Australian National University

Submission on Australia's draft National Science and Research Priorities

September 2023

ANU Institute for Climate, Energy and Disaster Solutions

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This submission draws on information from ICEDS' first submission to the National Science and Research Priorities. As such, we would like to acknowledge our colleagues and their contributions to that submission:
Dr Anna Sanders, Hon Prof Bob Webb, Caitlyn Baljak, Carla Alzamora, Dharani Sabba, Ewelina Przybyszewski, Prof Frank Jotzo, Georgina Robinson, Prof Lorrae Van Kerkhoff, Prof Ken Baldwin, Prof Mark Howden, Prof Roslyn Prinsley, Dr Steven Crimp, Prof Steven Dovers, Prof John Handmer.

Australian National University
Institute for Climate, Energy & Disaster Solutions

27 September 2023

The Hon Ed Husic
Minister for Industry and Science
House of Representatives
Parliament House
PO Box 6022
Canberra ACT 2600

Re: Australia's draft National Science and Research Priorities

Dear The Hon Ed Husic

Please find enclosed a submission by the ANU Institute for Climate, Energy and Disaster Solutions (ICEDS) on Australia's draft National Science and Research Priorities.

ICEDS connects industry, governments and communities with climate, energy & disaster-risk research from the Australian National University. Our goal is to advance innovative solutions to address climate change, energy system transitions and disasters. We facilitate integrated research, teaching and policy engagement across disciplines.

Our network of ANU researchers will gladly offer further consultation. ICEDS works alongside experts who are currently involved in the spectrum of research priorities identified in this submission.

Sincerely,

Professor Mark Howden
Director, Institute for Climate, Energy and Disaster Solutions

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Introduction

The ANU Institute for Climate, Energy & Disaster Solutions (ICEDS) is pleased to submit a second response on Australia's Science and Research Priorities. Our initial submission in April drew upon ANU's expertise and identified national challenges related to climate, energy, water, disasters, and regional partnerships in the Asia-Pacific. In the first submission we identified national challenges relating to:

1. Climate change mitigation: emissions reduction;
2. Energy transitions: accelerating just and effective energy transitions;
3. Greenhouse gas removal: including landscape carbon sequestration;
4. Climate change adaptation;
5. Disaster solutions: especially climate related disasters;
6. Water futures;
7. Place-based solutions, land use change, and urban systems;
8. Institutional and implementation arrangements for research and development (R&D).

In the first submission, ICEDS stressed the importance of integrated research, policy, and interdisciplinary innovation to address them.

This submission is a brief response to the draft national priorities consultation paper, offering advice to ensure Australia's research and innovation system meets national capability needs. While we endorse the emphasis given to dealing with climate change and emissions reduction, a greater emphasis should be given to social and ecological dimensions of climate adaptation, especially disaster preparedness and socio-ecological resilience. We maintain that Australia needs to invest in more research to support adaptation policy and planning at the local, state, national and international scales and to ensure this is integrated with disaster planning and prevention.

The consultation paper seeks additional details on implementing critical research areas (questions 4 and 5). In this submission, ICEDS makes recommendations of priorities and improvements to the nation's research and innovation systems to effectively achieve the draft National Science and Research Priorities. This ICEDS response further articulates the directions and recommendations provided in our first submission.

Implementation processes and arrangements

These recommendations relate to improvements to the systems underpinning Australia's science, research and innovation to support the critical research priorities identified in the draft National Science and Research Priorities.

Recommendation 1:
Improved delivery, targeted investment and implementation through interagency cooperation

To ensure Australia has the capabilities to address the national priorities and make progress on the proposed critical research areas we recommend that the Commonwealth Government:

- Increase funding and national coordination of climate change R&D with particular attention to adaptation

- Establish a new, well-resourced, national climate R&D agency to strategically fund R&D and mobilise community and industry responses

- Establish new Commonwealth funded PhD scholarships and Postdoctoral Fellowships that target the national research priorities and critical research areas.

- Facilitate opportunities to embed government staff in formalised adaptation professional courses to extend current capabilities.

Recommendation 2:
Adaptive, trans-disciplinary approaches to complex challenges

Australia's major national challenges require models of governance that are supported by adaptive, engaged, trans-disciplinary modes of research. Meeting this challenge requires traditional departments for disciplinary research be altered to support: institutes for inter- and trans-disciplinary engagement, problem-focused research; and accelerators for driving social and industrial change. This approach acknowledges that, in order to create adaptive governance systems, changes are required in how scientific research is structured and in how our research institutions interact with society.

To ensure the necessary capabilities to address complex futures, we recommend that the Commonwealth Government adopt research implementation arrangements that:

- Enable trans-disciplinary, engaged, problem-focused approaches to complex challenges.
- Encourage long-term perspectives in research planning and investment for critical research areas.
- Develop long-term strategic partnerships between Commonwealth agencies responsible for climate change, science and industry policy with research agencies (e.g., ANU). Include secondments and pathways for public servants to undertake post-graduate research on critical research areas.
- Formalise regional, community and industry engagement approaches to catalyse planning for complex and uncertain futures. Include exploration of adaptation pathways.
- Support the work of cross-disciplinary research institutes (e.g., ICEDS) and support regional universities and institutes to develop place-based and regionally specific adaptation research.
- Allow stronger co-design principles to be established when developing funding and governance models to support climate change adaptation.

Recommendation 3:
International cooperation

ICEDS recommends that international cooperation is central to delivering on Australia's national research priorities in response to climate change in the Asia Pacific region. To this end, Australia needs to increase international cooperation on research and development because:

- Australia is a small contributor to the global research efforts but makes significant contributions in areas such as ocean, climate and Antarctic science, water and land management, and biodiversity conservation.
- Australia's research is relevant to the many Pacific states.
- Australia has a huge area of ocean and needs to advance its understanding of these systems.
- Australia can learn from advances in knowledge generated overseas.
- There is much to be gained by engaging cooperatively in international research endeavours.

Recommendation 4:
Policy settings and institutional arrangements

ICEDS recommends developing mechanisms to support the integrity and independence of Australia's science, research and innovation industry. To do so will require robust institutional arrangements separating scientific research and political decision-making, including:

- Independent oversight mechanisms to evaluate research funding decisions
- Open and transparent communication between researchers and policy-makers while maintaining research independence
- The establishment of a statutory authority dedicated to advancing climate responses and sustainability transformations. The authority would be empowered to mobilise collaboration between policy and research organisations, and engagement with communities and industry to tackle climate, energy and sustainability challenges. To do so, the statutory body should work across levels of government to allow involvement in design and implementation at the local, state and territory, and national levels.
- The development of effective monitoring and evaluation oversight of investments to ensure they result in sufficient impact and represent value for money.

Thematic research priorities

These recommendations relate to specific topics that are either under-represented in the draft National Science and Research Priorities, or that require a different approach.

Recommendation 5:
More investment in energy transitions

The draft national priorities recognize the urgent need for the rapid decarbonisation of various sectors within the economy, particularly those with high emissions: construction, energy, transport, and agriculture. Effectively addressing this need necessitates a holistic approach encompassing technological advancements, policy enhancements, and social innovations that facilitate broad-scale transitions toward a low-carbon economy.

To ensure that our research efforts are strategically aligned with the critical aspects of transitioning our energy landscape, ICEDS proposes the following recommendations:

- Increase R&D to inform and guide Australia’s Energy Transition and to ensure that it is efficient, economic and effective. This includes research on electricity generation, transmission and storage infrastructure and mapping the trajectory to net zero
- Understand innovative and cost-effective financing options that address credit constraints and that could provide returns on Government investment in new industries, including hydrogen production
- Develop technology innovation partnerships and green economy trade agreements, to overcome coordination problems that constrain the growth of cross-border supply chains.

Recommendation 6:
Attention to disaster preparedness

As climate change exacerbates Australia's disaster risk, additional funding must be directed towards disaster solutions. Research priorities must include:

- Identification, development, and testing of innovative solutions that can effectively mitigate natural hazards and pre-empt disasters
- Understanding of underlying causes of vulnerability to disasters including those rooted in social inequity
- Investment in research aimed at reducing the financial burden of disaster preparedness and response.
- Investment in multi-hazard research to minimize compounding impacts of climate-driven disasters
- Coordination of research efforts to embed disaster preparedness across policy sectors as a collective responsibility and not solely the domain of emergency response agencies.

Recommendation 7:
Integration of urban systems in health and wellbeing research

Community health is inextricably linked to the environment in which populations live. Better understanding and optimisation of living conditions through urban systems would deliver a more holistic approach to the health and wellbeing of communities across Australia. Increased investment in urban science would address the knowledge gap presented by Australia's fragmented approach to urban research, and support the transition to sustainable, and climate-friendly urban systems.

Recommendation 8:
Enhanced innovation and research support for carbon sequestration and greenhouse gas removal

The draft national priorities recognise the need for increased carbon sequestration and for this to contribute to habitat and biodiversity conservation. However, Australia lacks an innovation and research hub for effective greenhouse gas removal methods and technologies. Although Australia is a global front-runner in terms of landscape management to achieve greenhouse gas removal, through mechanisms such as the Emissions Reduction Fund (ERF), Australia lacks research investment into landscape, biological, chemical and geological greenhouse gas removal technologies. This is a critical research area that requires additional investment.

To ensure the necessary capabilities for carbon sequestration and greenhouse gas removal, we recommend that Australia invest in independent research on:

- Landscape carbon sequestration methods that generate multiple benefits
- Supports the integrity of Australian Carbon Credit Units
- Developing novel carbon dioxide removal methods and technology.
- Rapid decarbonisation and effective sequestration methods and techniques.