National Reconstruction Fund Submission

Date

3 February 2023

phvl.com.au

Executive Summary

We are pleased to provide a submission on the proposed National Reconstruction Fund **(the Fund**) following the formal request for consultation.

We recognise the efforts and initiatives by the Department of Industry, Sciences and Resources (**the Department**) in seeking to improve our sovereign capability and manufacturing base. It is vital for Australia's future prosperity that policy addresses the significant and increasing failure of Australia as a nation to translate our "lucky country attributes"[1] into regional industries and jobs and a brighter future for all young Australians.

In providing this submission, we attempt to assimilate the perspectives of industry and private capital. Powerhouse Ventures Limited (**Powerhouse**) is an ASX listed investment vehicle that focusses on technology investing alongside active commercial / corporate support drawn from our decades-long global experiences.

The Powerhouse executives and shareholders have track records in building technology-based businesses and we continue to provide capital, corporate support, and commercial advice to a broad range of companies. With respect to the Priority Areas of the Fund, our experiences include:

a) **Critical Technologies (Space):** We supported Skykraft[2] via our own capital and we provided strategic commercial advice and lead the tricky negotiation of the foundational collaboration agreement with Air Services Australia. Our advice helped "future-proof" the company for its corporate finance requirements over the medium to long term time horizons and has enabled Skykraft to stay on its mission of launching and commercialising a unique Air Traffic Tracking & Management offering on a global scale.

b) **Critical Technologies (Quantum):** We provided the seed capital for Quantum Brilliance[3] in order to transfer the IP from ANU. We then syndicated the next 3 rounds of private capital and now provide corporate governance and corporate finance advisory support, including key business enablers around commercial partnerships, international expansion, and corporate governance.

c) **Resources Value-Add (Critical Minerals):** We privately provided seed capital to Lava Blue[4] and syndicated the private capital fundraising efforts and now provide corporate governance and corporate finance advisory support for its IP commercialisation and processing plant establishments in regional North Queensland.

d) **Modern Manufacturing (3d Printing and Nano-Scale Fabrication):** We privately provided seed capital for Syenta[5] – an ANU start-up working with other significant ventures such as SunDrive and Penten, on copper fabrication and circuit board printing; the Company's ultimate aim is nano-scale fabrication.

e) **Renewable Technologies (Photovoltaics):** We privately provided early capital for Greatcell[6] – a regional NSW-based start-up working on massive scale roll-to roll production capability for distributed and edge-based PV applications, including IoT, space, defence, and ultimately as a legitimate competitor and alternative to the heavily manufactured Chinese silicon panels.

---

[1] In our view, these are broadly: our scientific research capability, our natural resource endowment, and our cheap and abundant renewable energy potential (from the sun and wind and land mass)

[2] https://www.skykraft.com.au

[3] https://quantumbrilliance.com

[4] http://lavablue.com.au

[5] https://www.startupdaily.net/topic/funding/canberra-3d-printing-startup-syenta-lands-3-7-million-seed-round-to-revolutionise-electronics-manufacturing/

[6] https://www.greatcellenergy.com

f) **Defence Capability** (**Cyber**): We provided capital and advisory work for Fifth Domain[7], an Australian Signals Directorate alumni focusing on building a cyber-capable Australian work force.

We support wholeheartedly the Department's Fund initiative. The Fund should help bridge the gap between research and development which, despite grants funding and other policy initiatives, has been widening, as depicted at Figure 1:

- **Research Capability**: Australia consistently ranks in the top 10 of highly cited scientific papers in major research fields (Japan's Education Ministry recently ranked Australia 6th overall, for example[8]).
- **Development Translation**: Australia's manufacturing base and industry diversity continues to decline. Australia's economic complexity, as measured by Harvard University[9], ranks Australia 91st out of 133 countries.

Research capability - good

Highly cited scientific papers country rankings

1998-2000 (average)	No. of papers	2008-2010 (average)	No. of papers	2018-2020 (average)	No. of papers
1. U.S.	30,710	1. U.S.	36,910	1. China	46,352
2. Britain	6,071	2. China	9,011	2. U.S.	36,680
3. Germany	4,991	3. Britain	7,420	3. Britain	8,772
4. Japan	4,369	4. Germany	6,477	4. Germany	7,246
5. France	3,609	5. France	4,568	5. Italy	6,073
6. Canada	2,842	6. Japan	4,369	6. Australia	5,099
7. Italy	2,128	7. Canada	4,078	7. India	4,926
8. Netherlands	1,814	8. Italy	3,450	8. Canada	4,509
9. Australia	1,687	9. Australia	2,941	9. France	4,231
10. Spain	1,398	10. Spain	2,903	10. Spain	3,845
⋮				11. South Korea	3,798
13. China	1,217			12. Japan	3,780

Source: Education ministry
Note: Number of papers in top 10% of most-cited papers in each research field

Development Translation capability – poor

Figure 1 – Statistics on Australia's research and development activities

As the consultation papers for the Fund implicitly recognises, public funding of private enterprises can do more than just passively deploy capital amongst different enterprises and hope; it can and should be guided by a macro-policy objective; it can and should be structured and focussed thoughtfully; it can and should be bundled with other cross-agency initiatives. It is only via a well-structured and separately executed Fund that public capital can address and overcome the principal causes of stagnated development in the Priority Areas – the current economic headwinds and private capital risk aversion discussed in more detail below.

Whilst Australia's private capital is sufficiently large and well-structured and whilst there have been tax policy initiatives to incentivise venture investing, private capital is pessimistic of Australia's capability to establish new manufacturing. Private capital is also aware that the government procurement processes are not very facilitative of Australian-made and local content for such manufactured goods.

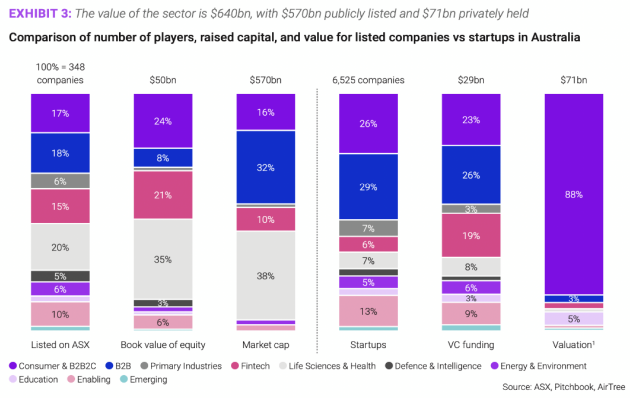
---

[7] https://fifthdomain.com.au

[8] https://www.asahi.com/ajw/articles/14691980

[9] https://atlas.cid.harvard.edu/countries/14

With the exception of Biotech and Hydrogen[10], private capital has a very insignificant effect or focus on domestic manufacturing base. In this regard, the Tech Council of Australia's recent report[11] demonstrates the distortion of capital attention away from the "making of new things", as shown below:



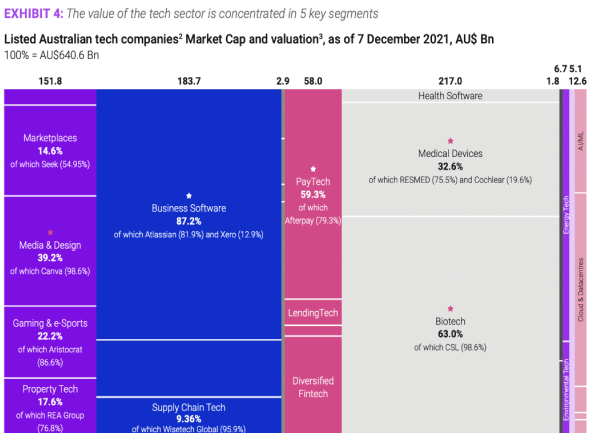


Figure 2 – Tech Council of Australia charts on capital allocation

Recommendations

Recommendation 1. Specific consideration in the investment process is given to addressing Resilience through a systems engineering lens.

Recommendation 2. Investment Proposals for Critical Minerals Processing Plants should be announced as "encouraged".

Recommendation 3. As it concerns "Renewables and Low Emissions Technologies, next generation research programs should not be the immediate focus of the Fund, as they appear to be for ARENA. In these areas, the Fund should focus on "development" of high technology readiness level[12] process flows before more "research" into next generation low technology readiness level items.

Recommendation 4. The Defence Priority Area should be utilised to target the significant capability gaps in the Accelerated Warfare domain.

Recommendation 5. The Fund should identify and target opportunities where there is overlap between Accelerated Warfare gaps and Dual Use Technologies.

Recommendation 6. The Fund should identify where a proposal is affected by an immediate lack of Private Capital Readiness and use that as a specific investment decision factor.

---

[10] Private Capital understands "oil and gas" type projects and accepts we have the distinct input advantage - sun, wind and land mass

[11] https://techcouncil.com.au/wp-content/uploads/2022/08/Turning-Australia-into-a-regional-tech-hub_Report-2022.pdf

[12] https://www.dst.defence.gov.au/sites/default/files/basic_pages/documents/TRL%20Explanations_1.pdf

Recommendation 7. The Fund should work on a cross-agency to develop investment levers to encourage the building of Centres of National Focus for the selected Priority Areas.

Recommendation 8. A key consideration of the Fund should be on the building up of industrial ecosystem development – power supply, reagent, labour upskilling, enabling technologies for specific manufacturing plants within the Priority Areas.

Recommendation 9. Favourable proposals for the Fund should be:

- Critical minerals processing plants.
- Inputs into Hydrogen and the Renewable Energy supply chains (eg Silicon Metal and silicon alternative production).
- Discrete manufacturing plants where there is sufficient inherent Resilience.
- Discrete manufacturing plants that add an element to Resilience.
- Dual use technologies (particularly where there is Accelerated Warfare capability gap).
- Enabling technologies for government property and infrastructure.

Recommendation 10. The Fund should develop a financial instrument for the construction of new manufacturing plants, whereby the Government could provide loan facilities that (a) are triggered when draw downs are in excess of predicted costs (b) is repaid after the project financiers but pari passu with equity holders and their threshold minimal return requirements.

Recommendation 11. The Fund design non-financial KPIs around "National Building" such as economic complexity and science research translation.

Recommendation 12. The Fund should develop structures and strategies whereby it can couple investment with local content provision and whatever cross agency support is needed for such direct and effective departmental orders.

Recommendation 13. The Fund should advocate for the establishment of a tax credit scheme for purchasers from manufacturers within the Priority Areas. Not only does this incentivise customers for the products, but it also makes the project financing more attractive to private capital. This would improve the risk-returns for the Fund.

Priority Areas

We note that the Department has identified seven Priority Areas – with which we agree – and is seeking input to inform further definition of action:

Question 1. **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 the NRF's purpose?**

Question 2. **How should industry 'transformation' and 'diversification' be defined and measured for each of the seven priority areas?**

Question 3. **How should 'value add' be defined and measured in relation to relevant priority areas?**

Question 4. **How much detail should be provided on each of the priority areas? How should greater detail and the need for flexibility be balanced?**

Put simply, the focus is on broadening our manufacturing base and "making stuff here". The structuring and allocation of capital from the Fund therefore needs to incorporate "systems thinking" in what will drive the economic outcome of the translation of capability into a manufacturing base. The application of systems thinking will also ensure that investments can be made into areas with the greatest overall return, and that second and third order effects of investment, under-investment, or non-investment can be considered.

Industry development rarely takes hold in isolation and does not develop in a slow, steady and predictable fashion. Industry sprouts and expands via the convergence of a few different market and technical improvements and enjoys tailwinds and feedback loops from adjacencies and new technologies.

Understanding how industrial systems develop informs some additional factors that sould be relevant to the investment process as follows:

- **Resilience**: separate to a discrete analysis of the addressable market for a priority area, is the requirement to look at industrial base as an entire complex and the geo-political dependencies of imported inputs to that base. Addressing resilience through a systems engineering lens will ensure that the separate elements that impact on national resilience can be addressed in a holistic, rather than a piecemeal, manner. Energy security and energy costs are clear examples providing resilience to our manufacturing capability. Enabling technologies, is another. The Consultation Paper identifies this.

Recommendation 1. We recommend that a specific consideration is given in the investment process to addressing Resilience through a systems engineering lens.

- **Minerals Processing**: An immediate win for the Fund would be support Australia stepping out from an ***extraction*** capability to ***extraction and processing*** capabilities as it concerns the critical minerals that support the energy transition[13]. Whilst we can and should support gigafactories and efforts to manufacture end products (transport etc) domestically, we should be cautious here. In our view, the opportunity is really for Australia to take, deliberately and judiciously, the next value-add step immediately adjacent to extraction and direct shipped ore; to move up and out from a geology and mining engineering base (which is meaningful and not to be dismissed, but rather continually supported) and into a new, but adjacent chemical engineering base; to process minerals into materials.

Recommendation 2. Investment Proposals for Critical Minerals Processing Plants should be announced as "encouraged".

Recommendation 3. As it concerns "Renewables and Low Emissions Technologies, next generation research programs should not be the immediate focus of the Fund, as they appear to be for ARENA. In these areas, the Fund should focus on "development" of high technology readiness process flows before more "research" into next generation low technology readiness level items.

---

[13] A discrete example is CSIRO's "Silicon Roundtable". An outcome of that initiative should be to focus on building a silicon metal refining industry as a necessary first step and broad foundation to an eventual photovoltaic manufacturing capability. It is not hard or interesting science. But it is very important and it concerns industrial capability capability. Next generation research programs should not be the immediate focus of the Fund, as they appear to be for ARENA – it should focus on "development" before more "research" or venture investing.

- **Accelerated Warfare**: The Department of Defence represents a significant buyer of domestic technology capability (given Australia's absence of a large industrial market and complex economic ecosystem as stated above) the Fund could be used to drive capability for Accelerated Warfare requirements[14]. In addition to robotic and autonomous systems, space control, information dominance, cyber-attacks, data networking (collection, processing, dissemination and control) are critical.

Recommendation 4. The Defence Priority Area should be utilised to target the significant capability gaps in the Accelerated Warfare domain.

- **Dual Use**: There is an opportunity to synergise a defence capability focus with private capital around dual use technology. But this opportunity also represents a significant threat if we execute dual use technology road maps poorly. For example, if a technology capability is developed within defence with non-transparent timelines and via a Foreign Prime that controls all background and foreground IP the overall benefit to the national economy will be diminished, if not entirely lost.

Recommendation 5. The Fund should identify and target opportunities where there is overlap between Accelerated Warfare Gaps and Dual Use Technologies.

- **Private Capital Readiness:** There ought to be an understanding of whether private capital provides a tailwind or a headwind. For example, with Hydrogen there is a significant private tailwind provided by the oil and gas industry and new entrants such as Fortescue Future Industries. For photovoltaics (a key enabling technology for green hydrogen and critical for energy resilience) there is a significant headwind – the private capital markets are unaware of the risk and opportunities in this field and unwilling to engage in technology development against an industrialised Chinese product.

Recommendation 6. The Fund should identify where a proposal is affected by an immediate lack of Private Capital Readiness and use that as a specific investment decision factor.

Investment Needs and Opportunities

Question 5.	**What are the opportunities for value-add, growth and diversification in each of the priority areas?**
Question 6.	**What are the manufacturing capabilities needed to support each priority area?**
Question 7.	**What are other capabilities needed to support each priority area?**
Question 8.	**What are the strategic priorities for supply chains / enabling inputs in each priority area?**
Question 9.	**What are the gaps in or barriers to private sector investment in each of the priority areas**

Broadly, we need to mindful of the distinct set of challenges facing Australia in translating research into industry – cultural, statism, market economics, undeveloped industrial ecosystems – and our distinct set of opportunity areas. These challenges, and opportunities, must be examined specifically

- **Cultural:** The legal framework in Australia, with its checks and balances and transparency, is an undeniable strength of ours, and we must continue to uphold and promote it. However, there is a distinct lack of a co-ordinated "Australia Inc" approach to procurement and development of technology. All our trading partners have a "Japan Inc", or Korea Inc" or Singapore Inc" approach. The US has just created one with its Inflation Reduction Act and Chips Act. Australia is therefore

[14] https://www.army.gov.au/sites/default/files/2020-11/2020%20-%20Accelerated%20Warfare_0.pdf

falling further behind. Australian private capital, as discussed above, has avoided areas where the making of things is done locally. Australian Bureaucrats, operating within procurement practices and cultures, always think only about the personal career risks associated with local content ordering. Most government departments regard Australian industry as “SMEs” (Small-medium enterprises only), supplying something as a sub-contractor to an offshore multinational prime contractor, which typically has access to, and ownership of, all foreground intellectual property arising from the engagement. We need to focus a lot of attention on this.

- **Statism**: There is a propensity in Australia for multiple states to want to own technological developments for their own parochial, rather than national, purposes. This has typically resulted in similar organisations being established in multiple states to address the same problem. The result is a dilution of the overall national effort. The literature on technology clusters, and the ‘spill-over’ effects of clustering, shows that the greatest impacts are made when multiple, related, high technology activities occur within a geographically constrained area. The benefits include industrial efficiency, workforce development and availability, knowledge transfer, and invention intensity.

Recommendation 7. The Fund should work on a cross-agency to develop investment levers to encourage the building of Centres of National Focus for selected Priority Areas.

- **Market Economics:** Australia has always had the significant challenge of developing manufacturing capability within its small private market. This challenge is exacerbated if we are attempting to develop manufacturing capability across a wide range of technologies simultaneously. A key consideration should therefore be on the provision or clear and actionable investment signals in order to “move the needle” in Development Translation around these Priority Areas.
- **Undeveloped Industrial Ecosystem:** We have a lack of adjacent industries and manufacturing (e.g. the learning rate for EV car batteries was facilitated by the adjacent use of lithium-ion batteries in consumer electronics and power tools; e.g. China’s advantage in graphite anode processing comes, in part, from their local demand for other industrial applications for graphite (such as furnaces, nuclear, lubricants) and their economies of scale in reagent supply since hydrofluoric acid is used in the pharmaceutical industry).

Recommendation 8. A key consideration should therefore be on the building up of industrial ecosystem development – power supply, reagent, labour upskilling, enabling technologies for specific manufacturing plants within the Priority Areas.

Generally, and notwithstanding the above-listed challenges, there are significant opportunities if we execute well. It is our view that immediate focus can be on “making new things” which have already achieved high technology readiness levels and for we have existing adjacencies.

Investing in critical mineral processing plants is, in our view, the lowest hanging fruit for the Fund form a risk-reward perspective. An historic and irreversible transition of the global energy systems has begun. Industry reports, such as Benchmark Minerals, forecast demand to outstrip supply out to decades. Australia is rich in natural resources and mining expertise. The opportunity to build an adjacent mineral processing industry fuelled by global demand and global capital provides the Fund with the most favourable tailwinds to earn returns while supporting national objectives.

Recommendation 9. Favourable proposals for the Fund should be:

- *Critical minerals processing plants.*
- *Inputs into Hydrogen and the Renewable Energy supply chains (eg Silicon Metal and silicon alternative production).*
- *Discrete manufacturing plants where there is sufficient inherent Resilience.*

- *Discrete manufacturing plants that add an element to Resilience.*
- *Dual use technologies (particularly where there is Accelerated Warfare capability gap).*
- *Enabling technologies for government property and infrastructure.*

When it comes to financing new manufacturing plants, private capital is risk adverse on "cost overrun" or project timeline risks. In Australia, private capital is so sensitive to these risks that it often avoids financing new projects all together. Thence the opportunity is lost.

This is where the Government's balance sheet can provide support via adequately structured cost overrun loan facilities. Financial structuring and engineering is available here having regard to the long term nature of the public balance sheet and the short term nature of the problem. For the construction of new manufacturing plants, the cost overrun risk is "only" relevant for the first 3-5 years of the projected plant life (where Interest Service Coverage and Leverage on a project is sensitive to blow-outs in costs). Whereas there would be two long term factors in play:

i. The Plant would often have a useful life of 15-20 year (free cash flow will continue to flow once the project financiers have been repaid);

ii. the large terminal markets for the end products minimises the market risks attached to free cash flows (once a plant is working – it will continue to find customers).

Recommendation 10. We therefore recommend the Fund develop a financial instrument for the construction of new manufacturing plants, whereby the Government could provide loan facilities that (a) are triggered when draw downs are in excess of predicted costs (b) is repaid after the project financiers but pari passu with equity holders and their threshold minimal return requirements.

Returns, Financial Instruments and working with other investors

Question 10.	**What factors and considerations should inform the portfolio rate of return for the NRF?**
Question 11.	**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 areas?**
Question 12.	**What types of concessional offerings would be preferred if these were offered (for example, lower interest rates) and why?**
Question 13.	**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?**
Question 14.	**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?**

A central premise of our submission is that a core objective of the Fund should be "making stuff here" and the broadening of our manufacturing base. In other words, a core KPI is non-financial – Nation Building. In our view the success metrics for such objectives are the Economic Complexity rankings and other Research to Development translations as discussed in our Executive Summary.

Recommendation 11. The Fund design non-financial KPIs around "National Building" such as economic complexity and science research translation.

A usual risk with non-financial metrics when it comes to corporate culture and structure, and a corporate's ability to attract and retain talent is that they get "crowded-out" by the more pressing, more obvious and easy

to measure financial matters. We do not believe those risks would manifest in the Fund - the task of National Building without outsized financial reward would be readily accepted up by many experienced investment and industry professionals.

In respect of co-investment with private capital, the “crowding out” risks implicitly recognised in the questions are more acute for venture technology investing and the areas of existing private capital readiness and allocation as highlighted by the Tech Council of Australia and discussed above. For investments / cost overrun type facilities on high technology readiness level manufacturing (where available, but for cost overrun risk), we believe the crowding out risks will be less of an issue and the Funds involvement will be a welcome enabler. For other areas, eg Dual Use / Accelerated Warfare or Quantum, the amount of private capital is underweight these areas. Again, it is our view that the Fund’s involvement will be a welcome enabler.

Complimentary Reforms

Question 15.	**What are the non-financial barriers preventing businesses from making the most of opportunities for value-add, growth and diversification in the priority areas?**
Question 16.	**Are there non-financial mechanisms that could support priority areas and the objectives of the NRF?**
Question 17.	**How could the NRF work alongside other complementary reforms to best deliver on the Government’s policy priorities?**
Question 18.	**To what extent are other levers required to support the objectives of the NRF (for example, skills, trade, supply chains?**
Question 19.	**How does the NRF, with other private and Government settings, drive the right ecosystems for sustainable industry growth?**

Just as we need to “make something here”. We need public departments to “order something here”. Because our domestic private markets are not as large as our international competitors, government contracts for new manufacturing are particularly important.

As discussed above, most government departments regard Australian industry as “SMEs” (Small-medium enterprises only), which would only ever be ordered for supply as a sub-contractor to an offshore multinational prime contractor, which typically has access and ownership to all foreground intellectual property arising from the engagement. We need to focus a lot of attention on this. All our trading partners do this with local content requirements.

Recommendation 12. The Fund should develop structures and strategies whereby it can couple investment with local content provision and whatever cross agency support is needed for such direct and effective departmental orders.