Submission to:

National Reconstruction Fund
Consultation Paper

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National Reconstruction Fund Task Force
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Dear Task Force

The Advanced Materials and Battery Council's submission to the National Reconstruction Fund Consultation Paper

Energy storage is the lynchpin of a global transition to net zero emissions and offers the opportunity for Australia to develop a manufacturing industry to underpin its green energy superpower status. The Advanced Materials and Battery Council (AMBC) has recently been established to support and guide the advanced materials and battery sector in Australia to become the cornerstone for re-shoring manufacturing in Australia. This submission provides feedback from the AMBC on how the National Reconstruction Fund could support the development of multiple battery chemistry supply chains in Australia and underpin manufacturing to supply the global energy transition.

AMBC members, representing a university and 18 industry proponents, connected to the Australian battery-tech ecosystem, are of the view that the priority areas as defined by the Consultation Paper, have different investment imperatives. The submission below ranks priority area imperative according to the potential to contribute to the global opportunity.

1) Target investment levels

a) What types of projects or investments should the Government direct the NRF to focus on, or not invest in, within each of the seven priority areas to achieve NRF's purpose?

All of the areas targeted for investment through the NRF are worthy causes, but decisions on allocations to specific sectors need to be tempered against the opportunity.

i) Renewables and low-emission technologies (Target investment $3 billion)

- Wind turbine components and solar panel manufacturing in Australia
  *[Restricted to domestic market -NRF investment imperative: **medium**]*

Domestic manufacturing of wind turbine components and solar panels will require extensive investment to tool up to produce competitively priced solar and wind components. This implies that Australian manufactured product would be for local deployment only because global supply chains are well-established, making it challenging to compete for large global opportunities. Whilst investment to manufacture for local supply is important, it is a smaller opportunity than to develop export markets.

- Livestock feed and low-waste packaging
  *[Restricted to domestic market – NRF investment imperative: **medium-large**]*
  Australian emissions from beef, dairy and porcine livestock can be reduced through feed additives currently under development in Australia. The livestock industry is well-understood and well-funded and therefore more visible to investors both local and international. A case in point is the recent investment by Bill Gates' Breakthrough Energy Ventures in Western Australia's Rumin8, which implies a recognition of the global benefit from effective emission reducing feed additives. AMBC members believe that an investment imperative for livestock feed additives is large, but tempered to medium when considering the visibility offered by interest from Breakthrough Energy Ventures and the relative simplicity of feedstock manufacturing for global consumption.
- Hydrogen
  *[Large international opportunity – NRF investment imperative: **high**, but already enjoying significant support]*
  Investment in electrolysers has been directed through Arena's Renewable Hydrogen Deployment Funding Round. Additional infrastructure investment for hydrogen has been allocated through the Australian Clean Hydrogen Industrial Hubs Program, the Middle Arm Sustainable Development Precinct for Darwin export opportunities, enabling infrastructure in the Pilbara, the Port of Newcastle and the Hunter region. S&P Global values the investment pipeline at A$133-185 billion. With significant support from private investors and other national governments like Japan and Germany, the NRF should take care not to crowd out investment in deep-tech companies by a singular focus on hydrogen related investment.
- Modernising steel and aluminium
  *[Large international opportunity - investment imperative: **high**]*
  Investment in metal processing that has low carbon content can supply into very large global markets to reach Net Zero Emissions.
- Production of batteries
  *[Large international opportunity – NRF investment imperative: **very high**]*
  Australia has large deposits of critical minerals, minerals processing know-how and world-leading electro-chemical nanotechnology intellectual property. Investment in Australian companies in existing and future battery chemistry supply chains to meet the requirements for transport electrification and renewable energy firming offer

Australia an exceptional opportunity to become a manufacturing hub for the global energy transition.

- Large investment target but too many opportunities
  [Primary focus of NRF should be on facilitating international opportunities]
  The IEA's World Energy Investment 2022 finds that "Outside major hubs like the United States and China, most countries do not have available local investment funds to match the needs of their clean energy start-ups, especially during scale-up" and that "accelerating innovation [to meet NZE targets} will require that … "stimulus" levels of capital become the new norm. And, to ensure the efficient use of resources, they should be accompanied by policy instruments, including those that encourage international co-operation, to help the private sector put more capital at risk in cutting-edge technology projects." If the NRF splits an investment pot of $3bn into 7 different areas the opportunity to benefit from the global energy transition will be limited

ii) Medical science (Target investment $1.5 billion)

- *[Large international opportunity – NRF investment imperative: **very high**]*
  The Coronavirus pandemic has highlighted the need for investment in medical science and global co-operation. Commercialisation of Australia's world-leading research should be prioritised by the NRF.

iii) Transport (Target investment not announced)

- *[Restricted to domestic market – NRF investment imperative: **medium**]*
  It is unclear what the NRF seeks to target for Transport. If the intent is to seek to manufacture electric vehicles (EV), it is suggested that the focus be directed to speciality/niche areas like vehicles for public transport and internal combustion engine vehicle (ICEV) refits. A vehicle refit sector could provide a cost-effective emission reduction program across the existing ICEV fleet. Manufacturing passenger EVs is easier and less costly than (ICEVs), so there is potential for Australia to succeed at manufacturing for a niche local market. Domestic manufacture of EVs is likely to require a large OEM to locate to Australia to manufacture EV's, and will be premised on the local availability of competitively priced domestically manufactured batteries, because of the high proportion of battery cost in the total cost of an EV.

iv) Agriculture, forestry and fisheries (Target investment $0.5 billion)

- *[Restricted to domestic market – NRF investment imperative: **medium-high**]*
  Food production is vital to supply Australia's domestic market and Australian producers have a "good brand" for high quality in overseas markets. There is well documented success of many food producers exporting from Australia, and the sector is globally competitive. With regard for this, agri-investment could be considered to be of lower-order priority for financial support from the NRF. However, in the face of rising demand and changing climate, the imperative tends more to high to represent Australia's ongoing supply to a growing global population.

v) Mineral resources (Target investment $1.0 billion)

- *[Large international opportunity – NRF investment imperative: **very high**, but sector already attracts significant private sector investment]*

  Australia has enviable mineral deposits and the capacity to process/refine onshore. Private investors are familiar with mining and processing technologies. However, advanced materials and batteries are not conventionally traded commodities and don't fit the normal mold of gold, copper, zinc or iron ore projects. The NRF should focus on supporting less-familiar, higher-risk low-emission, ESG-enhancing projects to crystallise off-take opportunities rather than a generalised approach to mining investment. In addition support needs to be provided for common use infrastructure that will service mining and processing regions that are currently isolated from critical services such as water, energy, and transport routes.

vi) Defence capability (Target investment not announced)

- *[Restricted to domestic requirement – NRF investment imperative: **medium-high**]*

  Defence requirements are specific. Australia has very good relations with high investing like-minded countries that can facilitate investment of their own domestic technology or help fund Australia technologies for a global market. NRF investment in high specification cells to support defence capability would be extremely beneficial for the Australian battery ecosystem.

vii) Enabling capabilities (Target investment not announced)

- *[Restricted to domestic requirement – NRF investment imperative: **medium**]*

  Streamlining project approval processes, reducing jurisdiction (Federal/state and local) interplays, and supporting decent scale demonstration facilities is critical to swift market entry and reduce risk for investors. This will increase risk for the NRF but as a country we miss 100% of the shots we don't take.

viii) The target investment levels do not match the priority areas.

It is unclear how the target investment levels of $1 bn for critical technologies and $1 bn for advanced manufacturing relate to the priority areas. What is the definition of critical technologies and advanced manufacturing? Where might companies in the transport, defence and enabling capabilities priority areas seek investment?

b) How should industry 'transformation' and 'diversification' be defined and measured for each of the seven priority areas?

'Transformation' should be defined as the ability to achieve NZE, and should be measured on the investment's carbon footprint.

'Diversification' should be defined as different pathways to achieve NZE and should be measured as proportion of each investment of the total NRF priority area targets.

In addition, clear rules for and reporting of genuine carbon offsets are imperative for meaningful change.

c) How should 'value add' be defined and measured in relation to relevant priority areas?

'Value add' should be defined as ability to create sustainable employment and measured as increase in sector employment and contribution to import replacements of materials and components in supply lines for critical technologies.

d) How much detail should be provided on each of the priority areas? How should greater detail and the need for flexibility be balanced?

Priority areas should be carefully scoped to include support for the establishment of supply chains to deliver growth in the priority area.

Prescriptive detail should be avoided to allow for priority area cross-overs and the application of technology to multiple sectors.

2) *Investment mandate*

a) Intended outcomes

The consultation paper notes that the investment mandate will seek to define intended outcomes without being too prescriptive or too diffuse to succeed. It will be modelled on the CEFC framework and seek to balance risk and return and develop governance process to ensure ESG compliant outcomes.

It is imperative for the NRF board members/investment and advisors to decision makers to have significant and demonstrable industry experience and knowledge about the suppliers, supply lines and complexities of and within each sector. Grants or investment from previous programs have too often favoured sub-sectors perhaps because decision makers are comfortable with a familiar sector rather than a lesser-understood disruptive technology which seeks to address future global demand. As evidence, the Modern Manufacturing Initiative support for recycling, clean energy, resources and critical minerals processing (detail in table below) showed a preference for resource processing and projects in Western Australia.

MMI Funding for recycling, clean energy, resources and critical mineral processing

Row Labels	Recycling & Clean Energy	Resources/CritMinProc	Grand Total
NSW	6%	4%	10%
NT	0%	2%	2%
QLD	1%	14%	15%
SA	1%	0%	1%
TAS	0%	2%	2%
VIC	6%	0%	6%
WA	0%	66%	66%
Grand Total	**13%**	**87%**	**100%**

MMI Funding for recycling, clean energy, resources and critical mineral processing

Row Labels	Recycling & Clean Energy	Resources/CritMinProc	Grand Total
NSW	**$18,848,707**	**$14,553,601**	**$33,402,308**
e-waste biorefinery	$4,208,800		$4,208,800
Hydrogen	$9,807,972		$9,807,972
METS		$10,000,000	$10,000,000
Underground mining Evs		$4,553,601	$4,553,601
Wool waste for packaging	$4,831,935		$4,831,935
NT		**$6,000,000**	**$6,000,000**
Lithium hydroxide plant		$6,000,000	$6,000,000
QLD	**$3,503,622**	**$46,205,087**	**$49,708,709**
Manufacture power management systems	$3,503,622		$3,503,622
Vanadium processing		$1,205,087	$1,205,087
Alumina production		$45,000,000	$45,000,000
SA	**$2,200,000**		**$2,200,000**
Silicon thermal battery	$2,200,000		$2,200,000
TAS		**$5,168,560**	**$5,168,560**
Underground mining Evs		$5,168,560	$5,168,560
VIC	**$20,000,000**		**$20,000,000**
Recycling for packaging	$20,000,000		$20,000,000
WA		**$222,294,535**	**$222,294,535**
Rare earth refining		$44,844,464	$44,844,464
Recycle lithium refinery residues		$4,901,488	$4,901,488
Redox flow batteries		$3,948,583	$3,948,583
Vanadium processing		$49,000,000	$49,000,000
Cathode precursor manufacturing		$119,600,000	$119,600,000
Grand Total	**$44,552,329**	**$294,221,783**	**$338,774,112**

The AMBC suggests that experience with mining projects is not necessarily adequate for assessing the feasibility of electrochemical or nanotechnology projects, and that mandates should be defined according to the potential for projects to succeed in a global energy transition and enhance manufacturing capacity in Australia. In addition, AMBC members would request that the NRF mandate should be for government to absorb reasonable risk so that private investors will be encouraged to participate. It is therefore imperative that the NRF is not constrained to invest in companies or projects that are low risk and therefore more likely to succeed without government support.

3) Investment needs and opportunities

a) What are the opportunities for value-add, growth and diversification in each of the priority areas?

Our response in section 1 above, discusses the relative benefits of investment in each the priority area. To reiterate, AMBC members would request greater focus on priority areas with a potential for export.

b) What are the manufacturing and other capabilities needed to support each priority area?

The AMBC's answer reflects its focus on manufacturing for the battery-tech sector. Developing electrochemical products and nanotechnologies is capital intensive. Equipment to test materials structure and properties is expensive, to design a manufacturing process, prohibitively expensive. Universities have laboratories with much of the testing equipment required but gaining access to that equipment is complicated by availability of the equipment, the lab, technicians and non-standard contracts. Helping universities standardise access to testing equipment would enhance the path to commercialisation.

Expertise in electrochemical and cell manufacturing process is globally limited. Investment in common user facilities to lessen equipment and expertise requirements would reduce investment requirements for first phase manufacturing.

To develop Australian-made batteries will require local supply of many components, including electrolyte, metal foils and reagents. Investment in manufacturing supply chain components would significantly reduce risk for industry.

c) What are the strategic priorities for supply chains/enabling inputs in each priority area?

The European Commission, Japan and the US Government have all indicated a discomfort with reliance on a single country, China, for supply of all segments of the battery value chains. As energy storage is an emerging sector, with as yet, fairly immature supply chains, Australian battery-tech companies are well-placed to supply into global value chains. Investing in domestic Australian supply chains, applying a granular understanding of supply chain complexity and a strategic focus on establishing viable domestic sources for import replacement of feedstocks to Australian cell manufacturers and pack assemblers now will deliver greater benefits through first mover advantage.

d) What are the gaps in or barriers to private sector investment in each of the priority areas? How can the NRF help build or encourage stronger pathways for Australian developed innovation and research, and encourage additional private investment in priority areas? How could the NRF consider Government policy priorities in performing its investment

AMBC members find that there is a limited private sector investor pool for investment in battery-tech and battery materials companies in Australia and most of it with a different risk appetite (that is, more focused on property and mining). Many of the members have sought investment from international sources. If the NRF mandate does not replicate the different risk appetite of private investors, NRF investment could serve to reduce the perceived different risk of domestic investment and attract more domestic private investment.

4) Returns, financial instruments and working with other investors

a) What factors and considerations should inform the portfolio rate of return for the NRF?

Portfolio rate of return should be modest, noting that if the NRF can fulfil a role of actively supporting early-stage companies, history tells us some investments will bring outsize returns while others may not because across the portfolio expectations should be that early stage investments have higher risk of failures as compared to components in low risk investment strategies in mature sectors and/or technologies.

b) What factors and considerations should inform the setting of acceptable but not excessive level of risk? Should the acceptable level of risk differ between priority risk areas?

Developing technology for the next decade is inherently risky. As Barack Obama said in 2011, "if we want to compete with China, which is pouring hundreds of billions of dollars into this space, if we want to compete with other countries that are heavily subsidizing the industries of the future, we've got to make sure that our guys here in the United States of America at least have a shot."

President Obama made this comment after his Administration was accused of wasting taxpayer money when Solyndra, a solar cell manufacturer, filed for bankruptcy after receiving a $535 million loan guarantee as part of the 2009 American Reinvestment and Recovery Act. Under the same program, Tesla received a $465 million loan guarantee to develop an affordable electric vehicle. When Tesla's share price soared in 2013 critics accused the Obama Administration of losing tax payer money by not taking equity in Tesla. The lesson to be learnt from government support for Solyndra and Tesla is that failure is a part of successful industrial policy, although of course the risk of failure should be limited rather than sought. Equally the assessment of outcomes needs to reflect the wider societal benefits and the existence and potential for spill-overs and market failures[1].

[1] See Rodrik, D. 2014. 'Green industrial policy'. Oxford Review of Economic Policy 30: 469-491 and

As mentioned previously, the AMBC suggests that the level of priority and the level of support should reflect the larger global opportunity rather than a protected domestic opportunity.

c) What types of concessional offerings would be preferred if these were offered (for example, lower interest rates) and why?

Low interest loans are a useful concessional investment form and can trigger private investment.

Members' experience is that equity rounds need to be quickly funded to avoid cash-flow crises while waiting for outcomes. Due diligence including deriving a potential equity price can present a challenge to successful equity deals. NRF due diligence and process needs to be mindful of the potential to present a real wedge to successful equity deals.

Some members propose a loan-equity hybrid model, more typically known as a Convertible Note, which is often used for high growth start-ups where the value of the business at the time of the financing is unclear. Convertible Notes are administered upfront as a loan in a simple document with a deferred interest payment which can be converted to equity at some agreed point(s)in time, at an agreed discount to the last funding round price. Convertible Notes' terms can be "engineered" to be preferential to investor and investee with terms designed upfront for industry standard acceptance. This avoids negotiation over equity value, or time considerations, acting as deterrents on deal closure.

d) What factors drive or constrain co-investment (for example, by industry, financial sector or domestic or offshore investors) and how should these be taken into account?

See above

e) What are the mechanisms and types of finance which will best attract co-investment from the private sector? How can the NRF best crowd-in investment?

See above

5) Complementary reforms

a) What are the non-financial barriers preventing businesses from making the most of opportunities for value-add, growth and diversification in priority areas?

Access to global actors like governments and large corporate off-takers would make supply into distant global markets more likely. Australian government agencies, such as Austrade, should be significantly boosted and focussed to gather market intelligence in priority areas and priority markets and promoting Australian suppliers into those opportunities.

Woolley, S. [Slate] 2013. Tesla Is Worse Than Solyndra: How the U.S. government's bungled investment in the car company cost taxpayers at least $1 billion. New York.

b) Are there non-financial mechanisms that could support priority areas and the objectives of the NRF?

The global energy storage opportunity is large enough for battery supply chain manufacturing to be a priority area on its own and not diluted /crowded out by hydrogen and renewable energy manufacturing projects. A bespoke target investment level for battery supply chain will provide significant visibility to investors and business elites, local and international, to increase their interest and their perception of risk. Local content policies are common in most of our trading partners and should be implemented in a flexible manner in Australia to give preference to efforts to incorporate local content, assisting build import replacement supply chains on shore.

c) How could NRF work alongside other complementary reforms to best deliver on the Government's policy priorities?

If the NRF is to be modelled on the CEFC, then perhaps there is a role for an Australian Manufacturing Commercialisation Agency (AMCA), modelled on ARENA, with priority areas in alignment between the NRF and the AMCA. Like ARENA, the AMCA would allocate grants to support the path to commercialisation avoiding interference with shareholder value. Battery-tech companies in Australia are at a variety of different technology readiness levels (TRL) and have different financial and funding requirements. Having 2 bodies that work together but support companies over the commercialisation process would closer reflect industry needs.

d) To what extent are other levers required to support the objectives of the NRF (for example, skills, trade, supply chains)?

The knowledge and skills required to work in battery-tech companies need to be picked up on the job. Governments and universities should engage with battery-techs to understand their requirements and develop programs to supply to their demand.

Battery-tech companies are focused on the requisite metallurgy, electrochemistry and cell manufacture not the rest of the supply chain. There are a number of components required that are outside of their scope or skill-set. Assistance to companies that can produce the components would greatly aid the manufacture of Australian Made Batteries.

e) How does the NRF, with other private and government settings, drive the right ecosystems for sustainable industry growth?

The NRF needs to provide infrastructure certainty for projects for access to cheap renewable energy, data, and other utilities as a given. Current impediments to projects are the lack of infrastructure currently in place which often skuttle projects before they start due to the prohibitive costs of getting utilities and infrastructure to site. GOC's need to be more dynamic and nimble in their ability to manage access for new connections. Finally, the process for approving government support in what-ever form must be accelerated. There is a spectrum of risk appetite in government support agreements which incur varying degrees of time and effort for all parties

and this should be addressed.

Further assistance for establishing a new advanced materials and battery sector could be the provision of R&D Tax Rebates for capital expenditure (as long as the capital item was used for R&D activity). As an example, IT start-ups in the software development sector are able to claim R&D Tax Rebates for software development costs. By comparison, manufacturing capital costs for battery-tech start-ups are not eligible for R&D rebates. Similarly, the ATO allows mining and gas companies to to write off Exploration Capital costs as expenses. Also, Flow Through Tax Losses, available to junior miners in Australia, and currently being proposed in Canada for battery manufacturers, should be made available to battery-tech companies in Australia.

Conclusion

The AMBC is very pleased that the Department of Industry is consulting on the benefits of investment in home-grown technology for global supply. We thank the Task Force for providing us with the opportunity to provide our feedback. If the Task Force has any further questions or detail, we are happy to be contacted either through the AMBC website (ambc.au) or to the Directors mentioned below.

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