



ANTARCTIC CLIMATE
& ECOSYSTEMS CRC

Antarctic Climate & Ecosystems Cooperative Research Centre

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Submission to the CRC Programme Review

Dear Mr Miles,

Thank you for the opportunity to make a submission to the review of Australia's Cooperative Research Centre Programme.

This submission comes from the perspective of a CRC involved in public good research – the ACE CRC. The Centre was originally funded in 1991 in Round 1 of the CRC Programme and is now recognised as a world leader in Antarctic and Southern Ocean research. The impact of ACE CRC research has been profound, as reflected in our publication and citation metrics, national and international recognition of our staff, and – most importantly – our focus on delivering science outputs to end users through innovative communication.

In our view the Terms of Reference of the review take a particularly narrow view of industry as the end-users of CRC research, and it is clear that there is a desire on the part of the Government to focus more on industry-driven research. However we submit that public good CRCs also deliver very significant economic benefits to Australia and have, in many cases, been the best performing CRCs in terms of delivering research outputs to a broad range of end users. The ACE CRC has demonstrated this over its lifetime, and we offer the following examples of our impact:

- **Fisheries management:** Results from ACE CRC marine research in the Southern Ocean have informed precautionary catch limits for krill in areas off East Antarctica. Krill forms the base of the food chain in the Southern Ocean for many species and must be harvested sustainably to avoid the collapse of fisheries. The ACE CRC has been at the forefront of this work.
- **Ocean acidification:** Experimental and modelling research by the ACE CRC and its partners on the effects of ocean acidification on Antarctic krill has led to the adoption of a new international approach to the management of other species. This work delivers directly on the global issue of maintaining food security through effective fisheries management.
- **Understanding Australian climate:** ACE CRC research has used high-resolution climate records from Antarctic ice cores to identify important processes that couple Antarctic and Australian climate. This work has revealed that the major drought in southwest Western Australia appears unprecedented in the past 700 years, and is also revealing links to East Australian rainfall. The work provides an improved basis for assessing long-term water resource needs as well as providing valuable information to Australian farmers.
- **Intergovernmental Panel on Climate Change (IPCC):** The IPCC assessments are the most significant process informing international negotiations on the state of the scientific understanding of climate change. The ACE CRC has played a particularly prominent and influential role in the IPCC, both through the science it delivered and through leadership

The ACE CRC is a unique collaboration between core partners the Australian Antarctic Division, CSIRO, the University of Tasmania, the Australian Government's Department of Climate Change & Energy Efficiency, the Alfred Wegener Institute for Polar and Marine Research (Germany) and the National Institute of Water and Atmospheric Research Ltd (New Zealand) and a consortium of supporting partners. It is funded by the Australian Government's Cooperative Research Centres Program.



An Australian Government Initiative



roles in the assessment itself. The Australian delegations to the IPCC and Framework Convention on Climate Change have relied heavily on ACE CRC science to support their position.

- **Climate Futures for Tasmania:** This project built on the climate science of the ACE CRC to deliver tailored climate projections for particular sectors of the Tasmanian economy including agriculture, viticulture, water and catchments, and coastal infrastructure¹. These assessments have in turn been used to guide adaptation strategies developed by companies as diverse as Aurora Energy, Fruit Growers Tasmania, Tasglobal Seeds, Tasmanian Dairying, Tassal, Wine Tasmania, and local councils.
- **Sea Level Rise “Online Calculator”:** The ACE CRC has established itself as a leader in sea level rise research and identified a need for information on sea level rise to be targeted to specific locations and presented in a manner suitable for a wide range of users. The end product, an online tool, *Canute*, provides estimates of the likelihood of flooding from the sea during this century, taking into account sea-level rise and the effects of tides and storm surges, for the entire Australian coastline at 2.5 km intervals. *Canute* is used by more than 400 registered users including local councils and planners; major infrastructure asset owners, investors and operators; and environmental consultants (including two SMEs that have participated as partners in the ACE CRC).
- **Whole of Government:** The ACE CRC has delivered scientific knowledge tailored to the needs of federal and state government departments, including those responsible for the environment, foreign affairs, defence, education and industry. Plain-language briefings delivered face-to-face and in Position Analyses have been particularly well-received by these stakeholders. Australia’s research activity in Antarctica and the Southern Ocean also underpins our sovereignty and security interests in the region.
- **The community:** The ACE CRC has devoted considerable effort to communicating Antarctic science to the public. We have pioneered novel approaches to outreach, including the “Climate Conversations” initiative in which ACE CRC researchers communicate the latest science to town hall meetings in regional Tasmania and Australia. ACE has developed a very high profile in the media to inform the public about our science. The impact of this work has been the raising of awareness in the Australian community of what the latest science says about climate change and of the importance of Antarctica to Australia and the rest of the globe.

Return on investment

In 2012 the ACE CRC commissioned an independent report, conducted by Agrans Research, to assess the impact of ACE CRC research outcomes (available on request)². This report estimated the value of the impact on Gross Domestic Product arising from ACE CRC research. Using accepted economic models, the total net present value of the annual net benefits over 100 years attributed to the ACE CRC is estimated at \$842 million.

¹ http://www.dpac.tas.gov.au/divisions/climatechange/adapting/adaptation_case_studies

² Chudleigh, P., B. White and J. Lai (2012), Impact Assistance with CRC mid-term review, Agrans Research, 41pp.

The quality of ACE CRC science has helped the Centre establish itself as a valued collaborator in the international community. This has allowed ACE to leverage substantial international investment in experiments in the Australian region. Examples include:

- Experiments led by ACE CRC research programs have attracted more than \$74M of overseas investment in joint experiments over the life of the Centre, including ship and aircraft time, and capital for research infrastructure from the USA, Japan, New Zealand, France, Belgium, UK, Germany and internationally coordinated programs.
- ACE CRC-funded research projects have successfully attracted world-class collaborators from dozens of countries and provided access to capability not held within Australian institutions.
- Users of the *Canute* sea level rise tool have reported on the efficiency of having all the scientific information in one place and accessible to decision makers. A conservative, independent estimate of the time saved by each user in not having to source and compile the material themselves is \$20,000. If we take the >400 discreet users to represent 100 organisations, including consulting firms, utilities, insurance firms, local councils, and State and Federal agencies, this represents a net saving to them of more than \$2M.

To specifically address Terms of Reference A: The existing CRC Programme provides for a mix of CRCs that deliver end-user driven research on a range of timelines. Our recommendation is that the existing programme has the balance about right, with a focus on end-user driven research rather than a single, narrow focus on industry as end-users. We argue strongly that the ACE CRC helps industries adapt to change, given the risks they face of climate change impacts, and that we significantly improve economic outcomes for the nation. Some of these impacts are immediate, but the real economic benefits are in the form of avoided costs on much longer time scales. If the focus of the CRC Programme is to become narrower, it is imperative that an alternative funding model for collaborative research that delivers economic benefits on timelines greater than four years is implemented. Alternatively, the CRC Programme could become the primary vehicle for public good research, while Industry Growth Centres take the lead on research that is strongly industry-led. The ARC Linkage Program is not a suitable alternative given the strong academic focus of the University Sector and inability of PFRAs to fully participate, and it is our view that any alternative funding model should be funded through the relevant Federal Department rather than the Australian Research Council.

The importance of partnerships

Australian research institutions are becoming increasingly specialised. This is in part due to tighter budgets as well as more strategic organisational leadership. Proposed changes to the Higher Education system are likely to drive universities to become even more specialised, thus continuing the existing trend. Hence we are continuing to move away from the old paradigm where institutions owned all their own capability to an innovation system where large, multi-disciplinary research can only be achieved by drawing capability from different institutions. Efficiencies and value are driven by facilitating collaboration and the CRC programme delivers that for a relatively modest investment that avoids duplicating capability across the system. Big science questions that transcend national boundaries, including a great deal of Antarctic and Southern Ocean research, also require international partnerships and shared research infrastructure, and CRCs are often better placed to establish such partnerships than PFRAs or universities.

To specifically address Terms of Reference E: Presently, there are very few mechanisms in Australia's innovation system to enable genuine, enduring collaborations at scale. Publicly Funded Research Agencies (PFRAs) and universities have different business and funding models. They compete for resources and have different stakeholders. It is therefore imperative that mechanisms like CRCs are in place to capture the synergies between these organisations and facilitate genuine collaboration. It does not simply happen by co-locating institutions; it requires funding and leadership. Australian Government policies must provide suitable mechanisms for building teams across the innovation system that deliver economic benefits to the nation and facilitate long-term, strategic research programs that will deliver in the medium to long term. CRCs are the only model that facilitates collaboration between universities and PFRAs. The ARC Linkage program remains highly academically focused and makes engagement with PFRAs extremely difficult. CSIRO, for example, under its current business model where it must leverage appropriation funding to generate a minimum of 40% external earnings, cannot 'buy in' to ARC Linkage programs because it does not generate a revenue stream. The ARC funds research - that is its mandate and it does it well. However, it does not mandate any form of end-user engagement, nor does the promotion of academic staff or university rankings within the Australian system reward it. Any move to an ARC-funded model would severely restrict the strong end-user pull of CRC research programs. The IP arrangements between universities and their employees, in which investigator-derived IP sits with the investigator rather than the institution, would further complicate any model within the ARC.

Engagement with SMEs

The ACE CRC has had two primary SME partners in the last funding round: Pitt and Sherry Consulting and SGS Consulting. Both partners value the work of the ACE CRC in the zone of their own interests, particularly in environmental consulting and sea level rise. ACE CRC research activities, such as the Climate Futures Tasmania project, helped these businesses develop some brand recognition, but both businesses have identified improvements that could be made to the relationship, including:

- Ensuring CRC researchers have time to engage with SME partners. There is a tendency for scientists to fully commit to a project load which makes it difficult to engage them in a timely manner, given the peaks and troughs of consultancy loads. A more defined and strategic project portfolio and business plan would help address this.
- Improved mechanisms by which SMEs can influence the research agenda at a CRC, although we note this may be unique to this CRC given the nature of the research we do in Antarctica and the Southern Ocean which takes years to plan and conduct.
- Opportunities to engage SMEs collectively given they are likely to have common business interests, rather than via a series of bilateral relationships with the CRC.

To specifically address Terms of Reference B: It can be difficult for SMEs to engage with CRCs and improvements can be made to the process. SMEs do not have significant resources to commit and are generally looking to extract expertise on areas within their business interests. We have heard that it can be hard to access scientists at exactly the time a consulting project requires advice, or to influence the research direction of a CRC. A more nimble business model that enables SMEs to participate in the CRC for a shorter period of time and/or that accommodates well-defined interactions with scientists, including a commitment of scientist time, could address this.

Education and training

The ACE CRC has provided one of the most important national training centres in environmental science over the past 20 years. Many of today's national leaders were trained at the ACE CRC, with many ACE graduates also taking prestigious posts overseas. Antarctic expeditions led by the ACE CRC have provided the platform for much of the science conducted by other organisations in Australia and built skills and capacity among post-graduate students from universities throughout Australia and overseas. The ACE CRC has also established PhD co-supervision arrangements with many leading international institutes and universities in Asia, the Americas and Europe, providing for greater exchange of expertise and rising talent.

To specifically address Terms of Reference C: The unique connection between universities and PFRAs through the CRC Programme is embedded in Postdoctoral appointments that bridge the gap between attention to national needs (as emphasised by PFRAs) and attention to advancing more fundamental science as emphasised by the university sector and the Australian Research Council. This connection grounds universities and ensures conceptual renewal within PFRAs. It influences the way universities think but falls well short of driving cultural change in universities. That would best be achieved by classifying CRCs as Category 1 for ARC Block Grant Funding thus bringing the programme in line with other competitive grant processes, including the Research Development Corporations. The modest investment in Postdoctoral candidates through the CRC programme builds capacity in the innovation system, creating the next generation of critical thinkers and domain experts. It is a key mechanism by which world-class capability is nurtured within Australia's innovation system and it is only through sustained investment that this capability is retained to deliver world-class science. A strongly industry-focussed model where Commonwealth funding is limited to four years, as is proposed for Industry Growth Centres, would effectively eliminate the capacity building role currently played by CRCs.

Concluding Remarks

The CRC Programme has been a major success within Australia's innovation system. We strongly recommend that it be maintained to include a mix of end-user driven research that does not purely focus on short-term economic returns. Public good research plays a critical role in delivering Australia's economic, social and environmental wellbeing over the medium to long term, and CRCs are the primary mechanism by which this is currently achieved.

Sincerely,

Prof Anthony Worby
CEO

Dr Katherine Woodthorpe
Chair