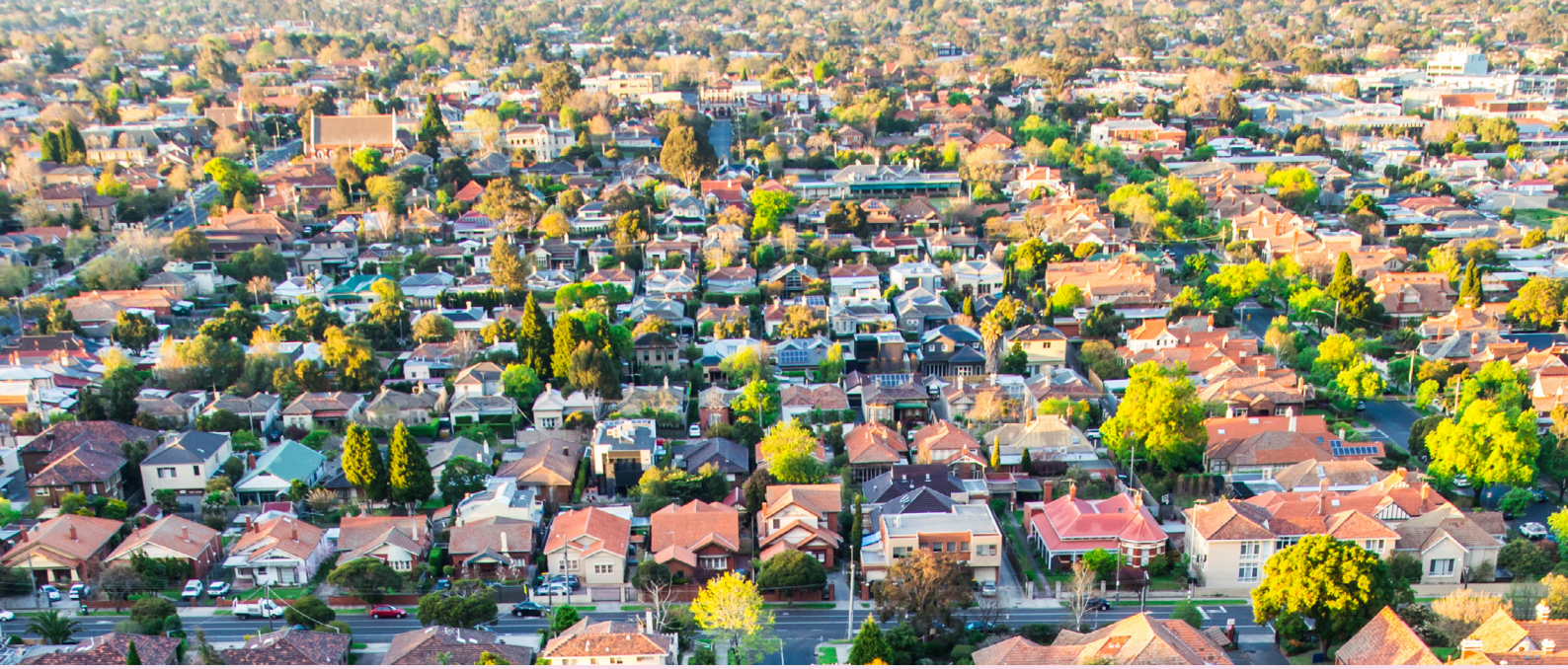
- government decision-makers across key portfolios for climate, biodiversity and the ocean
- research organisations
- global intergovernmental bodies.

Progress

- coordination of the Global Ocean Accounts Partnership across 23 countries
- BBNJ Finance Advisory Group – global expertise on finance for biodiversity conservation
- supporting 14+ governments with regulation and policy.

The Centre for Sustainable Development Reform (CSDR) connects knowledge and people to inform practical actions for a sustainable future. CSDR uses an applied, interdisciplinary approach to build research, education, and knowledge-sharing partnerships with a global network. It translates complex evidence into actionable insights for decision-makers at every level.





City Futures Research Centre

Transforming Australian cities through evidence-based research and data-driven solutions

Challenge

Cities face housing stress, fragmented planning, transport inequities and complex urban data gaps. Governments, developers and communities need actionable insights to design inclusive, efficient and sustainable cities that balance social, economic and environmental goals.

Solution

City Futures integrates four research programs: Housing informs affordable, secure and social housing policy; Planning advances compact, equitable and healthy urban development; Mobility develops sustainable, accessible transport systems; and Analytics delivers AI-driven tools, dashboards and scenario models. Together, these programs translate complex urban challenges into practical solutions, co-designed with policymakers, industry and communities for implementation and long-term impact.

Target customers/end-users

- federal, state and local government agencies
- urban developers, planners and industry peak bodies and partners
- communities and advocacy organisations seeking evidence-based urban solutions.

Progress

- informed NSW housing and transport policy, and national urban planning frameworks
- delivered AI and data platforms including CityViz, Housing Policy Bot and an AU$6.5m CRC project
- secured competitive ARC, AHURI, CRC-P and NHMRC funding.

City Futures Research Centre delivers research, tools and policy solutions to guide Australia's urban futures. Integrating housing, planning, mobility and analytics expertise, the centre equips governments, industry and communities to make informed decisions that improve affordability, sustainability, accessibility and liveability in cities.



Climate and Civil Society Research Cluster

Spearheading civil society's involvement in climate narrative-making

Challenge

Findings of the research provide insight into civil society's climate literacy and support relevant stakeholders in the process of climate policy consultation, decision-making, and implementation at local, national, and global levels. Collaboration between UNSW and FGV researchers contributes to the growing bilateral relationship between Australia and Brazil in climate-related fields.

Solution

Based on its research, the team advocates a central strategy of broad solidarity building. This involves:

- networking and forming alliances across civil society to promote and implement climate action.
- building solidarity between public authorities, civil society, the private sector, and other interest groups.
- supporting and amplifying climate activism among youth groups.

Target customers/end-users

- NGOs and independent research institutions
- community groups
- government agencies and international organisations.

Progress

- awarded almost AU$30K in grants and funds
- formal collaboration between UNSW School of Social Sciences and Fundação Getulio Vargas (FGV), Sao Paulo, Brazil
- Design Sprint which produced a documentary for COP30 in Brazil.

The central research goals of this cluster are to investigate whether civil society has been weakened in the process of global climate politics, particularly in the context of energy transition and the geopolitical race for transition-related minerals. In 2025, the focus is on how civil society has been entangled in 'climate information disorder' and which factors facilitate/obstruct civil society's capacity to affect climate policies.



DEFEND - Bushfire Containment Lines

A non-toxic fire-protective powder concentrate for short-term containment lines for bushfire threats

Challenge

Current fire-retardant products contain harmful chemicals and halogenated compounds that pose risks to people and the environment. Communities and emergency services urgently need a safer, non-toxic alternative that can be rapidly deployed to protect homes, vegetation and critical infrastructure in bushfire-prone areas.

Solution

DEFEND is a new bushfire containment line product developed in collaboration with Flame Security International. This new powder concentrate can be mixed with water to establish a short-term containment line around critical infrastructure and homes if a bushfire threat arises. It's safe for humans to handle and safe for the environment, and the coating will remain in place for up to two weeks unless rained on. The coating will retard the rolling bushfires approaching the critical infrastructure and homes.

Target customers/end-users

- homeowners in high-risk areas seeking stronger protection from bushfire damage
- utilities, councils and emergency services responsible for safeguarding critical infrastructure in bushfire-prone regions
- government agencies and insurers seeking scalable protection solutions for communities at high bushfire risk.

Progress

- secured ~AU$6.5m from Cooperative Research Centres Projects (CRC-P) for R&D and upscaling the new paint technology for commercialisation
- the powder concentrate succeeded in attaining USDA certification for wildfires.

Australia's increasing vulnerability to extreme weather conditions and frequency of devastating natural and man-made fires are major risks to new and existing assets and infrastructure. This product aims to protect and safeguard homes in bushfire-prone areas from bushfire threats.



Digital Frontiers Lab

Harnessing digital innovation to drive behavioural change for Mongolia's clean energy transition

Challenge

Mongolia's low-income households remain heavily dependent on coal, creating health and environmental challenges. Beyond affordability concerns, behavioural resistance and gendered household roles hinder the shift to solar. Deep-seated habits, cultural practices around heating and fire, and the division of household energy responsibilities make behavioural transition particularly complex and context-dependent.

Solution

Through the Coal-to-Solar project, the Lab develops design principles illustrating how digital technology can shape and sustain behavioural change toward clean energy adoption. Using participatory design and digital engagement frameworks, this multi-stream research program examines social, cultural, motivational, and gender-related factors influencing household energy choices. The resulting insights guide inclusive communication, renewable system design, and policy recommendations that foster long-term adoption and acceptance of renewable energy solutions.

Target customers/end-users

- low-income Mongolian households in energy transition
- policymakers and NGOs designing inclusive clean energy programs
- renewable energy providers integrating behaviourally informed digital tools.

Progress

- ongoing collaboration with UNDP Mongolia, GerHub, URECA, and the Chingeltei District
- insights integrated into UNDP Mongolia's community-engagement model
- project outcomes showcased at UNDP-UNSW Clean Energy Transition Conference.

The Digital Frontiers Lab partners with UNDP Mongolia, URECA and GerHub to accelerate Mongolia's shift from coal to renewable energy. The project integrates behavioural science, digital engagement tools, and gender-responsive design to influence household energy choices, promote inclusive participation, and strengthen local capacity for a sustainable energy future.





EPIWATCH

AI epidemic-detection system with advanced mapping, decision support and analytics

Challenge

The threat of pandemics and epidemics affect us locally and globally. Climate change increases these risks. Geopolitical instability, censorship and patchy reporting of serious epidemics are a barrier to global, real-time epidemic warnings. There is an immediate need for real-time threat detection for government and private sectors.

Solution

EPIWATCH® is an AI-driven system built on Azure, using three AI subsystems to curate real-time data from around the world. Its interactive dashboard provides analytics, maps, and decision-support tools to help users respond quickly to emerging threats. By combining climate and environmental data – such as rainfall, temperature, elevation, and human or animal density – EPIWATCH® can analyse epidemics in context. A cross-disciplinary team of AI engineers, epidemiologists, analysts, and support staff ensures seamless operation.

Target customers/end-users

- global governments: health, agriculture, defence
- private industry: pharmaceuticals, insurance, aviation, finance, agriculture, hospitals, multinational companies
- NGOs: humanitarian response).

Progress

- major philanthropic donations and seed funding from UNSW
- won a contract with US Defense for a pandemic simulation + invitations to tender from UK government and Gulf CDC
- 14 peer-reviewed publications.

EPIWATCH® has gained global recognition as a virtual command and control system delivering real-time global epidemic intelligence and decision-support tools. It overcomes censorship, financial disincentives to report, and diagnostic gaps. It uses advanced AI to curate vast, multilingual OSINT data, providing real-time global intelligence and decision support.

Spinout



FIRECOAT - Fire-Retardant Coating

The world's first bushfire intumescence paint for exterior and interior applications

Challenge

A supercharged intumescent paint that is world-first to achieve a Bushfire-Attack-Level (BAL) of 40. This new paint is manufactured locally and commercially branded as FIRECOAT. It is now currently sold across 300 outlets in Bunnings in Australia and ACE Hardware in the USA.

Solution

The new paint technology produces a dense layer of char, which offers an insulating barrier and effectively deflects the fire's heat away. This thick layer of char provides protection at elevated temperatures and minimises (or eliminates) degradation of materials underneath. The paint can be applied to various surfaces, including render, timber, aluminium, steel, concrete, plasterboard and brick. The paint delivers quicker recovery of minimal damage to critical infrastructure and homes.

Target customers/end-users

- critical infrastructure and home owners in bushfire-prone areas.

Progress

- secured ~AU$6.5m from CRC-P for R&D and upscaling the new paint technology for commercialisation
- attained fire-retardant certifications in Australia and the USA.

Australia's increasing vulnerability to extreme weather conditions and frequency of devastating natural and man-made fires are major risks to new and existing assets and infrastructure. This product aims to protect and safeguard homes in bushfire-prone areas from bushfire threats.



FootprintLab

The sustainability footprint for everything, everywhere, all at once

Challenge

- ESG accounting has become a multibillion-dollar industry as governments set net zero deadlines, nature positive goals, and multifaceted sustainability policies.
- the private sector is scrambling to measure its impacts and mitigate risks of government and market action.
- ESG accounting is expensive, time consuming, and complex.

Solution

FootprintLab holds an exclusive commercial licence to a database developed for the UN, which contains over 370 billion data points. This has made it easy and affordable to embed sustainability into any financial data globally. Its data-as-a-service API easily plugs into bank and service provider workflows, providing billions of possible insights for a transaction that previously had one or two. FootprintLab's customers convert this data into endless possibilities to help measure, disclose, and reduce impacts.

Target customers/end-users

- initial: governments, ESG accounting platforms, and consultancies that help companies measure their climate change impacts
- scale: banks, payment gateways, accounting platforms, fintechs, data analytics companies.

Progress

- sales: over 45 clients globally, including Australian government (federal and state), the United Nations, and universities
- signed pilot projects: with Mastercard, HCL Software, Ingenico
- supported by government to scale globally by DFAT, Austrade, Investment NSW.

Spinout

FootprintLab has the world's most credible ESG dataset, is co-founded by award-winning experts, and is at a key inflection point with global channel partners.



Gaawaadhi Gadudha – From Freshwater to Saltwater

Improving the health and wellbeing of Indigenous people through cultural practices and time on Country

Challenge

Relationships with culture and Country have always shaped the physical, mental, and spiritual health of Indigenous people. Yet, ongoing colonisation and racism continue to create inequitable health outcomes. Growing evidence shows that culture is a protective factor for health.

Solution

The team is developing a Model for Cultural Health for Indigenous Peoples (mob), other researchers, and organisations working in Indigenous Health. This model provides a blueprint for facilitating cultural health, and brings together key research components. These include Country, Creation, lore, law, identity, language, knowledges, practices, health, spirit, continuity, reawakening, connection, protocols, access, rights, freedom, care, teaching and learning, rights. The team works on Yuwaalaraay and Gamilaraay (North-Western NSW) and Yuin-Dirringanj (Far South Coast NSW) Country.

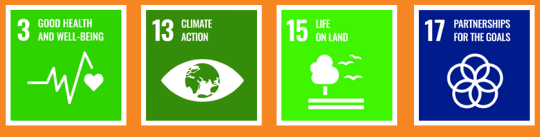
Target customers/end-users

- Indigenous communities in New South Wales
- health services and policy makers
- researchers and community organisations working in Indigenous Health.

Progress

- co-design of a unique, evidence–informed cultural health program
- cultural camps, facilitated by Knowledge Holders, held on culturally significant sites, found to be highly impactful for participants.

The Gaawaadhi Gadudha vision is to see strong cultural health in Indigenous Peoples, Country, and culture. The team sees health as physical, emotional, and spiritual. Cultural health is achieved by practising ‘culture on Country’.





Green Energy Statecraft

A new governance framework that accelerates the green energy transition while maximising its national benefits

Challenge

One of the biggest obstacles to launching large, first-of-their-kind, clean commodity projects (like green iron) in Australia is the absence of guaranteed demand at bankable prices. Without such certainty, project proponents and financiers lack the confidence to commit capital and make final investment decisions, stalling progress on green industry development.

Solution

The CCTI offers a straightforward and relatively low-risk solution to this problem. It proposes the government enters into offtake contracts to support the early-stage production of new clean commodities, such as green pig iron, sustainable aviation fuel and green ammonia. The CCTI addresses the gap left by existing policy tools, such as production tax credits, by stimulating early demand and providing clear price signals for first-mover projects.

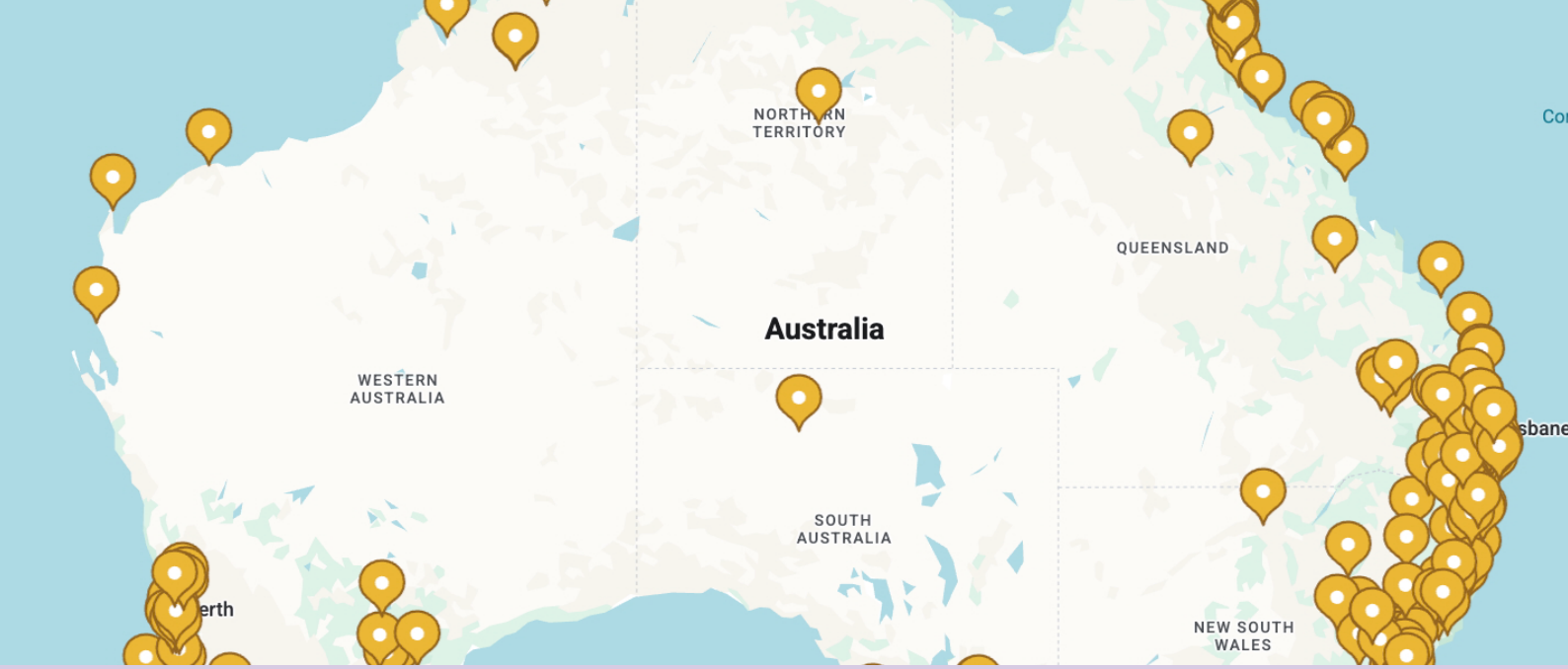
Target customers/end-users

- policymakers in the energy, economic and environmental domains
- industrial and financial stakeholders in clean-commodity sectors
- civil society and non-government organisations aimed at ensuring a just transition and broad public consensus.

Progress

- major funding secured
- 29 project-related publications, national media engagement
- 23 national and international events with a wide range of government, industry and civil society stakeholders
- deep stakeholder engagement to build consensus and drive durable change.

The project advances a new governance framework to help accelerate and shape the green energy transition. It engages government, industry, non-government organisations and researchers to highlight how the shift can strengthen national security across economic, energy, social and geostrategic domains.



HowWeSurvive - AI Disaster Recovery Map

Leveraging AI to build a world map of people's experiences of disaster recovery

Challenge

After a disaster, such as a flood or fire, too often people's voices about their priorities get drowned out by top-down organisations, leaving people frustrated and resources wasted by the wrong decisions being made. This is a global phenomenon and, given the increase in climate-fuelled disasters across the world, disaster recovery practices need to be reset to better support affected communities.

Solution

HowWeSurvive is, quite literally, putting people's (often ignored) experiences of disaster recovery on the map. Providing quickly accessible, simple information is intended to leverage better listening by responding agencies to improve their own practices. This is a bold effort to change established practices, and HowWeSurvive can help because it has long-term, independent funding.

Target customers/end-users

- state and federal disaster response and recovery organisations
- local and national non-government organisations, emergency services and community organisations
- researchers and academic partners.

Progress

- long-term, independent funding in place
- partnerships with MapAI, University of Canterbury, SEEDS India.

When it comes to disaster recovery practices, HowWeSurvive advocates for the priorities of affected people. Beginning in Australia, it is building a world map of people's experiences of disaster recovery from publicly available sources. In September, working with MapAI, it launched AI that allows for rapid interrogation of people's stories.



iFire - Interactive Visualisation of Fire Scenarios

An AI system that facilitates the interactive visualisation of fire scenarios

Challenge

Current systems are unable to experientially immerse groups of users in dynamically changing fires. iFire embeds groups of up to 30 users to experience and curate fires based on their end-user needs. By being able to change the fire conditions interactively, they can test their assumptions and responses in real-time.

Solution

iFire provides an adaptable simulation toolkit that can be deployed on either 3D or 2D screens, such as immersive cinemas or smart devices. Its intuitive interface allows end-users to navigate historical fires as cinematic experiences and transform them into a wide range of possible 'what if' future scenarios. This capability enhances situational awareness and decision-making by presenting participants with problem-solving experiences that test and expand their practical knowledge.

Target customers/end-users

- primary users are Fire and Rescue NSW (FRNSW), with a 3D cinema installed at Emergency Services Academy, Orchard Hills, training 6000 personnel
- secondary users are ABC New Online, with 12m+ viewers.

Progress

- ARC seed funding of AU$3.4m
- formal partnerships with FRNSW and Royal College of Art, UK
- first training module implemented and evaluated at Emergency Services Academy.

The system enables users across the creative, emergency, media and scientific sectors to generate and engage with a wide range of fire scenarios in 3D simulations. Using a Deep Learning model, it enables users to change variables such as wind direction and experience the resulting fire.



Institute for Climate Risk & Response

A research and training hub that builds climate risk and resilience capability

Challenge

Bridging the gap between climate science and real-world decision-making is critical, but inherently complex. Decisive action is often hindered by the uncertainty surrounding climate risks. Yet, all sectors of society face mounting pressure to adapt effectively.

Solution

ICRR leads innovative research and education in climate risk. Transdisciplinary experts from across climate and behavioural science, economics, accounting, business, and law co-create with industry, government, and communities to build capacity in adaptation planning, risk governance, assurance, and regulatory compliance. Through these partnerships and tools, ICRR helps turn climate science into practical strategies that support resilience, investment confidence, and effective policy action.

Target customers/end-users

- regulators and industry seeking robust advice on climate risk management, adaptation and resilience
- professionals seeking training in climate response, reporting and governance.

Progress

- AU$1M+ in research partnerships since its inception in 2023
- led national and international advisory roles
- potential audience reach of 7M+ through media and public engagement in 2025.

The UNSW Institute for Climate Risk & Response (ICRR) helps communities, businesses, and governments understand and manage climate impacts. By turning complex climate data and regulation into practical insights, it guides smarter decisions. Close collaboration and partnerships with regulators and industry stakeholders ensures real-world adoption.



International Centre for Future Health Systems

Climate-ready health systems, built with evidence, modelling and co-designed planning tools

Challenge

Decision-makers lack system-wide, timely insights into how climate hazards affect demand, capacity, medicines access, and workforce. Fragmented data and siloed responses impede targeted preparedness, continuity of care and protection of vulnerable populations, especially in climate-exposed regions and among groups facing socioeconomic disadvantage.

Solution

The Centre blends analytics of weather and service-use data with operations research to both quantify and stress-test climate impacts and to develop policy changes to care pathways (e.g., in mental health services).

Target customers/end-users

- health system planners and emergency preparedness leads
- primary care, hospital, pharmacy, and community mental health networks
- governments, insurers and NGOs.

Progress

- established core analytics and modelling, and published early pre-print on effect of heatwaves
- multi-disciplinary consortium with external partners
- grant proposal submitted for co-design work and policy implementation.

The Centre applies health-systems expertise to understand how climate-related hazards shift service use across emergency, hospital, primary care, and pharmacy. It seeks to integrate analytics, systems modelling, and stakeholder co-design to support operational planning, surge preparedness and equitable access for communities exposed to heat, smoke, storms, and floods.



Kaldor Centre for International Refugee Law

Through outstanding research and engagement, the Kaldor Centre is renowned as an intellectual powerhouse with global impact

Challenge

More than 120 million people worldwide are displaced from their homes – the highest number since the Second World War. As world leaders grapple with this challenge, it is an important time for innovative, rigorous thinking to promote solutions. The Kaldor Centre's evidence-based research, analysis and engagement bring a crucial, independent dimension to the debate.

Solution

The Kaldor Centre produces world-leading research and provides a credible, principled voice on refugee issues – correcting misinformation, sharing evidence of good practice, and undertaking the deep thinking needed to advance solutions for and with people in need of protection. The centre engages meaningfully to inform public policy debates and connects and resources others in the field. It provides a crucial bridge between research, policy and practice, forging connections to share knowledge and drive real-world change.

Target customers/end-users

The Kaldor Centre actively engages audiences with a creative, strategic approach to ensure its research is accessible and relevant to:

- domestic, regional and international policymakers
- civil society
- the general public.

Progress

The Centre's advice reaches policymakers at the highest levels, directly informing outcomes including:

- a pathway to permanency for thousands of people on temporary protection visas
- reform of the tribunal that reviews Australia's migration and refugee decisions
- drafting of a world-first Pacific Regional Framework on Climate Mobility.

The Kaldor Centre for International Refugee Law produces world-leading research that supports the development of lawful, sustainable and humane solutions for people in need of protection. It engages meaningfully to inform public policy debates on refugee law and forced migration. It connects and resources others in the field to help generate rights-based solutions to displacement.





Making Good Media: Making Irrestibile Visions of a Renewable Energy Future

Igniting hope through powerful video storytelling that makes renewable energy futures feel possible – and irresistible

Challenge

Most climate stories focus on fear and loss, which can contribute to inaction and feelings of helplessness. Young people especially struggle to imagine positive futures shaped by renewable energy. This project tackles the lack of hopeful, relatable stories that can inspire action, nurture optimism and build momentum for real change.

Solution

The project creates imaginative, research-informed videos that depict everyday life in renewable-powered futures and finds new ways to explain complex concepts using live cartooning. By combining visual storytelling and speculative design techniques, it reframes climate action as achievable and community driven. These videos are distributed through schools, festivals like SXSW Sydney and online channels to help normalise sustainable behaviours and build a sense of collective agency around the energy transition.

Target customers/end-users

- primary school educators and students seeking engaging sustainability content
- media viewers looking for a more inspiring approach to climate messaging
- policymakers, industry partners and cultural institutions exploring public engagement strategies.

Progress

- three co-authored Non-Traditional Research Outputs
- children's interactive projection and hologram workshops
- partnerships with Parramatta Council, SXSW Sydney, the Australian Museum, Be the Future, and UNSW Digital Grid Futures Institute.

Making Good Media makes bold videos that imagine positive renewable energy futures. Partnering with Digital Grid Futures Institute, UNSW Innovation Hub and Amplify programs, the team also creates workshops and interactions for school children that reframe climate action as exciting, possible and worth striving for.



National Heat Vulnerability Observatory

A nationally consistent approach to measuring and reporting urban heat vulnerability across Australian cities

Challenge

Heatwaves claimed more Australian lives than all other natural hazards combined between 1900 and 2010. They also have significant impacts on energy, water and economic cost. This project establishes benchmark data and analyses the cooling potential of urban development, providing an evidence base for informed decision-making to mitigate these impacts.

Solution

The project has established benchmark datasets to monitor heat vulnerability tailored to specific urban contexts and local overheating issues, as well as performance measures and key indicators, providing a consistent methodology for heat vulnerability assessment. It has also established analytical modelling for cities and precincts, including what-if scenario analyses of mitigation interventions to investigate the cooling potential of urban development. Lastly, it offers repeatable data collection protocols that enable benchmark datasets for more Australian cities.

Target customers/end-users

- government: develop evidence-based, effective mitigation strategies to reduce heat vulnerability
- planners, developers, architects, and designers: establish specific heat mitigation planning controls and design requirements
- communities: adapt to extreme heat.

Progress

- AU$500k+ funding from NSW Government Digital Restart Fund
- partnership with NSW DCCEEW
- 43 government representatives attended the Government User Needs Workshop.

The project has created a new National Heat Vulnerability Observatory Index, connected to the NSW Digital Twins. It monitors heatwaves, built environments and socio-demographic characteristics, and assesses thermal, energy and health impacts – helping planners make better decisions to reduce heat risks.



Project Halo

Improving coastal community livelihoods and building a resilient future using nature-based innovations

Challenge

Coastlines are under a variety of pressures. Sea-level rise is squeezing coastal defences and land-use practices have cleared thousands of hectares of mangroves; nature's primary defence. In urban locations, marinas and port expansions have replaced mangroves with concrete or rock walls.

Solution

Project Halo is transferring two innovative UNSW nature-based solutions to Fiji for use in a Pacific context. Firstly, in partnership with local communities, the USP-UNSW team is seeking to systematically re-instate natural tidal flows on degraded lands to revitalise the local ecosystems for the benefit of people and the environment. Secondly, the ability to integrate mangroves into coastal infrastructure is being developed within marinas and urban areas to harness the benefits of nature within concrete landscapes.

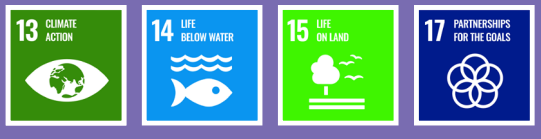
Target customers/end-users

- local communities and landholders who will benefit financially
- national governments wanting to implement innovative and effective NbS
- multilateral agencies wanting measurable nature-driven environmental, societal, and economic improvements.

Progress

- multi-million-dollar, multi-year, multi-benefactory project supported by Swire Shipping
- joint research and PhD supervision across UNSW and USP to unite Fijian knowledge and UNSW innovation
- Fijian-government endorsed.

Project Halo is an exciting research partnership between UNSW Sydney, the University of the South Pacific, the Government of Fiji, Swire Shipping, UNESCO, and SPC. With 25+ staff and PhD researchers committed to the project, Project Halo aims to provide evidence-based approaches that inform nature-based solutions to degraded Fijian coastlines.





Rapid Urbanisation and Population Health (RUPH) Research Group

Designing healthier, fairer urban environments

Challenge

Professor Xiaoqi Feng's research group provides robust scientific evidence showing that achieving at least 30% tree canopy in urban areas reduces heart disease, diabetes, and mental ill-health. This empowers councils to confidently set and reach green space targets that directly improve health and resilience for their communities.

Solution

This research offers evidence-based urban greening guidelines, enabling councils to increase tree canopy to 30% or more. This reduces chronic diseases and healthcare costs, while improving community wellbeing. The approach integrates big data, randomised trials, and partnership with planners to embed sustainable green space targets into city policies and existing planning systems for long-term health benefits.

Target customers/end-users

- local government councils, e.g., City of Sydney (Urban Greening Strategy)
- urban planners and policymakers
- communities, especially those vulnerable to health impacts of urban environments.

Progress

- AU$21M+ in research funding, including NHMRC and Heart Foundation support
- leading a AU$1.45M UKRI-NHMRC funded project
- research cited internationally + publications in over 200 papers.

The project brings together expertise and lived experience to design urban environments that improve health for all. By co-producing practical solutions with local communities and decision-makers, it has built strong partnerships that are driving real change and adoption in city planning.





Research Centre for Integrated Transport Innovation (rCITI)

rCITI leads global transport innovation through interdisciplinary research, emerging tech, behaviour, and policy integration

Challenge

rCITI addresses complex urban mobility challenges using data-driven modelling and simulations. Their projects include optimising train operations for Mitsubishi, developing carshare tools for GoGet, improving smart parking policies for Randwick Council, and researching motion sickness in autonomous vehicles for Ford—demonstrating practical, real-world impact across the transport sector.

Solution

rCITI develops easy-to-use tools and models that help governments and companies plan better transport systems. These tools leverage real data and can be integrated into existing systems. We work closely with partners to ensure our solutions are practical and sustainable. Their labs, such as TRACSLab and CityXLab, allow users to test ideas in safe, realistic environments before real-world deployment.

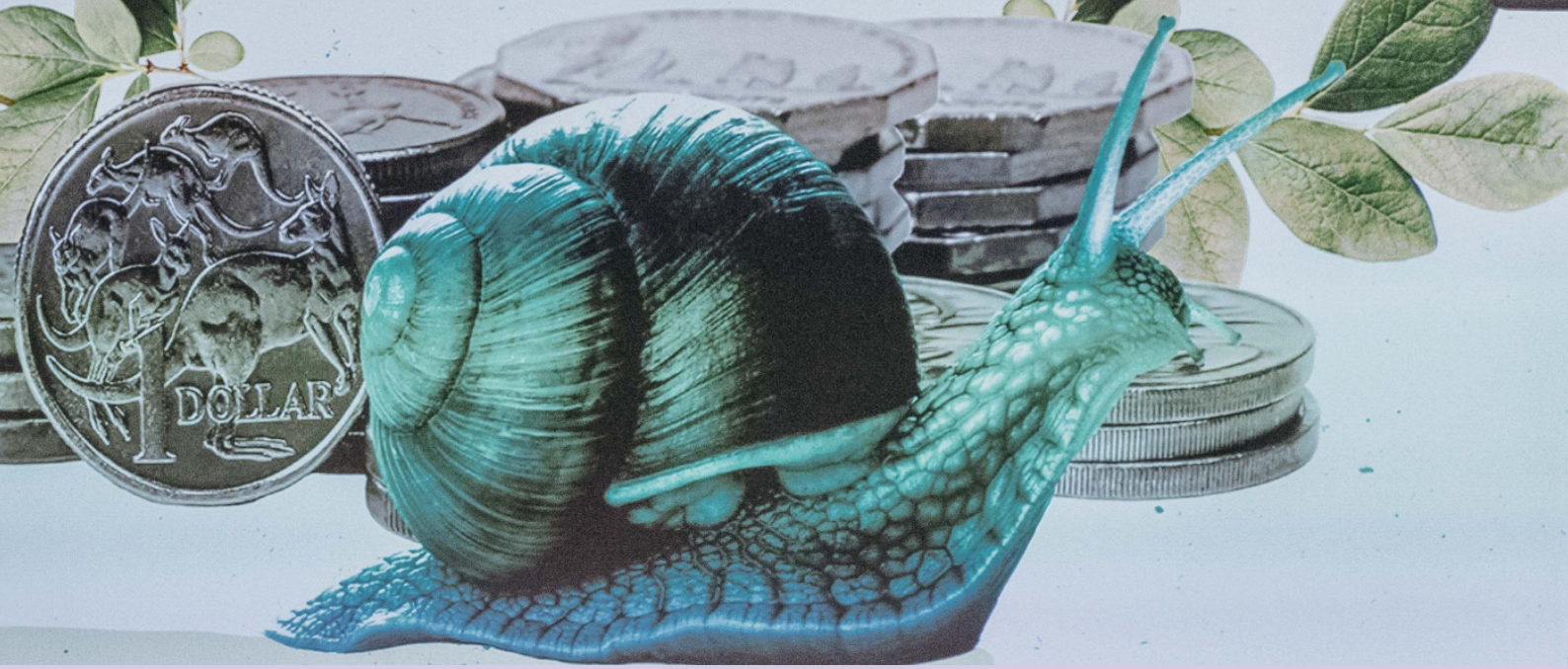
Target customers/end-users

- government agencies (e.g., Transport for NSW) for policy and infrastructure planning
- industry partners (e.g., Ford, Mitsubishi) for mobility innovation
- communities and commuters benefiting from safer, smarter transport systems.

Progress

- AU$20m+ in industry and agency-funded research
- integrated tools into NSW Government transport policy adopted by GoGet, Adiona and Ozharvest for fleet optimisation
- maintains 30+ active collaborations across government, industry and academia.

The rCITI directly benefits society by improving transport efficiency, equity, and sustainability through innovative technologies, behavioural insights, and policy collaboration. The team help shape smarter, safer, and more inclusive mobility systems for communities, governments, and industries worldwide.



Sustainability Assessment Program

Exploring new-economy pathways for ambitious climate goals

Challenge

The world is about to enter dangerous global warming. Existing climate mitigation scenarios assume ever-growing economies, and thus gamble on unprecedented and unrealistic technological achievements. One alternative, yet unexplored, future pathway is degrowth, which suggests a managed and equitable downscaling of energy and resource flows, while ensuring human wellbeing.

Solution

The project develops enhanced modelling techniques and infrastructure that are Australia-specific and capable of modelling the effects of key degrowth policies. With this, policymakers can explore future pathways in which Australia reduces its greenhouse gas emissions to ambitious mitigation targets while also improving individual and societal wellbeing.

Target customers/end-users

- Australian government
- international climate scenario modellers
- Intergovernmental Panel on Climate Change.

Progress

- AU$600K ARC Discovery Project funding
- research collaboration with the University of Sydney and Monash University
- joined the international post-growth modelling community.

This research project is building new methods for integrated assessment models used in climate mitigation scenarios worldwide. This allows for exploring unconventional economic approaches to reducing greenhouse gas emissions rapidly.



The Just Climate Transition Project

Championing a justice framework to guide the climate transition

Challenge

The Just Climate Transition Project will allow governments and civil society groups to deliver the fairest possible response to climate change.

Solution

Without fairly sharing the burdens of climate transition policies, the transition will very likely make existing harms worse – or introduce new harms. Just as important for the success of a climate transition is sharing the benefits in the right way. Through working with local and national stakeholders as well as Climate Transition authorities globally, the project has developed a framework for ensuring climate policies fairly share the benefits and burdens of climate action.

Target customers/end-users

- NGOs
- government bodies
- industry.

Progress

- secured several sources of funding including industry contributions, and Australian Research Council grants.

This project is focusing on how a robust conception of justice can be incorporated into a broader climate transition. Including a role for justice is vital to ensuring that vulnerable individuals and communities are not made worse off by any transition strategies.

UNSW SYDNEY

Profit meets Purpose.



UNSW Centre for Social Impact

Developing people and partnerships that accelerate social innovations for sustainable and inclusive economies

Challenge

Australia faces persistent social inequality, large-scale energy transitions, fragmented funding systems and limited data transparency that hinders effective responses. Communities, governments and organisations often lack evidence-based tools to mobilise resources and scale solutions. CSI addresses these gaps by generating knowledge, frameworks and partnerships that improve decision-making and enable lasting social impact.

Solution

CSI delivers applied research and tailored education to ensure social impact is central to decision-making. It creates evidence-based frameworks, data tools and policy recommendations that guide strategy, investment and environmental restoration. Partnering with communities, government, philanthropy and industry, it ensures practical, scalable solutions embedded across systems.

CSI empowers people and organisations to strengthen transparency, embed purpose in governance, improve outcomes and unlock investment for social and environmental value

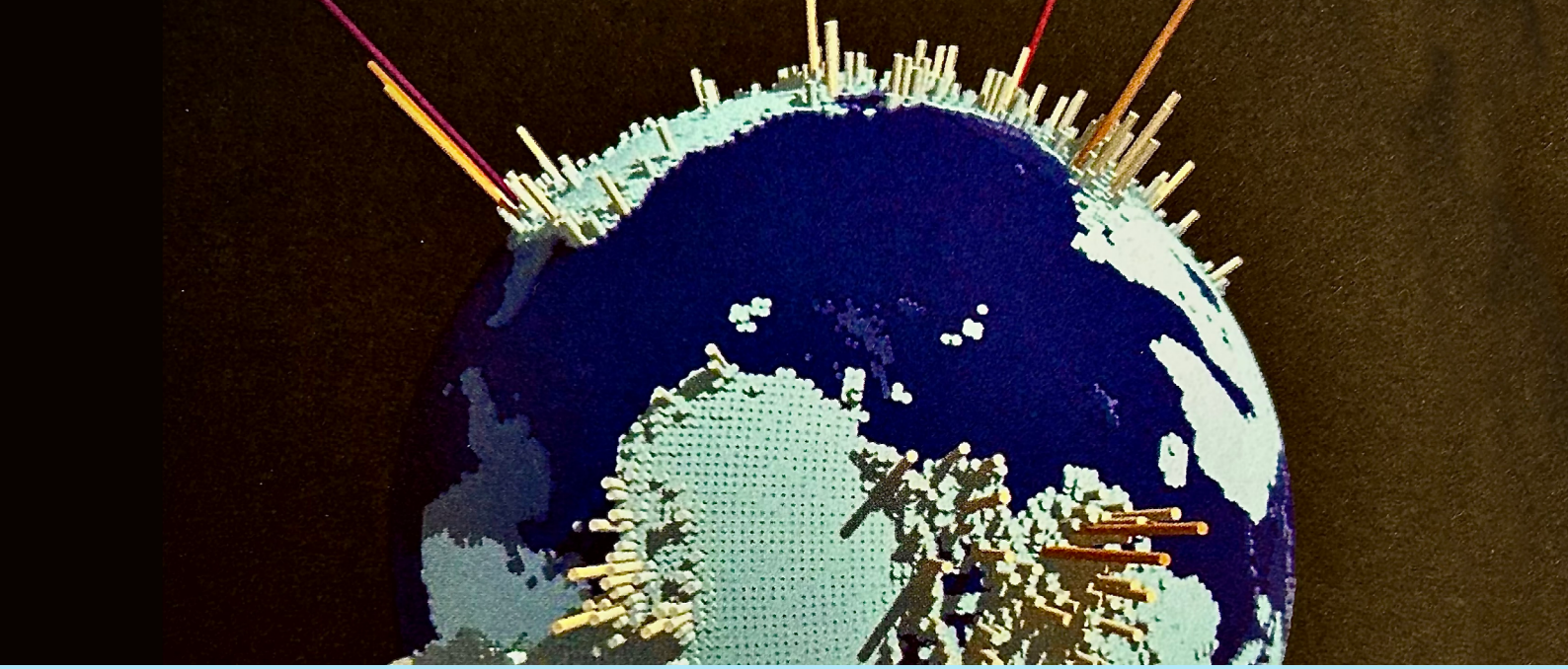
Target customers/end-users

- policymakers designing effective social and economic reform
- for-purpose or for-profit organisations seeking impact evidence and strategies
- investors and funders mobilising capital for measurable social outcomes.

Progress

- informed national policy on social enterprise and impact investing
- delivers education programs to more than 3000 current and future leaders yearly
- partnered with government, philanthropy and industry on systemic reform initiatives.ecosystem partners.

The Centre for Social Impact (CSI) at UNSW is a national leader in research and education, building evidence to improve inclusive prosperity within planetary boundaries. It influences policy, guides investment and builds professional capacity. It also fosters cross-sector collaboration to reduce inequality, deliver nature-based climate solutions and improve social outcomes.



UNSW Cities Institute

Brokers for action: Building governance systems for smart, healthier and more equitable urban environments in the region

Challenge

The Asia-Pacific region has become home to more than half the world's population, with internal migration producing new populations in cities and new spatial arrangements. There is an urgency around enabling city systems to transition at pace to respond to the impact on equity, health equity and wellbeing.

Solution

The institute bridges new knowledge with practice and policy, and strategically accompanies key partners to support Country-centred and community-determined outcomes through:

- First Nations focus: ambitious First Nations-led research to practice
- applied research: contemporary city challenges
- education: executive education, lifelong learning and capacity bridging
- innovation and research for social impact.

Target customers/end-users

- Australian government (federal, state, local) needing evidence-based urban policy
- industry (developers, architects, urban planners, urban designers, health/tech) requiring data, impact assessment in APAC.
- non-government organisations and international bodies (WHO, AFHC, ASEAN) collaborating on healthy, resilient and smart cities
- communities.

Progress

- convened roundtables with mayors and local government officials in the APAC around urban governance
- convened First Nations workshops with community working between First Nations politics and Country projects
- developing lifelong learning.

The UNSW Cities Institute brings together new knowledge and practice to support place-specific and community-determined outcomes for the better governance of cities in the Asia-Pacific region.



UNSW's Collaboration on Energy and Environmental Markets (CEEM)

Research and engagement impact for clean energy transition in Australia and beyond

Challenge

Clean energy transition is one of Australia's, and the world's, greatest challenges and opportunities. The scale of technology deployment required is daunting, as is the investment needed. Success requires comprehensive, coherent and resilient regulatory, market and policy frameworks to drive change – all while building and maintaining community consensus and support.

Solution

CEEM supports the clean energy transition by providing expert solutions on regulatory frameworks, energy market design and policy development. Focusing on renewable energy deployment, integration and consumer energy resources – including rooftop PV, batteries and electric vehicles – CEEM builds stakeholder trust through industry engagement, open-source modelling tools, and active participation in government and energy agency regulatory and policy processes, ensuring practical, scalable and evidence-based solutions for a sustainable energy future.

Target customers/end-users

- energy users aiming for affordable clean energy participation
- governments requiring independent advice on regulation, market design and policy
- industry partners deploying innovative technologies and business models to advance energy solutions.

Progress

- partnered in RACEfor2030 CRC and Indo-Pacific energy transition projects
- developing open-source tools for electricity system planning, market analysis and rooftop PV adoption
- research informs Australian energy policy, regulatory reviews and advisory panels.

For more than 20 years, Collaboration on Energy and Environmental Markets (CEEM) has advanced interdisciplinary research and made a significant impact on clean energy transitions in Australia and globally. Bringing together researchers from Engineering, Business and Arts, Design & Architecture, CEEM collaborates with industry, non-government organisations and governments to address energy challenges and develop sustainable solutions.





UNSW's Indigenous Land and Justice Research Group

Shaping Australia's clean energy transition

Challenge

Aboriginal landholders risk exclusion from Australia's renewable energy transition despite holding much of the land targeted for projects. Communities face barriers to participation such as limited access to technical advice, resources and policy influence. This hinders the ability for Aboriginal communities to secure benefits from clean energy developments.

Solution

The project co-develops renewable energy strategies with Local Aboriginal Land Councils through workshops, geospatial mapping and research-informed assessment of Aboriginal-owned land. By combining Indigenous knowledge with technical expertise, it equips land councils to plan for the energy transition and determine the best way to participate in renewable energy projects to achieve their desired outcomes. At the policy level, this project has influenced state and national strategies to embed First Nations rights, ensuring systemic inclusion in Australia's energy transition.

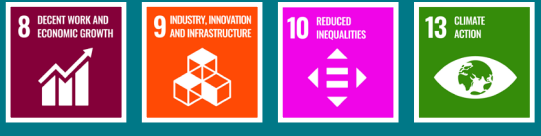
Target customers/end-users

- Aboriginal Land Councils (primary beneficiaries)
- government and regulatory bodies (policy adoption and beneficiaries through enhanced contribution to achieving net zero targets)
- Aboriginal peak bodies and clean energy industry (stakeholders/advocates).

Progress

- AU$500k funding for eight workshops and capacity building with Aboriginal Land Councils
- contributed to the Commonwealth First Nations Clean Energy Strategy and NSW First Nations Guidelines
- progress towards policy recommendations for the NSW government.

Led by the UNSW Indigenous Land and Justice Research Group, this project empowers Aboriginal communities to shape and benefit from Australia's renewable energy transition. Through knowledge exchange workshops, policy advocacy and practical tools, this initiative builds capacity and knowledge within Aboriginal communities to negotiate collective benefits.





Yuwaya Ngarra-li Partnership

A long-term, community-led partnership with Dharriwaa Elders Group

Challenge

Aboriginal people in Walgett, as in many communities, experience high rates of food and water insecurity, poverty and contact with the criminal justice system, along with poor housing, health, education and employment outcomes. Community-led solutions are urgently needed.

Solution

The partnership brings together the knowledge and strengths of the Dharriwaa Elders Group and the Aboriginal community in Walgett with UNSW staff and students with expertise in criminology, public health, engineering, housing and evaluation.

Led by the Elders' vision for change and shared protocols, Yuwaya Ngarra-li is developing, implementing and evaluating scalable models that address social policy priorities, including improving youth wellbeing, food and water security, care for Country and Aboriginal community control.

Target customers/end-users

- Aboriginal people in Walgett
- Aboriginal community-controlled organisations and other community and place-based collaborators
- local, state and federal policymakers.

Progress

Yuwaya Ngarra-li has contributed to >500 outcomes over the past five years, including:

- more than AU$500k fine debt cleared
- Dharriwaa Elders Group's Gali provided more than 29,000 litres of safe drinking water.

Through Yuwaya Ngarra-li, the Dharriwaa Elders Group and UNSW work together to improve the wellbeing, environment and life pathways of Aboriginal people in Walgett by collaborating on evidence-based initiatives, multidisciplinary research and capacity building. The partnership is contributing to significant community, place-based and systemic outcomes.



Connecting with UNSW@COP30

UNSW is home to some of Australia's most ambitious and high-potential research, spinouts, institutes and research centres — built on world-class research and focused on real-world impact.

If something in this portfolio has sparked your interest, please connect with us via:

unsw.to/cop30

Alternatively, you can:

Explore other opportunities to collaborate or invest at: unsw.to/collaborate

Connect with our business development & commercialisation specialists at: unsw.to/contact-us

Follow the UNSW Innovation Community on LinkedIn for news, stories, and opportunities



UNSW
SYDNEY