

RACE for 2030

An aerial photograph of a long, curved highway bridge spanning a body of water. The bridge has multiple lanes with cars driving on it. The surrounding landscape is lush with green trees and vegetation. In the bottom right corner, there is a decorative graphic consisting of a series of white circles of varying sizes arranged in a semi-circular pattern.

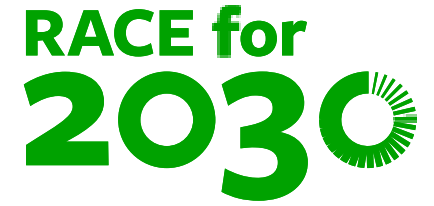
Research for a customer-centred clean energy transition

Chris Dunstan

Reliable Affordable Clean Energy for 2030 Cooperative Research Centre

Presentation to NCRE - 29th April 2021

Agenda



1. What is RACE for 2030
2. Research Overview
3. Some Research Themes
 - RACE for Homes
 - RACE for Everyone

Discussion:

- How can RACE for 2030 work with NCRE members in facilitating a customer-centred clean energy transition?
- How to involve consumer representatives in ongoing research?

About RACE for 2030

- 10 year, \$350m research collaboration
- Commenced July 2020
- About 70 partners (some currently being replaced)
- Four research programs, 17 themes, 55 PhDs
- 130 deliverables/milestones

Bringing together the whole energy value chain

Research and education partners



Government



International research affiliates



End users, industry associations



Bringing together the whole energy value chain

Network & retailers



Investors



Corporate technology



Start ups





Our Mission

Drive innovation for a secure, affordable, clean energy future

Our Vision

A flourishing low carbon Australia, where energy research improves quality of life and boosts energy productivity



Our Core Values

- We listen to the people's voice
- Speak from the heart
- Translate passion into action
- We build together
- Seek impact through innovation

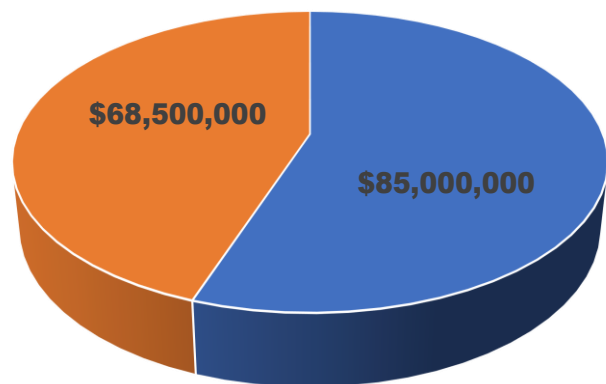
Who is RACE for 2030?



A 10 year research collaboration

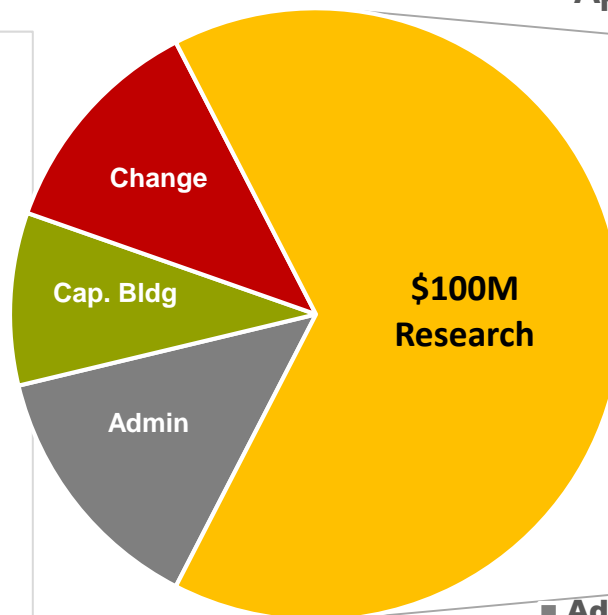
Partner in-kind contribution approx. \$200M

Cash contributions = \$153.5M

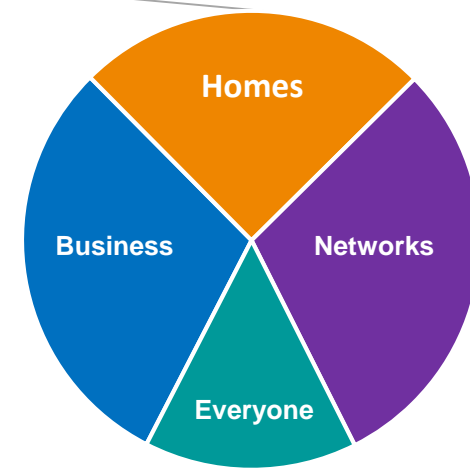


■ Partner Cash ■ Commonwealth Funds

Application of funds



■ Admin/Prog Mgmt
■ Educ/Capacity Building
■ Driving Change
■ RACE for Business
■ RACE for Homes
■ RACE for Networks
■ RACE for Everyone



The research: Energy innovation across the economy



Business



Homes



Networks



Everyone

Some key research themes

- H1 Residential Solar Pre-cooling / Pre-heating
- H2 Enhancing home thermal inertia for cost and load reduction
- H4 Rewarding flexibility: Customer-friendly cost reflective tariffs & incentives
- E1 What People Want: Trust building for collaborative win-win solutions
- E2 Foresighting and innovative planning

Initiating projects

- Projects can be proposed by research or industry
- Research undertaken by research partners
- Projects must have at least one or two “industry” partners

Initiating Projects

A. Opp. Ass't; Design Thinking;
Workshop; RACE Team; Govt...

B. Partner
initiated

Fast track

(≤\$150k & <6 months)

Partner submits **proposal**

Evaluate proposals* (PLs & CRO)

Full application invited

Submit full application

Evaluated by Prog Leader

Endorsed by CRO

Approved by CEO

Standard track

(≥\$150k or > 6 months)

Partner project nomination

Evaluate nominations

Open call for proposals*

Partners submit **proposal(s)**

Evaluate proposals (PLs & CRO)*

Invite full application

Partners submit **full application**

Review by Prog Leader; endorsed by CRO

Recommended by ReAC

Application approved by Board

Contract negotiation

Contract executed

*Option for invited proposal for
technology focussed projects
with significant proprietary IP

*External technical advice
where required

Discussion:

- How can RACE for 2030 work with NCRE members in facilitating a customer-centred clean energy transition?
- How to involve consumer representatives in RACE for 2030 research?

Update on Opportunity Assessments



Current Opportunity Assessments

- B1. Transformative energy productivity improvements in business.**
- B3. Decarbonising manufacturing through electrification.**
- B4. Flexible load management.**
- H1. Residential solar pre-cooling & pre-heating.**
- H4. Customer friendly electricity tariffs and incentives.**
- N1. Electric vehicle/ network integration.**
- N2. Low voltage network monitoring & enhanced DER hosting capacity.**
- E1. What people want & trust building**
- E3. Skills & training stocktake for clean DER transition.**

Other Opportunity Assessments

Next:

May '21

E2: Innovative foresighting and planning

B5: On-site anaerobic digestion for power generation

June '21

H2: Enhancing home thermal inertia

N4: Distribution system operator and beyond

Industry PhD Program updates

- 8 PhDs to be competitively advertised for recruitment via the universities in May
- Next round of call for topics from partners opening in May
- All submitted proposals must have confirmed industry and research partners

For any questions, please contact the
RACE Industry PhD Program Coordinator:
Dr Jess Breadsell
Jessica.breadsell@racefor2030.com.au

Theme	Research Partner	Industry Partner	Title
B4	UNSW	Buildings Alive	Fast-track to Net Zero Carbon buildings
E1	UTS	Solar Analytics	Customer first start-ups and the energy transition
E1	QUT	Essential Energy	An Australian Energy Sector Trust Index
H2	Curtin	ClimateKIC	Prefabricated solutions for retrofitting homes
H3	Curtin	Starling Energy	Portable green hydrogen solutions for households
H4	Griffith	Ausgrid	Tariffs and demand response for residential and industrial customers
N1	Monash	Enzen	Smart Charging Strategies for EVs in Smart Grids
N3	Monash	Planet Ark Power	Designing Distributed Renewable Micro-grids for Reliability

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Webinars



Mentoring



National & Global
Pitch &
Acceleration
opportunities

\$50,000



development grant prize
to a team with an
emerging tech idea

Fast Track projects underway



Project 1: CANVAS (Curtailment and Network Voltage Analysis Study)

Presented by Baran Yildiz (UNSW)

Project Partners: AGL, SAPN, Solar Analytics

Challenge: In parts of the network, higher penetration of distributed energy resources (DER) is pushing voltages - that are traditionally set high - beyond the recommended thresholds. When voltages increase beyond the recommended levels, DER inverters can reduce their outputs or completely turn off, causing financial losses for the owners (i.e. curtailment).

Opportunity: DER presents many opportunities and benefits to consumers and networks. However, there remains a limited evidence base regarding the extent and severity of DER curtailment in Australia, and its potential role in assisting network voltage management. Improved understanding of curtailment can support the integration of higher levels of DER.

Impact: Quantify and improve our understanding of curtailment by studying a fleet of Virtual Power Plant (VPP) residential participants located in South Australia, and their inverter operation. Understand energy user perceptions of curtailment and fairness of curtailment.



Project 2: Green Wave (net zero precincts)

Presented by Ed Langham (UTS)

Project Partners: Curtin, Monash, UTS

Challenge: Between large corporations and government agencies there are numerous net zero strategies and commitments, which have caused confusion in industries and the broader community.

Opportunities: This project looks at net zero commitments in university precincts at three universities - Curtin, Monash, and UTS. These institutes will leverage their campuses and unique research and innovation capabilities to reduce emissions. They want to establish a roadmap for identifying multiple net zero opportunities that can be employed at scale.

Impact: Lay foundations for collaborative decarbonisation solutions that build legitimacy and provide examples of how deep stakeholder engagement can improve planning processes and lead to better investment decisions.



Project 3: One Million Homes

Presented by Chris Lee (ClimateKIC)

Project Partners: NSW DPIE, Vic. DELWP, Energy Efficiency Council, Planet Ark Power, Curtin University, UTS

Challenge: Australian homes are very energy inefficient. Existing support programs are not highly scalable.

Opportunities: One Million Homes aims to support a rapid scale-up scheme of energy efficiency retrofits for large-scale impact across Australia. The project will identify barriers, knowledge gaps, build capability and enhance existing industry and government schemes, by implementing energy efficiency retrofits in at least one million homes.

Impact: The outputs of this research will be used to inform the work of a coalition of organisations working to implement large-scale energy efficiency retrofits using a public-private financing model.



Project 4: Innovative storage for commercial+industrial cooling

Presented by Frank Bruno (UniSA)

Project Partners: Glaciem, A2EP, UniSA and RMIT

Challenge: Heating Ventilation Air-conditioning Cooling and Refrigeration (HVAC-R) uses over 22% of Australia's electricity, and is a key contributor to peak electricity demand.

Opportunities: Using thermal energy storage to improve flexibility of HVAC-R can help reduce the network peak. However, existing thermal energy storage systems involve complex processes that add to the system costs and limit suitable industrial applications. This project seeks to remove a step in the process to make this technology economic for more businesses.

Impact: This project will help increase the network hosting capacity for renewable energy and reduce electricity costs for all customers.



OA - E3 Developing the future energy workforce



Presented by Holly Taylor (Energy Efficiency Council)

Opportunity: This Opportunity Assessment will prioritise research that leverages existing organisations and channels so that skills, innovation and learning initiatives can be quickly scaled up to facilitate the energy transition with a customer centric and increasingly decentralised energy system.

Impact: The impacts of this theme will be broadly felt across the energy sector as well as allied sectors. A key function of this theme is to quantify the potential and actual growth in the size of the decentralised energy products and services market in Australia by 2030 and 2035, with a specific focus on workforce and employment sizing and modelling.

OA – N1 Electric vehicles and the grid

Presented by Roger Dargaville (Monash University)

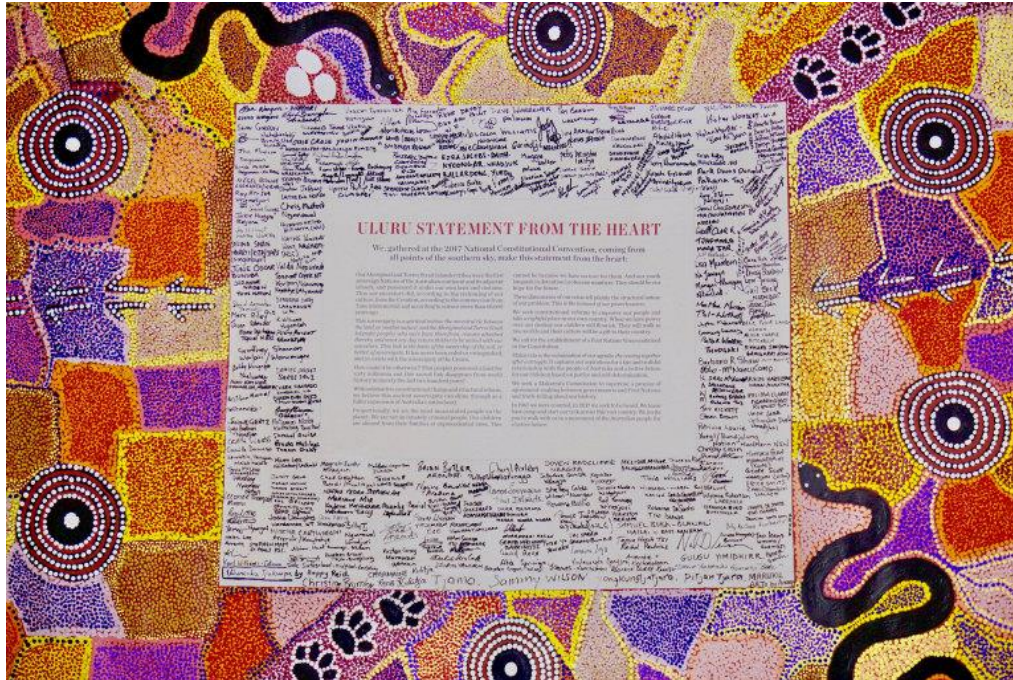


Opportunity: Large scale EV uptake will produce significant addition instantaneous demand on the grid if not optimised through either managed charging or V2G. Left unmanaged it could lead to short term reliability reduction at as little as 10% EV penetration, leading to wholesale cost increases of up to 10%; with only low power charging stations and a total increase in peak demand of as much as 5 GW (10-15%). Alleviating these impacts will cost billions.

Impact: This project will identify benefits and costs of integration to address barriers as well as enablers of EV integration and lead to reduction in energy costs to consumers as well as reducing emissions. We want to identify potential EV uptake pathways and commercialisation opportunities.

Well managed smart charging and V2G can alleviate most of the barriers within this theme.

Acknowledgement of country



We acknowledge the Traditional Owners of the ancestral lands in the various locations from which we meet today and recognise their continuing connection to the land, waters and culture.

We pay respect to Elders past, present and emerging – acknowledging them as the traditional custodians of knowledge of these lands.

RACE Business Insights Group

- We wanted more energy users to be engaged with RACE without having to make a partnership commitment.
- We want to attract initially 35 business energy users to regular updates on energy innovation and RACE activities.
- This is a place for partners to engage with end-users and to find willing hosts for your projects.
- Done in partnership with A2EP, who have commenced recruitment.
- First member is Steve Parbery from the Refrigerated Warehouse and Transport Association.
- For more information contact Martina Lyons at martina.lyons@racefor2030.com.au