Senate Economics Reference Committee

Inquiry into Australia's Innovation System

AMWU Submission, July 2014.

Introduction

The Australian Manufacturing Workers' Union (AMWU) welcomes the opportunity to make a submission to the Senate Economics Reference Committee inquiry into Australia's innovation system.

The AMWU represents approximately 100,000 members working across major sectors of the Australian economy. AMWU members are primarily based in manufacturing industries, in particular; metal, vehicle, and food manufacturing, but also in the industries of mining, building and construction, printing and graphic arts, repair and service and laboratory and technical services.

The AMWU has a long and proud history of fighting for the interests of workers in all areas of manufacturing. As well as doing this through ensuring workers receive fair pay and conditions, we have played an active role in policy debates that directly and indirectly affect our members.

Australia's innovation system is crucial in building our nations comparative advantages, especially in the manufacturing industry. Manufacturing is an industry that produces high value added products, using sophisticated processes and inputs and skilled labour. In order for Australian manufacturers to compete globally, they must employ the world's best technology, capital and skills and where possible, build on innovations developed at home.

Innovation is not simply desirable as an end in itself or as a source of national pride, it is crucial if Australia is to maintain its status as a high income advanced economy. Without a broad based and innovation driven economy, Australia risks being the victim of what economists call the 'resources curse'; an over-reliance on resource and agricultural sectors as economic drivers. Such an overreliance undermines higher value added and employment industries and ultimately fails to deliver broad based and sustained improvements in standards of living.

The AMWU believes that Australia has already gone down this path, through the unmitigated impacts of the mining boom on manufacturing and other trade exposed industries, adherence to a 'free trade' ideology that preferences resource and agricultural sectors and fails to deliver a fair trade playing field, and a persistent winding down of industry policies. As a result, we have seen manufacturing's share of the economy fall from 9.2% in 2002-03 to 6.8% in 2012-13, with employment in the sector falling by 124,000 jobs in the last 10 years alone. This decline has been absolute as well as relative, with the sector now producing $9.5 billion less per year in value added terms than it did prior to the impact of the GFC.

In order to secure our status as an advanced economy and secure our long term prosperity, Australia's innovation system needs to act as a seamless pipeline for the advancement of the country's prosperity; from basic research to applied research, collaboration with industry, especially start-up and SME businesses, the growth of those businesses and ultimately the creation of new wealth, jobs and areas of international comparative advantages.

The AMWU applauds the Senate Economics Reference committee's decision to hold this inquiry into Australia's innovation system, and especially the leadership of Senator Kim Carr in promoting the inquiry. At the same time, we note our disappointment with the current government for its apparent lack of interest in innovation policy and more broadly industry policy as a whole. This is evidenced not only by dramatic budget cuts or whole sale dismantling of industry and innovation programs in the federal budget (programs such as the highly successful Commercialisation Australia), but also by the fact the Prime Minister's Science, Engineering and Innovation Council, which would meet 3 times a year under the previous government, has yet to meet in the first 10 months of the current government's tenure. We hope that this inquiry will serve as an impetus for the government to finally acknowledge both the importance of Australia's innovation system and the government's central role in supporting and building that system so it can produce the greatest benefits for industry and the economy as a whole.

The AMWU is affiliated to the ACTU and strongly supports the ACTU's submission into this inquiry. In particular, the ACTU discusses the importance of public support for research, drawing examples from history and other countries. Needless to say, the AMWU is in strong agreement that a pure 'market failure' approach to public support for research is inadequate. It fails to take into account the fundamental public good aspect of research and if followed, would result in gross underinvestment in research and technology.

In addition, the ACTU provides an excellent analysis of the importance of manufacturing and in particular the impact of the loss of automotive manufacturing. The AMWU supports this analysis and where relevant, builds on it in this submission. Needless to say we strongly agree with the ACTU's conclusion that the loss of this sector represents a significant blow to Australia's innovation capacity as well as our 'industrial commons'.[1] In addition, we would note the potential loss of major shipbuilding capacity represents a similar threat and we continue to urge the government to secure

[1] Industrial commons refers to the shared capabilities, technologies, infrastructure and skills of a country's industrial enterprises. For a detailed discussion of the 'industrial commons', see: http://meedermindworks.wordpress.com/2010/01/21/the-industrial-commons/

the future of Australian shipbuilding capacity, capability, skills and jobs by bringing forward projects to ensure on-going work, as outlined in our report, *Australian Naval Shipbuilding*.[2]

This submission focuses on the role innovation plays in determining real world economic outcomes, and in particular, its role in supporting a advanced and growing manufacturing sector. As such, it focuses on the following items under the terms of reference:

> (c) The importance of translating research output into social and economic benefits for Australians, and mechanisms by which it can be promoted;
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> (d) The relationship between advanced manufacturing and a dynamic innovation culture;
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> (e) Current policies, funding and procedures of Australia's publicly-funded research agencies, universities, and other actors in the innovation system; and
>
> (j) Policy options to create a seamless innovation pipeline, including support for emerging industries, with a view to identifying key areas of future competitive advantage.

This submission is divided into several sections. First, the role of government in supporting innovation is discussed, then the importance of a diverse economy and the manufacturing sector specifically is analyzed. The current state of the innovation system is considered and finally, recommendations for improvements are made.

The government's broader role in innovation and industry policy

As the AMWU has repeatedly stated,[3] we take the view that a country's comparative advantage is not just the product of natural resource endowments and geography, but is the result of conscious and deliberate investment, strategic planning and capacity building performed both by the private sector and the government. This is especially the case in terms of advanced areas of advantage, where the development of infrastructure, skills and technology play a central role and investments have long lead times before their impacts are felt.

This view has not been popular among policy makers in Australia for several decades, but it has remained the norm globally. The USA, Germany, Korea, Japan, Singapore, China, the UK and even NZ

[2] Available at: http://www.amwu.org.au/content/upload/files/Ships_Campaign_13/AA_AUST_NAVAL_SHIPBUILDING.pdf

[3] For example, see our submission to the Joint Standing Committee on Treaties inquiry into the Korean – Australian Free Trade Agreement, available at: http://www.aph.gov.au/Parliamentary_Business/Committees/Joint/Treaties/13_May_2014/Submissions

are just a few examples of countries that have deliberately and carefully shaped their economic development through strategic government intervention to grow new areas of advantage and further develop existing ones.

As just one example, the UK recently announced a $900 million grant fund for the development and deployment of the latest automotive technologies.[4] The UK government also provides concessional loans to businesses, debt guarantees, venture capital funding, as well as tax concessions.[5] While the policy leavers vary, all advanced economies employ significant policies to attract, retain and develop industry capabilities and capacity.

Recent indicators are that industry leaders in Australia are becoming increasingly convinced that the government's economic role goes beyond "getting out of the way" of business and includes strategic support for industry growth.

The Prime Minister's Manufacturing Taskforce, and their report to government[6] represents one example of industry accepting a central role for government in shaping and promoting areas of comparative economic advantage. This report and its process brought together industry, union and government leaders to assess the future of manufacturing and make recommendations about the actions government should take to promote an advanced and diverse economy. The Economics Reference Committee would do well to consider its analysis and recommendations carefully as part of this enquiry, especially as they relate to innovation, collaboration between researchers and industry and policies to support investment. Some of these policies were subsequently implemented by the former government but are now being dismantled by the current government. There is no good reason for this reversal and its result can only be to damage future industry and jobs growth and a well functioning innovation system. This is an issue that we will return to below.

Even the Business Council of Australia (BCA) has recently called for a more hands on role for government in shaping our future economic development. In their report, *Building Australia's Comparative Advantages*,[7] the BCA advocate a strategic approach to policy making that includes the identification of areas of potential comparative advantage and tailored policy to support the growth of specific sectors. In her first speech as the BCA's new President, Catherine Livingstone, stated[8]

[4] For details, see: http://www.automotivecouncil.co.uk/low-carbon-technology/advanced-propulsion-centre-uk/
[5] For an example, see: http://www.capitalforenterprise.gov.uk/
[6] Available at: http://www.industry.gov.au/industry/manufacturing/Taskforce/Pages/Library%20Card/SmarterManufacturing.aspx
[7] Available at: http://www.bca.com.au/publications/building-australias-comparative-advantages
[8] Transcript available at: http://www.bca.com.au/docs/a726dd96-2d94-48ad-bbe6-e4cea9e1f3e2/CL_AICC_speech_Vision_for_a_Competitive_Australia_FINAL_28.7.2014.pdf

Australia needs to return to "*a more thoughtful role for government in facilitating and coordinating economic development and social progress*." She went on to say:

> *"We cannot afford to be complacent about the need to take control of our national destiny. If we don't take control, our future will unfold by default as a consequence of the actions being taken by other countries."* And finally,
>
> *"government has a key role in enabling business to grow and create wealth… It must be part of a strategic agenda that facilitates, enables and incentivises key sectors where Australia can succeed globally."*

While the AMWU and the BCA will likely have differing views about what specific policies the government should pursue in-order to promote economic growth and development, we welcome this realisation from one of Australia's largest and most influential employer associations. For too long the mantra of "government is the problem" and all that government needs to do to promote growth is "get out of the way" has dominated our politics and policy. Unfortunately, this remains the dominant philosophy of the current government when it comes to industry policy.

While long overdue and by no means universal, any repudiation of this mantra by industry leaders is very welcome. Only once we agree that the government has a broader strategic role to play in the economy can the necessary work begin on specific policies that give affect to that role.

The importance of manufacturing

Manufacturing is viewed by some as an 'old' sector that is past its prime and has little to contribute to our future prosperity. This is a view strongly opposed by the AMWU as well as the most advanced research into the determinants of income and wealth.

While the sector has been under incredible pressure in Australia recently, its importance to Australia maintaining its position as an advanced, high income economy has only become more apparent over time.

We have known that manufacturing is responsible for a disproportionately large share in business Research and Development spending (24%), while only being responsible for less than 10% of output. This is one indication of the central role manufacturing plays in supporting an advanced economy. Other indications are now available.

Relatively recent work by a team of researchers at the Massachusetts Institute of Technology has analysed how the complexity[9] of a country's economy is related to long run economic performance.[10] Their conclusions are startling at first glance, but should not be upon reflection.

Economic complexity, which is determined by an economy's diversity, knowledge base and uniqueness in produced products, has huge explanatory power in explaining countries growth experiences. It is closely related to the existence of a diverse and advanced manufacturing sector. The author's state:

> *"An increase of one standard deviation in complexity, which is something that Thailand achieved between 1970 and 1985, is associated with a subsequent acceleration of a country's long-term growth rate of 1.6 percent per year."*

The analysis goes on to compare the explanatory power of economic complexity to the standard variables which economists consider important for determining a country's long run growth prospects; institutional quality, human capital and competitiveness. Of course complexity is influenced by these factors, just as it influences them in return (a fact acknowledged by the authors), but the authors conclude that complexity:

> *"can account for a significant fraction of the cross-country variation in income per capita and economic growth, and that the ECI (Economic Complexity Index) is a much stronger predictor of growth than other commonly used indicators that measure human capital, governance or competitiveness."*

This should not be a surprise to economists and policymakers alike and has been loudly expressed by experts such as Professor Goran Roos for some time. The idea that advanced industries, using advanced technology to produce advanced products generate greater, longer lived and broader economic gains than simple industries producing simple homogeneous products is not revolutionary or surprising.[11] While it is still opposed by the more dogmatic 'free market' economists that argue 'a potato chip or a computer chip, doesn't matter, they're both chips', most economists and business people now realise that the imbedded skills, technology and international links in an industry do matter for the industry's and the nation's performance.

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[9] Complexity is measured by the interconnectedness of supply chains that go into the production of goods for export, as well as the goods uniqueness globally. It is effectively a measure of the technological, managerial and skills capacity of an economy.

[10] Ricardo Hausmann, Cesar Hidalgo, et al. 2011. "The Atlas of Economic Complexity". Puritan Press, Cambridge MA.

[11] For example, see: Hausmann, Ricardo; Hwang, Jason; Rodrik, Dani (2007). "What you export matters". Journal of Economic Growth 12: 1–25.

Advanced industries employ higher skilled workers, support higher incomes, have closer links to researchers (and therefore are sooner aware of emerging technologies and have an ability to influence the direction of research), utilise more advanced existing technology, have more developed international supply chains and produce more unique products. For all of these reasons, advanced industries form the core of any advanced economy. It should be noted that manufacturing, especially advanced manufacturing, lies at the core of advanced industries and economic complexity more generally. As Goran Roos has stated;[12] "A healthy manufacturing sector is a must for any advanced economy with ambitions to maintain economic and social wellbeing".

The lesson from this for Australia is one that has been ignored or put to one side for far too long, at grave risk to our future prosperity. Without advanced industries like automotive or shipbuilding manufacturing, Australia will lose the core capabilities and linkages that support long term improvements in standards of living. Through policies which neglect to support and actively damage the building of capacity in advanced industries, whether they are flawed trade policies, absent innovation policies, misguided government procurement policies or short sighted education policies, Australia is increasingly being led down a path that will result in the hollowing out of key advanced manufacturing capacities, with terrible long term consequences for our future prosperity.

The latest Economic Complexity Index ranking[13] has Australia ranked 74th in the world. Below countries we don't usually compare ourselves to like Nepal, Uruguay, Kazakhstan and Vietnam. We are far behind our traditional comparator nations of NZ, Canada, the UK and the USA. The countries dominating the ranking are Japan, Switzerland, Germany, Sweden and South Korea.

This poor ranking is no surprise, given the economy's increased reliance on mineral and energy exports. In fact, since the mining investment boom is only now starting to transition into a production boom, and our automotive manufacturing sector is scheduled to close by 2017, we should expect Australia's economic complexity to fall even further behind in these rankings in the coming years.

In addition, the failure to adequately support as many automotive manufacturing supply chain firms as possible to transition to new products and new markets will exacerbate the broader (as well as specific and individual) costs of the closure of automotive manufacturing. The government's $100 million Growth Fund (only $20 million of which is dedicated to diversification of supply chain firms) falls far short of what is required to adequately support this transition for businesses and minimise

[12] Goran Roos, Manufacturing into the future, 2011. Available at: http://www.thinkers.sa.gov.au/roossummary/files/inc/917488524.pdf
[13] Available at: http://atlas.media.mit.edu/rankings/country/

the impact of automotive manufacturing's closure on the broader manufacturing base. These firms need assistance ranging from advice on new market and product opportunities to financial support to invest and maintain solvency through the transition. The AMWU has developed a detailed policy package[14] to not only support business diversification, but also to support workers and communities with the transition that lies ahead. We again urge the government to adopt our package or a variation of it. Without a more ambitious government response to the closure of automotive manufacturing, the long term social and economic costs of this event will be much larger than they need to be.

A robust and seamless national innovation system is crucial if Australia is to avoid continuous falls in our economic complexity and prosperity as a result. Applied innovation deployed by business through investment is the practical mechanism by which an advanced and broad economic base is supported and built upon. The innovation system needs to be squarely focused on not just supporting innovation, but translating it into wealth, business and jobs creating outcomes. This requires active and well designed government policies. Policies that are currently either lacking or being dismantled by the government.

A seamless innovation system: where are we?

Enough has been written about the state of Australia's innovation system, by more informed institutions than the AMWU, that an in depth review is not warranted here. We encourage the Committee to review the latest Innovation System report[15] for both a summary of our current system and a summary of why innovation is crucial to business competitiveness and wealth and job creation. The Global Innovation Index 2014 report[16] is also useful and is cited below. In addition, the ABS collected data on business innovation including barriers to innovation, under their Selected Characteristics of Business Survey.[17] Unfortunately, due to budget cuts, this data is no longer collected. The latest release was for the year 2010-11. Regardless, this data still offers some useful insights into our innovation system, especially with respect to barriers businesses face when attempting to deploy innovation.

[14] Available at: http://www.amwu.org.au/content/upload/files/publications/SUBMISSIONS_2014/AMWU_PC_auto_review_final_submission.pdf
[15] Available at: http://www.industry.gov.au/science/policy/AustralianInnovationSystemReport/AISR2013/wp-content/uploads/2013/11/AIS-Innovation-Systems-Report-2013-v3.pdf
[16] Available at: http://www.globalinnovationindex.org/content.aspx?page=gii-home
[17] Available at: http://www.abs.gov.au/ausstats/abs@.nsf/mf/8167.0

The ABS data make clear that the most pressing barrier to investment in and deployment of new innovation is access to finance. This is particularly the case for small (fewer than 20 workers) and medium sized businesses (between 20 and 199 workers), of which 19% and 23% respectively report finance as the greatest barrier to innovation. This figure is 16.5% for large firms (over 200 workers) and 20% overall. Finance represents the greatest barriers by far across all size businesses, with cost of development and/or implementation as the third most cited barrier (on average 14.4% of businesses).

However, cost of development and deployment is closely related to access to finance, and it is not clear that businesses are not revealing the same basic pressures when citing access to finance or cost; namely an inability to invest in innovation due to cash flow and other finance restrictions. If we combine these two factors, almost 35% of businesses are not investing in innovation or deploying new technologies, processes etcetera, due to prohibitive costs or an inability to fund the investment. This is not surprising in the AMWU's experience. When discussing business conditions with firms that employ members, we never hear of levels of required returns on new investments that are lower than 14%. It is clear that in order to maximise the take up of innovation as well new investments, businesses need to access sufficient funding, especially small and medium sized businesses (SMEs).

In the AMWU's view, manufacturing businesses face additional barriers to financing, both for diversification projects (especially for auto suppliers facing the loss of their major customer), and for more general investment projects aimed at improving competitiveness, usually through the adoption of some type of innovation. This is supported not just by anecdotal experience of the AMWU. The Australian Industry Group (AIG), recently stated in their submission into Australia's Financial System:[18] "*official data and anecdotal reports from Ai Group members indicate banks are still reticent to lend, particularly to manufacturers*." The AIG go on to say:

> *"Ai Group has been concerned for some time that banks impose especially stringent lending criteria on the manufacturing sector. In a 2011 survey of members, we concluded that financial institutions, responding to the perception of higher risks facing the industrial sector, were downgrading manufacturing industries and making access to finance more difficult and expensive for businesses across the entire sector, regardless of their individual circumstances and risks.*

[18] Available at: http://fsi.gov.au/files/2014/04/Australian_Industry_Group.pdf

This finding was also reached in the report by non-government members of the Prime Ministers' Manufacturing Taskforce, in August 2012. The report noted that access to finance for the manufacturing sector was one of the major challenges for the sector in the years ahead.

Most recently, automotive supply chain businesses are reporting similar concerns to Ai Group following the recent decisions by the three car assemblers to end local production. The supply chain companies have told Ai Group that difficulties accessing bank finance to invest in new machinery and equipment is one of the main barriers stopping them from transitioning to new markets instead of winding up."

Any attempt to address the ability of our industries to deploy new innovations and move up the value chain, as well re-vitalise our industrial base, needs to address this financing issue.

The second most cited barrier to innovation given by the ABS data is access to skilled workers. Almost 18% of businesses cannot find adequately skilled workers either inside the business or in the broader labour market, with the number being over 23% for large firms. This is surely related to Australia's poor achievement in producing engineering and science graduates, which ranks a terrible 73rd in the world according to the Global Innovation Index.

Crucial in improving workers as well as managers skills is a strong and accessible Vocational Education and Training system, as well as accessible and affordable university education. Funding cuts both types of public education providers as well as for student support, and the promotion of private education providers and a user pays system over a truly universal access demand driven system, threatened both the VET and university system and make improving skills harder. University de-regulation can only lead to increased educational costs and lower student engagement, exactly the opposite of what is needed. Likewise for the VET system, with cuts impacting both the ability of students to take advantage of education and the quality of education on offer.

The Global Innovation Index shows a generally strong ranking for Australia at 17th in the world. However, certain sub-indices point to where there is significant room for improvement.

Related to our poor record of producing scientists and engineers, Australia ranks 59th in terms of expenditure on secondary school students. This ranking doesn't take into account distributional issues, namely the large disparity between funding of high and low socio-economic background students, so in reality, it is likely to represent an overly optimistic view of the opportunities granted to secondary school students across the board. The previous government's 'Gonski' reforms were

specifically aimed at addressing these disparities, and it is very regrettable that the current government sees proper school funding and reform of funding as unaffordable.

Australia's GDP per unit of energy use is ranked 66th in the world. This is an area that obviously requires attention, but again the current government's open distain for the renewable energy sector, as well as credible measures to promote alternative energies and energy efficiency (such as a carbon price, the Clean Technology Investment Program or the Clean Energy Finance Corporation), leave little hope that this will improve. This is a double shame, as high energy dependence means Australian industry will remain susceptible to global energy price fluctuations. In addition, it means Australia will lose the impetus of innovation in this growing field, costing business opportunities and innovations that could aid the global effort to combat climate change. We have already seen investment in renewables collapse this year, with only $40 million being invested in the first 6 moths of the year compared to $2.7 billion last year, [19] while globally, renewable investment continues to sore, reaching a record $63.6 billion in the second quarter of 2014 alone.[20]

Australia ranks 78th in terms of knowledge diffusion, which inhibits the spread of innovations, their take up and the positive externalities that justify public investment in innovation. In order to ensure both private and public investments in innovation result in the largest societal and economic payoff possible, a dramatic improvement in the diffusion of knowledge is needed.

Related to this is the low score Australia receives for high and medium technology manufacturers as a share of total manufacturers. Just 20% of Australian manufacturers are classified as high or medium technology. This is due to sustained underinvestment in the sector, as well as poor management skills and practises.

These issues were addressed by the Prime Minister's Taskforce on Manufacturing, but require significant further policy initiatives to address.

Australian manufacturing remains under severe pressure on a day to day basis, struggling with an uneven trade playing field, an overvalued Australian dollar and a government that far from supporting the sector, is actively pulling support away. The impact of the mining investment boom, and the proceeding currency appreciation, cannot easily be overstated in terms of exacerbating longer term structural pressures on the sector. Chart 1 below shows the magnitude of this boom, and its impact on manufacturing investment. In the chart, prior mining booms can clearly be seen,

[19] For example see: http://www.smh.com.au/environment/climate-change/australias-renewable-energy-industry-grinds-to-a-halt-20140716-ztio2.html
[20] See: http://blueandgreentomorrow.com/2014/07/18/global-renewable-energy-investment-up-33-in-second-quarter-of-2014/

however, they all failed to impact manufacturing investment to any significant degree. This is clearly not the case with the current boom.

Chart 1: The mining investment boom and manufacturing investment

Source: ABS

Too many Australian manufacturers are too busy fighting to stay alive from one day to the next to focus on longer term plans to move up the value chain, innovate, improve management practises and access new markets and opportunities. However, without a dramatic increase in investment in the sector, aimed at improving capabilities, technology, the existing capital stock (some of which is 60+ years old) and management as well as worker skills, Australia cannot hope to secure a broad based and advanced manufacturing and economic base.

This is a massive challenge for any government, and the current government's recent attitude towards the sector, as evidenced by their treatment of the automotive manufacturing sector among other things, leaves the AMWU with little hope it will be addressed any time soon, at great cost to the future prosperity of all Australians, as well as countless AMWU members.

We continue to urge the government to change course. They can develop and implement serious policies to support the elevation of our manufacturing base; including policies to aid innovation and investment, access to global supply chains and exports, greater access to government procurement work recognising the benefits of having local suppliers access procurement work, increased support

for training including apprentices and policies to address management skill inadequacies. Only through strong government action and the articulation of a strong vision for an advanced and competitive manufacturing sector can these challenges be overcome. They not only represent a challenge, but an opportunity for any government to put Australia's future prosperity on a much sounder footing.

Perhaps the most disappointing result form the Global Innovation Index is Australia's 81st ranking on the Innovation Efficiency Ratio. At 0.7, this means Australia does not get as much out of our innovation system as we put in. The discussion above provides some insight as to why that might be; we don't have enough scientists and engineers, firms struggle to implement and fund innovation, knowledge isn't diffused widely and manufacturers who should play a key role in translating innovation into concrete economic gains, are struggling to do so.

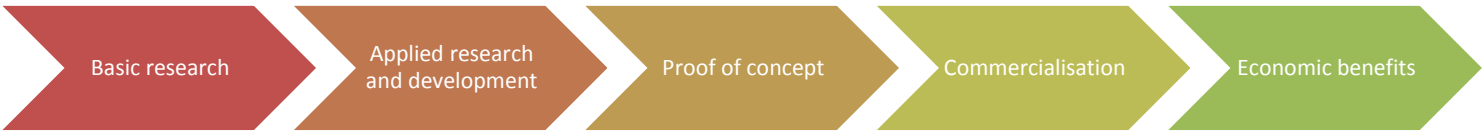
Addressing these challenges was one of the motivations behind the previous government's *Plan for Australian Jobs*[21], which sought to implement key recommendations of the Prime Minister's Manufacturing Taskforce. However, the initiatives announced as part of that plan have now been shelved by the current government; including the establishment of 10 Industry Innovation Precincts to be supported by $500 million in project funds, the $380 million Venture Australia venture capital fund to support the commercialisation of new innovations and SME growth and the expansion of Enterprise Connect, to service more SME businesses, especially manufacturers.

A seamless innovation system: where we should be.

The innovation system can be thought of as a serious of steps, each one being a result of the steps proceeding it and being required for the steps following it. It begins with basic research, which is almost entirely funded publicly, and ends with the economic benefits of successfully commercialised innovation; improved industry competitiveness and productivity, new products and processes, business and job expansion, access to new markets and the generation of new wealth. In addition, the most important innovations have broader societal benefits which go beyond the purely economic, such as improved medical care than extends lives or cures disease or safety innovations that avoid injury and death. Figure 1 below shows this progression in diagrammatical form.

[21] Available at: http://www.lsq.com.au/Documents/PublicDocuments.aspx?EntryId=2&sort=&Page=1

Figure 1 The innovation system



The analysis in the proceeding section provides some guidance as to what parts of the innovation system need the most attention. However, the shortcomings of Australia's innovation have been exacerbated by recent government decisions. Based on a misguided belief that 'government is the problem' and good policy is simply for government to 'get out of the way, these changes don't strengthen the system, they take us backwards. The most grievous examples include:

- Reforms to the higher education system that will increase the cost for students, especially women, students from low socio-economic backgrounds or ones that pursue courses that don't offer high incomes upon completion. This will discourage students from study, exactly the opposite of what is needed.
- Significant cuts to the CSIRO and other scientific bodies ($145 million), which directly impact research programs, as do cuts to university research funding ($250 million).
- The abolition of industry skills programs, whether the 10 apprenticeship programs abolished or the National Workforce Development program, or other programs. This makes it harder for businesses to train and find skilled workers and managers.
- The abolition of the 10 Industry Innovation Precincts and the $500 million Industry Collaboration Fund. A massive step backwards in promoting collaboration between industry and researchers and providing access to resources and innovation for SMEs. Even if 5 of these precincts end up re-badged under the government's Competitiveness Agenda policy, 5 would have been lost, as well as significant funding.
- The abolition of the Industry Innovation Fund, which included $380 million of venture capital funding under Venture Australia. This represents a huge step backward for the Australian venture capital industry. An industry that is crucial for the commercialisation of innovation and creation of new businesses.
- The abolition of Commercialisation Australia and Enterprise Connect, two programs praised by business as being highly effective in improving productivity, adoption of innovative processes and management practises, supporting investment and crucially, commercialising new innovation, including support for proof of concept activities and accessing private commercialisation funding.

In addition, the current government's approach to infrastructure provision is disappointing. In particular, the government's broadband infrastructure policy represents a deterioration, both in terms of speed and connectivity, of this vital piece of infrastructure. The current project is set to deliver capacity of up to 25Mbps, while the original NBN project was to deliver 100Mbps universally. This slower and less universal broadband infrastructure will severely limit innovation and the growth of IT dependent businesses. A world class and universal broadband system is necessary not just for service firms, but for any business that wishes to be competitive in the 21st Century. It's scrapping will hinder innovation, investment, new business formation, collaboration between industry and researchers and knowledge diffusion. It is another significant step backwards.

Recommendation 1: Any attempt to strengthen Australia's innovation system must being with reversing these misguided and counter-productive cuts, including the watering down of broadband infrastructure.

The CSIRO has an exceptional record in research and innovation. The CSIRO has done an excellent job at engaging with industry, especially considering a very limited budget for the task. However, this engagement as well as the research activities of CSIRO must be expanded in order to better translate research into real world outcomes and to better assist industry in solving problems and taking advantage of opportunities. Programs like Researchers in Business, CSIRO consulting services, the SME engagement centre and Australian Growth Partnerships should all receive additional funding.

There is a case for the creation of a dedicated CSIRO Division, headed by an Executive Team Member, purely dedicated to engagement with industry and the provision of industry support and partnerships. Such a division could bring together the current engagement programs under one roof, as well as support new active (rather than passive) engagement activities. Existing engagement functions are currently spread throughout the entire organisation, with no single Executive Member in charge of promoting real world outcomes based on CSIRO work.

Elevating this role to a executive function would send a strong signal that the CSIRO is there to generate real benefits for Australian Industry, and that it takes the 'I' in its name seriously. Such a division would not necessarily take responsibility for all industry engagement since scientists and engineers in specialty areas are the ones that need to work directly with industry, but it would be able to facilitate and coordinate more industry engagement, as well as serve as a central organising base for industry liaison. It could also be tasked with developing new ways to reach and help businesses which may not currently see the CSIRO as a potential partner.

Recommendation 2: Consider the creation of a CSIRO Industry Engagement Division, to better promote, coordinate and manage industry engagement.

While the AMWU was and remains supportive of the *Plan for Australian Jobs*, in our view it didn't go far enough. It is now even more evident that in order for industry, an in particular manufacturers, to make the necessary investments in new processes, capital, innovation and skills needed to move firms into higher value, more advanced manufacturing, greater investment support is needed. The case for policies to address the ability of businesses, especially manufacturers, to better access necessary finance has been made above. But this issue isn't just one of private business interests. It is one of the national interest.

In this submission, we have argued that the future prosperity of the nation rests on the existence of a diverse and advanced industrial base or 'industrial commons'. This industrial base is under great threat and dramatic action is needed to preserve and grow the base we have. If such action is not taken, the future prosperity of all Australians and the status of Australia as an advanced high income economy is under grave threat.

The AMWU believes this represents a threat to our national interest and policies that aim to address this threat can be thought of as policies which support a broader public good. Indeed, this is a key definition of the 'industrial commons'; namely that its benefits accrue to society as a whole, while the decisions taken which lead to its degradation are taken by private individuals and businesses, based on private costs and benefits.

That is why the AMWU has been advocating for a Manufacturing Finance Corporation (MFC), based on the Clean Energy Finance Corporation (CEFC). The CEFC supports the take up of low carbon technologies across the economy with various publically funded financing products (including concessional loans) based on the fact these technologies are new to the market and financial sector (and are hence treated as very risky), and there is a broader public good reason to support investment in low carbon technologies that exceeds the private returns to these investments (namely combating climate change). The AMWU considers that similar reasons exist for the creation of a MFC.

Advanced manufacturing technologies are also new and their potential and functioning is also little understood by the finance industry. Whether they be additive manufacturing, new forms of computation, design and censoring, new materials and their applications or advanced applications of biological breakthroughs, a large raft of new technological fields are revolutionising manufacturing

globally, but Australian financial institutions are understandably reluctant to invest in these technologies, especially when they have the option of investing in mining as an alternative.[22]

In addition, as outlined above, there is a public interest in maintaining and growing Australia's industrial base. Whether couched in terms of economic complexity or diversification or the need to support good high income jobs and a range of skills and abilities across the economy, there is no doubt it is in the nation's long term interest to have a broad economic base that is not reliant on mining and agriculture for our future prosperity.

As outlined above, this public good extends to supporting the maintenance and diversification of existing manufacturing businesses, especially the hundreds of automotive supply chain firms facing a grim future, but also many other in many sectors of the economy.

It is worth noting that a MCF would not constitute government spending, but an equity injection by government. As such, it would not add to any government deficit. Concessional loans would be registered as additional public debt, but only to the degree they are concessional, not to the total value of the loan.

Similar loan programs/corporations exist in the UK, targeting SME businesses[23] and the Australian Industry Group has suggested government provided 'soft loans' as part of the government's Growth Fund program.[24] Government provided financial assistance for import and export activity is also commonly provided through financing corporations of the CEFC type. The Export Finance and Insurance Corporation is an example in Australia,[25] while the Export-Import Bank is the USA equivalent.[26] In fact, these export credit agencies are extremely common, with at least 40 operating with government backing.[27]

Some details of how such a MFC could work are presented below. In addition to its investment promotion activities, a MFC could link all clients to the relevant Industry Innovation Precinct, Enterprise Connect and the CSIRO industry liaison division, to ensure the each firm enters a network of supportive public institutions, businesses and researchers. Such a network should represent an industry ecosystem, where businesses, researchers, financiers and government agencies cooperate

[22] Indeed, the AMWU believes there is a broader public good case for government to invest in the application of new technologies for this reason, regardless of the sector involved.
[23] See: http://www.capitalforenterprise.gov.uk/
[24] See the AIG final submission into the Productivity Commission's review into the automotive industry, available at: http://www.pc.gov.au/__data/assets/pdf_file/0005/134186/subpp242-automotive.pdf
[25] See: http://www.efic.gov.au/Pages/homepage.aspx
[26] See: http://www.exim.gov/
[27] See: http://en.wikipedia.org/wiki/Export_credit_agency

to generate the best business and economic outcomes for the nation. In addition, as has been born out in the CEFC example, often such a corporation can assist in gaining private funds for a project, just by performing due diligence, creating a signal that the project is viable and acting as an intermediary.

The MFC: Structure and governance

The MFC would be supported by an equity injection from the Commonwealth, and function as a Commonwealth Corporation.

It would be governed by an independent board of governors, compromising leaders in the fields of finance, industry (manufacturing), science and technology, and unions.

It would be headed by a CEO, who would be a high profile Australian of exceptional caliber and integrity and be responsible for the running of the Corporation on a day to day basis.

The MCF would be brought into existence by an Act of parliament, establishing its functions and responsibilities in legislation.

It would be expected that the Corporation would apply commercial rigor when making its investment decisions, focusing on projects and technologies at the later stages of development. By adopting a commercial approach, it would be expected that the Corporation would invest responsibly and manage risk so it is financially self-sufficient and achieves a benchmark rate of return. This benchmark rate of return would be expected to be met across the whole portfolio of the Corporation's assets, not by any specific asset.

The benchmark rate of return would be set by legislative instrument, and would be equivalent to the average 5 year government bond rate.

The MFC: Function

The government would have the expectation that the Board will take a long-term outlook when setting the investment strategy for the Corporation.

The Corporation would be the government's primary mechanism to help mobilise investment in the Australian manufacturing sector, to improve its competitiveness through the deployment of new technologies, and over the long term to transform the sector into an 'advanced manufacturing' sector.

An advanced manufacturing sector is one that entails the rapid transfer of science and technology into manufacturing products and processes. Its competitive advantage is based on the use and coordination of technologies like IT, automation, nanotechnology, computation, sensing, and networking, and materials in either processes or products.

The Corporation will invest at the demonstration, commercialisation and deployment stages of innovation. The Corporation will be established to finance the renewal of Australia's manufacturing industrial base using financial products and structures to address the barriers inhibiting investment.

The Corporation will have regard to its potential effect on other market participants when considering investment proposals. In line with its policy intent, the Corporation should have regard to positive externalities and public policy outcomes when making investment decisions and when determining the extent of any concessionality for an investment.

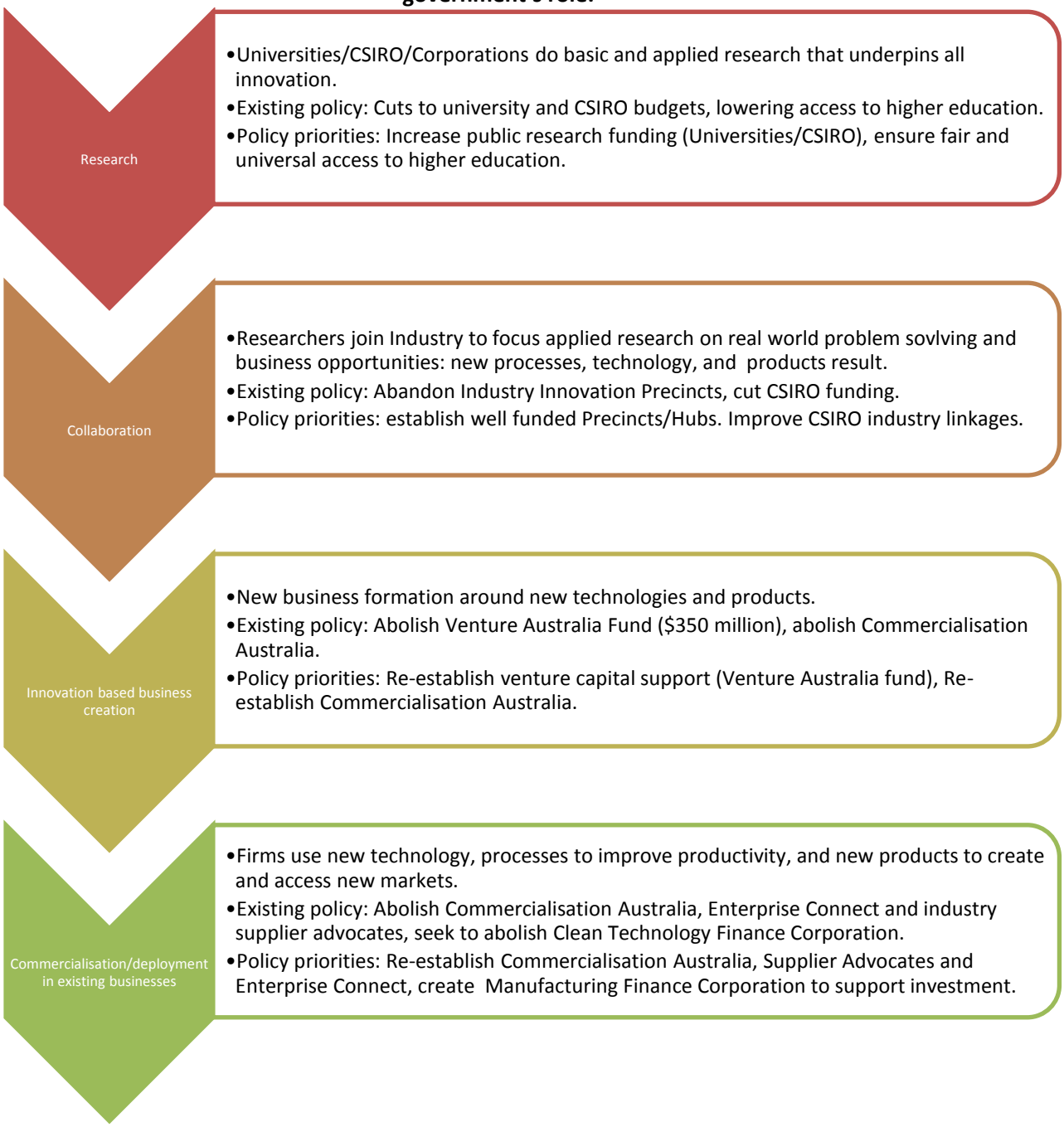
Recommendation 3: Establish a Manufacturing Finance Corporation with an equity injection from government of at least $5 billion.

Conclusion

If these recommendations are followed, Australia stands a chance to boost the innovation system so it can provide the broad benefits to the economy and society it is capable of delivering. Greater resourcing, better coordination and collaboration between industry and researchers and an improved ability of industry to reap the rewards of our innovation are all needed to reach this goal.

Figure 2 below provides a summary of the innovation system, what the impacts of recent policy decisions are and what new policy directions should be implemented. It highlights that the current government is moving in the wrong direction but it also makes clear returning to the pre-budget status quo isn't good enough.

Figure 2. The Innovation Chain: how research translates to wealth creation and what is the government's role.



For too long, Australian's have had the luxury of seeing their incomes rise from a mining boon and a terms of trade shock, rather than from improvements in productivity and innovation. But we know the mining boom and terms of trade are short lived factors and they have undermined the longer term sources of our prosperity by hollowing out our trade exposed sectors and industrial base. We can no longer afford to ignore the dismantling of our innovation system and our industrial base. If we fail to act to grow the real drivers of long term prosperity; innovation, technology, skills,

advanced industries and good, well paying jobs, our status as a high income advanced economy will be lost.