

# RACE for 2030

RELIABLE  
AFFORDABLE  
CLEAN  
ENERGY

## ANNUAL REPORT 2022



Australian Government  
Department of Industry,  
Science and Resources

**AusIndustry**  
Cooperative Research  
Centres Program

# Accelerating the transition to Reliable, Affordable, Clean Energy

Driving innovation for a secure, affordable, clean energy future.

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### Acknowledgement of Country

RACE for 2030 would like to respectfully acknowledge the Traditional Owners of the ancestral lands throughout Australia and their connection to land, sea and community. We recognise their continuing connection to the land, waters and culture and pay our respects to them, their cultures and to their Elders past, present and emerging.

## About

# RACE for 2030

Reliable, Affordable, Clean Energy for 2030 (RACE for 2030) is a Cooperative Research Centre (CRC) for energy and carbon transition.

Established in July 2020 with \$68.5 million of Commonwealth funds, and commitments of \$280 million of cash and in-kind contributions from our partners, we have some \$300 million of total resources to invest in research, commercialisation, capacity building, market transformation and CRC operations through to 2030.

Our aim is to deliver over \$3.8 billion of cumulative energy productivity benefits and 20Mt of cumulative carbon emission savings by 2030.

RACE for 2030 currently has 18 full-time employees managing research, partner activities, market transformation and operations.

Please visit our website [www.racefor2030.com.au](http://www.racefor2030.com.au) for detailed information about our team, our Board and research agenda.

## OUR CORE VALUES

- We listen to the people's voice (seek diversity in perspectives and listen to energy users).
- We speak from the heart (be authentic, with the best of intentions).
- We translate passion into action (highly driven to deliver great outcomes).
- We build together (inclusive and collaborative).
- We seek impact through innovation (to achieve our ambitious shared vision).



“The Victorian Government’s Department of Environment, Land, Water and Planning (DELWP) is delighted to have been a partner of RACE for 2030 for another year. Partnering with a broad range of industry and academic partners through RACE for 2030 has allowed us to participate in important research that addresses some of the major challenges and opportunities presented by the energy transition. This vital collaboration is helping us deliver the programs and projects that are shaping Victoria’s clean energy future and making our state a happier, healthier place to live.”

**Department of Environment, Land, Water and Planning**



# Chair's message



**Louise Sylvan, AM FAICD**  
Chair

RACE for 2030 has a central role and a key task, along with others in Australia, of helping to meet the nation's emissions reduction targets with a particular focus on assisting businesses – large and small, energy market participants and others – through our cooperative research.

The past year has presented significant challenges. We have experienced cost-of-living pressures and inflation, skyrocketing energy prices and issues with security of supply, as natural events linked to climate change become more frequent and international events impacted the domestic energy market. Despite this turbulence, our RACE partners – universities, governments, networks and businesses – remain committed and focused on having the greatest impact possible. Recent events have reinforced our determination to accelerate the two key energy transitions – decarbonisation and shaping our future distributed energy system.

The delays created by COVID in particular have left us with much to do and a strong sense of urgency to do it. The recent political reset in Australia marks a new era of collective action on net zero and emissions reduction that enables all our efforts to move more quickly.

The sheer magnitude of the task ahead represents an enormous, whole-of-system challenge. There is much to highlight in RACE for 2030's work and this Annual Report documents these in some detail, but I will emphasise just two examples.

1. The challenge of net zero must be underpinned by a skilled workforce of both scale and substance. The work ranges vastly including building solar and wind farms, identifying or inventing alternative building materials, changing gas appliances in peoples' residences, upgrading the standard of peoples' housing and so on. This year we worked closely with a focused cross-section of key partners' to assess how we can develop this workforce. Three work packages and a roadmap were developed, defining pathways and priority projects to address fundamental questions including how to measure the workforce, how training and skills can be fit for the future and how to strengthen our innovation pathways.

2. Tax arrangements can enable or inhibit change. One research project, emphasising the strength of cooperation between RACE partners across sectors and disciplines<sup>2</sup>, investigated how Australia can accelerate the uptake of electric vehicles (EVs) within business fleets by encouraging home charging. While business fleets are an effective pathway for early adoption of EVs<sup>3</sup>, availability of site re-charging infrastructure facilities is currently low and around 47% of fleet vehicles are home garaged<sup>4</sup>. The project concluded that taxation changes can provide an immediate solution using fleet employees' home charging which can include smart charging stations; the project recommended 17 short- and long-term tax changes to be considered.

Now two years' old, RACE for 2030 has made a firm start in challenging pandemic conditions as we faced the tough realities of establishing and staffing a new organisation and getting it off the ground while Australia was 'on hold'. With our team now in place and governance embedded, we want and need to race ahead. The Board is focused on improving processes that will propel us, such as streamlining the time it takes to get research approvals up.

During this time, we also learned that face-to-face contact is essential to developing rapport and establishing the trust that fosters strong partnerships. Our team has been constrained from meeting in person to build on our foundation networks and enabling relationships amongst our partners to expand their collaborative work. This has been frustrating for us all and disappointing for the Board who are looking forward to connecting more extensively with partners in the coming year. We are much looking forward to seeing people – and not just on a screen!

Lastly, RACE for 2030 staff have once again demonstrated their strong passion and commitment to contribute to our goals and the tenacity to work through and around challenges. In particular, I would like to thank Jon Jutsen, the RACE for 2030 CEO, for his leadership. As well, the Board has been dedicated and committed to the success of RACE and to enabling these important partnerships to emerge and evolve in Australia – I thank them for their time, commitment and passion for this CRC.#

**Louise Sylvan**  
Chair  
RACE for 2030

“  
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1. Lead researcher: University of Technology Sydney. Partners: Monash University, SA Department of Energy and Mining, RMIT, VIC Department of Environment, Land, Water and Planning, Australian Power Institute (API), Griffith University, Potsdam-Institut for Klimafolgenforschung, QLD Department of Natural Resources, Mines & Energy, Climate-KIC Australia, Energy Efficiency Council Inc, NSW Treasury Office of Energy and Climate Change, Startup Bootcamp (ACH Australia PL), Australian Alliance for Energy Productivity Ltd, AIRAH, Ultima Capital Partners PL, EnergyLab Australia PL. Participants: Clean Energy Council, International Renewable Energy Agency, International Energy Agency, AiGroup, DISER (Commonwealth).

2. Lead researcher: Griffith University. Partners: Monash University, AGL, Energy Efficiency Council, VIC Department of Environment, Land, Water and Planning, NSW Treasury Office of Energy and Climate Change, SA Department of Energy and Mining. Participants: Australian Fleet Management Association.

3. DISER, 2021

4. AFMA and AGL, 2020

# CEO's message



**Jonathan Jutsen**  
CEO

As Australia and the world grapple with unprecedented energy and climate challenges, never has innovation been more critical to unlock the opportunities from our transition to clean, decentralised energy services. RACE for 2030 are passionate about making a real difference in this pivotal economic and environmental transformation.

I would like to thank our 74 partners for sharing the journey with us and being so supportive, as we work together to unlock these opportunities. Along with our Chair, members of the Board and our Leadership team, I am looking forward to spending more time with you in person now that COVID is less of a constraint in year two.

RACE is transitioning from start-up to the rapid growth phase of the research program, and in year two we have learned a lot about how best to extract value for partners from the CRC model, recovering from COVID, building an incredible research team and simplifying our systems to get partner projects approved more rapidly, and we have also gained insights on program design from a series of opportunity assessments, which are now being completed.

This financial year we initiated some significant research projects. We committed \$16.7m cash plus in-kind to 52 projects of which 15 were completed and a further 37 projects were in train by the end of the year. This expenditure is significantly less than we would like, but we expect our preparatory planning and experience will be utilised to rapidly expand the research program this year. We are presently launching a series of multi-million-dollar, multi-year, high impact innovation projects (the first two of which are now underway).

We continue to focus on innovation to address four strategic challenges for Australia – accelerating integration of EV's into the electricity network (particularly bi-directional charging), reducing carbon emissions and energy bills by retrofitting millions of existing homes, supporting the network challenge of minimum demand and ensuring reliable grid operations by getting the most from rooftop solar, and optimal paths to net zero emissions for businesses, precincts and value chains.

Our success ultimately will be measured by the impact of our research on energy productivity and reducing carbon emissions. While it is very early days to measure our impact, our forecasts show us broadly on track based on current projects relative to our targets for FY22 and are on the way to delivering our commitments of reducing CO<sub>2</sub> emissions by 20Mt and gross energy impact of \$4.9B in 2030 escalating to \$8.8B by 2035.

I am very excited about the year ahead with rapidly increasing appreciation of the immediate need for energy and carbon innovation, supported for the first time by political consensus at both Commonwealth and State levels on the urgency necessary for reducing emissions and making energy more affordable. We are still seeing excessive focus on supply side options, which is likely to lead to over-investment in centralised energy infrastructure and we hope that our research will support increased focus on energy demand management that results in better outcomes for energy consumers and the grid.

I would like to thank the wonderful national RACE team and our supportive, exceptional Board for steering us through FY22 and into what I believe will be a breakthrough year for RACE in FY23.

**Jonathan Jutsen**  
CEO  
RACE for 2030

“We are on the way to delivering our commitments of reducing CO<sub>2</sub> emissions by 20Mt and gross energy impact of \$4.9B in 2030 escalating to \$8.8B by 2035.”

# Our partners

At RACE for 2030, we are working with our partners to address the enormous challenges to decarbonise our energy system while keeping the lights on, applying downward pressure on energy bills and ensuring there is a skilled workforce up to the job. To achieve this, we are working with a range of stakeholders including researchers, government and industry across the entire energy services supply chain.

We currently have 74 partners, which includes new additions such as Boral, Alpha Solar Technologies, Mirvac Energy and Energy Consumers Australia. We will continue to grow our partner base as we launch several multi-year, multi-million dollar projects in FY23. These projects will attract significant attention and interest and will help to position RACE as the 'go-to' place for industry-led energy and climate research in Australia.

We've built in greater flexibility to our partner options in FY22 and welcome new partners to join us for single projects that will typically run for two to three years. We also encourage partners to bring innovation challenges to us so that together we can leverage the benefits of the CRC including making connections within our amazing partner base, leveraging RACE funding and delivering and validating outstanding results.

Our team is well resourced with local partner support staff in each state. With the lifting of travel restrictions, we've been travelling to meet partners in person and hosting events and workshops to make up for time lost during the past two years, with much more to come. Now we're ramping up the size and scale of our projects, there are huge opportunities for new partners to join RACE and play a key role in the energy revolution.



# Our partners



# Our research

RACE research is focused on driving decarbonisation of energy services, while improving their reliability and reducing costs, guiding the clean energy transition to a distributed energy system and higher energy productivity. We are focused on innovation that maximises benefits for Australian businesses and consumers.

In FY22, RACE for 2030 significantly expanded our research activity and now that COVID impacts seem largely behind us we are looking forward to rapidly ramping up through launching larger, multi-year projects.

Our FY22 research activity is summarised in the table below.

## Summary of research project activity FY21 and FY22

	FY21 started (No. of projects)	Total value (\$ + In kind)	FY22 ongoing (No. of projects)	Total value (\$ + In kind)	
<b>PROJECTS STARTED</b>	Opportunity Assessments	9	\$3,222,933	6	\$1,715,957
	Fast Track	6	\$1,094,613	12	\$2,785,456
	Standard Track	0	-	5	\$4,505,629
	Industry PhDs	9	\$2,242,804	3	\$738,565
	Non-research	0	-	2	\$305,204
	<b>Projects started – total</b>	<b>24</b>	<b>\$6,560,351</b>	<b>28</b>	<b>\$10,050,811</b>
Projects completed	-	-	15	\$4,317,546	

RACE for 2030 had 52 active research projects across the year, double the FY21 project numbers – 15 were completed, while another 37 were underway. After initiating nine ‘Opportunity Assessments’ in FY21, we initiated the remaining Assessments in FY22, allowing us to use these to design the forward program.

RACE for 2030 initiated 12 ‘Fast Track’ projects during the year, with a total cash budget of \$1,554,155 and in-kind contributions valued at \$1,231,301. Establishing our Standard Track project development process for larger, longer-term projects in FY21 also enabled several multi-year projects to be initiated by the second half of FY22. The Research Advisory Committee (ReAC) continues to play a pivotal role, this year reviewing and recommending five Standard Track projects to the Board for funding approval, with a total value of \$4,505,629.

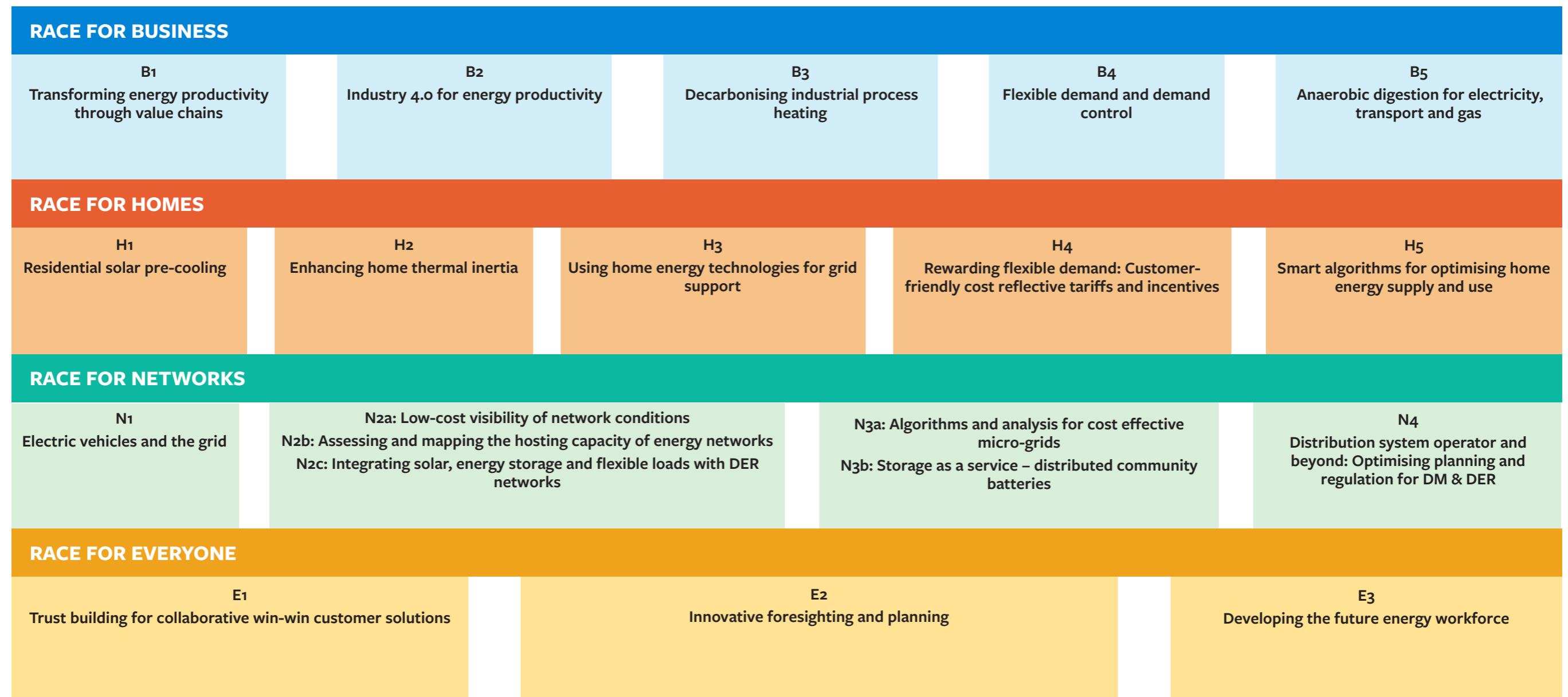
We are focused on refining processes to improve research agility and speed to market, including clarifying and streamlining project development processes. This year we improved our planning through the annual RACE for 2030 Research Plan, developed through engagement and project development with research and industry partners, including workshops in major cities, and face-to-face meetings to determine and refine, objectives, actions, timelines and priorities. The Research Plan will be updated by February.





# Our research themes 2021-22

In FY22, RACE for 2030's research was framed by our four research programs and 17 themes.



# Our projects

## Opportunity Assessments

Opportunity Assessments are conducted to assess and identify the best way to progress the work under each of the 17 key themes within our four research programs, developing ‘research roadmaps’ and forging the foundations of relationships between industry and researchers on which projects are built. Following the nine Opportunity Assessment projects initiated in FY21, we began six of the remaining eight Opportunity Assessments in FY22, which we will continue to develop throughout FY23.

THEME	PROJECT	LEAD RESEARCHER	RACE FOR 2030 PARTNERS	\$ CASH	\$ IN-KIND
B2	INDUSTRY 4.0 FOR ENERGY PRODUCTIVITY	University of Technology Sydney	A2EP, AGL, AMPC CSIRO, Department of Environment, Land, Water and Planning (VIC), Exergenics, Office of Energy and Climate Change (NSW Treasury), RMIT, Simble, Sydney Water	\$149,980	\$147,152
B5	ONSITE ANAEROBIC DIGESTION	Griffith University	A2EP, AMPC, Department of Environment, Land, Water and Planning (VIC), Office of Energy and Climate Change (NSW Treasury), Queensland Farmers’ Federation, Singh Farming, Sydney Water, UTS	\$180,007	\$86,479
H2	ENHANCING HOME THERMAL EFFICIENCY	RMIT	Climate-KIC Australia, CSIRO, Department of Environment, Land, Water and Planning (VIC), Office of Energy and Climate Change (NSW Treasury)	\$148,705	\$159,051
N3	LOCAL DER NETWORK SOLUTIONS	Curtin University	AGL, API, Ausgrid, Climate-KIC Australia, CSIRO, Department of Environment, Land, Water and Planning (VIC), Department of Energy and Mining (SA), Griffith University, Monash University, Office of Energy and Climate Change (NSW Treasury), RMIT, Sydney Water, UTS	\$205,003	\$127,606
N4	DSO AND BEYOND	University of Technology Sydney	AGL, Ausgrid, Curtin University, Department of Environment, Land, Water and Planning (VIC), EPRI, Monash University, Planet Ark Power, RMIT, UTS	\$150,001	\$79,472
E2	FORESIGHTING FOR NET ZERO ENERGY SYSTEMS	University of Technology Sydney	AGL, Ausgrid, Climate-KIC Australia, CSIRO, Curtin University, Department of Environment, Land, Water and Planning (VIC), Energy Efficiency Council, Monash University, Office of Energy and Climate Change (NSW Treasury), Opturion, Starling Energy Group, Sydney Water, UNSW, UTS	\$150,040	\$132,460

## Fast Track projects

There were 18 Fast Track projects during FY22 – 12 were initiated, while six which that were initiated in FY21, were completed.

THEME	PROJECT	PROJECT HIGHLIGHT STATEMENT	LEAD RESEARCHER	RACE FOR 2030 PARTNERS	STATUS	\$ CASH	\$ IN-KIND
B1	<b>IMPROVING ENERGY PRODUCTIVITY THROUGH THE ELECTRIFICATION OF COLD CHAIN LOGISTICS – PHASE 1: CONCEPT DEVELOPMENT</b>	To develop a concept design for a eutectic refrigeration system suitable for use in both diesel and electric light to medium refrigerated transport vehicles.  The project will improve the energy productivity of cold chain logistics by reducing diesel fuel consumption and energy costs and improving temperature control with more efficient refrigeration.	University of South Australia	Aldom, Department of Energy and Mining (SA), Simble	In progress	\$149,565	\$131,114
B1	<b>DECARBONISATION PATHWAY FOR THE AUSTRALIAN CEMENT AND CONCRETE SECTOR</b>	To develop a decarbonisation roadmap that has strong stakeholder endorsement, both within the Australian cement and concrete sector and the wider community, that accelerates adoption of emission reduction pathways.	SmartCrete CRC		Completed	\$50,00	\$-
B4	<b>PHASE CHANGE MATERIALS FOR FLEXIBLE DEMAND IN REFRIGERATION</b>	The project will investigate the use of CO <sub>2</sub> as a heat transfer fluid to improve the performance of Phase Change Material Thermal Energy Storage (PCM TES) and increase the range of potentially suitable applications for the technology across a range of industries.	University of South Australia	A2EP, Glaciem Cooling Technology, RMIT	Completed	\$100,00	\$162,837
B4	<b>LOAD FLEXING OF INDUSTRIAL REFRIGERATION SYSTEMS AT ABATTOIRS</b>	The project will investigate the feasibility of abattoirs flexing the electrical demand of their refrigeration plants by using advanced simulations and controls with thermal storage systems. The research would deliver the costs and benefits for making such changes to abattoirs and potentially all industrial refrigeration plants in Australia with a load flexing potential in excess of 2GW hrs per day (excluding cold stores).	A2EP	AGL, AMPC, Glaciem Cooling Technology, UTS	Completed	\$104,395	\$108,928
B5	<b>BIOGAS FROM AGRICULTURAL WASTE: A TECHNO-ECONOMIC EVALUATION</b>	This project will carry out techno-economic feasibility on anaerobic co-digestion of sugar industry residues (sugarcane bagasse, sweet sorghum bagasse and mill mud) with banana waste, chicken manure and food waste. The produced biogas will be upgraded and compressed to BioCNG for use in transport, farming and/or electric power generation.	Griffith University	A2EP, Queensland Farmers' Federation, Singh Farming	In progress	\$59,963	\$43,441
B5	<b>MAPPING ORGANIC WASTE IN SYDNEY TO ADVANCE ANAEROBIC CO-DIGESTION FOR ENERGY GENERATION AND GHG REDUCTION</b>	This project will bring together key stakeholders in the typically siloed waste, wastewater and energy sectors to begin to quantify and geospatially map the multiple layers of UOW in Sydney and assess its bioenergy potential. The project is expected to help demonstrate the potential of AD as a climate change solution.	University of Technology Sydney	Office of Energy and Climate Change (NSW Treasury), Sydney Water	In progress	\$150,000	\$138,303

## Fast Track projects

THEME	PROJECT	PROJECT HIGHLIGHT STATEMENT	LEAD RESEARCHER	RACE FOR 2030 PARTNERS	STATUS	\$ CASH	\$ IN-KIND
B5	<b>TECHNO-ECONOMIC ANALYSIS ON IMPROVING BIOGAS FROM ANAEROBIC DIGESTION ON PRE-TREATED SEWAGE SLUDGE</b>	Sydney Water treats sewage sludge through anaerobic digestion and is constructing a thermal hydrolysis plant at St Marys Wastewater Treatment Plant. In this project, a techno-economic analysis including biodegradability and net energy generation will be compared for thermally hydrolysed pre-treated sludge and wet air oxidation treated digested sludge.	Griffith University	RMIT, Sydney Water	In progress	\$70,001	\$103,733
H2	<b>PATHWAYS TO SCALE – BARRIERS TO, OPPORTUNITIES FROM AND IMPACTS OF RETROFITTING ONE MILLION+ HOMES</b>	This project will fill knowledge gaps and build capability for industry and government to implement home energy efficiency retrofits in one million+ homes, through public-private partnership.	Climate-KIC Australia	Curtin University, Department of Environment, Land, Water and Planning (VIC), Energy Efficiency Council, Planet Ark Power, UTS	Completed	\$ 99,182	\$80,399
H4	<b>INCENTIVISING WITHIN-DAY SHIFTING OF HOUSEHOLD ELECTRICITY USE</b>	This project will test a variety of electricity tariff augmentations designed to incentivise households to better align their electricity use with solar energy output. This includes testing and comparing incentives to move consumption into daylight hours with incentives to move away from non-daylight hours; and comparing incentivising routine actions with ad hoc actions.	Monash University	Department of Environment, Land, Water and Planning (VIC), PowerPal	In progress	\$ 114,980	\$ 93,988
N1	<b>BUSINESS FLEETS AND BEVS: TAXATION CHANGES TO SUPPORT HOME CHARGING FROM THE GRID, AND AFFORDABILITY</b>	Business fleets are an effective pathway for early adoption of BEVs (DISER, 2021) but their site re-charging infrastructure facility numbers are low. Taxation changes can provide an immediate solution by using fleet employee's home charging, which can include smart charging stations (SmartCh.Stns) to gain off-peak rates and avoid grid congestion.	Griffith University	AGL, Department of Environment, Land, Water and Planning (VIC), Energy Efficiency Council, Monash University, Office of Energy and Climate Change (NSW Treasury)	Completed	\$100,002	\$119,997
N2	<b>MEASURING AND COMMUNICATING NETWORK EXPORT SERVICE QUALITY</b>	The project will develop a range of proposed metrics and strategies for communicating these to customers. By considering the relevance, utility and uncertainty of such metrics for different stakeholders, and the implications of adoption, including perverse incentives or other unintended consequences, the project will help DNSPs to efficiently plan for DER capacity while enhancing customer choice and supporting greater penetration of renewables.	University of Technology Sydney	Essential Energy, SAPN, Solar Analytics	In progress	\$149,093	\$95,655
N2	<b>OPTIMISED ZONE SUBSTATION MV VOLTAGE MANAGEMENT TO INCREASE DISTRIBUTED ENERGY RESOURCE (DER) HOSTING CAPACITY</b>	This project will utilise a novel solution to manage challenges introduced by DERs in power distribution networks. It will leverage Planet Ark Power's unique power electronics and software solution, eleXsys as the core element and will demonstrate novel LV and MV voltage management techniques for zone substation, supporting 100% penetration of distributed energy resources.	Monash University	Planet Ark Power	In progress	\$200,000	\$165,953

## Fast Track projects

THEME	PROJECT	PROJECT HIGHLIGHT STATEMENT	LEAD RESEARCHER	RACE FOR 2030 PARTNERS	STATUS	\$ CASH	\$ IN-KIND
N2	<b>CURTAILMENT AND NETWORK VOLTAGE ANALYSIS STUDY (CANVAS)</b>	The project aims to develop socio-technical insights into energy-user experience of voltage related distributed energy resource (DER) curtailment.	University of New South Wales	AGL, SA Power Networks, Solar Analytics	Completed	\$100,00	\$91,038
N2	<b>IDENTIFICATION, KEY MANAGEMENT AND TRUST FOR INVERTERS FOR DISTRIBUTED ENERGY RESOURCES</b>	This project will develop a distributed framework for device identity management and status information that enables network operators or VPP operators to establish secure communications and continuously monitor the compliance with security requirements.	Monash University	Selectronic	In progress	\$150,014	\$94,083
N4	<b>DISTRIBUTED ENERGY BUSINESS MODELS: COMPARING DISTRIBUTED ENERGY BUSINESS MODELS WITHIN CURRENT AND EVOLVING INSTITUTIONAL STRUCTURES TO IDENTIFY KEY OPPORTUNITIES AND LEVERAGE POINTS FOR A CLEAN, AFFORDABLE AND RELIABLE ELECTRICITY GRID</b>	The project will investigate selected new and emerging business models for distributed energy resources (DER) and storage and analyse them against existing and evolving regulatory frameworks and institutional settings in order to identify pathways for accelerating implementation.	Curtin University	Griffith University, Planet Ark Power, Redgrid, RMIT, Starling Energy, Western Power	In progress	\$149,903	\$ 97,717
N4	<b>DEMONSTRATING PATHWAYS FOR URBAN RENEWABLE ENERGY ZONES – BARRIERS, OPPORTUNITIES, AND IMPACTS OF ESTABLISHING URBAN REZ</b>	This project will fill knowledge gaps and build capability for local councils, communities, industry and network providers to establish Urban Renewable Energy Zones (Urban REZ) through private finance.	Climate-KIC Australia	Curtin University, UTS, Ausgrid, AGL, Department of Environment, Land, Water and Planning (VIC), Office of Energy and Climate Change (NSW Treasury), Planet Ark Power, Starling Energy Group, Western Power	In progress	\$150,000	\$101,132
E2	<b>THE GREENWAVE: ANCHORING ECONOMIC RECOVERY THROUGH NET ZERO ENERGY STRATEGY</b>	This project will identify how net zero energy and decarbonisation strategies can more deeply engage community and business partnerships to deliver greater trust, legitimacy and social value.	University of Technology Sydney	Buildings Alive, Climate-KIC, Curtin University, EnergyLab, Monash University, Office of Energy and Climate Change (NSW Treasury), Redgrid, Sunovate	Completed	\$100,002	\$84,581
E2	<b>DECISION ENGINE TO SUPPORT THE PATH TO NET ZERO</b>	This project will design a platform as a Proof of Concept to explore the requirements of businesses and organisations seeking a path to net zero and elicit the research and data requirements needed to enable consistent, globally informed optimal path planning.	Monash University	AGL, Curtin University, Opturion, Sydney Water, UTS	In progress	\$106,241	\$57,254

## Standard Track projects

In FY21, RACE for 2030 established our 'Standard Track project' development process for larger and longer-term projects. There are now five Standard Track projects in progress, with the first kicking off in October 2021.

THEME	PROJECT	PROJECT HIGHLIGHT STATEMENT	LEAD RESEARCHER	RACE FOR 2030 PARTNERS	\$ CASH	\$ IN-KIND
B1	<b>TESTING AND MONITORING OF AN ENERGY EFFICIENT INDIRECT EVAPORATIVE CO<sub>2</sub> REFRIGERATION SYSTEM AT A COLES SUPERMARKET</b>	This project will model and validate the performance of a new-generation, energy efficient refrigeration system. The system incorporates an indirect evaporative cooling system, combined with natural refrigerants, to deliver up to 16% improvement in system efficiency and 24% reduction in peak demand. The project will continuously monitor the first deployment at scale, on-site, in a Coles supermarket across at least one full operational year, providing direct evidence of the efficacy and viability of the technology under real-world conditions.	University of South Australia	A2EP, Glaciem Cooling Technology, QUT, Seeley International	\$608,332	\$957,457
B4	<b>24/7 RENEWABLES: SOLUTIONS FOR MATCHING, TRACKING AND ENHANCING CORPORATE RENEWABLES PURCHASING</b>	In this project tools will be developed for matching renewables purchasing of large energy users with their demand; tracking, understanding and enhancing the outcomes of these purchasing approaches and on-site energy management activities. Potential renewables products, accounting and contracting approaches will be assessed, and new options developed that can enable customers to establish a stronger link between their energy purchases and renewables generation.	University of New South Wales	AGL, Buildings Alive, Curtin University, Enosi, Mirvac, Starling Energy Group	\$447,498	\$727,790
H2	<b>RENOVATE OR REBUILD: FULL SERIES EVALUATION PROJECT</b>	The primary objective of this research is to understand what impact the Renovate or Rebuild TV show has on viewer attitudes, preferences and purchases related to sustainable housing.	Office of Energy and Climate Change (NSW Treasury)	CSIRO	\$239,885	\$121,756
H4	<b>CARSELDINE VILLAGE LIVING LABORATORY – A SUBTROPICAL TEST CENTRE FOR END USERS/PROSUMERS, HOUSING INDUSTRY AND ELECTRICITY NETWORKS</b>	Terrace dwellings in the Village are sold price inclusive of 3.5kW solar, 10.3kWh battery, Wi-Fi AC, EV circuit, 7-star NatHERS as standard providing opportunities to test and evaluate demand response strategies such as solar pre-cooling, load shifting, cost-reflective tariffs, and dynamic operating envelopes. It will also enhance understanding of motivations, needs and barriers experienced by households, technology providers, builders and electricity networks while assessing energy use reductions and cost savings.	Queensland University of Technology	Department of Energy and Public Works (QLD), Powerlink, UNSW	\$317,536	\$826,894
N1	<b>MY V2X EV – INFORMING STRATEGIC EV INTEGRATION</b>	This project aims to remove barriers and enable opportunities for V2X, developing a path to implementation through technical solutions and creating partnerships for demonstrations.	RMIT	CSIRO, Curtin University, EPRI, Griffith University, Monash University, UTS	\$200,025	\$58,457

## Industry PhD projects

Over the life of RACE for 2030, we aim to graduate 55 high quality doctoral candidates in industry relevant disciplines. The industry-led topics allow for detailed investigation and insights to be provided based on international best practice and local research for the duration of each project.

Across two years and three rounds we have called for PhD topics, receiving a total 32 nominations for diverse and pivotal topics, as the interest of industry and research partners in our shared purpose continues to escalate.

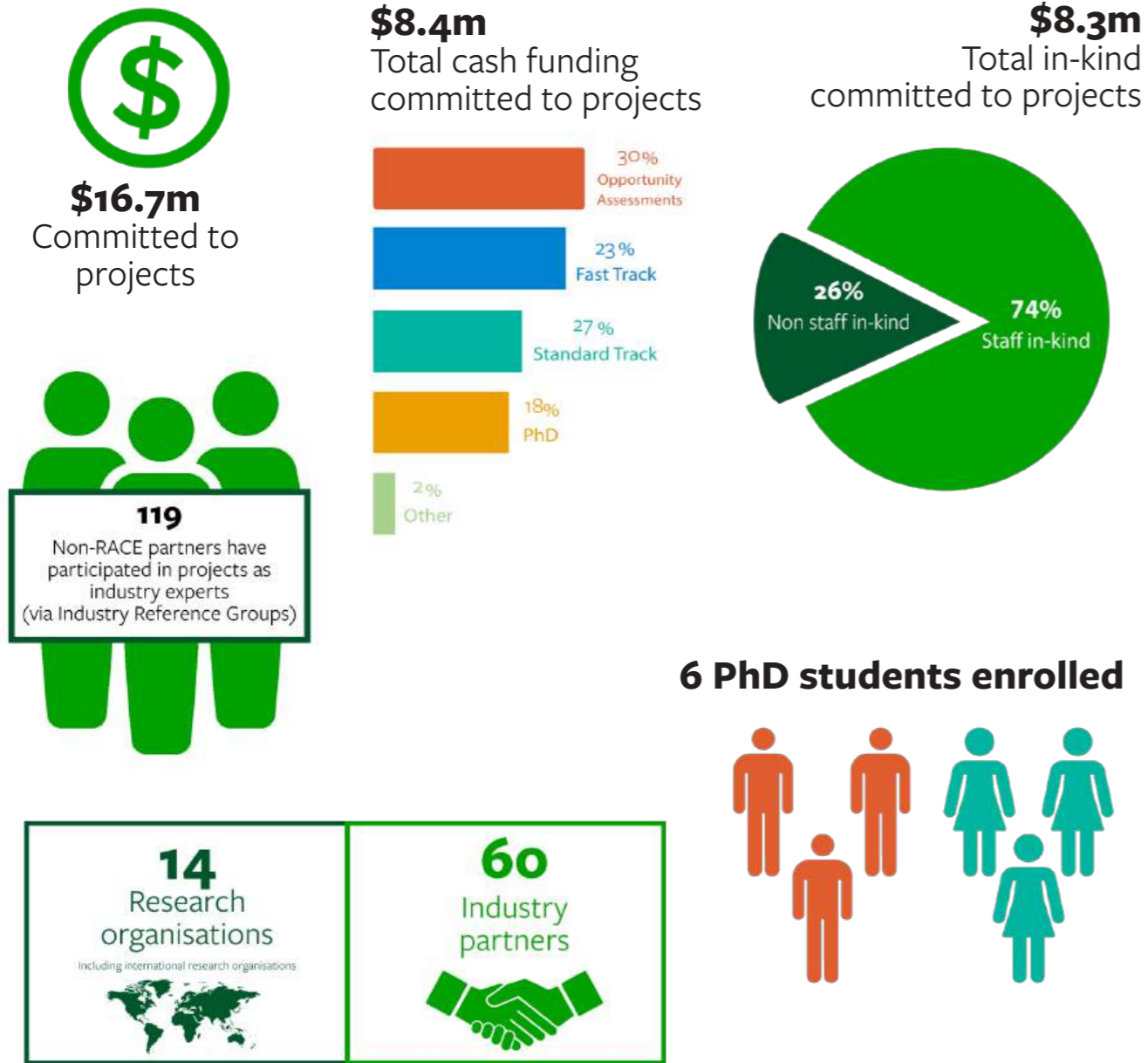
In FY21, we confirmed nine research projects across all four research programs and six universities. Now at end FY22, we have 12 active projects – five PhD candidates have commenced, six are preparing to commence in early FY23 and we are working closely with our host University to secure candidates for one further opportunity. Below is a snapshot of current and future research being conducted as part of our RACE for 2030 Industry PhD program.

THEME	PROJECT	LEAD RESEARCHER	RACE FOR 2030 PARTNERS	Round #	STATUS	\$ CASH	\$ IN-KIND
B4	<b>FAST-TRACK TO NET ZERO CARBON BUILDINGS</b>	University of New South Wales	Buildings Alive	# 1	Initial candidate withdrew. Replacement candidate recruited, due to commence September 2022.	\$123,000	\$90,675
B4	<b>DATA INNOVATION FOR ZERO CARBON BUILDINGS</b>	University of Technology Sydney	Buildings Alive	# 2	Candidate commenced January 2022.	\$123,000	\$88,650
B5	<b>OPTIMAL DESIGN OF BIOGAS POWER GENERATION SYSTEM IN WASTEWATER PLANTS</b>	University of Technology Sydney	Sydney Water	# 2	Candidate commenced December 2021.	\$123,000	\$98,775
H2	<b>PREFABRICATED SOLUTIONS FOR LARGE-SCALE ENERGY EFFICIENCY RETROFITTING OF RESIDENTIAL BUILDINGS</b>	Curtin University	Climate-KIC Australia	# 1	Initial candidate withdrew. Recruitment for replacement candidate in progress.	\$123,000	\$69,128
H3	<b>GREEN SMALL SCALE HYDROGEN SOLUTIONS FOR HOUSEHOLD ENERGY SUPPLEMENTATION</b>	Curtin University	Starling Energy Group	# 1	Candidate due to commence October 2022.	\$123,000	\$87,750
H4	<b>INNOVATIVE TARIFFS AND DEMAND RESPONSE POTENTIAL FOR RESIDENTIAL AND INDUSTRIAL CUSTOMERS</b>	Griffith University	Ausgrid	# 1	Candidate due to commence October 2022.	\$123,000	\$76,583
N1	<b>SMART CHARGING STRATEGIES FOR ELECTRIC VEHICLES IN SMART GRIDS</b>	Monash University	Enzen Australia Pty Ltd	# 1	Candidate due to commence October 2022.	\$123,000	\$200,972
N1	<b>ARTIFICIAL INTELLIGENCE FOR MANAGEMENT OF ELECTRIC VEHICLES AND VEHICLE-TO-GRID (V2G) RESOURCES OPTIMISATION</b>	University of Technology Sydney	Planet Ark Power	# 2	Candidate due to commence November 2022.	\$123,000	\$182,140
N3	<b>DESIGNING DISTRIBUTED RENEWABLE MICRO-GRIDS FOR RELIABILITY</b>	Monash University	Planet Ark Power	# 1	Candidate due to commence September 2022.	\$123,000	\$172,502
E2	<b>THE DEVELOPMENT OF AN AUSTRALIAN ENERGY SECTOR TRUST INDEX</b>	Queensland University of Technology	Essential Energy	# 1	Candidate commenced May 2022.	\$123,000	\$144,300
E2	<b>DEVELOPING APPROPRIATE AND ROBUST COMMUNITY MANAGEMENT STRATEGIES TO SUPPORT SUCCESSFUL RENEWABLE MICRO-GRID ENERGY SOLUTIONS FOR OFF-GRID INDIGENOUS COMMUNITIES</b>	Griffith University	Western Power	# 1	Candidate commenced February 2022.	\$123,000	\$214,500
E2	<b>HOW CAN THE “CUSTOMER FIRST” AND ITERATIVE APPROACHES OF SUCCESSFUL AUSTRALIAN AND INTERNATIONAL START-UPS BE APPLIED TO HELP THE ENERGY TRANSITION?</b>	University of Technology Sydney	Solar Analytics	# 1	Candidate commenced August 2021.	\$123,000	\$79,395

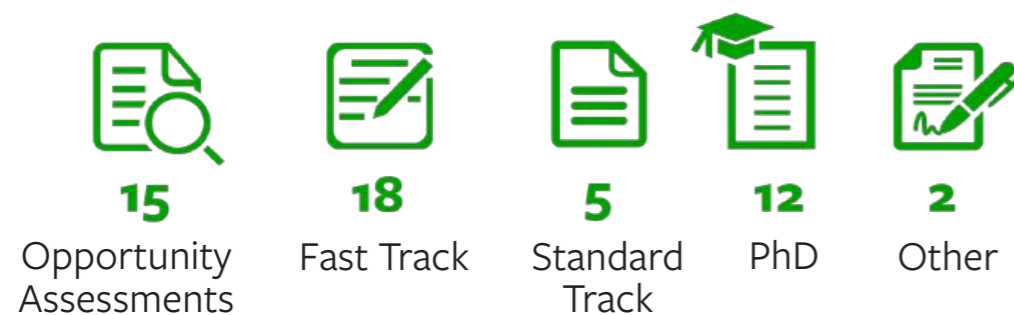
An Industry Reference Group (IRG) provides support and guidance for each Industry PhD project and ensures the project is developed to address an industry-relevant problem. Within eight months of project commencement a rapid review of the issue will be delivered for wide public dissemination as well as a systematic literature review for scientific publication.

Candidates are awarded a scholarship of \$38,000 annually for three years, with an additional \$3,000 provided annually for research expenses, with funding drawn from industry and research partner attributes and RACE for 2030.

# A summary of our research



## A breakdown of our projects



# Our impact

Energy is the key enabler of our economies, industries and communities. RACE for 2030 is focused on delivering research that can expedite the reliable, affordable, and clean energy transition. The impact of our research is ultimately the real measure of our success.

While it is early days in our 10-year journey to be able to measure impact, we already ensure that every project proposal has to identify the path to impact for that project and the expected impact/\$ of RACE investment is a key evaluation criterion for allocating funding.

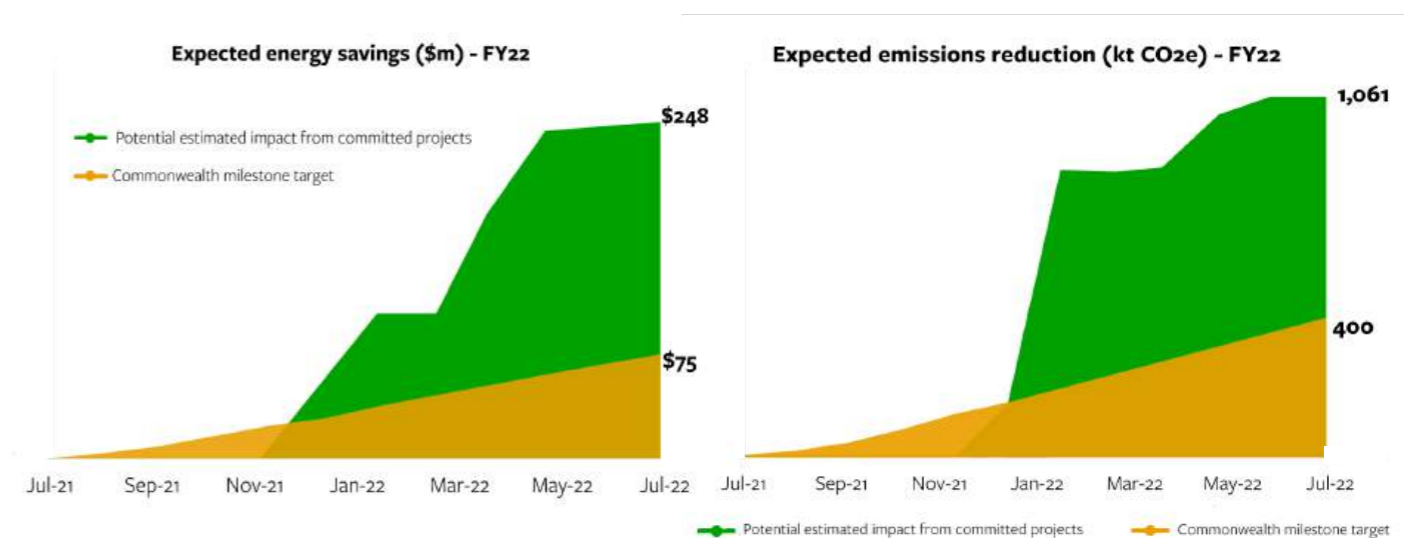
We are also able to see some early outcomes from our work. For example, capacity building is an important focus of our research. In FY22, we explored how we can develop the future energy workforce, working closely with key partners to proudly produce the Australian Energy Employment Report. The Report has been recognised by Federal and State Governments who have committed to adopt its recommendations for monitoring and planning the energy workforce in Australia. We can also demonstrate that RACE's work on taxes on EVs has had an impact on the debate and ultimately, government policy.

We have refined our impact tracking methodology, and our ability to capture and quantify research impact data to measure and report on progress against our RACE energy saving and emissions reduction goals. We also set key performance metrics to measure achievement of research activity levels through our focus on longer-term or Standard Track projects.

All of our projects across our four research programs have specific paths to impact, to devise a trajectory from research outputs to achieving real-world impacts in terms of:

- Reduced CO<sub>2</sub> emissions
- Lower industrial energy bills
- Lower residential energy bills

RACE for 2030 has committed to impact targets of reducing over 20Mt of CO<sub>2</sub>e emissions and saving up to \$4.9B in 2030 escalating to \$8.8B by 2035. Our annual targets for FY22 were \$75m of energy savings and 400kt of CO<sub>2</sub>e reduction. Progressing towards these targets, RACE projects that were funded in FY22 are expected to have a cumulative potential impact of over \$250m in energy-related savings and 1.1Mt CO<sub>2</sub>e emissions reduction.



We will increase our focus on our impact in the coming and subsequent years. For further information on the impacts of our individual research projects, please refer to our Impact report on our website.



# Our board



**Louise Sylvan AM FAICD  
Chair**

Louise is an Adjunct Professor at the University of Sydney, Chair of Energy Consumers Australia, a non-executive director of The Australian Centre for Social Innovation (TACSI) and a Member of the Advisory Group of the Net Zero Australia project.

She was previously CEO of the Australian National Preventative Health Agency, a Commissioner of the Productivity Commission, Deputy Chair of the Australian Competition and Consumer Commission as well as President of Bush Heritage Australia and a non-executive director of Social Enterprise Finance Australia, Impact Investing Australia and the Australian Risk Policy Institute.



**Katherine Woodthorpe  
AO FAICD**

Dr Katherine Woodthorpe AO is an experienced Chair and non-executive director serving for more than 20 years on the boards of a variety of organisations including listed entities, government boards and for-purpose organisations. She has a strong track record in a broad range of innovation-dependent industries including healthcare, renewable energy and environmental and climate science. She has been cited in various media as one of Australia's most influential people in innovation.

Amongst her current appointments in the energy/climate field, she Chairs Natural Hazards Research Australia and is a Director of Anteotech Ltd and Vast Solar Pty Ltd. She was previously a Director of ARENA.



**Simon Smith**

Simon has over 20 years' experience in government decision-making, policy development, regulatory reform and organisational leadership. He has served as CEO/Secretary of large NSW public sector entities across industry policy, vocational education, environment, finance and first minister's portfolios.

Simon is currently employed as Chief Operating Officer of the ASX listed PEXA Group, which provides the digital services used by lawyers, conveyancer's and banks to settle over 80% of Australian property transactions.



**Ivor Frischknecht**

Ivor is an experienced Chief Executive Officer and Non-Executive Director working at the intersection of energy and climate, innovation and investment.

He was the inaugural CEO of the Australian Renewable Energy Agency and oversaw its \$2.1 billion portfolio for six years, during which it invested in 350+ ground-breaking clean energy projects. He is also a non-executive director of CleanCo Queensland and advises the Victorian Government's \$1.3B Solar Homes Program and Kilara Capital.



**Catherine Cooper**

Catherine is an experienced non-executive director having served on a significant number of boards for over 20 years. Career highlights include the establishment of a national joint venture Rural Bank, being a Telstra 'Business Woman of the Year' finalist twice, inclusion in an international management program, and winning a position in the ASX Top 200 Chairman's Mentoring program run by the AICD.

Catherine's current and past board roles include Energy Consumers Australia, Beston Global Foods (ASX), Deputy Chair of Australian Eggs RDC, Wine Australia RDC, Animal Health Australia, Energy Advocacy Panel member, Chair of SA EPA, Director of Grains Australia and as a Commissioner of the Australian Fisheries Management Authority. Catherine is very experienced in research development, strategy, evaluation and achieving commercial adaptation outcomes. A significant part of her board portfolio is with national RDC and CRC organisations. In addition, her strategic governance and risk management skills are well established.



**James Colbert**

James has over 20 years' experience spanning global corporates and start-ups. James brings deep experience in strategy, commercial and technology.

He has served as APAC Regional Director for global leader Schneider Electric and been at the forefront of the energy transition with technology and large generator/retailers.

James is currently a partner with KPMG in management consulting where he advises and supports businesses across energy, mining and property on strategy and technology.

He sits on the Board Advisory panel for Energy Consumers Australia and is the former Chair of the International MicroGrid Association.

# RACE for 2030

RELIABLE  
AFFORDABLE  
CLEAN  
ENERGY



Australian Government  
Department of Industry,  
Science and Resources

**AusIndustry**  
Cooperative Research  
Centres Program