

Australian Energy Transition Research Plan
Design Issues Paper

20 April 2020

1. Overview

Australia is a major energy powerhouse that exports energy to the rest of the world, yet we have one of the most difficult energy transitions ahead of us. While other global economies can utilise a multitude of energy sources to successfully undertake an energy transition, Australia has a high level of legacy fossil fuel use, one of the longest and skinniest energy networks in the world, no neighbouring countries with surplus energy, no legacy nuclear power, no cheap domestic gas, and limited hydroelectric infrastructure which is further constrained by Australia's topography and hydrology.

While the energy transition to non-fossil and renewable sources is already occurring across Australia, there is no clear picture of the energy research currently underway to support a successful transition. Further, the international energy sector recognises that Australia has a unique environment, and subsequently unique energy transition research considerations that will develop over the coming decade.

The Australian Council of Learned Academies (ACOLA) is therefore undertaking a scoping study that will consult with a broad range of stakeholders from across Australia's energy sector to inform the development and design of an Australian Energy Transition Research Plan (the Research Plan).

ACOLA is the forum whereby Australia's independent learned academies come together to contribute to and inform national policy, and to develop innovative solutions to complex global problems and emerging national needs. Positioned at the intersection of science, engineering, technology, humanities, arts, social science, health and medicine, this collaboration brings together unique cross-disciplinary research perspectives not offered elsewhere.

ACOLA has established a Steering Committee comprising experts from Australia's learned academies to develop the concept of the Research Plan, and is well placed to identify current energy transition research underway and gaps in research across multiple scales, from local to regional and international, and community to public and private. Further details about this project and the design consultation process can be found at www.acola.org/energy-transition-research-plan.

In the broader context of the global response to human-induced climate change, the core propositions that will underlie the Research Plan are:

- the Australian energy sector is on a pathway to net-zero emissions, albeit without (at present) a national consensus on the trajectory
- investment and policy interest is largely on the scaling up of clean energy technologies, with, to date, relatively little attention on other aspects of the transition such as social, sectoral and regional impacts
- this is a massive transition, encompassing stationary, transport, industrial and export energy, with significant economic, social and environmental dimensions
- many of the challenges are unique to Australia, being a product of our economy, resource endowment, geography and our social and political structures
- while much research is currently underway, additional, more multidisciplinary and better-focused research is needed to ensure that Australia successfully manages the risks and seizes the opportunities of the energy transition.

The high-level objective of the Research Plan is to support a successful transition of the Australian energy sector to net zero emissions, where success encompasses both economic efficiency and social equity dimensions. Specifically, ACOLA aims to:

- identify and promote the research priorities that will be critical for a successful Australian energy transition (from basic research through to translation)
- identify the current and future gaps in Australian energy research to ascertain what needs to be done, and any immediate priorities
- consider if the research being undertaken is sufficient in scale, easily translated and well targeted to make the energy transition as efficient, fair and smooth as possible
- influence the direction, allocation and quantum of research funding in Australia
- be independent of the policies and programs of the governments of the day, as these too will evolve and will always be part of the context.

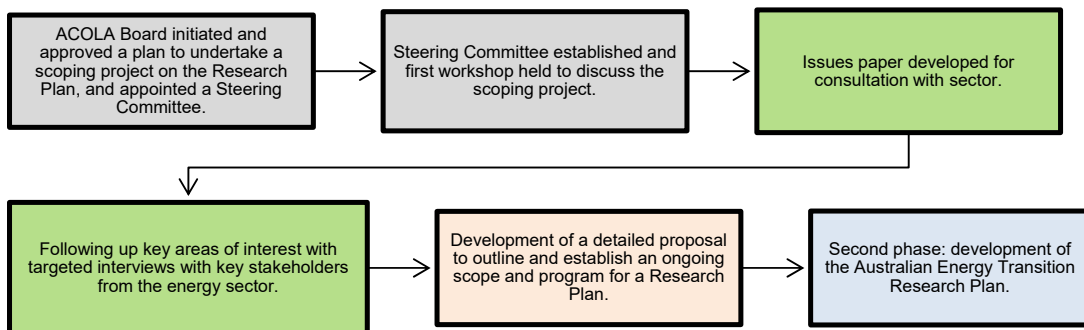
It is envisaged that the Research Plan will be a long-term project to initially set, and then continuously monitor and update research priorities and outcomes, from basic research through to development and translation.

The intended audiences for the Research Plan include research bodies and organisations that undertake research (both publicly and privately funded), the agencies and programs that provide funding to those bodies and policymakers.

To determine what a Research Plan of this dimension will look like, how it will be governed, how the research priorities will be determined over time, and how the process of undertaking the Research Plan will be funded, ACOLA is seeking input, advice and new ideas from a broad range of stakeholders across Australia, including energy research bodies, energy funding agencies, energy market and consumer bodies, energy users and consumers, energy (and related) industry associations, government policy departments, labour and social agencies, and Australia’s learned academies.

Question 1: Would you or your organisation be willing to participate with ACOLA in the development and ongoing support of a Research Plan?

The next stage of work, which this issues paper will inform, is the development of a detailed proposal for the design of the Research Plan. Subject to successful funding of the proposal, development of the actual Research Plan would then commence and would include a deeper engagement process with stakeholders.



Key: complete underway forthcoming second phase

ACOLA is seeking to gauge the level of interest from stakeholders in the development and support of an Australian Energy Transition Research Plan.

2. Scope

Question 2: What should be the scope of the Research Plan (how should we define 'energy', 'transition' and 'research')?

The research being undertaken around Australia's energy transition should be aligned with national priorities, have a coordinated approach to implementation, be effectively translated, and optimise the economic, social and environmental impact. It is therefore proposed that Australia's research priorities for the energy transition are multidisciplinary in nature and focus. Specifically, this means bringing together perspectives across science, technology, engineering, mathematics, economics, health and medical sciences, social and political sciences, humanities and the arts. It is also proposed that a Research Plan could identify and document relevant research underway (i.e. an audit), and Australia's research priorities and plans (i.e. a gap analysis).

As the Australian energy transition evolves, the Research Plan should also be responsive and adaptive. Specifically, the scope should incorporate:

- a wide and inclusive whole of Australia context, that concentrates on Australia's needs and research priorities, and engages:
 - all nine Australian Governments and their various bodies
 - the energy industry (generation, networks, retail, market bodies)
 - the publicly funded research agencies, particularly universities and CSIRO
 - energy consumers, end-users and community groups.
- a definition of 'energy' that encompasses electricity (all sources), natural gas, liquid fuels and hydrogen, as may be used in the stationary energy, transport and industry sectors. This includes the generation, transport, storage, use and export of energy, which also means energy efficiency and productivity. That is, it is inclusive of all technologies from the present through to the coupled net-zero emission energy sector
- an emphasis on the energy transition, which incorporates both community support, and regional and sectoral adjustment
- a comprehensive overview of the research currently being conducted and what is needed. This includes research across all areas including science, technology, engineering, mathematics, economics, health and medical sciences, social and political sciences, humanities and arts disciplines
- a wide definition of research, from fundamental to applied
- goals and outcomes, funding and accountability for delivery. Critically, a 'plan' also includes the translation of research outcomes into implementation.

There are numerous research projects currently underway through industry, academia, publicly funded research institutes, non-government organisations and state, territory and federal governments. However, there is not yet a plan that provides a national, independent and comprehensive research map. It is acknowledged that there is also a great deal of research being undertaken internationally that may help to address research gaps in Australia and that would be accommodated by a Research Plan.

ACOLA is seeking the views of stakeholders on this proposed scope.

3. Deliverables

Question 3: What processes and products should the Research Plan deliver?

The proposed deliverables of the Research Plan are to:

- map and continuously monitor current energy transition-related research activity, noting that the Research Plan will initially have a modest scope and focus on a small number of critical research areas

- focus on the gaps between the research that is currently being undertaken (of which there is no comprehensive picture at present), and the research that is needed (which is not currently defined)
- address the need for periodic research and dialogue into community and business attitudes towards aspects of the energy transition
- bring together the sector on a regular basis to explore, communicate and evaluate the progress of the Research Plan
- provide an annual progress statement and scorecard of the Research Plan and the extent to which it has been successfully translated into action, through an annual conference, such as the ERICA State of Energy Research Conference
- undertake annual revisions of the Research Plan, through ongoing consultations and engagement.

ACOLA is seeking the views of stakeholders on these proposed processes and products for the Research Plan.

4. Design of the proposed Research Plan

Question 4: What existing research plans and design approaches can ACOLA draw on for the proposed Research Plan?

A strong level of engagement, clear pathways for the translation of research, ongoing funding and strategic governance will be critical success factors in the design of the Research Plan.

There are examples of successful energy research plans that ACOLA can draw on as a basis for developing the Research Plan. For example, the German Federal Government's *Innovations for the Energy Transition* Energy Research Program; The European Network of Transmission System Operators – Electricity (ENTSO-E) R&D roadmap for 2017-26 provide helpful international examples. The Commonwealth Technology Roadmap (to be published in 2020) will also be important.

A Research Plan could draw on these three examples, the Australian Renewable Energy Agency (ARENA) experience and many others, in defining its scope and mode of design and implementation.

ACOLA is seeking the views of stakeholders on models and inputs that may be used in the design of the Research Plan.

5. Engagement

Question 5: How would you or your organisation like to be engaged in the development of the Research Plan?

To be successful, there needs to be a strong sense that a Research Plan is designed by the energy community and for the benefit of energy users.

It is acknowledged that there are Australian researchers already working on large, coordinated bodies of work, such as the Australian Energy Market Operator's (AEMO) ongoing Integrated System Plan for the National Electricity Market (NEM) and Whole of System Plan (WA) for the Wholesale Electricity Market (WEM), the Energy Security Board's work on post-2025 NEM market design, the Chief Scientist's work on a National Hydrogen Strategy (these three all being endorsed by the Council of Australian Governments (COAG) Energy Council), and the research being undertaken within companies, universities and the CSIRO.

A collective intent, and leadership from governments, industry, the research community and energy users will therefore be required for a Research Plan to be successfully implemented. It is acknowledged that this will be a long-term endeavour that will require extensive and ongoing consultation with the sector. This could incorporate calls for input, drafts for comment, workshops and conferences.

ACOLA is seeking the views of stakeholders on their preferred mode of engagement with the development and support of the Research Plan.

6. Governance and funding

Question 6: How should ACOLA govern and fund the development and ongoing support of the Research Plan?

The purpose of the Research Plan is to help inform and influence the direction, allocation and quantum of research funding in Australia. A future Research Plan must therefore be administered in a way that is independent, strategic, objective, results-oriented, focussed on the interests of consumers, and is accountable.

To guide the development of the Research Plan and to create a well-considered, balanced and independent perspective, ACOLA has formed a Steering Committee comprising leading experts from Australia’s learned academies. The role of the Steering Committee is to provide strategic oversight, expert analysis and provocative thinking.

There are several different operating models that could be utilised to support the Research Plan. Importantly, it is envisaged that ACOLA will continue to provide the leadership and administration of the Research Plan to ensure a long-term focus on independent, transparent, robust evidence-based and multidisciplinary advice. This will require a modest level of ongoing financial support.

The purpose of the Research Plan is not to explicitly address the funding of the actual research being undertaken; rather, it is envisaged that it may be used in advocacy and applications for research funding by interested parties. For the purposes of this project, funding will therefore be sought for the development and ongoing maintenance of the Research Plan only.

ACOLA is seeking the views of stakeholders on how the project should be governed (such as through a committee drawn from the Fellows of the learned academies), and how the process might be funded.

7. Risk analysis

Question 7: What do you see as the key risks that ACOLA will need to manage in the development of the Research Plan?

There are several key risks that may arise over the course of the development, design and implementation of the Research Plan. These risks and mitigation strategies include:

Identified risk	Mitigation strategy
The identified research priorities are incorrect, or the process surrounding the Research Plan is not robust.	Ensure consultation is wide and ongoing, and frequent updates are made to the Research Plan across an annual cycle.
The Research Plan lacks influence on the allocation or quantum of research funding, and fails to create impact.	Active and ongoing advocacy of the Research Plan.
The research itself is not successfully translated.	Ensure that there is close engagement with research users in the development and implementation of the Research Plan.

ACOLA is seeking the views of stakeholders on these and other risks they perceive, and their mitigation.

8. Final remarks

Question 8: Are there any other issues that ACOLA should be considering in the design of the Research Plan?

ACOLA welcomes any further comments you may have on the proposed Research Plan.

9. Next steps

ACOLA and the Steering Committee will be conducting targeted interviews with stakeholders from the energy sector. Information received from consultation will be combined with evidence-based research to inform a strategy for the development of the Research Plan.

For further information or any queries about the project, please contact:

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