



Queensland University of Technology
response to the
Department of Industry, Science and Resources
consultation paper on the
National Reconstruction Fund

QUT welcomes the opportunity to contribute to the Department of Industry, Science and Resources consultation into the implementation of the National Reconstruction Fund (NRF).

The University believes implementation of the Fund will be critical to other Government priorities including the Critical Minerals Strategy, Australia Made Battery Plan, the Australian Protein Roadmap, and A Future Made in Australia. Strategic investment in key industries will bridge the technological gap required for Australia to become a key player in the industries of the future, building sovereign capabilities in the value-add chain, and clean energy technology manufacturing needed to support decarbonisation goals and employment opportunities in regional Australia.

The dedicated NRF \$1 billion to enabling capabilities in quantum technologies, robotics and sensing technologies, clean energy generation and storage technologies – and the further \$500 million to support value-adding to the agriculture, forestry and fisheries sectors – will also need significant investment in human capital.

QUT, as one of Australia's leading universities, already has a number of research projects and Centres working closely with industry to assist this transformation. These include: Centre for Clean Energy Technologies and Practices, Centre for Robotics, Centre for Biomedical Technologies, Centre for Agriculture and the Bioeconomy, Centre for a Waste-free World, and Advanced Robotics Manufacturing Hub (ARM Hub).

Our response reflects QUT's current and emerging capabilities and strategic direction, as well as considerations relevant to the higher education and research sectors more broadly. Universities have a vital role to play in the transformation and diversification of Australian industry. Our comments focus on two key areas where universities offer significant expertise and capability that can benefit all Australians:

- Application of advanced research expertise to drive technological innovation; and
- Training of future workforces.

1. Priority Areas and Project Types

As the Consultation Paper notes, Australia has significant 'natural and competitive strengths' in the priority areas identified. For these strengths to be effectively leveraged into strong future industries, Government investment is required to mature and de-risk emerging technologies to a point where Australian businesses and international investors can proceed with confidence. QUT suggests the NRF focuses on targeted, evidence-based investments designed to expedite technologies through Technological Readiness Levels (TRLs). In addition, the behavioural, economic and cultural challenges that accompany industry change and adoption of new technologies need to be understood and addressed.

QUT suggests the following areas of investment for the NRF:

- Within the priority industries indicated, there are major areas where further fundamental and/or applied research is needed to progress technologies to a point where they are able to attract private investment. For example, with respect to *Value-add in resources*, further research (TRLs 3-6) is needed to develop processing technologies for rare earths and nickel laterites, to effectively overcome mid-stream 'pinch-points' that are currently inhibiting the effective harnessing of these vital resources.
- Investments in projects to test, prototype and pilot new technologies. Innovative technologies cannot be leveraged to build new industries and create quality jobs until they are fully tested and de-risked. Universities and research agencies play a major national role here as providers of research expertise, equipment and facilities, and specialist support staff. For example, QUT's National Battery Testing Facility conducts trials of a range of battery energy storage technologies, with synthesis capabilities that can be tailored to meet industry requirements. QUT also operates the Mackay Renewable Biocommodities Pilot Plant, an industry-hosted R&D facility established in 2010 with Commonwealth support that converts biomass including bulk agricultural waste into biofuels, green chemicals and other valuable bioproducts. The Pilot Plant has recently received Queensland State Government funding to enhance its capability to assist businesses in rapidly testing new technologies at scale. NRF investments along similar lines might include:
 - Direct investments in pilot projects.
 - Incentives to businesses to partner with universities and research agencies to pilot new technologies.
 - Incentives to universities to provide technical support services to industry.
- Along with projects that develop technical solutions, QUT encourages investment in projects that identify and address behavioural, economic and cultural barriers to industry change and technology adoption. Many of the priority areas indicated not only face technical challenges, but also lack methods for addressing people's reluctance to take up new technologies and new forms of employment. As an example of what might be considered, QUT currently leads two large-scale ARC Industrial Transformation Training Centres that seek to address these challenges. The Training Centre for Behavioural Insights into Technology Adoption (BITA) seeks to identify and overcome behavioural barriers to technology uptake across biomedical technologies, food innovation, and cyber security. The Australian Cobotics Centre focuses on the implementation of collaborative robotics within Australian manufacturing, including the human and design factors that need to be considered when deploying human-robot collaboration in workplaces.

2. Investment Criteria and Risk Management

Environmental, Social and Governance (ESG) considerations

QUT regards it as imperative that ESG considerations are front of mind in NRF decision-making. This is not only important for the overall sustainability of the priority industries and their ability to deliver benefits that increase the well-being of Australians; it is also vital for Australia's competitiveness on the global stage, as new markets open up in clean technologies and adherence to international regulations (e.g. the EU's new Sustainability Reporting Requirements) becomes essential. Consistent with *Connections*, QUT's new strategy for 2023-2027, we suggest a strong focus on environmental sustainability (in particular, the need to move toward rapid decarbonisation), and on the ability of projects to deliver benefits to First Nations Australians, including appropriate recognition of Indigenous sovereignty.

Additional criteria and acceptable level of risk

QUT acknowledges the Australian Government's intention that the NRF deliver a positive return over the medium to long term. However there is a strong case, at this time of urgent industry transformation (particularly around renewables), for the Government to take a leading role in driving transformation by taking on a degree of innovation risk that the private sector cannot sustain and the community sector cannot afford. To realise its policy ambitions, the Government will need to be willing to carry a significant level of risk with respect to NRF investments.

Risk can be mitigated via the kinds of rigorous piloting and testing initiatives described above, as well as by thorough consideration of likely market hurdles and consumer adoption barriers. QUT recommends that projects meet the following criteria:

- Demonstrated proof-of-concept.
- Strong market outlook and evidence of likely consumer up-take.
- Plan for job creation, including training and skills considerations.

3. Pathways for Australian-developed innovation and research

To enable effective uptake of Australian-developed innovation and research, it is vital that the Government support universities in creating robust pathways for knowledge production and transfer. Measures might include:

- Supporting universities in providing career pathways into priority industries for highly-skilled undergraduate and postgraduate students across STEM and HASS disciplines.
- Supporting universities to develop more flexible intellectual property transfer pathways.
- Implementing the 'premium rate' recommendation of the 2016 '3Fs Review' into the R&D Tax Incentive scheme to provide an additional tax offset of up to 20 per cent on collaborative R&D expenses for companies collaborating with universities (as well as institutes and publicly-funded research agencies).
- Provision of pre-seed and proof-of-concept funding, through establishment of a devolved funding scheme separate from institutional block grant funding, similar to New Zealand's PreSeed Accelerator Fund, to enable rapid, local decision-making for advancing opportunities to the point where they can be commercialised.

4. Skills and Training

Training and skills development will be vital to the transformation and diversification of Australian industry. Australia's world-class tertiary education system will need to be effectively harnessed, to develop the skilled workforce and talent pipeline needed to build capability across the priority areas indicated. However, this will require support from Government in both financial and policy terms. Such assistance might include:

- Support for universities to develop new degree structures and qualifications suited to emerging industries, such as:
 - New, cross-disciplinary undergraduate degrees, suited to emerging industry needs; and
 - Short-form qualifications geared toward upskilling of the existing workforce (for example, graduate certificates to allow employees of traditional resources industries to enter the renewables sector).
- Incentives for prospective students to undertake these pathways, including financial signals to students in the form of 'carrots' rather than 'sticks'.
- Incentives for universities and other higher education providers (e.g., TAFE and private providers) to work together to allow efficient upskilling pathways.

In developing training and upskilling initiatives, it should be recognised that skills in both technical and human factor domains will be needed to support emerging priority industries.

5. Relation to Other Reforms

In order to harness the full potential of Australia's innovation ecosystem, QUT encourages the Australian Government to ensure the NRF complements other recent and upcoming reforms and reviews of Australia's research and education sectors, including the Australian Universities Accord and the University Research Commercialisation Action Plan.

Such complementarity should enable a range of new measures to better facilitate the uptake of Australian research by industry and the Australian community, alongside affirmation of the continuing value of fundamental research in driving innovation.

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