Manufacturing Skills Australia's submission to the Senate inquiry: The shortage of engineering and related employment skills

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Manufacturing Skills Australia

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

This submission has been prepared by Manufacturing Skills Australia in response to the Senate's inquiry into the shortage of engineering and related employment skills.

Manufacturing Skills Australia (MSA) is the national Industry Skills Council recognised by the Australian Government to ensure that the skill needs of manufacturing enterprises are being met. It is responsible for workforce development initiatives which include providing industry intelligence and advice to inform government policy, supporting the development, implementation and improvement of nationally recognised training and qualifications, and providing skills and training advice to individual enterprises to assist with training and development processes.

Our vision is to be the pre-eminent organisation in Australia fostering and advocating for the workforce skill development needs of a thriving industry. We provide bi-partisan leadership and value the empowered and informed input of industry stakeholders. We strive to provide high quality information and workforce development resources to support the participation of industry in developing an innovative, highly productive and globally competitive manufacturing industry.

MSA is funded by the Australian government through the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) and works closely with Skills Australia, industry associations, unions, training providers, government agencies and employers to continually evolve and improve skills for manufacturing.

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Executive summary

As the Industry Skills Council with the national responsibility for providing advice and assistance on skills needs, workforce developments strategies, and oversight of the Training Packages relating to engineering trades persons and technicians, MSA is pleased to have the opportunity to provide a submission to the Senate inquiry into:

The shortage of engineering and related employment skills

In its submission, MSA has addressed a number of key areas within the Terms of Reference. These key areas and MSA's responses are summarised below.

(b) the impact of the long-term outsourcing of engineering activities by government on skills development and retention in both the private and public sectors

There is very little research that has been conducted into the impact of outsourcing of government activities on skills development and retention either here in Australia or internationally. Whilst the impact on engineering skills development and retention in both the private and public sectors is unknown, there is anecdotal evidence that within the public sector, the loss of engineering expertise hampers the sector's ability to be an "informed client".

Government projects are dependent on Government fiscal policy and, in most cases, tied to the electoral cycle. As a consequence, most funding is for three years or less. The skills for most engineering professions and related occupations have a three year or longer lead time. As a consequence, most enterprises are reluctant to take on apprentices or cadets when they are unable to guarantee continuity of employment.

The economics of the "boom and bust" cycle of government infrastructure development means that small to medium enterprises are unable to compete for these lucrative contracts as they are unable to sustain employment levels during the "quiet" times when government is not investing in infrastructure projects. Given that the majority of engineering enterprises in Australia are small to medium enterprises, this means a large part of the engineering sector is being disadvantaged.

Recent research has shown that the manufacturing sector is the largest employer of engineering trades apprentices and technicians, with around 9.3% of all apprentice commencements in 2010.

(c) options to address the skill shortage for engineers and related trades, and the effectiveness and efficiency of relevant policies, both past and present

The Australian National Engineering Taskforce (ANET) identified several options that could be used to address the skill shortage for engineers and related trades. These include:

- Improving articulation between vocational education and training (VET) and Higher Education
- Increasing the number of people completing Advanced Diploma or Associate Degree qualifications
- Providing greater support for women within engineering and related occupations
- Promoting careers in engineering and related occupations as careers of choice to students transitioning from school to the tertiary sector
- Improving the mathematical and science skills of secondary school students so that they are able to successfully transition to tertiary study in an engineering and related technologies area
- Raising the profile of engineering cadetships

MSA concurs with these strategies and has a number of projects either under way or planned to support these strategies.

Skilling Australia for the future forms the major policy basis for the current Australian Government funding initiatives and for policy directions such as opening up the tertiary education sector by uncapping university entry numbers, centralising the regulation of the VET sector through the Australian Skills Quality Authority (ASQA) and the reform of the Australian Apprenticeship system and of the VET sector.

According to research undertaken by the national Industry Skills Councils (ISCs), the most effective funding initiative to date for VET-sector training has been the Enterprise Based Productivity Places Program (EBPPP). This research found that the program had increased the level of enterprise investment in workforce development, and all learners in EBPPP-funded training were in priority occupations as determined by the Priority Occupations Productivity Places Program List or as approved on an as needs enterprise basis supported by an evidence-based rationale.

The impact of reforms to both the higher education sector and the VET sector are yet to be felt as these reforms are only just being phased in.

(e) effective strategies to develop and retain engineering talent in the private and public sectors through industry training and development, at enterprise, project and whole-of-sector levels

The biggest issue facing engineering enterprises outside of the resources sector is the "poaching" of engineering talent at all levels by resources enterprises. One consequence at the trade and technical level is that employers are reluctant to take on Australian Apprentices if they are only going to lose them to the higher paying resources sector.

More generally, high wages is only one strategy that is effective in attracting, developing and retaining engineering talent. There is evidence that enterprises that promote a culture of life-long learning and provide their workforces with opportunities to grow and develop their careers are more successful in attracting, developing and retaining talent.

MSA is aware that establishing effective pathways to increase the availability of ongoing and other high-level skills is strategically important to addressing skill shortages. It is working with Engineers Australia and other industry groups to ensure that articulation opportunities are maximised and that VET qualifications are fit-for-purpose and well targeted to meet industry needs. Clearly articulated career pathways are an essential part of any whole-of-sector strategy to develop and retain engineering talent.

(f) opportunities to provide incentives to the private sector through the procurement process to undertake skills development

Already some states are recognising the need to provide incentives to the private sector to undertake skills development through the procurement process. Both the governments of South Australia and Queensland have introduced a policy that requires enterprises undertaking government contracts to ensure that percentage of total, on-site labour hours on government building and civil work over a certain amount and duration is worked by apprentices, trainees, Aboriginal people, local people experiencing barriers to employment or through the upskilling of existing workers. There is evidence that requiring enterprises within the private sector to undertake skills development of their workforce as part of the procurement process can be a very successful incentive.

(g) consequences of skills shortages in the construction sector to the public sector's capacity to effectively procure and manage infrastructure projects

The "poaching" of skilled workers from manufacturing by both the construction sector and the resources sector has a direct impact on the public sector's ability to effectively procure and manage infrastructure and other projects. Without appropriately skilled and experienced workers, Australian manufacturing will have difficulty meeting demands from successful contractors for equipment and materials within timeframes. This in turn will lead to a "blow out" in project costs and timing which then impacts directly on the effectiveness of the public sector's procurement and management processes.

Preamble

MSA believes that the inquiry into the shortage of engineering and related employment skills is timely given the rapid growth of infrastructure projects within the resources sector and the structural adjustment currently occurring in the manufacturing sector. The activities of both these sectors have or will have profound impacts on the number and quality of workers required within the engineering occupations.

It is important that what is defined by "engineering and related employment" is clearly understood. The Australian and New Zealand Standard Classification of Occupations (ANZSCO) classifies engineers in Major Group 2 Professionals, Sub-Major Group 23 Design, Engineering, Science and Transport Professionals; and engineering trades and technicians in Major Group 3 Technicians and Trades Workers, Major Sub Group 31 Engineering, ICT and Science Technicians and Major Sub Group 32 Automotive and Engineering Trades Workers. Obtaining data from the Australian Bureau of Statistics (ABS) regarding employment numbers for engineers and related employment is difficult because the majority of data is not disaggregated beyond the Sub Group level.

Recent research has shown that the manufacturing sector is the largest employer of engineering trades apprentices and technicians, with around 9.3% of all apprentice commencements in 2010[1]. The National Resources Sector Employment Taskforce[2] criticised the resources sector for not being more proactive in recruiting and training apprentices. The resources sector is a heavy user of engineering skills both at the trade level as well as at the professional level. At the end of 2009, the resources sector employed over 5% of all trades people but only 3.6% of apprentices with the largest number of these being Horticultural trades workers (30.4% of resource sector apprentices)[3]. Furthermore the Taskforce found that the resources sector preferred to employ experienced tradespersons. Anecdotal evidence gathered by MSA for its 2012 Environmental Scan found that the resources sectors "poaches" experienced trades people from the manufacturing sector. This in turn puts further pressure on a sector at a time when the need for a highly skilled and technology savvy workforce is critical for its ongoing survival. As a result manufacturing enterprises are reluctant to train apprentices and upskill existing engineering tradespeople if they are then going to lose them to the resources sector. This creates a cycle that only reinforces engineering skills shortages.

The impact of the long-term outsourcing of engineering activities by government on skills development and retention in both the private and public sectors

There is very little research that has been conducted into the impact of outsourcing of government activities on skill development and retention either here in Australia or internationally. When the Australian government moved to outsource services in the early 2000s, the focus of the research was on the advantages and disadvantages for government of this policy change[4]. The only organisation to raise any concerns regarding the impact of outsourcing by government was the Royal Australian

[1] National Centre for Vocational Education Research, 2011, *Apprentices and trainees 2010 – annual* Table 7, Adelaide
[2] National Resources Sector Employment Taskforce, 2010, *Resourcing the Future*, report, Australian Government, Canberra http://www.deewr.gov.au/Skills/Programs/National/nrset/Documents/FinalReport.pdf
[3] Karmel, T, and Mlotkowski, P, 2010, *Tradespeople for the resources sector: projections 2010-2020*, Technical Paper, National Centre for Vocational Education Research, Adelaide
[4] Griffith and Figgis, 1997, Verspaandonk, 2001; Australian Public Service Commission, 2002; Abelson, 2005

College of Architects which expressed concern regarding the impact of the "boom or bust" cycle created by changes of government[5]. Since then there has been little to no research in this area.

According to Griffith and Figgis (1997), the impact of outsourcing ("competitive tendering and contracting") would:

- Increase industry capabilities by giving private contractors "the opportunity to develop new capabilities and skills to meet the demands of government purchasers".
- Encourage multinational companies to set up offices in Australia, bringing with them new technology, knowledge and expertise which would be passed on to Australian companies.
- Encourage regional development by using contract specifications "to ensure the employment of local resources and the promotion of local development".[6]

These assumptions have not been investigated to confirm that this is what happens when government activities are outsourced.

In 2006, only 20% of the engineering workforce was employed in the public sector[7]. This is despite over 350 projects being funded through the Department of Infrastructure and Transport in 2006-07[8]. As such a low percentage of the engineering workforce is employed in the public sector, and the majority of these are employed in the Rail Transport sector[9], the impact of outsourcing has been significant.

> *Public sector engineers are increasingly affected as work is outsourced to contractors and the overall capacity of the public service is reduced. Structural changes have significantly changed the way that engineers work across the public sector.*[10]

The economics of the "boom and bust" cycle of government infrastructure development means that small to medium enterprises are unable to compete for these lucrative contracts as they are unable to sustain employment levels during the "quiet" times when government is not investing in infrastructure projects. Given that the majority of engineering enterprises in Australia are small to medium enterprises, this means a large part of the engineering sector are being disadvantaged.

The impact of this "boom and bust" cycle is felt not only in those enterprises undertaking the project but also on the engineering enterprises that are suppliers. For example, there is a flow on effect to fabrication enterprises supplying the steel for the construction of rail networks. The increase in orders may require the organisation to take on additional fabrication tradespersons. The specific skill set required may not be readily available, and due to the long lead times required to train qualified tradespersons, the enterprise may be reluctant to train to meet their needs. Due to this, labour may be imported on a short-term contract basis. When this contract labour moves on at the completion of the project, the skills are lost to the enterprise.

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[5] Australian Institute of Architects 2001 Architects warn the government *Media Release* https://www.architecture.com.au/i-cms?page=510
[6] Griffith, G and Figgis, H 1997, *Outsourcing in the Public Sector, Briefing Paper No 22/97* NSW Parliamentary Library Research Service, pg 22 http://www.parliament.nsw.gov.au/prod/parlment/publications.nsf/0/EF5487324EB40557CA256ECF000A1FE5/$File/22-97.pdf
[7] Australian Bureau of Statistics, 2006, *Census of Population and Housing*
[8] Department of Infrastructure and Transport, *Annual Report 2006-07* http://www.infrastructure.gov.au/department/annual_report/2006_2007/c-1.aspx
[9] Workplace Research Centre and National Institute of Labour Studies, 2011, *Engineering Skills Capacity in the Road and Rail Industries*, Australian National Engineering Taskforce http://www.anet.org.au/wp-content/uploads/2011/06/ANET-Road-and-Rail1.pdf
[10] Australian National Engineering Taskforce, 2010, *Scoping Our Future - Addressing Australia's Engineering Skills Shortage* http://www.anet.org.au/wp-content/uploads/2010/12/Scoping-our-futureWEB.pdf

There is anecdotal evidence that private enterprises undertaking Australian Government contracts do not and are reluctant to invest in skills development unless required to do so within the contract. The majority of engineering occupations require long lead times – three or more years. Most government contracts are short-term, that is three years or less in duration, while the nominal time required to train an apprentice for example, is four years. This inability to ensure continuity of employment is one of the reasons that employers are reluctant to invest in skills development.

> *"If Australia wants to have an indigenous Defence supply capability, then the Australian Government needs to invest in those suppliers beyond the initial contract period." (ADF project manager)*

With regard to retention of skills, the outsourcing of services by government has been considered to offer access to specialist expertise and sophisticated technical solutions without the need to invest in specialist staff or expensive technology that may be only used occasionally[11]. Again there has been no research into the impact of outsourcing on retention of skills either within the public sector or within private enterprises. The majority of research that has been conducted in relation to outsourcing has been focussed on the Information and Communication Technology (ICT) sector and/or the skills required to manage the outsourcing process. There is some evidence that outsourcing has led to the loss of relevant skills from the public sector, with public sector workers not being picked up by the private sector as they have been considered to not have the 'correct' skill set.

> *However with that outsourcing we lost a lot of institutional knowledge and capability. We struggle to remain an informed client and are desperately trying to build technical expertise in key areas that cannot be met through the private sector.*[12]

Many private organisations that have been successful in the tender process often contract the required skills for that project. These 'sub-contractors' only work on that project, may have limited contact with the permanent employees of the tendering enterprise. There is little transfer of skills or knowledge. Also MSA has anecdotal evidence that, where the tendering organisation undertakes the work, there has been a 'narrowing' of skill development with workers only being upskilled in those skills that are required to meet the needs of a particular contract.

The current level of investment in private infrastructure projects as a result of the minerals boom in Australia is unprecedented. Given that Government has outsourced the majority of its engineering capabilities, this means that public infrastructure projects will be competing for the same pool of engineering professionals and tradespersons. ANET has estimated that the current shortage of engineers and related tradespeople has had a significant cost on the economy and the community as well as being a considerable problem for business[13].

There is a strong need to obtain empirical data relating to the impacts that outsourcing of government services on skills development and retention in both the public and private sectors has had, not only in relation to engineering but across the entire skills base.

[11] Griffith, G and Figgis, H, 1997, *Outsourcing in Public Sector Briefing Paper No 22/97*, NSW Parliamentary Library Research Service http://www.parliament.nsw.gov.au/prod/parlment/publications.nsf/0/EF5487324EB40557CA256ECF000A1FE5/$File/22-97.pdf
[12] Australian National Engineering Taskforce, 2010, *Scoping Our Future Addressing Australia's Engineering Skills Shortage* http://www.anet.org.au/wp-content/uploads/2010/12/Scoping-our-futureWEB.pdf
[13] Ibid

Options to address the skill shortage for engineers and related trades, and the effectiveness and efficiency of relevant policies, both past and present

In 2010-11, ANET published a series of research reports into the current skills shortage for engineering and related trades. ANET identified two major government policies that were having a major impact on Australia's ability to address skill shortages in this vital area:

- Large demand fluctuations (government investment in infrastructure) over the past 30 years; and
- Differences in government funding between the VET and higher education sectors leading to anomalies and inconsistencies for both students and course providers.[14]

The research also identified several other factors that are impacted by government policies that contribute to the skills shortage being experienced within engineering professions and related trades. These are:

- The very low number of women (only 6% of the workforce)
- The ageing workforce; and
- Access to education and training in regional and rural areas.[15]

MSA concurs with ANET's research findings, based on feedback received from our stakeholders. The impact of short-term government policies relating to the development of infrastructure such as roads and rail networks, public building works such as hospitals and schools, etc, sees a cycle of "boom and bust" where there is a surge in infrastructure construction under a particular government followed by a dearth of projects under a different government. The majority of government projects have a three year (or less) life cycle due in many instances to the Australian political cycle. Governments are reluctant to commit to long-term projects due to the uncertainty of the electoral cycle.

Options to address the skill shortage for engineering and related trades

ANET identified a number of areas in which improvements could be made which would boost the number of people entering engineering and related trades.

These are:

- Improving articulation between VET and Higher Education. According to ANET, only 6% of commencing students in engineering courses are admitted on the basis of a VET qualification[16]. MSA has found that dual sector institutions are doing better with the articulation between the two sectors. Several institutions are introducing structures which facilitate transitions from VET qualifications into a range of Bachelor degrees. MSA is also working with Engineers Australia and other industry groups to ensure articulation opportunities are maximised and that VET qualifications are fit-for-purpose and well targeted to meet industry need[17].

[14] Workplace Research Centre, and National Institute of Labour Studies, 2011, *Engineering Skills Capacity in the Road and Rail Industries*, Australian National Engineering Taskforce http://www.anet.org.au/wp-content/uploads/2011/06/ANET-Road-and-Rail1.pdf
[15] Ibid
[16] Australian National Engineering Taskforce, 2011, *Engineering Skills Capacity in the Road and Rail Industries – Building engineering capacity through education* http://www.anet.org.au/wp-content/uploads/2011/06/ANET-Report-Building-Education-Capacity-Executive-Summary.pdf
[17] Manufacturing Skills Australia, 2012, *MSA Environmental Scan 2012 (draft,)* not yet published

- Articulation from Higher Education to VET also needs to improve. Many employers complain that higher education graduates are not work ready and need extra support to transition into the workforce[18]. MSA has expanded the range of technical and paraprofessional engineering qualifications within its Training Packages. In 2011, the Vocational Graduate Diploma of Engineering was added to the Metal and Engineering Training Package to facilitate articulation pathways and provide graduates with the necessary skills to work effectively in the engineering field.
- In addition, MSA is currently researching the feasibility of a fairly standardised approach to an Associate Degree in Engineering – one that is recognised and accepted by industry across Australia. This approach would still offer flexibility of elective choices to meet particular needs but it would also offer a guaranteed pathway to higher engineering qualifications as well as access from VET qualifications. At the moment there are many Associate Degrees in Engineering being developed and implemented by higher education institutions across the country yet there seems to be little consistency in their content coverage and articulation arrangements.
- Increasing the number of people completing Advanced Diploma or Associate Degree qualifications which would assist in meeting the number of technically trained engineering staff. It would also provide a pool of people who could progress to professional engineering qualifications.
- Providing greater support for women within engineering and related occupations. Only 6% of professional engineers are women. In general, they are lower paid than their male counterparts, although the work undertaken is the same. In the VET sector, in 2010, fewer than 2% of completions were women[19]. MSA offers a study award to women within manufacturing and engineering to undertake further study as part of its strategy to attract more women into these areas.
- Promoting careers in engineering and related occupations as careers of choice to students transitioning from school to the tertiary sector. In 2009, students undertaking qualifications in the Engineering and related technologies field made up 16.6% of VET students and 7.4% of higher education students[20].
- Improving the mathematical and science skills of secondary school students so that they are able to successfully transition to tertiary study in an engineering and related technologies area. Recent feedback from stakeholders at the Skills Australia Engineering Pathways Forum indicated that many students transitioning from school lacked the mathematical capability to undertake engineering qualifications[21]. Anecdotal evidence compiled by MSA accords with this view. Many employers of apprentices cite that they are finding it increasingly difficult to recruit suitable candidates due to their low levels of maths and science. A report released by Universities Australia[22] found that more than 40% of students did not feel encouraged to do well in maths and science by their teachers at high school. A third also admitted that their post-school choices were influenced by past teachers.
- Improving access to education and training in engineering and related technologies in regional and rural communities. ANET found that in 2006, 83% of the engineering workforce

[18] Ibid
[19] National Centre for Vocational Education Research, *VOCSTATS* http://www.ncver.edu.au/resources/vocstats/intro.html accessed January 2012
[20] National Centre for Vocational Education Research, 2011, *Tertiary education and training in Australia 2009*, Table 12, Adelaide
[21] Skills Australia, 2011, *Engineering Pathways Seminar – A summary of the outcomes*
[22] Universities Australia, 2012, *STEM and non-STEM First Year Students* http://www.universitiesaustralia.edu.au/resources/680/1319

was living in the major cities[23]. However the work is increasingly located in the rural and regional areas of Australia and this is predicted to continue as multiple resources projects come on line. Very few engineering graduates come from rural and regional higher education institutions. In an article in its January newsletter, Engineers Australia highlighted those regional universities which are offering engineering courses, scholarships and facilities to promote the pursuit of engineering studies in non-urban areas[24]. In the VET sector, engineering courses remain one of the major course offerings at TAFEs in regional areas[25].

- Raising the profile of engineering cadetships. MSA research for its 2012 Environmental Scan found that the value of cadetships was not very well understood by employers. Within MSA's Training Packages, cadetships can be offered in conjunction with qualifications which house pathways in CAD and drafting and structural steel drafting, all skill areas identified by ANET as being in critically short supply[26]. MSA is currently reviewing and expanding its coverage of CAD and drafting skills from Certificate III to Advanced Diploma levels, and endorsement of new materials will be a priority in 2012.

The effectiveness and efficiency of relevant policies, both past and present

Skilling Australia for the future[27]

This document forms the policy basis for the current Australian Government funding initiatives and for policy directions such as opening up the tertiary education sector by uncapping university entry numbers, centralising the regulation of the VET sector through the Australian Skills Quality Authority (ASQA) and the reform of the Australian Apprenticeship system and of the VET sector.

While the Australian Government is working towards a cohesive policy that supports skills development and the upskilling of the existing workforce, the inconsistency of state and territory governments' policies in areas such as rural and regional development, skill development and the funding of the same is negating this work.

Building Australia's Future Workforce[28]

Building Australia's Future Workforce was announced in the 2011 Federal budget. This is the latest iteration of the Australian Governments policy on skills development and retention. A major focus is to increase the capacity of Australia's existing workforce through the development of high level skills which are necessary if Australia is to continue to make the most of opportunities and maximise the benefits of the resources boom and match industry's needs. A variety of measures were announced, some of which are relevant to efforts to address the engineering skills shortage. Some of these have been outlined below.

[23] Workplace Research Centre and National Institute of Labour Studies, 2011, *Engineering Skills Capacity in the Road and Rail Industries*, Australian National Engineering Taskforce http://www.anet.org.au/wp-content/uploads/2011/06/ANET-Road-and-Rail.pdf
[24] Engineers Australia, New offerings at regional universities *Engineers Australia*, Vol 48 No 1, January 2012 http://engineersaustralia.realviewtechnologies.com/default.aspx
[25] National Centre for Vocational Education Research *VOCSTATS* http://www.ncver.edu.au/resources/vocstats/intro.html accessed January 2012
[26] Workplace Research Centre and National Institute of Labour Studies, 2011, *Engineering Skills Capacity in the Road and Rail Industries*, Australian National Engineering Taskforce http://www.anet.org.au/wp-content/uploads/2011/06/ANET-Road-and-Rail.pdf
[27] Rudd, K, Swan, W, Smith, S, and Wong, P, 2007, *Skilling Australia for the future* Policy Document, Australian Labour
[28] Australian Government, 2011, *Building Australia's Future Workforce: trained up and ready to work* http://cache.treasury.gov.au/budget/2011-12/content/download/glossy_skills.pdf

Australian Apprenticeships

The effectiveness of the Australian Apprenticeship system to provide adequate numbers of tradespeople, especially in the engineering field has lately been outstripped by the needs of industry. As a consequence, the Australian government undertook a review[29] of the entire system in 2011. The outcomes from that review[30] are currently being implemented. Among the first two reforms to be implemented are:

- Mentoring support for apprentices and employers; and
- Accelerated Apprenticeships

While it is too early to assess the impact of these reforms, MSA is supportive as they are line with feedback received by MSA from its stakeholders. Another important reform which is yet to be introduced is the national harmonisation of apprenticeship regulation, rules and pathways. A major barrier experienced by enterprises that have a national focus is the differing Australian Apprenticeships arrangements across the country. This makes it difficult to move apprentices to where the work is, if it is in a different state to where the apprentice begins his/her apprenticeship.

Apprentice Kickstart program

In 2009, the Australian Government launched the Apprentice Kickstart program which was to support two measures designed to counteract the impact of the global recession on Australian Apprenticeships commencements and retention[31]. The number of apprentices commencing apprenticeships in the Engineering trades covered by MSA in 2009 had dropped to 6,882 from 10,546 in 2008. In 2010, the number of commencements had risen to 8,414. While it is difficult to say that the increase in numbers from 2009 to 2010 can be wholly attributed to the impact of the Apprentice Kickstart program, it will arguably have contributed significantly. The early indications for 2011 are that there will have been little change in commencements from 2010[32]. Between 2008 and 2010, completion numbers in the Engineering trades covered by MSA increased by 603 or 8.5%[33].

Higher education statistics for the same period show that the number of commencing domestic students in Engineering and Related Technology courses had increased by around 1,500 students per year. They accounted for less than two thirds of all commencing students in these courses. During the same period, the number of domestic students completing higher education qualifications in Engineering and Related Technologies increased by 771 or 8.6%[34].

Commencements in the engineering technology (non-trade) qualifications covered by MSA have increased by just over 10% since 2008 with the most commencements being in the Diploma of Engineering – Technology and the Advanced Diploma of Engineering which, in 2010, accounted for nearly 70% of commencements. Completions also increased over the same period by a similar

[29] Department of Education, Employment and Workplace Relations, 2011, *A shared responsibility Apprenticeships for the 21st Century* http://www.australianapprenticeships.gov.au/FAQ/Documents/Apprenticeshipsforthe21stCenturyExpertPanel.pdf
[30] Department of Education, Employment and Workplace Relations, 2011, *Australian Apprenticeships Reform* http://www.australianapprenticeships.gov.au/documents/AustralianApprenticeshipsReform.pdf
[31] Department of Education, Employment and Workplace Relations *Apprentice Kickstart* http://www.deewr.gov.au/Skills/Programs/SkillTraining/AustralianApprenticeships/Pages/AAKickstart.aspx
[32] National Centre for Vocational Education Research, *VOCSTATS* http://www.ncver.edu.au/resources/vocstats/intro.html accessed January 2012
[33] Ibid
[34] Department of Education, Employment and Workplace Relations, *Higher Education Statistics* http://www.deewr.gov.au/HigherEducation/Publications/HEStatistics/Publications/Pages/Students.aspx accessed January 2012

margin. However, while the Diploma and Advanced Diploma accounted for the majority of completions (62.4% in 2010), the overall number of completions in the engineering technology field is significantly low (588 in 2010).

In its report, ANET expressed concern regarding the low numbers of people graduating from both the higher education and VET sectors[35]. Completions rates are also a source of concern for MSA, especially in relation to apprenticeships and traineeships. According to the National Centre for Vocational Education Research (NCVER) data, the estimated qualification completion rate for students undertaking qualification in the Engineering and related technologies field between 2005 and 2007 was 25% or less. While this completion rate data is for qualifications at certificate I and above, completion rates for students under taking Certificate III and above qualifications in 2007 was higher at 30% or above. However, the data is not disaggregated down to Field of Education level. The major concern with this data is that it does not map student completion rates longitudinally and may be giving a false impression of actual completion rates.[36] MSA, in its response to the report "A shared responsibility – Apprenticeships for the 21st Century", believes that completion rates within the engineering trades may be as much as twice the rates indicated by NCVER if completions were mapped longitudinally rather than by contracts (as in the case of apprenticeships and traineeships) or by mathematical formulae[37]. MSA is supportive of the introduction of the Unique Student Identifier (USI).

Productivity Places Program

The Productivity Places Program (PPP) was introduced in 2008 with the primary objective of providing targeted training to support the development of skills to meet existing and future industry demands. A total of 711,000 qualifications are to be delivered over five years to 2012[38]. Except for a few specific areas, the PPP is being delivered through State and Territory government agencies.

A recent independent review of the PPP has found that the program to date has not achieved its goals. The review found that it has failed to adequately target its training to skills shortage levels, that is almost impossible to estimate how many people have participated in the program and that the training being undertaking was skewed to low level qualifications rather than addressing skills shortages and emerging needs[39]. The findings of the report are in line with feedback that MSA has received from its stakeholders. Stakeholders also told MSA that course offerings were driven by what the registered training organisation (RTO) was prepared to offer rather than by what the enterprise required.

Enterprise Based Productivity Places Program

The Enterprise Based Productivity Places Program (EBPPP) was introduced in 2010 to provide opportunities for employees in participating enterprises to increase their skill levels and gain further qualifications. The program is expected to assist enterprises to increase productivity and meet the

[35] Australian National Engineering Taskforce, 2010, *Scoping Our Future Addressing Australia's Engineering Skills Shortage* http://www.anet.org.au/wp-content/uploads/2010/12/Scoping-our-futureWEB.pdf
[36] National Centre for Vocational Education Research, 2011, *The likelihood of completing a VET qualification 2005-07*, Adelaide
[37] Manufacturing Skills Australia, 2011, *Manufacturing Skills Australia's response to the report – A shared responsibility – Apprenticeships for the 21st Century* (unpublished)
[38] Department of Education, Employment and Workplace Relations, *Productivity Places Program Overview* http://www.deewr.gov.au/Skills/Programs/SkillTraining/ProductivityPlaces/Pages/Overview.aspx
[39] Ross, J, 2011, $2bn government skills program 'failed to address key shortages', *The Australian* August 30, 2011 http://www.theaustralian.com.au/national-affairs/bn-government-skills-program-failed-to-address-key-shortages/story-fn59niix-1226124865101

demand of today's economy for higher level skills. The program is a partnership between enterprises, Industry Skills Councils (ISCs) and the Australian Government.[40].

In late 2011, the ISCs released a review that examined the outcomes of the first 12 months of this program.[41] Among the key findings were:

- Enterprises had been able to align strategy, skills development and the attainment of nationally recognised qualifications.
- There was early evidence that the program had increased the level of enterprise investment in workforce development.
- Employers had been able to negotiate with RTOs to deliver tailored training services that met the enterprise's needs at a reduced cost to the enterprise.
- All learners in EBPPP-funded training were in priority occupations as determined by the Priority Occupations Productivity Places Program List or as approved on an as needs enterprise basis supported by an evidence-based rationale.

To date, all feedback received by MSA regarding the EBPPP has been positive, in line with the above findings.

Critical Skills Investment Fund

The Critical Skills Investment Fund (CSIF) was launched in 2011 with the goal of helping to increase the supply of skilled labour to enterprises in the resources, construction, renewable energy and infrastructure sectors. This fund is perhaps the first fund that specifically targeted the industries in which engineers and related occupations are especially in short supply. The successful recipients of the first round of funding were announced late last year. As a result, it is too soon to assess the impact that this program has had on skills development, particularly in increasing the supply of engineering technicians[42].

National Workforce Development Fund

The National Workforce Development Fund (NWDF) is the latest funding program to support training and workforce development in areas of current and future skill needs[43]. The first round of successful applications was announced late in 2011. Outcomes from some of the projects being undertaken may be available late in 2012. Like the previous EBPPP, the program is a partnership between enterprises, ISCs and the Australian Government.

While industry is supportive of the new funding arrangements for training, the constant changing of these arrangements makes it difficult for them to adequately identify skill needs, to source appropriate training programs and apply for funding in what is often a very short time frame. The involvement of the ISCs in supporting enterprises throughout the application process and in monitoring delivery is seen as essential for the ongoing success of these programs.

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[40] Department of Education, Employment and Workplace Relations, *Enterprise Based Productivity Places Program* http://www.deewr.gov.au/Skills/Programs/SkillTraining/ProductivityPlaces/Pages/EBPPP.aspx
[41] ACIL Tasman 2011 *An economic review of the Enterprise Based productivity Places Program* Industry Skills Councils http://www.isc.org.au/pdf/REPORT%20-%20EBPPP%20report%20FINAL.pdf
[42] Department of Education, Employment and Workplace Relations, *Critical Skills Investment Fund* http://www.deewr.gov.au/Skills/Programs/SkillTraining/CSIFund/Pages/Home.aspx
[43] Department of Education, Employment and Workplace Relations, *National Workforce Development Fund* http://www.deewr.gov.au/Skills/Programs/SkillTraining/nwdf/Pages/default.aspx

National Foundation Skills Strategy for Adults

The National Foundation Skills Strategy for Adults (NFSS) provides a framework of approaches for state, territory and Commonwealth action to lift the foundation skills of working age adults over the next decade. The Strategy was endorsed by the Ministerial Council for Tertiary Education, Skills and Employment on 25 November 2011 and has a focus on supporting the English language, literacy and numeracy (LLN) trainer workforce, VET equity and generic skills development, rather than a focus on particular industries or vocational skill sets. The Strategy is due to be introduced in early 2012 and is expected to have a broad impact at both national and state and territory level.

Foundation skills are required at all levels of the workforce (as emphasised in the recent national ISCs' publication 'No more excuses'[44]) and are of particular importance for people entering/re-entering the workforce and for workers transitioning into higher roles and/or higher level studies. Watson and McIntyre[45] found that there is a need to raise the foundation skills levels of learners transitioning from VET qualifications to higher education. However there is currently very little support available for these learners. This is line with feedback MSA has received during its industry consultations for the Foundation Skills Training Package support resources project. Feedback received by MSA indicated that there was a need to develop strategies/products that support tradespeople transitioning into supervisory roles and/or into higher level courses, including higher education.

Other policies impacting on the supply of skilled engineering workers

The other area of government where policy is impacting on the supply of skilled engineering workers is at State and Territory Government level. The divergence between states and territories in identifying and funding Australian Apprenticeships is creating confusion within industry, especially for enterprises which operate nationally.

The policy that allows a learner to access funding for training at a certain level only once is also creating problems for workers who need/want to reskill. For example, a person with a Certificate III in Process Plant Operations who may want to reskill as a maintenance plant engineer because there are openings within the enterprise, is unable to obtain funding support to undertake the Certificate III in Engineering – Mechanical Trade to acquire the necessary skills. This may result in the enterprise losing a valuable employee, or the employee being made redundant if the organisation is moving in a different direction in order to stay sustainable.

Another policy currently causing concern is the move to a demand-led funding system for the VET sector. There is concern that engineering related qualifications, which are not currently being seen as 'sexy' by students, will be the losers as students dictate to RTOs which courses to run. Victoria has already moved to a demand-led system which has seen a disproportionate rise in the number of personal trainers at the expense of less popular courses. In MSA's 2012 Environmental Scan survey, 68% of RTOs stated that enrolment numbers will impact the offering of courses.[46] While the demand for engineering trades apprentices is unlikely to be impacted, the impact of a fully demand-led system

[44] Industry Skills Councils, 2011, *No more excuses: An industry response to the language, literacy and numeracy challenge* http://www.isc.org.au/pdf/NoMoreExcuses_FINAL%20FINAL%20single%20page.pdf
[45] Watson, L and McIntyre, J, 2010, *Scaling Up – Building engineering workforce capacity through education and training*, University of Canberra http://www.anet.org.au/wp-content/uploads/2011/06/ANET-Scaling-Up2.pdf
[46] Manufacturing Skills Australia, 2012, *MSA Environmental Scan 2012 (draft,)* not yet published

on engineering technical and para-professional enrolments in Victoria will only become clear later this year when NCVER releases enrolment data for 2011.

Effective strategies to develop and retain engineering talent in the private and public sectors through industry training and development, at enterprise, project and whole-of-sector levels

MSA, as the national Industry Skills Council for manufacturing and engineering, has a focus on assisting manufacturing and engineering enterprises to identify and meet their workforce development needs. It is currently undertaking a series of projects that will assist manufacturing and engineering enterprises to develop effective strategies to develop and retain engineering talent, as well as developing whole-of-sector tools and promoting nationally accredited training through Training Packages and nationally recognized qualifications.

The biggest issue facing engineering enterprises outside of the resources sector is the "poaching" of engineering talent at all levels by resources enterprises. One consequence at the trade and technical level is that employers are reluctant to take on Australian Apprentices if they are only going to lose them to the higher paying resources sector. While higher wages are a factor in attracting talent to an enterprise, studies have shown that there are several other factors that play a role in attracting and retaining talented employees.[47][48] The adoption of effective strategies based on these factors has been shown to lead to higher levels of attraction and retention of talented employees.

The success of the EBPPP model in upskilling the existing workforce has been clearly demonstrated in the report by ACIL Tasman. As at June 2011, 91.5% of enterprises accessing funding through the EBPPP were small businesses. One of the major benefits identified in the report was that the EBPPP recognised the experience and skills (and prior learning) of participating staff. This enabled staff to build on their skills and experience in the enterprise or industry and improve their career prospects in the organisation[49]. Access to nationally recognised training together with an organisational culture that supports lifelong learning has been shown to increase retention within organisations[50]. In 2012, MSA is undertaking a research project with its participating enterprises to identify the ongoing benefits, including retention of skilled workers, of the scheme. Results will be available late in 2013.

MSA is aware that establishing effective pathways to increase the availability of ongoing and other high-level skills is strategically important to addressing skill shortages. It is working with Engineers Australia and other industry groups to ensure that articulation opportunities are maximised and that VET qualifications are fit-for-purpose and well targeted to meet industry needs. Clearly articulated career pathways are an essential part of any whole-of-sector strategy to develop and retain engineering talent.

In 2011, the Vocational Graduate Diploma of Engineering was endorsed as part of the Metal and Engineering Training Package, and provides a national qualification for the first time for Principal

[47] Smith, A, Oczkowski, E, and Selby Smith, C, 2008, *To have and to hold: Retaining and utilising skilled people*, NCVER, Adelaide http://www.ncver.edu.au/publications/2045.html
[48] Mitchell, J, Dobbs, G and Ward, J, 2011, *From apprenticeship to a career*, ACCI, Barton http://www.acci.asn.au/getattachment/6366be9e-2d77-4d5c-9661-5168b64fafa3/From-Apprenticeship-to-Career-Nov,-2011.aspx
[49] ACIL Tasman, 2011, *An economic review of the Enterprise Based Productivity Places Program*, Industry Skills Councils http://www.isc.org.au/pdf/REPORT%20-%20EBPPP%20report%20FINAL.pdf
[50] Smith, A, Oczkowski, E, and Selby Smith, C, 2008, *To have and to hold: Retaining and utilising skilled people*, NCVER, Adelaide http://www.ncver.edu.au/publications/2045.html

Technical Officers. This qualification and thirty five new units of competency have been developed to provide learning opportunities in mechanical, mechatronic, manufacturing, heating, ventilation, air conditioning and maintenance disciplines of engineering, as well as technical leadership, technical documentation and publication skills. This will facilitate career advancement and skill recognition opportunities for existing technicians and opportunities for enterprises to upskill their technical workforce. It will also provide an effective bridge to higher education and professional engineering and will help to facilitate further education for professional engineers, who are so highly sought across manufacturing and resources-related projects.

MSA is also working with Engineers Australia to investigate the viability of developing a nationally recognised Associate Degree of Engineering. This degree will provide a para-professional qualification that is recognised throughout Australia as providing the skills and knowledge required in engineering technical fields such as mechanical engineering draftsperson and technician, shipbuilding draftsperson, aircraft detail draftsperson and airframe technical officer.

ANET identified that there was a need to provide support and develop the foundation knowledge of people transitioning from trade or low level engineering qualifications to higher level qualifications. Many VET-award holders lack the foundation knowledge in mathematics and science to successfully undertake a higher education qualification in engineering without additional support. Another issue impacting on successful transitions is that the characteristics of the students. According to Watson and McIntyre, the majority of students transitioning are older and/or working full-time[51]. Through industry consultation, MSA has found strong support for the development of resources which will assist VET-award holders to successfully undertake further studies at higher levels, including transitioning to higher education. As part of the support resources for the Foundation Skills Training Package project, MSA is developing resources that will assist in supporting such transitions.

Opportunities to provide incentives to the private sector through the procurement process to undertake skills development

Already some states are recognising the need to provide incentives to the private sector through the procurement process to undertake skills development. Both the governments of South Australia and Queensland have introduced a policy that requires enterprises undertaking government contracts to ensure that a minimum percentage of total, on-site labour hours on government building and civil work over a certain amount and duration is worked by apprentices, trainees, Aboriginal people, local people experiencing barriers to employment or through the upskilling of existing workers. In Queensland the percentage of hours is 10% while South Australia has just raised their percentage to 15%[52].

There is evidence that requiring enterprises within the private sector to undertake skills development for their workforce as part of the procurement process can be a very successful incentive. The Jobs Fund program which commenced in 2009 had as one of its criteria, the requirement that projects "create and retain jobs and develop skills". Under the program, projects undertaken created almost

[51] Watson, L and McIntyre, J, 2010, *Scaling Up – Building engineering workforce capacity through education and training*, University of Canberra http://www.anet.org.au/wp-content/uploads/2011/06/ANET-Scaling-Up2.pdf

[52] Department of Further Education, Employment, Science and Technology *Workforce Participation in Government Construction Procurement Policy – the 15 Per Cent Policy*
http://www.dfeest.sa.gov.au/AboutDFEEST/Strategiesplanspolicies/15Policy/tabid/324/Default.aspx
Skills Queensland *10 per cent Training Policy* http://www.skills.qld.gov.au/Functions/10-per-cent-Training-Policy.aspx

9,500 jobs, more than 2,400 traineeships and over 5,000 work experience positions[53]. The inclusion of a similar requirement in the procurement process for all public sector projects would provide a major incentive to the private sector.

Consequences of skills shortage in the construction sector on the public sector's capacity to effectively procure and manage infrastructure projects

At Manufacturing Skills Australia's 2011 conference, the Chief Executive Officer of Construction Skills Queensland[54] highlighted the impact that the skills shortage in the construction sector will have on the Queensland economy. He projected that by mid-2013 in Queensland alone, for infrastructure projects with a value in excess of $300 million, some 30,000 construction workers a month will be needed across the mining, coal seam gas/liquid nature gas and public infrastructure sectors. When asked how the construction industry would meet these skill needs, his reply was "we will buy them" from other industries. MSA already has received anecdotal evidence to the effect that this is happening.

The result of this "poaching" of skilled and experienced engineering and related workers from manufacturing has a direct impact on the public sector's ability to effectively procure and manage infrastructure projects. Without appropriately skilled and experienced workers, Australian manufacturing will have difficulty meeting demands from successful contractors for equipment and materials within timeframes. This in turn will lead to a "blow out" in project costs and timing which then impacts directly on the effectiveness of the public sector's procurement and management processes. It will also result in manufacturing work for construction going off shore as contractors strive to ensure supply.

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[53] Department of Education, Employment and Workplace Relations, *Employment*, What is the Jobs Fund? http://www.deewr.gov.au/Employment/Pages/JobsFund.aspx

[54] Construction Skills Queensland, 2011, *Building & Construction Industry Workforce Planning* "Current Science no longer works" http://www.msq.org.au/skillsconference/2011/presentations/Brett_Schimming.pdf