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Mr Geoff Knight
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Dear Mr Knight

Manufacturing Green Paper

The Australian Academy of Technological Science and Engineering (ATSE)[1] welcomes this opportunity to provide some comments on the Manufacturing Green paper. The Academy supports this initiative and notes that manufacturing is a matter of great importance to Australia. The Manufacturing Green Paper (henceforth referred to as 'the Paper') is overall an excellent document for which the Department is to be commended. It is critical that South Australia focusses its efforts on the areas in which the State has, or might realistically derive in time, genuine competitive advantage leading to significant economic benefit. The following comments, prepared by the ATSE South Australian Division, outline areas that the Academy feels should be focused on in the development of the final Manufacturing Strategy (henceforth referred to as 'the Strategy').

In responding to the green paper the Academy has considered the recommendations from the 2011 Goran Roos paper, '*Manufacturing in to the future'*, recognising the key importance of this paper to the final Manufacturing Strategy. The Academy strongly supports the proposition by Professor Roos that "a healthy manufacturing sector is a must for any advanced economy". The Academy feels that the future of SA manufacturing will have a key focus in advanced technological areas that depend on strong intellectual property. In many cases this will be in entirely new or niche market opportunities, characterised by high returns and specialised skills, and necessitate careful consideration of issues surrounding intellectual property. Whilst final manufacture may be conducted off-shore in some cases, in building a depth and breadth of innovative companies in the Australian advanced manufacturing sector, much of the value will be retained in SA. This future may be typified by a large number of smaller, highly innovative and networked manufacturing companies, rather than large corporations or divisions of multi-nationals.

International comparison: The Paper refers to nine other economies either engaged in reviews of their manufacturing strategies, or as examples of leveraging manufacturing from a resources industry. The smallest of these, Finland, Singapore and Chile, all have annual GDP of around $250 billion compared to South Australia at $90 billion. Only Canada and Chile have economies broadly comparable with South Australia with respect to the

[1] The Australian Academy of Technological Sciences and Engineering (ATSE) is an independent body of 800 eminent Australian engineers and scientists driving technological solutions for a better Australia. ATSE was established in 1976 with the mission to promote the application of scientific and engineering knowledge to the future benefit of Australia. ATSE is one of four learned national Academies, which have complementary roles and work together both nationally and internationally. www.atse.org.au

percentage of GDP derived from resources and primary produce. Many of the economies have a long history of substantial and varied elaborately transformed manufacturing with government policies designed to nurture such industries, whereas South Australia does not share a similar history. The capacity for South Australia to invest in major economic structural reform is very much less than for all these other economies. It is important to note the relative small size of the South Australian economy by global standards.

Clarification of opportunity: To generate focus the final Strategy would benefit greatly by differentiating between two broad categories of advanced manufacturing opportunities. These are opportunities for the provision of technologies, products and services arising principally from:

1. The specified needs of South Australian industries and customers that are of global dimension and significance (global lead customers); and
2. The individual brilliance and entrepreneurship of South Australian researchers and business people where the outcomes are targeted at niche global markets.

Cases within these two categories can merge, there opportunity is maximised. Otherwise, different strategic emphasis is required for each.

In category 1 South Australia has a mining and resources boom. It may be argued that defence, automotive, wine, metals, cleantech and food reside here as well; further comments follow later on both category 1 and category 2 opportunities. In category 2 there are several examples, many of which have been identified in the Paper in the section on High Value Manufacturing (page A21). Amongst our 6792 manufacturers how many other niche opportunities at earlier stages of development might we find?

The Paper suggests that a number of such category 2 opportunities may cluster into an aggregated “industry” called “Cleantech”, particularly where it is driven by the demands of the expanding resources sector. Perhaps the same could be said for metals processing and fabrication, and SA’s “clean green” agriculture, fishing and overall food production and processing industry.

In particular, clusters supporting the emerging biofuels industry, utilising the State’s non-agricultural marginal lands to produce, aggregate and process biomass from non-food crops like algae, agave and camelina, to produce drop-in fuels for transport, including aviation, require specific consideration.

Both categories are very important, it is important to differentiate between and correctly classify these two categories in order to ensure strategic emphasis and outcomes. Niche market strategies are required in cases where there is not an industry of global significance to drive demand, innovation and clustering and/or where the market is not clearly defined.

Information and knowledge: On numerous occasions, including in the “Minister’s forward” and “The way forward”, the Paper emphasises the need to map and understand the existing industry and R&D capabilities and strengths in South Australia; however, as Professor Roos states, *“the lack of reliable data is presently a problem in South Australia”.*

Genuine, sustainable competitive advantage for South Australian science-based advanced manufacture will be first found in world leading:

- R&D already being undertaken in industry, universities and other public institutions
- Products, systems and services already being marketed by businesses
- The ideas in the minds of Australia's entrepreneurs, normally highly technically skilled and specialised individuals that are crucial to any economy

This is true for both category 1 and 2 opportunities.

A top priority for Government must be to comprehensively and expertly uncover, document, map, comprehend and constantly update this innovation landscape. The work will best be done by close consultation and co-operation between Government, industry and the research bodies. It can only be done by individuals actively involved with Industry, with the training and skills to ask the right questions, understand what they see and hear, discern the links and the clustering opportunities - a significant investment is required in excellent people. Industry Associations as well as individuals are also fundamental to this work, Government could consider adequately resourcing appropriate Industry Associations to conduct this important work.

Lead industries and customers of global dimension: The Paper importantly emphasises several times the vital role of lead customers in opportunity identification, demand creation, and the leadership of clusters to meet the need. This of course is only possible in the aforementioned Category 1 opportunities.

Mining and resources: Building advanced manufacturing capability to service the mining and resources sector in South Australia is an important focus of the Green Paper. The needs for world leading clever technologies, products, and services of the major companies that will exploit SA's resources are as important a source of sustainable competitive advantage as the cleverness and innovation already at large in our State. These companies should be encouraged to sponsor and invest in South Australian capability and innovation. As the paper says "*the resources sector is heavily internationalised, both in terms of ownership and supply chains and has strong propensity to import plant and equipment".* This is a key issue.

Other Category 1 opportunities: Further consideration should be given to defence, automotive, wine, metals, cleantech and food. We suggest that the car manufacturing industry does not offer a sustainable competitive advantage of global dimension for South Australia, or Australia, in its current form. For it to remain as a category 1 industry into the future there needs to be considerable redefining of its competitive advantage globally (i.e. what type of car(s) will we build in the future that provides a competitive edge). Where existing SA businesses supplying the car manufacturing industry have genuine market leadership in technology and product they should be nurtured via the strategy for category 2 opportunities.

The Australian wine industry is struggling today relative to the boom export years of nearly a decade ago. This surely is an example of the failure to apply broadly based advanced manufacturing principles as defined by Professor Roos. As part of this problem lead customers failed to develop and support clusters for relentless innovation of technologies, products and services for continued global leadership. The spread of the industry over five states and therefore the difficulty of developing a national strategy is a very significant factor. South Australia should give further consideration to specifically how to recreate sustainable competitive advantage in this industry. Working for us, there are lead customers of global significance and a clearly defined market. However the industry is spread across five states.

The SA's defence industry is an example of relative failure to apply advanced manufacturing principles. The opinion of most SME businesses in SA that might have aspired to participate in the State's major defence projects is that the opportunity did not eventuate. As is the case for the mining and resources industry, international primes naturally select proven imported products and solutions. This is understandable in an industry comprised of major projects that are few and far between. In addition our defence projects have not been without their inherent problems. Again it is likely that South Australia should treat defence industry participants under category 2 strategies.

The strategy for mining and resources should be unique: Thus, subject to careful consideration of the wine industry, and the potential clusterings of Cleantech, Biofuels and Clean Green Food, one of the State's most likely industries of global dimension for the future, with globally significant lead customers, is the mining and resources industry. The strategy for this industry should be specific and very comprehensive. The Manufacturing Strategy should make this very clear.

Individual entrepreneurship and niche global opportunities: Most of South Australia's Science Based advanced manufacturing success stories are category 2; they have arisen from the innovation and entrepreneurship of rare individuals in business and the research sector. These do not and cannot amount to lead industries of global dimension. However in a very small but clever economy like South Australia they are vital. They bring variety to our manufacturing, and they challenge the front line of technology. The entrepreneurs see needs and see solutions. This category of opportunity requires its own set of strategies and policies.

General remarks: The Academy supports this initiative by DIMITRE, however, we would suggest that the proposed vision requires consolidation and more specific, measurable outcomes. The four "Smart" strategies also require further clarity and substance.

Professor Roos' Recommendation 2: The recommendation that the SA Government develops an integrated Industrial, Innovation and Research policy is strongly supported. It should be noted that the Premier's Science and Industry Council (PSIC) has recently established a working group, chaired by Dr Leanna Read FTSE, to commence the development of a new innovation strategy for the State to supersede the 2004 STI[10] Strategy. This working group should provide a major resource to the development of a new integrated Industrial, Innovation and Research policy.

Professor Roos' Recommendation 3: The proposal to establish a South Australian Industry, Innovation and Research Policy Council has already been addressed. At the initiative of the Premier, the Premier's Science and Innovation Council (PSIC) has recently been established from its predecessor, the Premier's Science and Research Council to bring a much stronger focus on building effective linkages between the public research sector and industry. Consistent with this, its membership has been considerably strengthened with industry members. Together with the formation of the Manufacturing Council chaired by Professor Roos, as well as overlaps in membership and existing links to the Economic Development Board, there does not seem to be a need to set up another council focused on innovation.

Professor Roos' Recommendation 10: This recommendation proposes the use of voucher-type systems used in Europe and being trialled in several Australian states. This is

generally supported for application in SA, but careful consideration needs to be given to the design of such a system to ensure it is appropriate for conditions within our state. The most important point is to implement mechanisms that foster closer relationships between the public sector and industry. A voucher system is one mechanism to stimulate these networks, but must also be accompanied by other approaches such as contract research projects, placing students/researchers within an industry setting or by research co-supervision (refer also to Recommendations 42 and 43).

Professor Roos' Recommendation 32: The concept of 'clusters' including both networks of cooperation as well as geographical precincts is strongly supported as the way to leverage different and complementary skill sets, particularly in a small state such as SA. Examples of precincts include the Waite Precinct and Roseworthy (agribusiness precincts); the Mawson Lakes campus of the University of South Australia (particularly minerals processing); Thebarton (biosciences and high-tech precinct), and the newly established Tonsley sustainable industries cluster and the SAHMRI medical research consortium.

Professor Roos' Recommendation 35: The suggested strategy that the commercialisation of intellectual property at universities and starts-ups should be focused primarily on student participation is not supported. Australia has a relatively immature system for establishing start-ups, so concentration on student participation at the exclusion of more established researchers could disrupt the current progress being made in this sphere.

Professor Roos' Recommendation 37: The proposal to develop technical evaluation services by universities is recommended as one important means to encourage links between industry and the research sector. It provides the opportunity to develop a more systematic approach to enhancing links between industry and our local universities, rather than the current situation where the success of such linkages is dependent on the entrepreneurial skills of individual researchers.

The example stated in the report, the Medical Devices Partnering Program (MDPP), is headed by ATSE Fellow Professor Karen Reynolds. This began through a modest investment from the Premiers' Science and Research Fund in 2007/08 and the program has now assisted a large number of companies and won a number of awards for its results. This program is one good working model of supporting advanced manufacturing and can be expanded to other sectors where key partners and essential success factors can be brought together.

Since 2008, the MDPP has assisted more than 45 companies and inventors in the advanced manufacturing sector with services ranging from expert technical and market advice, introductions and linkages, proof of concept studies, prototype design and construction. The client list has included start-ups as well as world leading companies. Dr Steven Farrugia, Vice President Technology, ResMed Ltd (a world leading Australian Stock Exchange-listed medical device company) has commented that "*The MDPP is possibly the best model for fostering University/Industry collaboration that I have encountered in an Australian University*".

Professor Roos' Recommendation 41: The recommendation to encourage higher numbers of science and engineering students from an early age in the school system is very strongly supported and a core priority for ATSE. We note and support the proposal to use ATSE, the Australian Industry Group and Business SA in the coordination of this initiative,

but also emphasise the importance of SA Government policy and incentives, particularly for training of teachers.

Professor Roos' Recommendation 42: ATSE is strongly supportive of valuing applied research equally with basic research, and to enhance the way academic staff work with industry. The current ERA system for determination of research excellence in universities is far too heavily weighted towards basic research. It is most important that the Federal Government introduce impact measures to balance this basic research bias.

I trust these comments are useful and would be happy to discuss them further.

I would like to acknowledge the contributions of the Fellows of the South Australian Division, notably Dr Mike Heard FTSE, Dr Leanna Reid FTSE, Mr Henry Muller FTSE and Dr Meera Verma FTSE.

Yours sincerely

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