Potential pathways for a promising offshore renewable energy sector:

The Australian Blue Economy CRC

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Blue Economy CRC RPL

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The Australian Blue Economy & the Blue Economy CRC

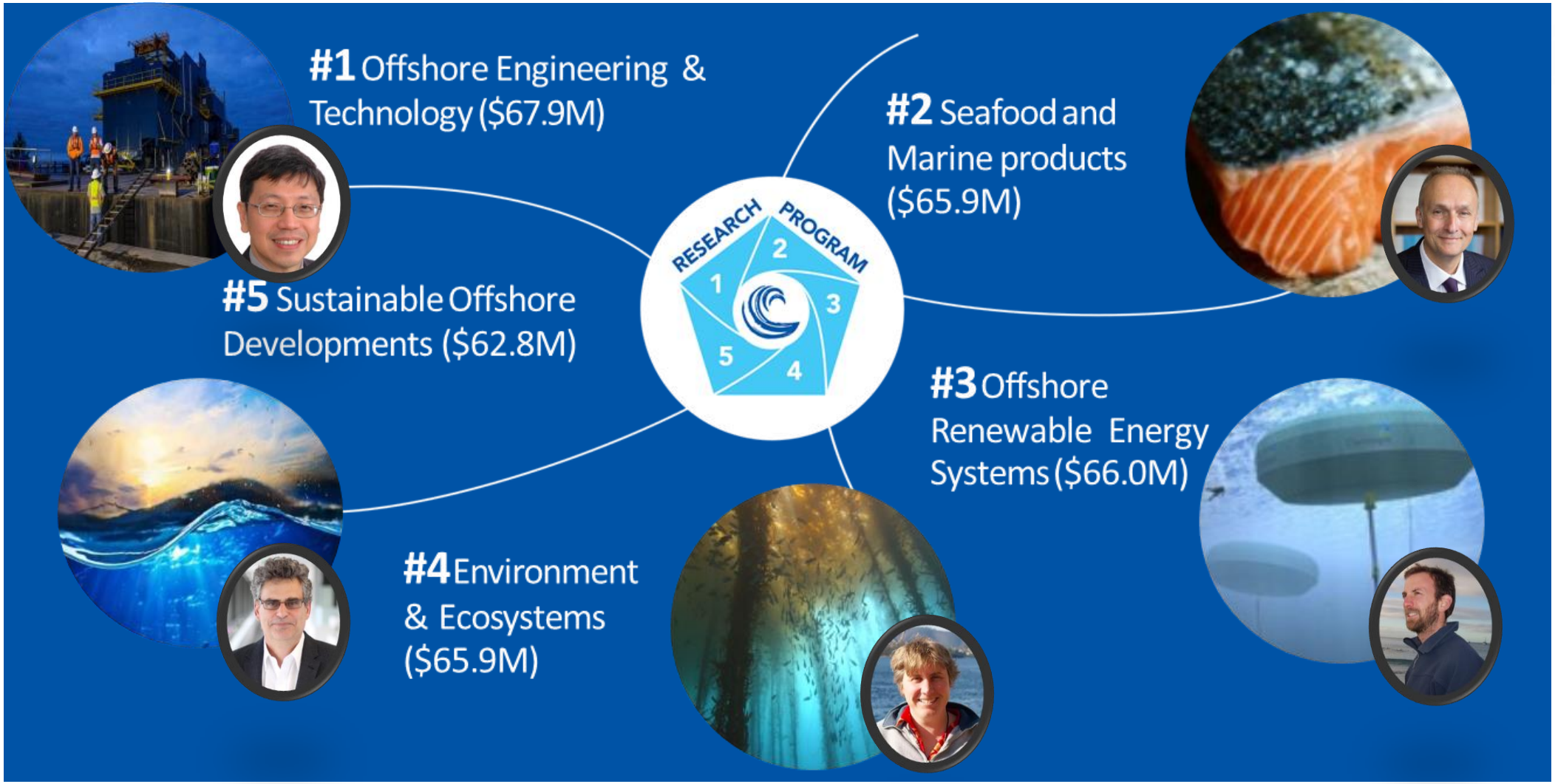
- Australia's Blue Economy is worth ~$AU47b pa, growing at 2-3X the rest of Australia's GDP
- Part of a global blue economy, expected to double by 2030 to $US3t.
- Australian blue economy products fetch high premium on basis of perceived quality
- High incentives for growth
- To support sustainable growth; the Australian Commonwealth is supporting the 10-yr Blue Economy Cooperative Research Centre

Vision: The Blue Economy CRC will enhance development of Australia's sustainable blue economy through the delivery of world-class, industry focussed research into integrated seafood and renewable energy production systems.

The Blue Economy CRC Research Programs

Dr John Whittington
CEO

Prof Irene Penesis
Research Director

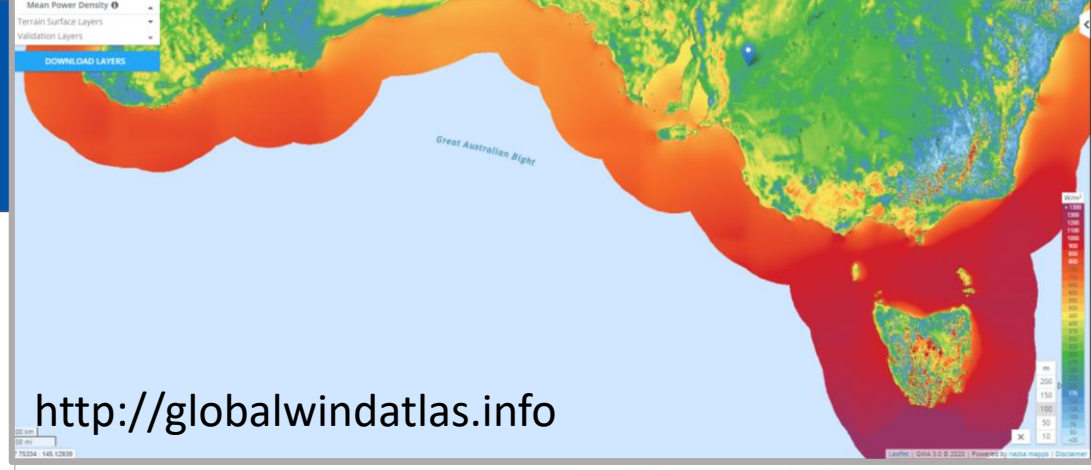


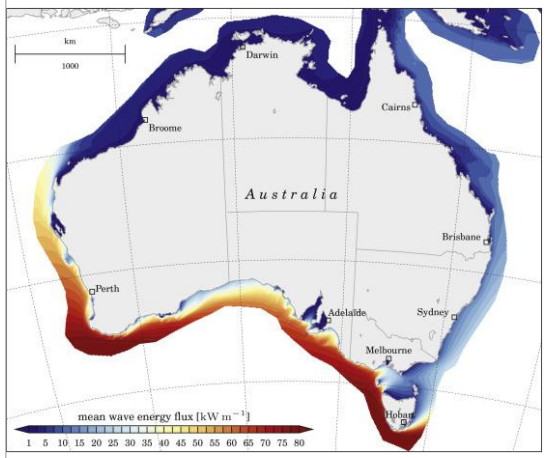
Acknowledgement of our CRC partners

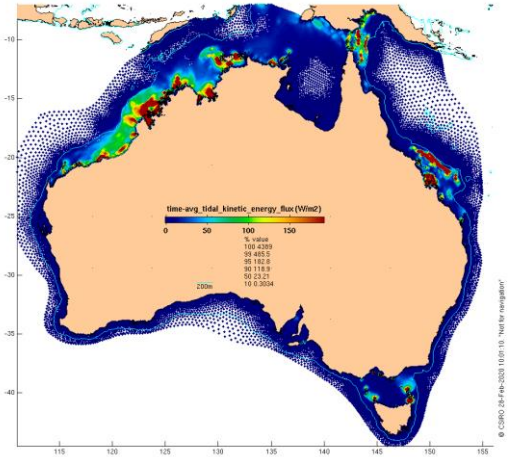
The Australian ORE Opportunity

Australia possesses immense high quality, temporally consistent offshore renewable energy resources :

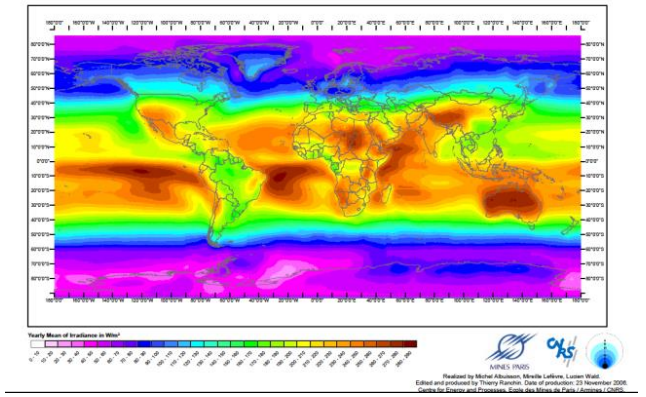
- **High resource availability** (wind, solar, wave, tidal)
- 85% of Australia's population lives within 50km of the coast means **Distinct advantages** over the need for long distribution networks to in-land renewable energy farms.
- Early stage innovation (Atlantis, OPT, Bombora all have Australian origins) + CarnegieCE + WaveSwell Energy
- Distributed generation reduces dependence on storage in high penetration renewable scenarios
- Established offshore industry: opportunity for **sustainable transition**







Averaged Solar Radiation 1990-2004



Challenges for ORE in Australia

- Why go offshore when there is so much land for onshore wind and solar
- There is not enough energy demand in Australia to justify heading offshore
- Relative cost of offshore renewable energy
- Australia is too far away from major offshore renewable (wind) hubs to be competitive
- Immature regulatory framework (offshore clean energy infrastructure bill in preparation)
- Local environmental interactions unknown
- Not identified as priority low emission technologies in Australia (solar and storage, CCS,..)
- …

The Offshore Renewable Energy Systems Research Program (RP3)

Program Objectives: *Identify, develop and demonstrate offshore renewable energy systems, optimised for co-located off-grid offshore operations.*

Work Package 1:

Development of energy system models for offshore industry, encompassing resource, techno-economic, socio-environmental components, to support market development

Scoping Projects:

- Energy demand assessment of offsho
- Offshore hybrid energy systems (ener review)

Work Package 2

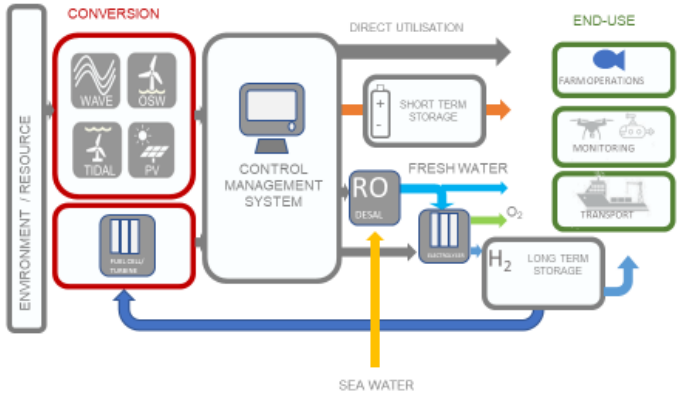
Supporting ongoing development of Offshore Renewable Energy Converter technologies, increasing survivability and decreasing environmental impact, capital and operating costs.

Scoping projects:

- Offshore hybrid energy systems (OREC oppor review)

General projects:

- Mooring tensioner for WECs (CarnegieCE)



Work Package 3

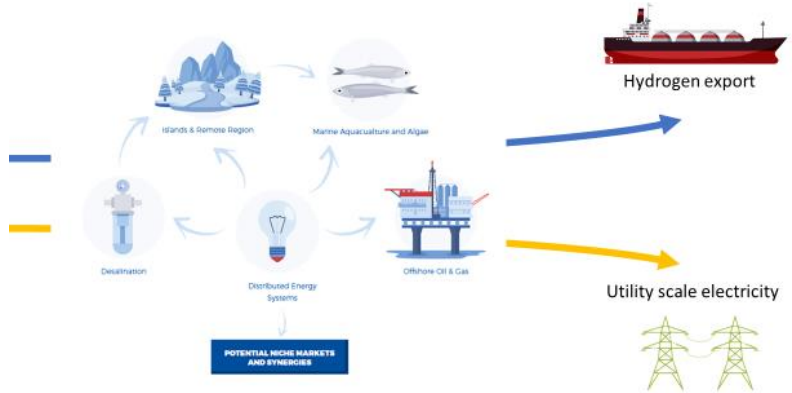
Lab scale demonstration of an islanded offshore renewable energy system (offshore hybrid hydrogen microgrid) to meet market resource demand (electricity, freshwater, hydrogen, oxygen,...)

Scoping projects:

- Offshore hybrid energy systems (Control systems opportunities review)
- Hydrogen Storage and Distribution

General projects:

- DC microgrids for offshore application (Griffith University)



Work Package 4

Offshore scale demonstration of operational offshore renewable energy system, including hybrid conversion of offshore energy to electricity and hydrogen, via islanded microgrid, delivering to established (diesel displacement) market demand

Infrastructure

Offshore Hydrogen Microgrid Infrastructure – 3 phase plan

- 700 kW ITM Power electrolyser
- 65kW Capstone C65 Hydrogen Microturbine
- DC Microgrid network

An interlinked work-program (links to RP3)

- Offshore structures
- Operations and Maintenance
- Monitoring systems
- Licensing/Standards
- OHS
- Vessel requirements (H_2/Electric)
- Hazard identification
- Risk management/mitigation
- Commissioning/Logistics
- Corrosion
- Moorings

RP1
Offshore Engineering & Technology

RP5
Sustainable Ocean Developments

- Regulatory framework
- Permitting and Licensing
- Social acceptance
- Market assessments
- Supply chain development
- Stakeholder engagement
- Workforce profiling

RP3
Offshore Renewable Energy Systems

- Energy for offshore operations
- Oxygen application in aquaculture
- Kelp aquaculture/other biomass
- Bioenergy/Negative Emissions
- Multi-use platforms
- Freshwater needs

RP2
Seafood & Marine

RP4
Environment & Ecosystems

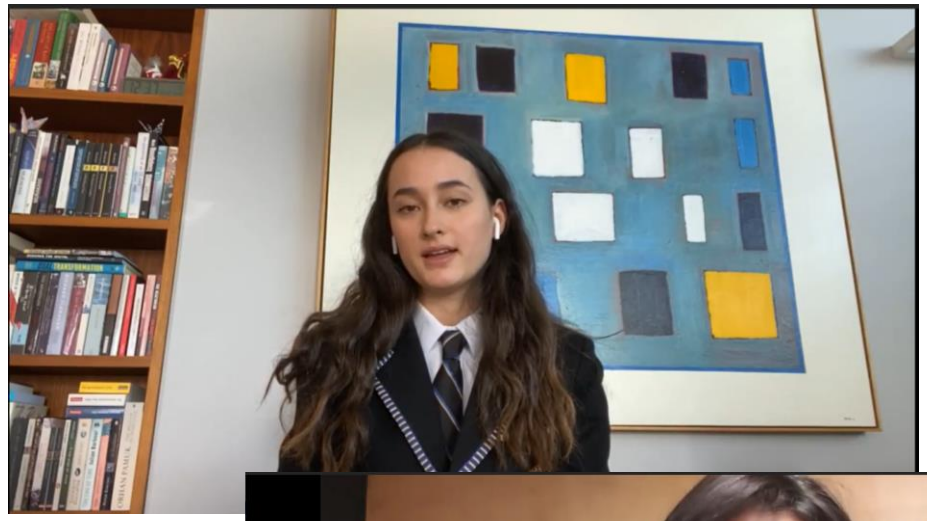
- Environmental effects
- Site suitability
- Marine Spatial Planning
- Integrated system modelling
- Integrated sensor networks
- Decision support tools
- Digital frameworks

Education & Training

- The Blue Economy CRC is establishing a strong education program to support emergence of future innovation leaders in Australia's Blue Economy
- The PhD scholar and Postdoctoral Fellow programs carry a strong emphasis on industry placements and international exchange

Community & Outreach

- Monthly webinar series established, with high uptake (routinely >200 attendees). Recordings at Blue Economy CRC YouTube channel. https://www.youtube.com/channel/UCC61VVwFrN7KIkc6uHVJ5mA
- School engagement during a COVID year limited to virtual exchange
- Regular newsletters / Social media (Twitter/LinkedIn) and Web updates



The Offshore Renewable Energy Systems Program

Will advance technological and commercial readiness of emerging offshore renewable energy system technologies, so they can fulfil their potential to decarbonise societal demands.

CRC seeking to strengthen its international collaborations, working towards common goals. CRC able to fund partner contributions to larger projects.

Future projects will deliver to program aims (and milestones) and realise the Blue Economy CRC vision



Thank you

Blue Economy CRC Research Program 3
Offshore Renewable Energy Systems

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Kosala Gunawardene (AUT)

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The CRC Program supports industry-led collaborations between industry, researchers and the community.

Further information about the CRC Program is available at www.business.gov.au.

BLUE ECONOMY
COOPERATIVE RESEARCH CENTRE

Australian Government
Department of Industry, Science, Energy and Resources

Business
Cooperative Research Centres Program

Delivering Innovation in Sustainable Seafood & Renewable Energy Production for a Marine Nation

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