DfCO2 Newsletter

December 2025 edition

Message from Centre Director

Dear Colleagues and Partners,

With the joyous Christmas season approaching, I am delighted to share the latest updates from our Centre. As we reflect on the past year, I extend my sincere thanks to our partners, collaborators, advisors and team members for your dedication, passion, and invaluable contributions to the mission of DfCO2.

In this issue, we are pleased to highlight the many achievements and successes of our team. Together, we have strengthened our foundation, advanced meaningful research, and helped elevate the national conversation on decarbonisation.

Looking ahead, the Centre will continue to deliver high-impact research, generate data-driven insights, and develop policy-ready solutions that support Australia's climate goals. We remain committed to closing the "say - do" gap and reducing the risk of greenwashing through transparent, evidence-based approaches, while further enhancing the Centre's national reputation for leadership in climate innovation. Achieving net-zero requires responsibility that extends beyond sustainability teams - everyone has a role to play in driving meaningful change.

From all of us at DfCO2, we wish you a wonderful holiday season filled with peace, happiness, and good health.

Professor Chun-Qing Li
Centre Director

DfCO2 Annual Workshop

26 November 2025, Sydney

Centre members gathered for the DfCO2 2025 Annual Workshop, generously hosted by our partner Standards Australia at their Sydney office.

The event brought together Chief Investigators, Partners, Postdoctoral Researchers, and Students to share research insights and collaborate in advancing our mission to deliver carbon-neutral infrastructure for Australia. Mr. Rod Balding, CEO of Standards Australia, opened the day with a warm welcome address, setting the tone for an insightful program.

Event Highlights:

✅ Centre Director, Professor Chun-Qing Li presented the Year in Review, highlighting our 2025 progress and achievements.

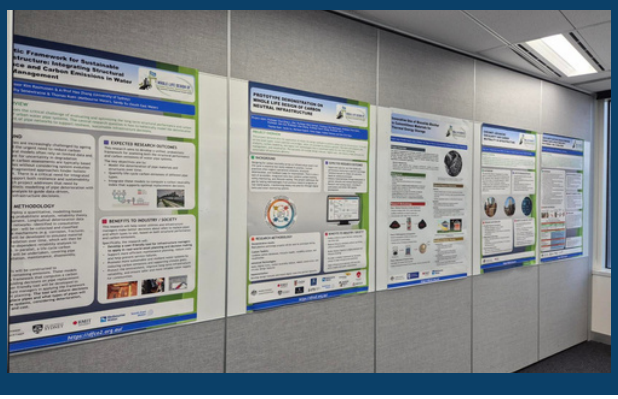
✅ Mr. William Cox (Aurecon) shared global strategies for decarbonising the infrastructure sector.

✅ Moana J. Eruera (Standards Australia) presented the Standards Australia journey from research to implementation, showcasing successful standards that are accelerating the transition to net zero.

✅ Professor Yan Zhuge led a though-provoking dialogue with Alison Scotland, Simon Koger, Professor Lihai Zhang and Professor Jian Zuo, discussing two key Centre priorities:

1. Strengthening DfCO2's Industry-Embedded Training Program
2. Engaging industry and policymakers to accelerate research translation

✅ Research projects posters showcase



DfCO2 Annual Workshop

26 November 2025, Sydney

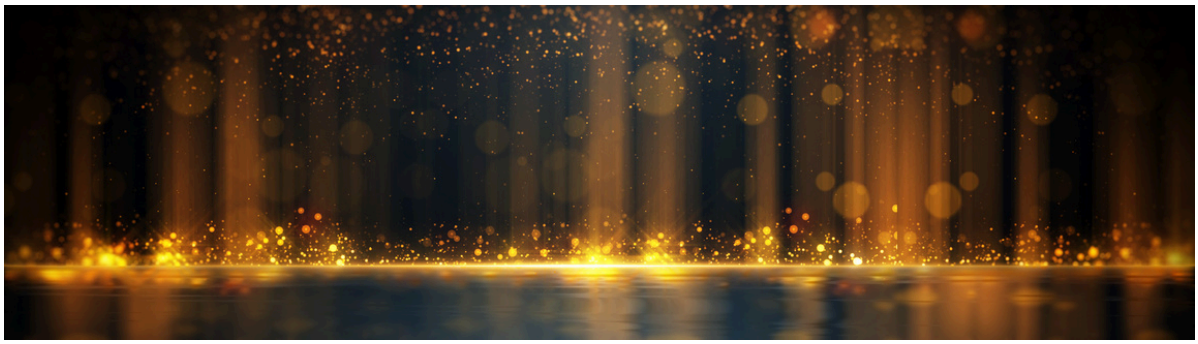
Key Workshop Takeaways:

- Net-zero responsibility must extend beyond sustainability teams – everyone has a role to play.
- Universities need to guide industry on emerging carbon standards, reporting, and lifecycle requirements; interpret policy and adopt innovations.
- Australia must engage globally and strengthen commercialization pathways for economic impact.
- Mandatory climate risk reporting increases demand for research - driven solutions. Researchers need to demonstrate project benefits the industry - e.g. capital/ efficiency gains.
- Industry-embedded/ partnered PhDs, funded top-ups, and improved data access create effective, mutually beneficial training models.

A big THANK YOU to all our speakers, panellists, and presenters for sharing your insights and sparking new ideas - the room was buzzing with energy!

We look forward to building on this momentum and welcoming you to future DfCO2 events!

Awards and Recognitions



Global Recognition for DfCO2 Researchers: Top 2% Scientists Worldwide

DfCO2 researchers ranked among the World's Top 2% Scientists, based on a global citation study by Stanford University and Elsevier). This prestigious recognition includes both career-long and single-year impact (2024) – a testament to the sustained research excellence of our Centre's multi-disciplinary team.

The researchers include:

- Professor Chun-Qing Li
- Dist. Professor Mark Stewart
- Professor Kim Rasmussen
- Professor Yan Zhuge
- Professor Jian Zuo
- Professor Kevin Zhang
- Professor Sujeeva Setunge
- Professor Lihai Zhang
- Professor Jie Li
- Dr Yancheng Li
- Professor Flora Salim
- Dr Rajeev Roychand

Engineers Australia Honorary Fellow award

William (Bill) Cox, HonFIEAust CPEng EngExec NER has been awarded Engineers Australia 2025 Honorary Fellow. Bill is a global engineering leader, renowned for championing sustainability, digital transformation and diversity across the industry.

The award celebrates engineers who have achieved a lifetime of outstanding success in the profession and recognise their invaluable contributions to the engineering community. Bill is also a member of DfCO2's Industry Advisory Committee.

Awards and Recognitions

2025 Professional Engineer of the Year

Dr. Yew-Chin Koay, partner Investigator Major Road Projects Victoria, has been awarded the prestigious 2025 Professional Engineer of the Year (Victoria). Dr Koay is a nationally recognised leader in sustainable infrastructure and structural engineering. With over 25 years of experience, he has made groundbreaking contributions to low-carbon construction materials, fibre-reinforced polymers, and structural health monitoring.

IALCCE 2025 Award

Congratulations to Distinguished Professor Mark Stewart, who received the Senior Award for Outstanding Achievements in Life-Cycle Civil Engineering. The award was presented at the 2025 IALCCE Conference held in Melbourne in July.

Coffee-concrete showcased at National Gallery

The award-winning project led by Prof Jie Li and Dr Rajeev Roychand - featuring a technique that strengthens concrete by 30% using waste coffee grounds, is now on display in Making Good: Redesigning the Everyday at the National Gallery of Victoria.

This innovative work showcases turning waste into a valuable resource, advancing stronger, more sustainable materials while reducing emissions and landfill. The recognition builds on their previous showcase at Germany's renowned Futurium museum, where the innovation was featured as a material for a sustainable future.

Awards and Recognitions

Promotion to Bradley Distinguished Professor

We are thrilled to share that Professor Yan Zhuge from the University of South Australia has been promoted to Bradley Distinguished Professor - the first recipient in UniSA STEM. This award recognises of her contributions and achievements in research/creative activity, education, leadership and engagement.

Sitzler Completes Mega Infrastructure Project in Darwin - Tiger Brennan Drive Overpass

Industry partner Sitzler has delivered the Tiger Brennan Drive Overpass, one of Darwin's largest road infrastructure projects, incorporating more than 50,000 tonnes of recycled crushed concrete and Type 2 gravel.

The project embedded circular economy principles from the outset, creating value for local projects, communities, and the broader economy.

The achievement was recognised with two prestigious honours at the Master Builders Northern Territory Excellence Awards: Civil/Infrastructure Project Over $25M and the Judge's Award.

AIBUILD - City of Melbourne Small Business Award Nominee

Congratulations to industry partner AIBUILD and Yifei Wang for being selected as a finalist for the City of Melbourne's Small Business Innovation Award, recognising outstanding innovation and positive community impact across the city. Since its founding, AIBUILD has been dedicated to transforming advanced AI research into scalable, real-world solutions that deliver measurable value across industries.

Grants and Funding Successes

A huge congratulations to all our researchers on their grant awards!
This exceptional achievement showcases their outstanding leadership in sustainability research - sparking innovation and accelerating the transition to net zero!

QUAD Clean Energy Supply Chain Diversification Grant

Professor Kate Nguyen and her team from RMIT University successfully secured funding of $2.4M for their project *Sustainable Rare Earth Nanocomposite for Next Generation Li-S Batteries*. This project aims to deliver impact-driven solutions for Australia and our Indo-Pacific neighbours, reinforcing our commitment to a circular economy and sustainable technology across the region.

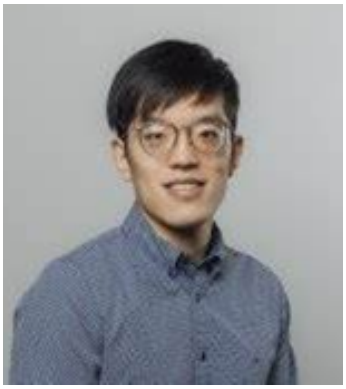
ARC Discovery Projects 2026

Dist. Prof Mark Stewart and his team from the University of Technology Sydney was awarded $975,000 for their project *Serviceability, Safety and Reliability of Green Concrete Infrastructure*. The project will enable designers and builders to use green concrete in their infrastructure projects, reducing carbon by 30-50%, and conform to Australian Standards.

ARC Linkage Projects

Dr Li Gao and his RMIT team (with industry partner Nature Ventures Pty Ltd) secured a $427,000 grant for their project *Highly selective membranes for sustainable lithium extraction and recycling*. This project will develop next-generation lithium extraction technology by scaling up highly lithium-selective membranes for sustainable recovery and recycling.

Early Career Researcher (ECR) Grant



Dr Shuangmin Shi, research fellow was awarded The University of Melbourne's ECR Grant for his project *Smart building façade harvesting vibration energy from everyday weather conditions*. This project aims to generate usable electricity for building appliances, contributing to reduced energy consumption and lower carbon emissions through self-powered building systems.

Talks/ Webinar series

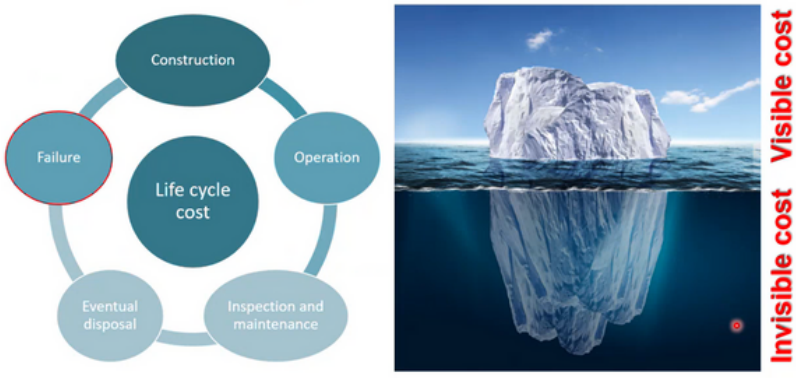
Throughout the year, we host a series of webinars aimed at promoting the outcomes of the Centre's research and training programs.

November Webinar

21 November 2025 Webinar - **Reliability-Based Infrastructure Protection and Management for Cost Efficiency and Sustainability.**

Our November webinar featured Professor Lihai Zhang, our Chief Investigator from the University of Melbourne. Prof Zhang, a leading expert in Infrastructure Protection and Management.

In this session, he discussed how probabilistic modelling, failure-mode analysis, and optimisation can be used to assess structural safety, uncertainty, and life-cycle risk, enabling smarter decisions on inspection, retrofitting, and maintenance. It also highlighted how these data-driven strategies can reduce life-cycle costs, extend service life, and support more sustainable, resource-efficient infrastructure management.



Life-cycle cost (LCC)

Guest speaker nominations:

If you have someone in mind whose expertise could enrich our webinar series, or if you are interested in presenting at our next webinar series, drop us an email at dfco2@rmit.edu.au and let's kick off the conversation!

Conferences/Industry Forums

Our researchers continue to demonstrate global leadership by playing key roles at leading international sustainability conferences

Professor Yan Zhuge served as Co-Chair of the **Concrete 2025 Conference in Adelaide**
The event that drew nearly 700 participants from around the world. The conference brought together leading experts who shared new ideas, insights, and perspectives on the future of concrete and its evolving role in the built environment.

Professor Jian Zuo served as Chair of the **International Conference on Resource Sustainability (iCRS2025) in Adelaide**.
icRS sets a global, interdisciplinary platform for researchers and practitioners to share the latest ideas, findings, and practices in resource sustainability. Annual conferences are hosted in different countries, with the 2026 conference to be held in Cebu, Philippines.

D*f*CO2 and RMIT proudly hosted the **IALCCE 2025 Symposium** in Melbourne (July 2029) Co-chaired by Professor Chun Qin Li, the symposium brought together over 300 delegates from 31 countries. The event highlighted global breakthroughs in life-cycle design, performance assessment, digital tools, whole-of-life costing, and risk analysis - advancing infrastructure safety, resilience, and sustainability across diverse environments.

Conferences/Industry Forums

Professor Kevin Zhang hosted an **Industry Forum on AI-Enabled Digital Transformation in Construction** at RMIT University, bringing together leaders from more than 30 industry and government organisations. The event provided a dynamic platform for meaningful dialogue on how AI is reshaping the construction sector.

A clear takeaway emerged: AI is no longer a distant concept - it is already transforming the industry, and the challenge now is how to scale, integrate, and govern it responsibly and with purpose.

Professor Flora Salim served as **Co-Chair of the 3rd International Conference on Urban Science and Intelligence** held in Bali, Indonesia. She also presented a talk on Longitudinal and Continual Learning of Dynamic Behaviours and Tasks in Open World.

Professor Kevin Zhang led an **Industry Workshop on Autoclaved Aerated Concrete (AAC) Recycling** to gather stakeholder insights on current barriers, potential solutions, and emerging opportunities.

With Hebel offcut waste accumulating on construction sites, improving recycling practices has become an urgent priority to reduce landfill and minimise environmental impact. The workshop brought together key industry partners to collaboratively explore pathways for more effective AAC waste management.

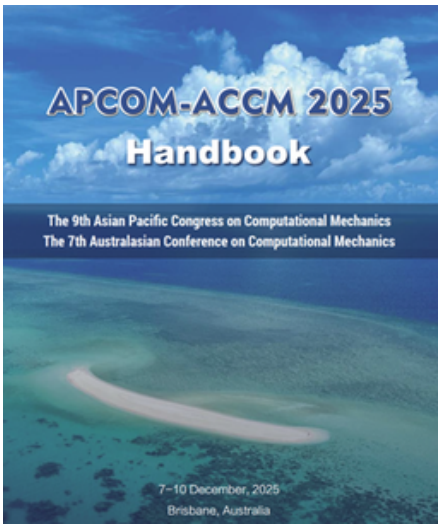
Conferences/Industry Forums

Dr Jingxuan Zhang presented her recent work *Turning Waste into Roads: Uncertainties in Circular Economy Driven Kerbside Glass in Asphalt* at the **CRIOCM Conference** held in Hangzhou, China in November 2025.

This research highlights our commitment to developing data-driven, uncertainty-aware methods to support circular and low-carbon infrastructure solutions.

Dr Shuangmin Shi presented his research - *Assessing the Structural Reliability of Cladding Panels Under Hail Impact* at the **9th Asian Pacific Congress on Computational Mechanics in Brisbane (APCOM-ACCM 2025)**.

The conference attracted more than 650 participants from 27 countries, making it one of the largest international gatherings in computational mechanics ever hosted in Australia.



Dr Shuangmin Shi and Prof Lihai Zhang presented their research - *Structural Reliability and Resilience of Building Cladding Subjected to Hail Impact* at the **1st International Conference on Infrastructural Monitoring and Protection in Perth (CIMP1-2025)**.

The conference serves as a premier forum for exploring cutting-edge developments in structural engineering.

Personnel Updates

Our Centre is growing rapidly, supported by a vibrant community of researchers driving our mission forward. We are delighted to welcome our new research fellows - **Dr Weiqi Xing** and **Dr Mani Khezri**, and forward to their valuable contributions to our Centre.

Dr Weiqi Xing
University of Technology Sydney

Dr Xing holds a PhD in Engineering, an MSc in Sustainable Construction, and a BEng (Hons) in Civil Engineering. Her work integrates sustainability science, civil engineering, and emerging construction technologies.

Her current research applies life-cycle assessment, probabilistic modelling, and whole-of-life performance evaluation to civil infrastructure systems. By quantifying uncertainty, it provides decision-relevant insights into carbon performance and supports reliable pathways to net-zero, contributing to emerging practices in carbon-neutral infrastructure, sustainable materials, resource optimisation, and climate adaptation.

Dr Mani Khezri
The University of Sydney

Dr Khezri brings expertise in sustainable infrastructure systems and advanced computational modelling. His research integrates structural reliability, probabilistic analysis, optimisation, and life-cycle carbon and cost assessment to support data-driven decision-making for low-carbon, resilient infrastructure, with a particular focus on asset management and water distribution networks.

He works closely with industry and utility partners to translate research into practical tools that balance structural safety, environmental performance, and long-term economic efficiency. His current research focuses on data-driven decision frameworks for infrastructure asset management, particularly in water distribution networks and structural systems.

Publications by DfCO2 researchers

- **A coupled chemical-electro-mechanical model for multi-ion corrosion-induced degradation in offshore reinforced concrete: Development and potential for residual life assessment** - *Construction and Building Materials*
  A coupled electrochemical-mechanical model was developed to assess the service life of RC panels exposed to complex corrosive offshore environment.
  DOI: https://doi.org/10.1016/j.conbuildmat.2025.143377

- **A fully coupled depth-dependent corrosion model for reinforced concrete piles under marine environmental conditions** - *Construction and Building Materials*
  A comprehensive Multi-ion Reactive Corrosion model is developed to predict the residual service life of reinforced concrete pile structures in marine environments.
  DOI: https://doi.org/10.1016/j.conbuildmat.2025.140795

- **Carbon footprint reduction in concrete using spent coffee grounds biochar: a life cycle perspective** - *International Journal of Construction Management*
  This study demonstrates the dual benefits of SCG biochar, offering a sustainable approach to reducing concrete's carbon footprint and enhancing waste valorization in line with circular economy goals.
  DOI: https://doi.org/10.1080/15623599.2025.2584549

- **Translating lab success to the field: Evaluating coffee biochar-enhanced concrete in real-world construction** - *Case Studies in Construction Materials*
  This field study evaluates the performance of coffee biochar-enhanced concrete under actual construction and environmental conditions.
  DOI: https://doi.org/10.1016/j.cscm.2025.e04233

- **Sustainable stabilisation of expansive clay subgrades using ethylene-vinyl acetate copolymer emulsion: A comprehensive laboratory evaluation** - *Case Studies in Construction Materials*
  This study explored a sustainable solution to stabilise expansive soil as pavement subgrade using ethylene-vinyl acetate (EVA) copolymer emulsion.
  DOI: https://doi.org/10.1016/j.cscm.2025.e04256

Publications by DfCO2 researchers

- **Improving expansive soil subgrade using sustainable green polymer-based admixture** - *Case Studies in Construction Materials*
  The experimental study assessed the viability of a polymer-based admixture, the Renolith emulsion, as a stabilizer for expansive clay subgrade.
  DOI: https://doi.org/10.1016/j.cscm.2025.e05090

- **Effect of fine-grained wood biochar on the geotechnical and microstructural behaviour of expansive clay as pavement subgrade** -*Journal of Rock Mechanics and Geotechnical Engineering*
  The study investigates the geotechnical and physicochemical properties of expansive clay soils enhanced with fine-grained wood biochar from wood waste.
  DOI: https://doi.org/10.1016/j.jrmge.2025.01.019

- **Dynamic BIM-based digital twin for lifecycle estimation of infrastructure embodied carbon** - *Life-Cycle Performance of Structures and Infrastructure Systems in Diverse Environments*
  This study reviews BIM–LCA workflows, highlighting methodological advances and their integration with digital twins.
  DOI: https://10.1201/9781003595120-53

- **It is not easy diffusing green: The impact of mandatory regulations on the diffusion breadth and depth of voluntary environmental standards** - *IEEE Transactions on Engineering Management*
  Leveraging data on leadership in energy and environmental design certifications across the U.S. states, this research investigates how mandatory regulations shape the diffusion breadth and depth of voluntary environmental standards.
  DOI: https://doi.org/10.1109/TEM.2025.3550873

- **Converting plastic waste into wood-plastic composite products - A practical environmental impacts assessment using primary data** - *Resources, Conservation and Recycling*
  This study addresses key gaps and reveals a disconnect between theoretical and industry practices in life-cycle burden allocation.
  DOI: https://doi.org/10.1016/j.resconrec.2025.108267

- **Deep learning insights on the banning of engineered stone: decoding public sentiments in Australia** - *Journal of Building Design and Environment*
  This study contributes to the methodological development of sentiment analysis and offers practical insights for policy formulation and implementation.
  DOI: https://doi.org/10.70401/jbde.2025.0007

Books/ Book Chapters

Books

- **Governing the transition to a circular economy in Australia**
  Author: Cramer, Jacqueline & Iyer-Raniga, Usha 2025, RMIT University,
  ISBN: 9780992391430
  https://online.fliphtml5.com/bugmd/nuoo/#p=1

- **Circular practices in buildings and construction to achieve the sustainable development goals**
  Author: Iyer-Raniga, Usha. 2025. Elgar
  DOI: 10.4337/9781035338870

- **Building a Circular Future in Australia: Why, What and How?**
  This book explores the transition to the circular economy through a multi-dimensional lens, highlighting its necessity for a sustainable future
  Author: Iyer-Raniga Usha and Cramer, Jacqueline. 2026., CRC Press.
  ISBN 9781032441566

Book Chapter

- **Dynamic BIM-based digital twin for lifecycle estimation of infrastructure embodied carbon**
  Author: Zoe Zou | Book: Life-Cycle Performance of Structures and Infrastructure Systems in Diverse Environments
  DOI: 10.1201/9781003595120-53

Turning Coffee Waste into Lower Carbon Concrete

L - R: Professor Jie Li, Dr Rajeev Roychand and Dr Mohammad Saberian with coffee biochar in their lab at RMIT University.

Dr Jingxuan Zhang

RMIT researchers are advancing new ways to cut the carbon footprint of infrastructure by turning everyday organic waste into construction materials. Earlier work showed that heating used coffee grounds to about 350°C without oxygen creates a biochar that, when replacing 15% of sand in concrete, boosts 28-day strength by around 30% - offering a practical way to ease pressure on natural sand supplies.

Building on this, a new study led by Dr Jingxuan Zhang and Dr Mohammad Saberian delivers a full life-cycle assessment - a cradle-to-grave analysis that measures carbon emissions, resource use and other environmental impacts from production through to end of life.

The study, ***Carbon footprint reduction in concrete using spent coffee grounds biochar: a life cycle perspective*** is published in the International Journal of Construction Management - https://doi.org/10.1080/15623599.2025.2584549.

Read further here:

Industry News

Australian Adoption of the Global Ratings for Low Carbon and Near Zero Concrete

Cement Concrete & Aggregates Australia has released the guide, developed in partnership with the Global Cement and Concrete Association (GCCA) to establish a clear and consistent framework for assessing the carbon performance of concrete in Australian projects. This release represents a significant step toward providing transparent, comparable benchmarks for embodied carbon in concrete mixes, helping to scale lower-carbon solutions across Australia's infrastructure pipeline and supporting the sector's broader decarbonisation goals.
Read further here:

MECLA Briefing on the Australian BIM Advisory Board's position paper on Digitalisation for Decarbonisation in Construction and Infrastructure

MECLA hosted a briefing on The Australian Bim Advisory Board's draft Position Paper on Digitalisation for Decarbonisation. To achieve our net-zero targets, digital technologies must be leveraged to accelerate decarbonisation. This paper explores the challenges, pathways, and strategic steps to decarbonise construction and infrastructure in Australia and New Zealand.
Read further here:

Standards Australia releases National Climate Scenario Guidance Stakeholder Insights Report

In collaboration with the Department of Climate Change, Energy, the Environment and Water, Standards Australia led national consultations to understand how organisations across the country are approaching climate scenario analysis. The resulting report offers key insights that will inform national guidance and represents an important step toward helping organisations navigate climate-related risks and opportunities with greater confidence and clarity.
Read further here:

Delivering Net Zero Infrastructure: Workforce Report

Developed as part of the Infrastructure Net Zero initiative – a coalition of government and industry bodies committed to decarbonising Australia's infrastructure - the report finds that only about half the workforce delivering Australia's $213 billion five-year Major Public Infrastructure Pipeline are contributing to net zero outcomes. It calls for coordinated action to build the skills needed to decarbonise Australia's infrastructure sector and creation of a national, industry-wide training program to establish consistent decarbonisation skills standards.
Read further here:

Upcoming Events

World Sustainable Built Environment Conference

To register: https://www.wsbe26.org
Conference Co-chair: Professor Usha Iyer-Raniga, RMIT University

Connect with Us

We are dedicated to keeping you informed about our Centre's activities. Please visit our website **https://dfco2.org.au** which is regularly updated to showcase the Centre's progress and opportunities to collaborate.

If you have any news stories, achievements, or exciting updates to share with us, please email **dfco2@rmit.edu.au** and Tag us on **LinkedIn**

For inquiries and more information about Dfco2, contact us:
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The ARC Training Centre for Whole Life Design of Carbon Neutral Infrastructure is funded by the Australian Government through the Australian Research Council and in collaboration with institutional and industry partners.

We acknowledge the Traditional Owners of Country throughout Australia on whose unceded lands we conduct the business of the Centre. We pay our respect to Aboriginal and Torres Strait Islander cultures and to Elders past, present, and emerging. We also acknowledge the Traditional Custodians and their Ancestors of the lands and waters across Australia where we conduct our business.