THE ZERO CARBON WORKSHOPS

About zero C

Zero carbon (C) represents our common long-term challenge beyond Net Zero. It is a guiding principle to reach government, industry and global emission targets for 2050 and the only pathway to halt and reverse climate change.

THE WSU WORKSHOP SERIES

Using the format of the zero C Workshop Series, the Western Syd U Research Theme Champions, in partnership with the Urban Transformations Research Centre, provide a platform for researchers, industry and government to meet, learn and discuss the challenges ahead.

Workshop 1 in March 2023 was a dedicated workshop where researchers from across Western Syd U met to consider the multi and interdisciplinary capabilities and focus areas for future research. Zero C was considered as both a physical climate challenge for the planet and also an existential challenge for people and community. The keynote speeches were recorded and published here.

In *Workshop 2*, industry took centre stage. This event in August 2023 built on the zero C issues that emerged from *Workshop 1*. The event had two segments. First, a panel of representatives from industry, government and not-for-profit organisations provided insights into their sector-specific research needs to progress decarbonisation. In the second segment, participants evaluated the research and development needs for societies and economies to remain successful and profitable whilst decarbonising supply chains, products and services.

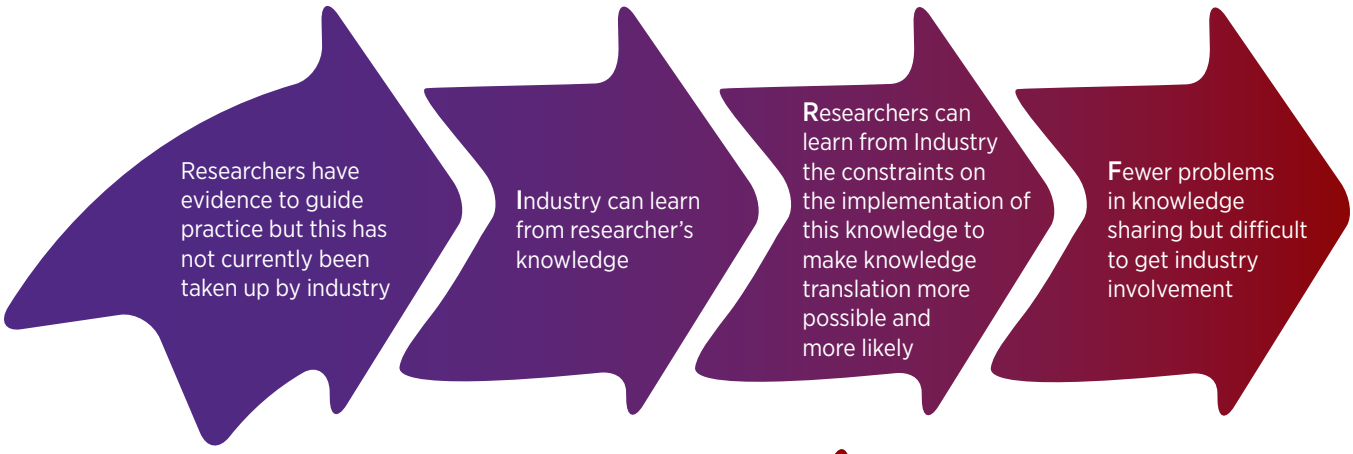
The key overriding questions that emerged were:

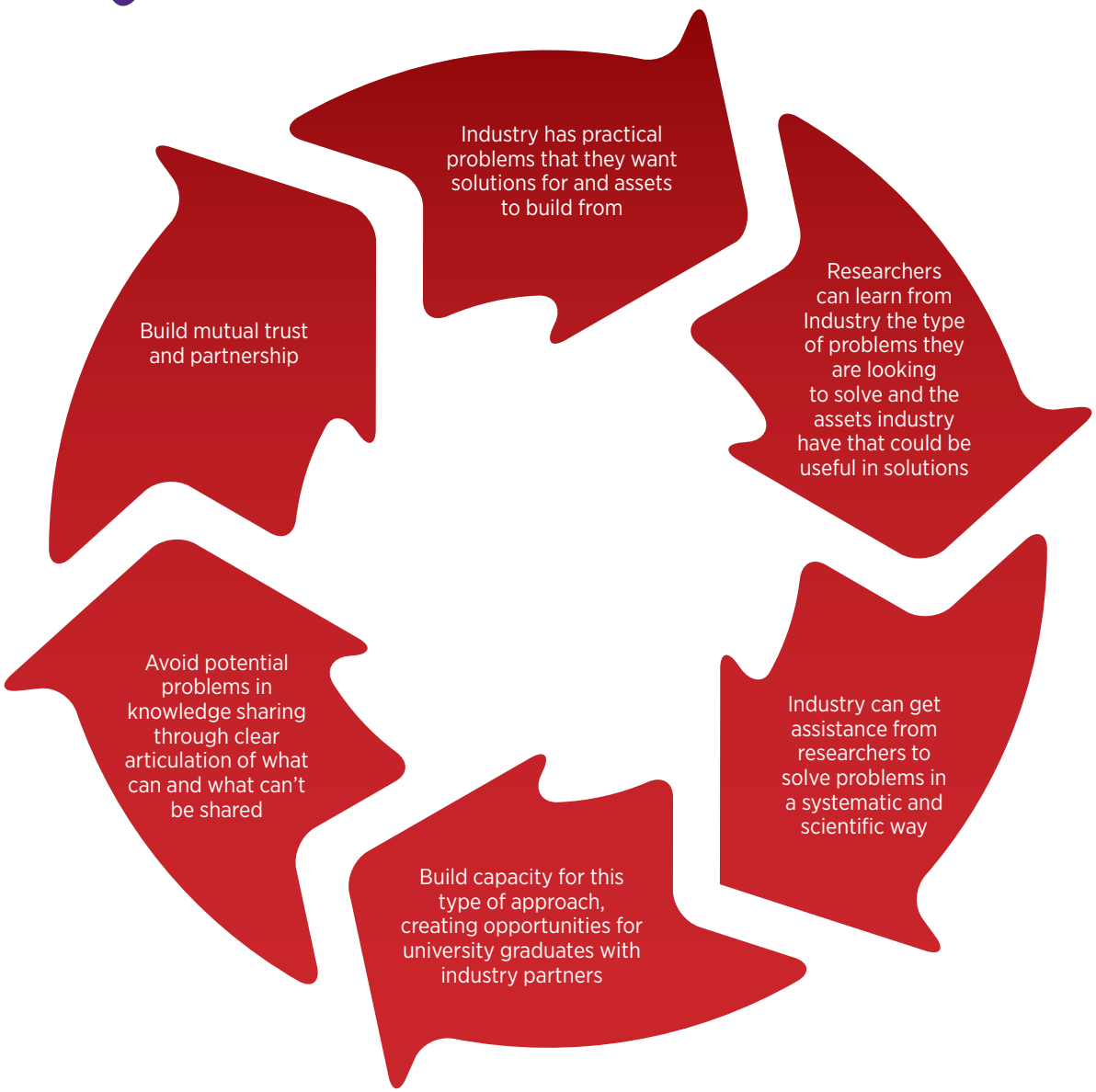
- How will we live in a low-carbon world and what are the means to get there?
- How will we enable equity during the renewable energy transition?
- How will we adapt our way of life to increasing extreme events?
- What is the changing role for community while embracing prosumerism, electric vehicles and increasing digitisation?

INDUSTRY – RESEARCH DYNAMICS

The workshop brought to the fore the important dynamics that drive industry and research activities. While group work identified several mutually beneficial project areas (see below), it also highlighted that the two groups are typically seeking different outcomes. Researchers are interested in knowledge gain, sharing this knowledge widely, and more generalisable solutions. Also, developing high quality outcomes with integrity, often needs time. Industry is interested in specific problem solutions and is not always interested in sharing solutions due to commercial interests. Due to competitive advantages and fast-evolving markets, industry needs rapid delivery of innovation and solutions.

A set of mutual advantages from industry – research partnerships were identified that can be summarised in the following two diagrams.





THREE MAJOR THEMES EMERGED UNDER THE BANNERS OF COMMUNITY, EQUITY AND INDUSTRY.
THESE LED TO ONE DEFINED POTENTIAL RESEARCH PROJECT UNDER EACH THEME.

THE INDUSTRY-WESTERN SYD U THEMES AND POTENTIAL COMMON RESEARCH PROJECTS

1. COMMUNITY

The community enabled renewable energy transition

Community is playing an increasing role in the transition to zero C. One example is the rise of the prosumer (i.e., producers of energy through rooftop solar, while continuing to be consumers and connected to the grid). This opens the possibility of new all electric precincts and the retrofitting of the majority of the already built environment.

One area of research concerns the changes needed in society for zero C to occur. It was identified that changing energy sources towards renewables is not enough and we need to shift away from business-as-usual pathways in nearly all areas.

Another area of research relates to what the future community would look like and leads to the following questions: Is there limited consumption? More sharing? Less work? Are houses now getting smaller?

The house example is poignant because houses are still getting bigger, which has implications for embodied carbon and direct carbon-intensive energy use, and yet the community does not seem prepared to change, despite the increasing fury towards government and authorities related to climate inaction. Here are opportunities for interdisciplinary, industry-led research that explores this contradiction.

More generally for the community, we need to understand their needs and the benefits they get from switching to zero C technology and the incentives needed to help the community switch, for example, rooftop solar and rental housing. At the moment, the structure of property rights means that renters are not encouraged to use rooftop solar. Landlords are also not encouraged because they don't get the benefits. There needs to be a policy in place that either incentivises the renter appropriately or requires (or incentivises) the landlord to install and maintain rooftop solar. One possibility of the latter is the use of energy ratings systems for rental housing, which means that investments in energy saving technology can feed into rental prices.

As always, there is a governance question. What is the role of each level of government in achieving zero C? Everyone is working in silos and each can find excuses for inaction because the roles are not well defined.

Participants clearly identified the need for effective incentive programs to speed up the transition of the community towards less carbon-intensive behaviours. These programs relate to uptake of solar, but also the production of waste, consumerism, household energy use and personal transport. There was also a collective call for better community education and awareness programs around zero C that provide simple and practical messages delivered in multiple languages and for different age groups. The programs need to build trust and follow the principle of 'horizontal communication'. Here, collaborative work from industry, government and academia is needed to be successful. General trust in researchers from universities should be leveraged to prevent the impression of industry lobbying or political motivation. The resulting education products could be disseminated through community groups, facilitation by local governments or 'Industry Night' events.

2. EQUITY

Equity for zero C through mutual and reciprocal relationships

Mutual benefit and reciprocal relationships were the overarching themes for collaboration. There were a few different relationships identified where reciprocal benefits could be optimised. These included industry and community as well as consumers and producers. Interestingly the partnering of industry and community revolved around "taking away something unpleasant" i.e., benefit in saving/reduction of costs whereas the consumer and producers was about "adding something good" i.e., reward/ incentives.

The most appropriate research methodology to investigate pathways to optimised mutual benefits was deemed to be participatory research. Participatory research can:

- enhance empowerment
- values local knowledge
- contextualises understanding thereby gaining deeper and nuanced insights
- builds capacity and
- can have long-lasting benefits.

Participatory research may be used as an advocacy tool to address zero C issues and influence motivations of others to trial the research findings in their industry.

Equity and access encompasses discussions about how to spread support and ensure equal access to resources, such as solar panels. It relates to the focus on disadvantaged communities, cost, and affordability.

Affordability and cost challenges underscore the need for solutions that address poverty, low income, and the financial barriers that hinder access to sustainable energy solutions. It directly relates to equity, public housing, and the need for cost-effective options.

Infrastructure development is a central theme, with a specific focus on addressing the unique needs of disadvantaged communities. This theme is closely related to public housing and the development of community-based solutions.

Of high importance to achieve equity in zero C fields are considerations about cultural diversity. The multi-cultural aspect poses a unique challenge, highlighting the need to understand and address diverse cultural perspectives. This theme intersects with equity and community-based solutions and offers interesting pathways for interdisciplinary research collaborations.

A range of industry/government partners were identified during the workshop that are already active in this space. They include:

- AGL Energy – a major Australian energy company with operations in renewable energy and sustainability
- Energy Efficiency Council – a national association promoting energy efficiency
- New South Wales Department of Planning and Environment - the state government department responsible for environmental and energy policies
- Clean Energy Finance Corporation (CEFC) – a government-owned organization dedicated to driving investment in clean energy
- NSW Land and Housing Corporation – the state government agency responsible for social housing
- CSIRO – Australia's national science agency is involved in energy research and innovation (also check out CSIRO Data61 'Decision Science' programs) and
- Impact Investment Group (IIG) – a Sydney-based organization focused on impact investing in renewable energy and social impact projects.

3. INDUSTRY

Circular economy for zero C by 2050

While Net Zero targets can be achieved through efficiency, renewable energy, and offsets, we still face the challenge of embodied energy and carbon in materials, which many currently consider a greater obstacle. Several key areas have been identified that can lead to deep collaboration between industry and research.

Circular economy incentives aim at addressing market failures that prevent or delay the transition to circular products, services and solutions (e.g., buying and selling of carbon credits). Industry-research partnerships could investigate current roadblocks towards economic circularity and design solutions to overcome them. These also include developing guidelines and frameworks that address transition risks and provide indicators for success.

New procurement, declaration and reporting frameworks are needed to create greater transparency of embodied and emitted carbon in processes and products. Refined mechanisms for carbon accounting and disclosure are needed, which require deep collaboration between state government agencies, industry and researchers. These solutions should be applied consistently across the state or country to avoid conflicting regulations, which could pose implementation challenges at the local economic level.

Furthermore, new technology and related product policies are necessary required. Researchers can contribute to the development of evidence-based environmental impact declarations for materials, including zero C concrete, carbon zero materials and related standards to ensure product quality. Innovative spaces like circular Net zero homes and living labs can serve as excellent showcases for advancements in this field.

Additionally, workshop participants saw opportunities for Western Syd U academics to develop translational frameworks that provide user-friendly tools and resources, such as successful case examples, for industry to successfully achieve zero C. Establishing these frameworks and case studies would require collaboration with industry for data mining and case study analyses. These frameworks would address questions related to short-, medium- and long-term strategies and actions towards the shared goal of zero C.

The workshop also identified potential funding schemes to support industry:

1. Western Syd U Industry partnership funding
2. Western Syd U Research Theme Program Research Grant Assistance Scheme
3. https://climateactionaustralia.net.au/innovation-and-funding/funding/
4. https://www.energy.nsw.gov.au/business-and-industry/programs-grants-and-schemes/developing-renewable-and-low-carbon-manufacturing
5. Go-Green Co-Innovation Program (GGCIP): Forecast Opportunity View - GGCIP2022-2023: GrantConnect (grants.gov.au)
6. Recycling modernisation fund – plastics technology stream: The RMF Plastics Technology stream - DCCEEW