ENGINEERS
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Australia's skilled migration program

Submission for Joint Standing Committee on Migration inquiry

March 2021

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1. Introduction

1.1 About Engineers Australia

Engineers Australia is the peak body of the engineering profession in Australia. We are a professional association with about 100,000 individual members. Established in 1919, Engineers Australia is a not-for-profit organisation, constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community.

Engineers Australia maintains national professional standards, benchmarked against international norms. As Australia's signatory to the International Engineering Alliance, this includes accreditation of undergraduate university engineering programs. Furthermore, Engineers Australia manages Australia's largest voluntary register for engineers, the National Engineering Register (NER).

Under the Migration Regulations 1994, Engineers Australia is the designated assessing authority to perform the assessment of the potential migrant engineering professionals' skills, qualifications, and/or work experience to ensure they meet the occupational standards needed for employment in Australia.

1.2 Submission structure

In this submission, Engineers Australia demonstrates that demand for engineers in Australia will always outstrip supply from domestic entry level graduates. A skilled migration program will, therefore, always be needed. However, what matters more is how the migration program is structured to ensure it delivers on the policy outcomes that include increased national engineering capability. In this regard, change is necessary.

An executive summary is provided with an overview of Engineers Australia's primary issues for consideration by the Committee.

This submission, at Section 3, provides comments to address Term of Reference 1(b) to frame subsequent data and recommendations for action.

The most important is Section 4, which compares the employment outcomes of Australian-born and overseas-born engineers.

Section 5 provides some comments against Terms of Reference 3 and 6.

Three appendices are provided to illustrate the key attributes of the Australian engineering labour force generally, plus demand and supply considerations.

1.3 Data sources

The data shared in this submission is mostly based on Engineers Australia analysis of the 2016 census. References taken from this analysis is not footnoted, but is available from two Engineers Australia reports:

- Australia's Engineering Capability: How the last ten years will influence the future (2019)[1]
- Engineers and Industry: A decade of change (2019)[2]

Other Engineers Australia reports used in this submission are as follows:

[1] Andre Kaspura, *Australia's Engineering Capability: How the last ten years will influence the future* (2019) Engineers Australia <https://www.engineersaustralia.org.au/sites/default/files/Australia%E2%80%99s%20Engineering%20Capability%20-%20digital%20-%2020190207.pdf> at 30 March 2021.
[2] Mark Stewart, Engineers and Industry: A decade of change (2019) Engineers Australia <https://www.engineersaustralia.org.au/sites/default/files/Engineers%20and%20Industry%20-%20digital%20-%2020190211.pdf> at 30 March 2021.

- Australian Engineering Employment Vacancies: 2020 Trends (2021)[3]
- Australia's Next Generation of Engineers: university statistics for engineering (2020)[4]
- The Engineering Profession: A Statistical Overview, Fourteenth Edition (2019)[5]
- Engineers Make Things Happen: the need for an engineering pipeline strategy (2017)[6]

1.4 Contact details

For a discussion about the issues raised in this submission, please contact Jonathan Russell, General Manager for Policy and Advocacy, at JRussell@engineersaustralia.org.au.

[3] Sybilla Grady, *Australian Engineering Employment Vacancies* (February 2021), Engineers Australia <https://www.engineersaustralia.org.au/sites/default/files/Engineering%20Vacancy%20Trends%202020.pdf > at 29 March 2021.

[4] Andre Kaspura, *Australia's Next Generation of Engineers: university statistics for engineering* (2020) Engineers Australia <https://www.engineersaustralia.org.au/sites/default/files/Higher_education_statistics_2020.pdf> at 29 March 2021.

[5] Andre Kaspura, *The Engineering Profession: A statistical Overview* (14th ed, 2019) Engineers Australia <https://www.engineersaustralia.org.au/sites/default/files/resources/Public%20Affairs/2019/The%20Engineering%20Profession%2C%20A%20Statistical%20Overview%2C%2014th%20edition%20-%2020190613b.pdf. at 29 March 2021.

[6] Andre Kaspura, *Engineers Make Things Happen: The need for an engineering pipeline strategy* (2017) Engineers Australia <https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-03/Engineers%20Make%20Things%20Happen.pdf> at 29 March 2021.

2. Executive summary

At the 2016 census, 58.5% of engineers in the Australian labour force were born overseas. The skilled migration program, including its various visa classes including permanent and temporary, are essential to the nation's engineering capability.

However, continuing large scale intakes of qualified engineers will not further develop Australia's engineering capability unless action is taken to modify the migration program to ensure a better fit for the policy objectives, and more support is provided to migrants and employers to ensure better employment outcomes.

At present, regarding engineers, due to the inefficient utilisation of migrant engineers, the skilled migration program is only primarily a success if the overarching objective is simply to stimulate population growth by introducing people with high level qualifications.

2.1 Essential issues for migrant engineers

Of those who arrived from 2007 onwards to the time of the 2016 census, the top country of supply was India which supplied 23,217 and the top 10 nations supplied two-thirds of all migrant engineers (so, the supply source is very concentrated).

Migrant engineers are much more likely than Australian-born engineers to work in non-core industries, which indicates that they are also much more likely to work in non-engineering roles. This trend is true of migrants regardless of arrival date and is most pronounced for recent arrivals. (See Appendix A for an explanation of 'core industry').

The concern is that migrant engineers are arriving in Australia to meet a policy objective of enhancing domestic engineering capability, but we are only making effective use of 40.9% of them (that being the proportion who work in engineering roles)

The difference in employment outcome for migrants as compared to Australian-born engineers is significantly worse, both in terms of utilisation in engineering roles and raw unemployment, especially for women and those in regional capitals.

Labour force participation in 2016 for overseas-born qualified engineers who arrived from 2012 onward has fallen well below rates for other, earlier, arrival cohorts, and for Australian-born qualified engineers. Irrespective of when they arrived, overseas-born engineers experience higher unemployment rates than Australian-born engineers do, with recent arrivals experiencing higher rates than in the unskilled labour force segment.

These figures suggest that continuing large scale intakes of qualified engineers will not significantly develop Australia's engineering capability, unless if action is taken to modify the migration program to ensure a better fit for the policy objectives, and more support is provided to migrants and employers to ensure better employment outcomes.

At the time of the 2016 census, the unemployment rate for engineers generally was 6.0%. However, the situation for migrants is put into stark relief if overseas-born and Australian-born engineers are examined in isolation. For Australian-born engineers the unemployment rate was 3.7%. For migrants it is 7.6% (6.9% for men and 11.3% for women).

Of the top 10 migrant groups by country of origin, which deliver 67.1% of all migrant engineers, all have higher rates of unemployment than Australian-born engineers. For those from India, China, Iran, Malaysia, Pakistan and Bangladesh, the differences are stark. The only source countries that come within one percentage point of the Australian-born rate are England and South Africa.

This data suggests that attempts to use the skilled migration program to boost employment and productivity in regional Australia is, to a significant extent, also underperforming. The opportunity to boost domestic engineering capability with new migrants is inefficient—it takes too long to get new migrants into employment.

Engineers Australia's analysis also demonstrates that, for those same groups of migrant engineers, those who are employed are much less likely than Australian-born engineers to work in engineering roles—again, except for those from England and South Africa.

Unfortunately, there is very little hard evidence to explain the reasons for the employment outcomes of migrant engineers.

A recent survey conducted by the University of Technology, Sydney (UTS) into employment barriers for skilled migrant engineers identified the following as the potential top three barriers to employment for migrants: lack of local experience; lack of local references; not a permanent visa holder or citizen. The same research identified some key solutions to employment, these being: internship opportunities; mentoring programs; re-skilling/upskilling.

To fully understand barriers to employment, from the migrants' experience and from those of employers and recruiters, Engineers Australia has embarked on a research project to uncover these barriers from both perspectives. The project is due to be completed by June 2021.

2.2 Other issues

An area of concern is that, for engineering, there would be benefit in reviewing the basis for the skills list to better accommodate future needs. The skills lists are based on Australian and New Zealand Standard Classification of Occupations (ANZSCO) codes and these are typically for the traditional disciplines of engineering and role titles (e.g. draftsperson).

Engineering is an evolving profession and if Australia is to enable migration of those with skills in emerging fields of practice and emerging industries, the skills lists need to be more amenable to change.

An element of the skilled migration program that needs reform is the points-based system for ranking applicants. Engineers Australia is concerned that it skews supply towards those with relatively low levels of work experience. The points-based system can generate many combinations of outcome that skew results (as is intended) but not always towards outcomes that are likely to lead to employment outcomes that match the potential of the migrant.

Some visa classes enable migration if the applicant agrees to remain in a regional location for two to four years. The obligation to remain in the area can however pose a significant barrier to finding jobs that match the migrant's skills and experience.

2.3 Further data

For an overview of the Australian engineering labour force generally, please see Appendices A-C. These include:

A. Basic characteristics of engineers in Australia, industries of employment and location of employment.

B. Supply of engineers, including domestic students and an introduction to overseas students in context and their value to the overall skills pipeline.

C. Demand for engineers, an historical perspective, an overview of current demand, and why there is a need for more data on demand.

2.4 Summary of recommendations

- Engineers Australia recommends that this inquiry consider refining the migration program's objectives to be more specific. Also, to consider if the migration program is designed to attract the right people.
- Engineers Australia recommends that a subsequent inquiry be established to examine the barriers to full and meaningful employment of skilled migrants.
- Engineers Australia recommends that the Australian Government commission research to explore the reasons for different employment outcomes amongst migrants and Australian-born people in occupations targeted by the skilled migration program.
- Engineers Australia recommends that skills lists are revised to be more amenable to change.

- Engineers Australia recommends that the points-based system be reviewed to ensure it does not create unintended consequences in the supply of migrants or their employment outcomes onshore.
- Engineers Australia recommends that the regional sponsorship program be reviewed, and consideration given to freeing migrants of their obligation to remain in the regional area after a shorter period of time, such as six months.
- Engineers Australia recommends that the National Cabinet commission skills demand studies for every industrial sector that relies on skilled migration for a sustainable labour force.

3. Program objectives

The data presented in this submission suggest that continuing large scale intakes of qualified engineers will not further develop Australia's engineering capability unless action is taken to modify the migration program to ensure a better fit for the policy objectives, and more support is provided to migrants and employers to ensure better employment outcomes.

If the skilled migration program is not reformed, the effects will be felt in 10-15 years and lead to poor national competitiveness.

Term of Reference 1(b) is to examine "The purpose of the skilled migration program and whether it is meeting its intended objectives, including: (b) if more long-term structural changes are warranted."

In the absence of detailed documents on the Department of Home Affairs website, the following online summary from the Department is taken as the objectives of the skilled migration program:

> *The Skilled stream of the Migration Program is designed to attract migrants who make a significant contribution to the Australian economy, and fill positions where no Australian workers are available. Skilled migrants have very high participation rates in the workforce, helping to stimulate economic growth, which results in more jobs.*
>
> *The Skilled stream also plays an important role in regional development through providing skills and labour which can't be sourced locally, as well as encouraging investment and promoting local spending in regional areas.*[7]

As a statement of program objectives, this is too vague to enable proper analysis of its success or to enable proper assessment of the need for long-term structural change. For example:

- What defines "significant contribution to the Australian economy"?
- Are the targeted positions being filled, or is there a mismatch between migrant capability and jobs filled?
- Is simple workforce participation a marker of success or is consideration of the value of their participation required?
- Are skilled migrants moving to regional areas and filling vacancies aligned to their capabilities?

Engineers Australia is concerned that, contrary to the stated objectives, the migration program:

- Does not support qualified engineers in their search for employment commensurate with their capabilities.
- Ignores the high variability in workforce participation of migrants depending on their country of origin, despite the same benchmark qualifications.
- Values youth over experience, creating a disconnect between skills supply and employer needs.
- Values regional settlement without acknowledging that most engineering jobs are in metropolitan Sydney and Melbourne. creating another disconnect between skills supply and industry needs.

At present, regarding engineers, due to the inefficient utilisation of migrant engineers, the skilled migration program is primarily a success if the overarching objective is to stimulate population growth by introducing people with high level qualifications.

Engineers Australia recommends that this inquiry consider refining the migration program's objectives to be more specific. Also, to consider if the migration program is designed to attract the right people.

[7] Department of Home Affairs, Skilled migration program <https://immi.homeaffairs.gov.au/what-we-do/skilled-migration-program/overview> at 15 March 2021.

4. Migrant engineers

The data used in this chapter, like the rest of the submission, is mostly based on the 2016 census. Although this means the data is dated and so the results would be different today, Engineers Australia believes that the scale of the variances between Australian-born and overseas-born engineers would remain. The 2016 census data is, therefore, a very valuable indicator of the trends and the scale of the issues.

In 2006, the majority of qualified engineers were Australian-born. By 2016, the majority (58.5%) were born overseas, with only 41.5% born in Australia. This increase was mostly due to skilled migration. Skilled migration has substantially affected the ethnic composition of the engineering labour force to a greater degree than in other skilled professions. At the 2016 census, 30.2% of the general population was born overseas.[8]

At the 2016 census, there were 192,899 overseas-born engineers in the Australian labour force. A further 52,924 were not in the labour force or did not state their status. Of those in the labour force:

- 161,402 (83.7%) were men, and 31,497 (16.3%) were women.
- 78,981 (40.9%) were employed in engineering occupations.

4.1.1 Source countries

The composition of the source of Australia's overseas-born qualified engineers has shifted over time. In the most recent arrival period, India, China and the Philippines account for 43.5% of new migrant engineers. Table 1 demonstrates the change in source for overseas-born qualified engineers in the Australian labour force.

Of those who arrived before 1990, England supplied the most with 5,483 and the top 10 nations supplied just over half of all overseas-born qualified engineers. Of those who arrived from 2007 onwards to the time of the 2016 census, the top supplier was India which supplied 23,217 and the top 10 nations supplied two-thirds of all migrant engineers (so, the supply source was more concentrated).

Table 1 Top 10 source countries for overseas-born qualified engineers

Rank	Before 1990	Number	Since 2007	Number
1	England	5,483	India	23,217
2	Vietnam	2,494	China	9,594
3	China	2,421	Philippines	6,950
4	New Zealand	1,754	England	4,682
5	Malaysia	1,699	Iran	4,570
6	Philippines	1,482	Malaysia	2,707
7	India	1,080	Sri Lanka	2,762
8	Sri Lanka	1,062	South Africa	2,672
9	Poland	958	Pakistan	2,451
10	Hong Kong	946	Bangladesh	1,805
	Top 10	19,379	Top 10	61,410
	All arrivals	34,360	All arrivals	91,515
	% top 10	56.4%	% top 10	67.1%

[8] Australian Bureau of Statistics, 2016 Census QuickStats, <https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/036. at 12 March 2021.

4.1.2 Industries of employment

In Appendix A the concept of 'core industry' is explained. Migrant engineers are much more likely than Australian-born engineers to work in non-core industries, which indicates that they are also much more likely to work in non-engineering roles. This trend is true of migrants regardless of arrival date and is most pronounced for recent arrivals.

For example, 69.6% of Australian-born engineers work in core industries, but just 56.5% of all migrants do, and this reduces even further to 48.9% for those who arrived since 2012. Looked at differently, in the core industries, 52.3% of the engineers were overseas-born, compared to 65.8% in non-core industries.

The concern is that migrant engineers are arriving in Australia to meet a policy objective of enhancing domestic engineering capability, but we are only making effective use of 40.9% of them (that being the proportion who work in engineering roles). For example:

- In the retail industry, the biggest employer of engineers is the supermarket and grocery stores sector. In 2016, over 1,100 migrant engineers who arrived in Australia after 2011 worked in this subindustry, but only 4.9% were employed in engineering occupations.

- Similarly, over 2,600 migrant engineers who arrived in Australia after 2011 worked in the cafes, restaurants and takeaway food industry – a sub-industry of the accommodation and food services industry. Of those, only 1.1% worked in engineering occupations.

- And for administrative and support services, the largest sub-industry is building cleaning, pest control and garden services, which employed over 1,200 migrant engineers who arrived after 2011. Only 1.7% of these engineers worked in engineering occupations.

4.1.3 Location of employment

At the 2016 census, the lion's share (an average of 63.6% across all arrival cohorts) of skilled migration of qualified engineers was in NSW and Victoria.

The resources boom did attract migrant qualified engineers away from NSW and Victoria, mainly to Queensland and Western Australia. However, the changes involved were relatively small compared to the overall intake of migrant qualified engineers.

Engineers are more likely than other skilled workers to be in capital cities (see Appendix A for details). For example, in NSW, 80.4% of the engineering labour force was in Sydney, compared to 74.9% of other skilled workers. If Australian and overseas-born engineers are considered separately, it is observed that in NSW, for example, 66.7% of Australian-born qualified engineers are in Sydney, compared to 91.5% of migrant qualified engineers. That pattern is replicated for each jurisdiction.

4.2 Employment outcomes for migrants

The difference in employment outcome for migrants as compared to Australian-born engineers is significantly worse, both in terms of utilisation in engineering roles and raw unemployment, especially for women and those in regional capitals.

Labour force participation in 2016 for overseas-born qualified engineers who arrived from 2012 onward has fallen well below rates for both other arrival cohorts and for Australian-born qualified engineers. Irrespective of when they arrived, overseas-born engineers experience higher unemployment rates than Australian-born engineers do, with recent arrivals experiencing higher rates than in the unskilled labour force segment.

These figures suggest that continuing large scale intakes of qualified engineers will not significantly develop Australia's engineering capability, unless if action is taken to modify the migration program to ensure a better fit for the policy objectives, and more support is provided to migrants and employers to ensure better employment outcomes.

4.2.1 Unemployment rate

At the time of the 2016 census, the unemployment rate for engineers generally was 6.0%, and when broken down by gender was 5.5% for men and 9.1% for women.

If Australian-born engineers are considered in isolation, the rate is 3.7%. When split for gender, it is quite similar, with 3.7% for men and 3.8% for women.

However, the situation for migrants is put into stark relief if overseas-born engineers are examined in isolation. The numbers change to an overall rate of 7.6%; 6.9% for men and 11.3% for women. For women there is, on average, a 7.5 percentage point difference if one's country of origin is not Australia.

Employment outcomes for migrants who have been settled in Australia for a long time are generally better than the overall average for migrants, but still do not meet the same benchmark for engineers as a whole.

The unemployment rate also differs markedly for migrants depending on where they come from, and where they live in Australia.

Unemployment by country of origin

In Figure 1, the grey line at 3.7% is the unemployment rate for Australian-born engineers in the labour force at the 2016 census. This is then compared to the unemployment rate in 2016 for qualified engineers from the top 10 source countries who arrived in Australia between 2007 and 2016.

It shows that all migrant groups examined (which at Section 4.2.1 we explained deliver 67.1% of all migrant engineers) have higher rates of unemployment than Australian-born engineers. For those from India, China, Iran, Malaysia, Pakistan and Bangladesh, the differences are stark.

The only source countries that come within one percentage point of the Australian-born rate are England and South Africa. For an Iranian engineer (noting that Iran is currently the fifth largest source of engineers) there is, on average, a 10.7 percentage point difference in unemployment rate when compared to an Australian-born engineer.

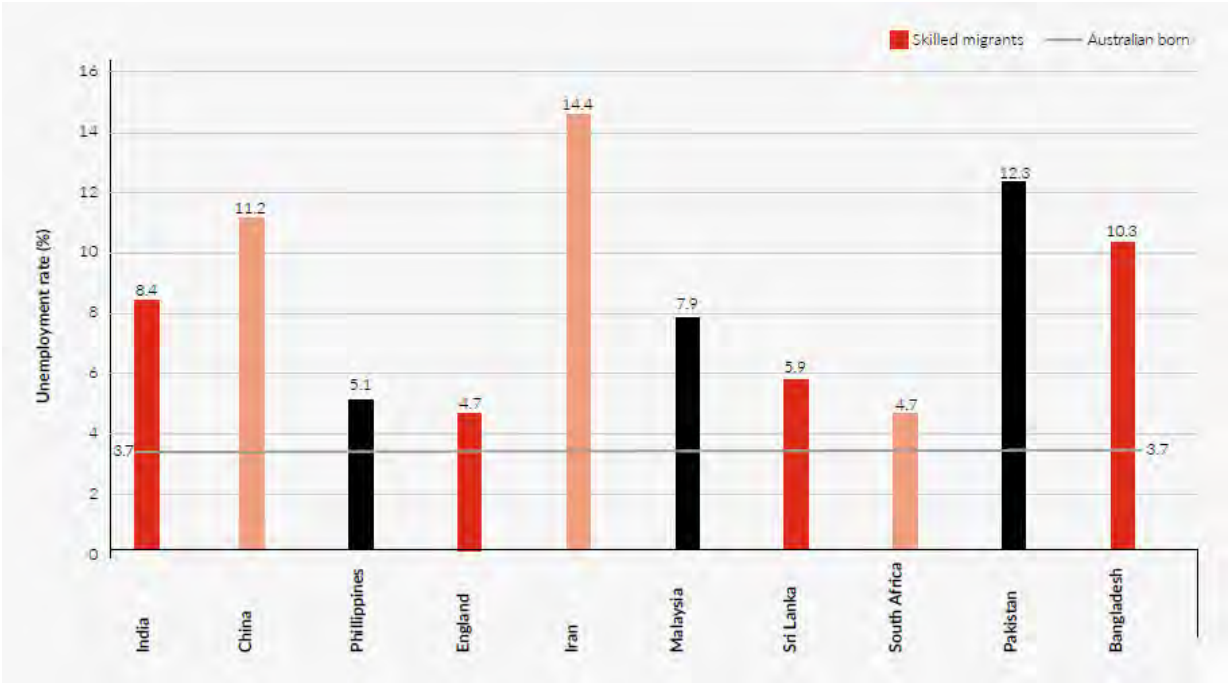


Figure 1

Unemployment by date of arrival and city of settlement

Noting that, at the 2016 census, the overall unemployment rate for Australian-born engineers was 3.7%, and for overseas-born engineers it was 7.6%, Figure 2 shows the unemployment rate for migrant engineers in each capital city (except Canberra). It demonstrates that employment outcomes are much worse for recent arrivals. Darwin is an outlier, probably because at the time of the census there was high demand for engineers in the Northern Territory. Also, Hobart shows a low unemployment rate for older arrivals, but an enormous disparity with the employment outcomes of recent arrivals.

This data suggests that attempts to use the skilled migration program to boost employment and productivity in regional Australia is, to a significant extent, failing. Also, that the opportunity to boost domestic engineering capability with new migrants is inefficient—it takes too long to get new migrants into employment.

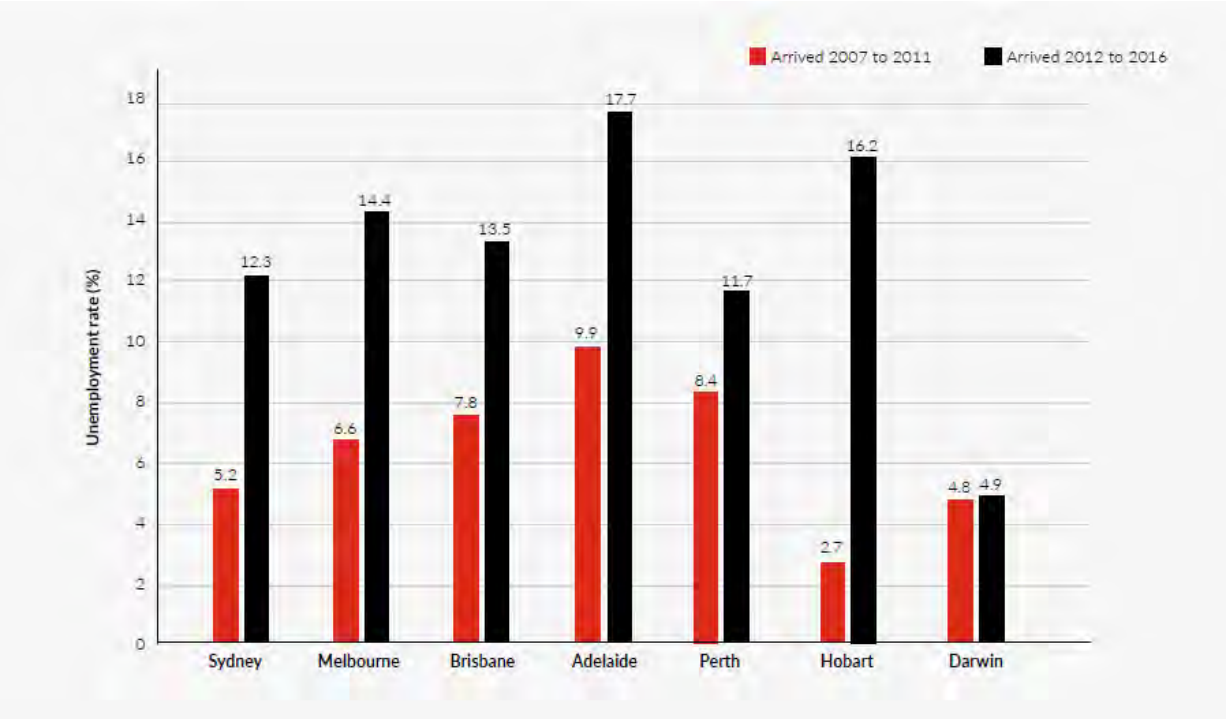


Figure 2

4.2.2 Employed in engineering occupations

In Figure 3 on the following page, the black line represents the percentage of engineers working in an engineering role in 2016 (the Y-axis in the original report form which this came was mislabelled as 'unemployment'). At section 4.2.1 it was shown that the unemployment rate for migrant engineers is higher than for engineers generally. Only those from England and South Africa enjoyed an unemployment rate approaching that of the Australian-born.

Figure 3 demonstrates that those same groups of migrant engineers who are employed, are much less likely than Australian-born engineers to work in engineering roles—again, except for those from England and South Africa.

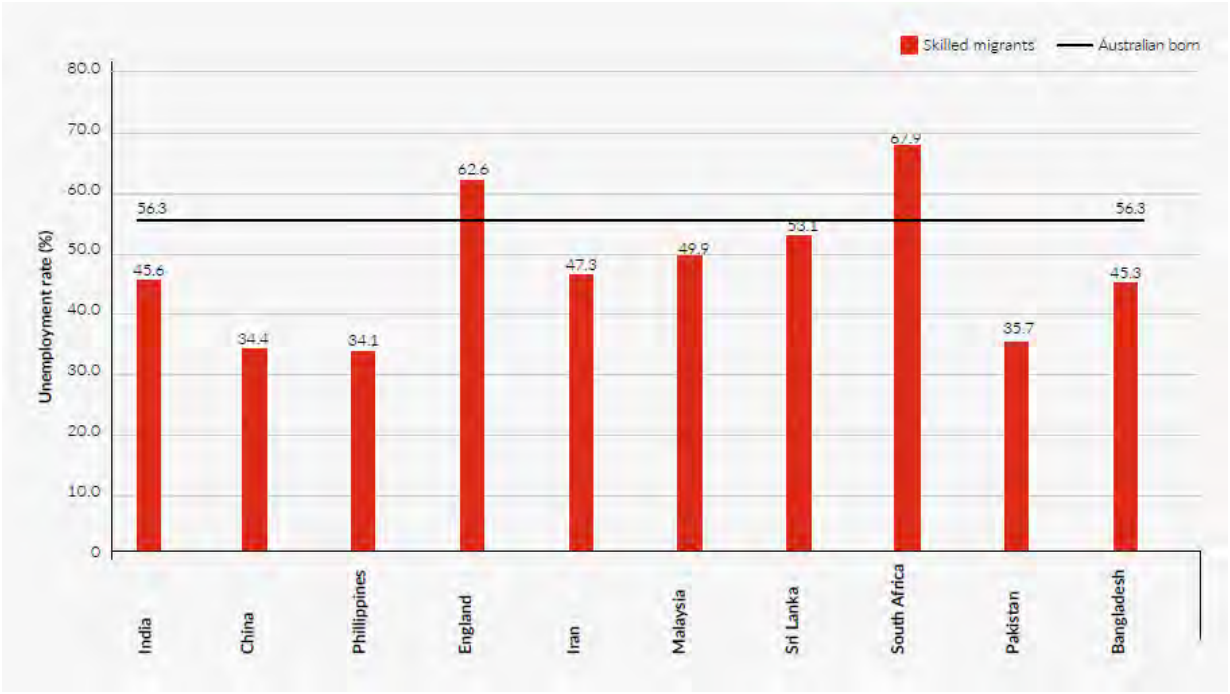


Figure 3

4.2.3 Understanding why

There is very little hard evidence to explain the reasons for the employment outcomes of migrant engineers described above.

A recent survey conducted by the University of Technology, Sydney (UTS) into employment barriers for skilled migrant engineers identified the following as the potential top three barriers to employment for migrants:

- Lack of local experience
- Lack of local references
- Not a permanent visa holder or citizen

The same research identified some key solutions to employment, these being:

- Internship opportunities
- Mentoring programs
- Re-skilling/upskilling

Each of these factors can be addressed. For example, language entrance requirements could be raised, or training provided once onshore; local experience is earned as soon as employment commences; and engineers are trained to read and understand new standards as a normal part of their career, with specific standards typically learned after graduation.

Other viable programs include government supported internships, and industry run mentoring and networking programs to enhance local experience, knowledge and networks that contribute to employment outcomes for skilled migrant engineers.

The barriers to employment can be overcome with relatively simple effort on the collective part of government, industry and the migrants themselves. Since these barriers remain, it indicates that the issues may run deeper.

To fully understand these barriers to employment, from the migrants' experience and from those of employers and recruiters, Engineers Australia has embarked on a research project to uncover these barriers from both perspectives. Without proper research, the feedback from employers and migrants is, to date, anecdotal.

Engineers Australia's research project will address two main areas for understanding the barriers to employment for overseas-born engineers.

1. Understanding the lived experience of engineers born overseas (both skilled migrants and those with humanitarian refugee status), the barriers they face, the mental, societal, and financial impact on them, and the economic impacts.
2. The barriers within industry and recruiting firms to employing overseas-born engineers.

This is expected to address factors like the length of time it takes for skilled migrants to gain employment, the underutilisation of their skills (underemployment), and the fact that overseas born female engineers have almost three times the unemployment rate of Australian born female engineers, just to name a few. It will look in depth at the employment side of the equation to identify what industry employers and recruiters are looking for, where they see the gaps in overseas born versus Australian born candidates and what can be done to address those gaps.

The project is due to be completed by June 2021. Once these barriers are understood through qualitative research, it will then inform sessions with government, industry and academia to co-design solutions to employment outcomes. Engineers Australia is willing to share the research insights with the Committee.

Solutions could range from developing bridging courses, creating government funded intern programs, delivering Australian standards training, to mentoring and sponsorship programs.

Engineers Australia recommends that a subsequent inquiry be established to examine the barriers to full and meaningful employment of skilled migrants.

Engineers Australia recommends that the Australian Government commission research to explore the reasons for different employment outcomes amongst migrants and Australian-born people in occupations targeted by the skilled migration program.

5. Responses to Terms of Reference

5.1 Term of Reference 3

Skills lists and the extent to which they are meeting the needs of industries and businesses and keeping pace with Australia's job landscape

It is important to remember that the skilled migration program is about the future needs of Australia, rather than immediate short term specific labour market status and job vacancies (for which the employer-sponsored scheme is more appropriate). Therefore, all engineering occupations should remain on skills lists due to the increasing diversity of engineering practice, and increased cross-disciplinary nature of engineering work.

An area of concern is that, for engineering, there would be benefit in reviewing the basis for the skills list to better accommodate future needs. The skills lists are based on Australian and New Zealand Standard Classification of Occupations (ANZSCO) codes and these are typically for the traditional disciplines of engineering and role titles (e.g. draftsperson).

Greater alignment between Fields of Education, Fields of Research and ANZSCO would enable greater data interrogation. The data reported in Appendix B is based on Fields of Education. This misalignment has resulted in some unintended consequences. For example, Electrical Engineering and Electronics Engineers are treated as separate occupation categories but are often taught within a combined program. Differentiating graduates with different quotas can be challenging.

Engineering is an evolving profession and, if Australia is to enable migration of those with skills in emerging fields of practice and emerging industries, the skills lists need to be more amenable to change.

Engineers Australia recommends that skills lists are revised to be more amenable to change.

5.2 Term of Reference 6

The complexity of Australia's skilled migration program including the number of visa classes under the program and their requirements, safeguards and pathways

The suite of visa classes available can only be properly assessed if the overall objectives of the skilled migration program are more clearly defined (see comments at Section 3).

In general terms, data available to Engineers Australia indicates that employer-sponsored visas (either temporary or permanent) are the most efficient option to fill immediate job vacancies. The skilled migration program, in contrast, is useful mainly for lifting overall engineering capability.

5.2.1 Points-based system

An element of the skilled migration program that needs reform is the points-based system for ranking applicants. Engineers Australia is concerned that it skews supply towards those with relatively low levels of work experience.

For example, on the basis of age, a 20-year-old (with presumably no work experience as an engineer) earns 25 points, in contrast to a 40-year-old (with probably 15 years of experience) earning 15, and anyone over 45 earning none.

The age-based points are partially offset by the skilled employment points favouring someone with 15 years of experience. However. This is complicated if you consider that an engineer is not eligible for registration (and thus independent practice) until they have accrued five years of relevant experience. So, a 25-year-old with some work experience but not enough to practice independently (assume graduation at a typical age of 21) will earn a total of 35 points, in contrast to a 40-year-old who will earn 30.

Another example of the points system devaluing experience is the English test results. For example, a new overseas graduate will earn 10 additional points if they achieve Proficient English (7 in each band in IELTS) or 20 additional

points if Superior English is achieved (8 in each ban in IELTS). By contrast, eight years of overseas work experience provides only 15 additional points.

The points-based system can generate many combinations of outcome that skew results (as is intended) but not always towards outcomes that are likely to lead to employment outcomes that match the potential of the migrant. For example, an applicant for the Skilled Work Regional (Provisional) visa (subclass 491) will earn an extra 15 points if being sponsored by a family member and the Minister has accepted that sponsorship. Unfortunately, as shown at Section 4.2.1 of this submission, employment outcomes for regional cities are often much worse for engineers.

Engineers Australia recommends that the points based system be reviewed to ensure it does not create unintended consequences in the supply of migrants or their employment outcomes onshore.

5.2.2 Employment rules in government

Engineers Australia is aware that employment in a Commonwealth agency often requires Australian citizenship. This is of special significance in Canberra, where the Commonwealth Government is a major employer. This contrasts with states and territories which typically allow non-citizens to work in government agencies.

For a sense of the scale of this issue, consider that at the time of the 2016 census about 46,000 engineers were employed in the public sector:

- Commonwealth: 19,837
- State: 19,983
- Local: 6,124

5.2.3 Barriers associated with regional sponsorship

Some visa classes enable migration if the applicant agrees to remain in a regional location for two to four years. The intention of this policy is to attract migrants to those areas. The obligation to remain in the area can however pose a significant barrier to finding jobs that match the migrant's skills and experience. For engineers this is because the great majority of engineering roles are in metropolitan areas, especially Sydney and Melbourne.

That an engineer migrant is locked into living in an area with fewer suitable roles could be another reason for why the unemployment rate for migrants in regional capitals is usually high.

It is recommended that the regional sponsorship program be reviewed, and consideration given to freeing migrants of their obligation to remain in the regional area after a shorter period of time, such as six months.

Appendix A: Engineering workforce

In this submission, "engineer" refers to engineering associates, engineering technologists and professional engineers. "Professional engineer" is the most numerous and what people usually think about when describing an engineer, but each is vital to a well-functioning engineering profession. Their attributes are:

1. **Professional Engineer**: Professional Engineers apply lifelong learning, critical perception and engineering judgement to the performance of engineering services. They challenge current thinking and conceptualise alternative approaches, often engaging in research and development of new engineering principles, technologies and materials. Professional Engineers require at least the equivalent of the competencies in a four-year full-time honours bachelor degree in engineering.

2. **Engineering Technologist**: Engineering Technologists exercise ingenuity, originality and understanding in adapting and applying technologies, developing related new technologies or applying scientific knowledge within their specialised environment. Engineering Technologists require at least the equivalent of the competencies in a three-year full-time bachelor degree in engineering.

3. **Engineering Associate**: Engineering Associates apply detailed knowledge of standards and codes of practice to selecting, specifying, installing, commissioning, monitoring, maintaining, repairing and modifying complex assets such as structures, plant, equipment, components and systems. Engineering Associates require at least the equivalent of the competencies in a two-year full-time associate degree in engineering or a two-year full-time advanced diploma in engineering from a university or TAFE college.

The following illustrates the scale of each cohort of engineer: cumulatively from 2010 to 2018, Australian universities have produced about 69,030 new domestic graduates (that is, not overseas students) eligible to join the engineering team: 4,279 engineering associates (6.2%); 4,800 engineering technologists (7.0%) and 59,951 professional engineers (68.8%). (Note that the number of engineering associates supplied via TAFE qualifications is not included due to an unavailability of relevant statistics to Engineers Australia.)

Basic characteristics of engineers in Australia

At the 2016 census, there were 329,957 engineers in the Australian labour force. A further 87,621 were not in the labour force or did not state their status. Of those in the labour force:

- 284,975 (86.4%) were men, and 44,982 (13.6%) were women.
- 185,916 (56.3%) were employed in engineering occupations.

Industries of employment

Engineers feature much more prominently in a select number of industries, which are classified by Engineers Australia as "core industries." The remaining industries are classified as non-core. The core industries have both a high number of engineers and a high proportion of those engineers working in actual engineering occupations. They are:

- Professional, Scientific and Technical Services
- Mining
- Electricity, Gas, Water and Waste Services
- Information Media and Telecommunications
- Construction
- Public Administration and Safety
- Manufacturing

The top 10 industries of overall employment are as follows, noting this list has broken the classification down to the next, more granular, level of ABS industry classification:

1. Architectural, Engineering and Technical Services
2. Computer System Design and Related Services
3. Tertiary Education

4. Heavy and Civil Engineering Construction
5. Telecommunications Services
6. Metal Ore Mining
7. Other Machinery and Equipment Wholesaling
8. Defence
9. Cafes, Restaurants and Takeaway Food Services
10. Local Government Administration

Location of employment

In almost all states, concentrations of both qualified engineers and engineers employed in engineering occupations are disproportionately higher in capital city regions than in other regions within the state.

Concentration of skilled workers in capital cities is not unique to qualified engineers, but a feature of all skilled workers. However, except for Hobart, the concentration of qualified engineers in capitals is higher than for other skills.

At the time of the 2016 census, the percentage of the engineering labour force in each jurisdiction was as follows:

- NSW: 32.7%
- Victoria: 28.0%
- Queensland: 16.3%
- Western Australia: 13.8%
- South Australia: 5.5%
- Australian Capital Territory: 1.8%
- Tasmania: 1.0%
- Northern Territory: 0.9%

Appendix B: Supply of engineers

Skilled migrants are essential to Australian engineering capability. At the time of the 2016 census, 58.5% of all engineers in the Australian labour force were born overseas.

Australia sources its engineering labour force from national engineering education programs and from permanent and temporary skilled migration programs. At present the structural balance is weighted in favour of overseas born engineers which presents risks if migration factors change adversely—such as a global pandemic with associated closure of international borders.

The source of new engineers in 2015 (the date for which data for all three groups is available to Engineers Australia), was as follows:

- Entry level graduates: 8,162 (in 2018 the number was 8,444)
- Permanent visa holders: 10,778
- Temporary visa holders: 5,709

Supply is influenced by government higher education and migration policies, and by the choices made by individuals to study engineering. Therefore, it is important that Australia continues to increase the production of its own engineers through its education system.

Detail on supply from migration programs is provided at Section 4. The following is an examination of domestic supply through universities.

Domestic students

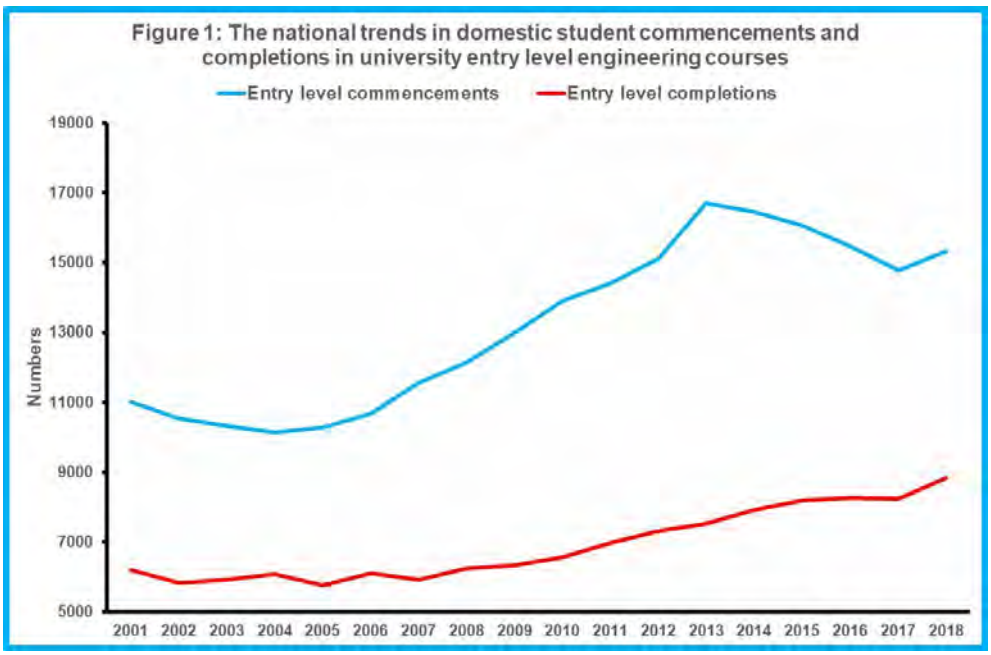
Domestic students are citizens and permanent residents and production of engineers from this group demonstrates progress toward mitigating the risks associated with high dependence on skilled migration.

The following table (copied from the Engineers Australia report, *Australia's Next Generation of Engineers: university statistics for engineering*) shows the number of domestic entry-level completions from Australian universities from 2003-2018. A range of data can be derived from the table, but the overall point is that there is currently about 8-8,500 domestic entry-level completions each year.

Table 15: Additional Supply of Engineers from Domestic University Course Completions in Engineering

Source	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Men																
Associate Engineers	90	92	87	83	121	155	254	285	300	475	437	445	515	488	457	493
Engineering Technologists	524	488	561	691	490	502	439	346	377	419	400	488	415	465	455	486
Professional Engineers																
Four year degree	3272	3302	3310	3179	3417	3648	3653	3626	3945	4061	4186	4279	4437	4598	4436	4625
Four year double degree	1051	1215	1195	1192	1165	1082	1069	1348	1324	1355	1519	1562	1629	1292	1432	1604
Sub-total	4323	4517	4505	4371	4582	4730	4722	4974	5269	5416	5705	5841	6066	5890	5868	6229
Total completions	4937	5097	5153	5145	5193	5387	5415	5605	5946	6310	6542	6774	6996	6843	6780	7208
Women																
Associate Engineers	14	<10	<10	<10	12	20	24	35	27	40	35	58	50	55	36	48
Engineering Technologists	88	88	139	156	109	130	116	117	117	99	112	155	82	85	90	92
Professional Engineers																
Four year degree	663	636	604	528	506	523	552	542	595	624	627	659	641	705	696	734
Four year double degree	233	251	275	280	274	247	234	258	297	311	311	349	393	269	320	362
Sub-total	896	887	879	808	780	770	786	800	892	935	938	1008	1034	974	1016	1096
Engineering Team	998	975	1018	964	901	920	926	952	1036	1074	1085	1221	1166	1114	1142	1236
Total																
Associate Engineers	104	92	87	83	133	175	278	320	327	515	472	503	565	543	493	541
Engineering Technologists	612	576	700	847	599	632	555	463	494	518	512	643	497	550	545	578
Professional Engineers																
Four year degree	3935	3938	3914	3707	3923	4171	4205	4168	4540	4685	4813	4938	5078	5303	5132	5359
Four year double degree	1284	1466	1470	1472	1439	1329	1303	1606	1621	1666	1830	1911	2022	1561	1752	1966
Sub-total	5219	5404	5384	5179	5362	5500	5508	5774	6161	6351	6643	6849	7100	6864	6884	7325
Engineering Team	5935	6072	6171	6109	6094	6307	6341	6557	6982	7384	7627	7995	8162	7957	7922	8444

The following figure, copied from the same Engineers Australia report, shows the quite variable trend in the number of domestic students choosing to study engineering, and consequently completing qualifications. The quite worrying downward trend from 2013-2017 appears to have reversed, but it highlights the degree to which Australian engineering capability is dependent on an effective skilled migration program.



Overseas students in context

Overseas students are those studying in Australia under temporary visa arrangements related to their education. There were 4,850 completions of entry level courses by overseas students in 2018. In that same year, there were 7,509 completions of post-graduate courses by overseas students; often mature age students who would exhibit the sorts of attributes sought by employers such as significant prior work experience.

The COVID-19 border restrictions that have led to very low numbers of new overseas fee-paying students at universities influences overall engineering skills supply to some degree, but that is not the whole story.

Some overseas students, when they complete their engineering education, seek to join the Australian engineering labour force. This is possible but only by negotiating skilled migration arrangements such as the *Temporary Graduate visa (subclass 485)* or securing a sponsored work visa.

This group should not be amalgamated with domestic students to establish the supply of new entry level engineers because immigration formalities are the hallmark of this process and many other overseas students do return to their home country. The approach taken by Engineers Australia is to present statistics for overseas students as indicators of what is happening in Australian engineering education, but to capture the increase in supply of entry level engineers through immigration statistics which also capture migrant engineers who did not study in Australia.

In the main, overseas students studying engineering in Australia are part of one of Australia's largest export industries: the export of education services. In 2019, it was reported that international education contributed $37.6 billion to the Australian economy[9]. For engineering programs anecdotal evidence suggests that program choice for international students is directly related to migration opportunity.

[9] The Hon Dan Tehan MP, Minister for Education, 'International education makes significant economic contribution' {Press Release, 22 November 2019) https://ministers.dese.gov.au/tehan/international-education-makes-significant-economic-contribution?utm_source=miragenews&utm_medium=miragenews&utm_campaign=news at 29 March 2021.

Value of overseas students to overall skills pipeline

Many entry-level graduates do go on to work in Australia, but it needs to be noted that, for the purposes of Engineers Australia's analysis, this cohort of engineers should be counted as migrants, and not simply graduates.

Comprehensive data on employment outcomes for graduates overall (domestic and overseas students) is encouraging. For example, in 2020 the share of engineering undergraduates securing full time employment within four months of graduation was 83%, well above the equivalent rate of 69% for all fields of education combined.[10] This data does not show the differences for domestic and overseas graduates of engineering and, for reasons shared with migrants generally and explained at Section 4, it is reasonable to expect that overseas graduates might find it harder than domestic graduates to secure an engineering job.

Research dating back to 2006[11] distilled three reasons for the poor labour market outcomes of overseas graduates of Australian higher education programs of engineering (and accounting and Information Technology (IT)): a lack of occupation specific work experience, an absence of a viable Australian labour market bridging program, and weak English skills.

In 2009, Engineers Australia commenced delivery of a Professional Year Program for Engineering (PY Engineering) through its subsidiary company, Engineering Education Australia (EEA). [12] The Professional Year numbers are significant with 1,350 students in 2019 and 1,450 in 2020.

PY Engineering is a 44-week work readiness program for former overseas engineering students who have graduated from a university within Australia and are seeking permanent residency. Upon successful completion, candidates are eligible to apply for five migration points that can be used for all points tested visas. The program is designed to enhance participants' ability to obtain employment in their chosen discipline by applying their technical skills and knowledge in the Australian workplace.

The first 32 weeks consist of online study and classroom workshops, followed by 12 weeks of work placement in an engineering role. During this time candidates develop a thorough understanding of Australian work conditions, health and safety requirements, and other important aspects of working as an engineer in Australia.

Since 2017, EEA (in collaboration with the professional bodies for accounting and IT) have monitored the destinations of a sample of candidates who have completed the program. The data collected for the first three quarters of 2020 was that between 78% and 83% had secured employment upon completion of the program.

A smaller share of surveyed candidates indicated that they were working in engineering roles. The range in the first three quarters of 2020 was 43% to 61% within six months of completing their program. It is important to note that a large majority of survey participants also indicated that the COVID-19 pandemic had affected their employment (between 59% and 74%). This is significant as in previous years the number of Professional Year students gaining an engineering role has been up to 70% in the six months after the program. Comparative data is not available for all engineering graduates.

These employment outcomes show that by addressing overseas graduates' readiness for the Australian workplace, much of the disparity between employment outcomes may be reduced or eliminated.

[10] See Social Research Centre Graduate Outcomes Survey.
[11] Bob Birrell, Lesleyanne Hawthorne and Sue Richardson, *Evaluation of the General Skilled Migration Categories* (2006), Commonwealth of Australia.
[12] Engineering Education Australia, Professional Year in Engineering <https://eea.org.au/professional-year-program> at 29 March 2021.

Appendix C: Demand for engineers

Demand for engineering services is highly variable, but generally follows national economic fortunes. A lag indicator of demand is internet job vacancies. In general, as vacancies increase, unemployment falls and as vacancies fall unemployment increases.

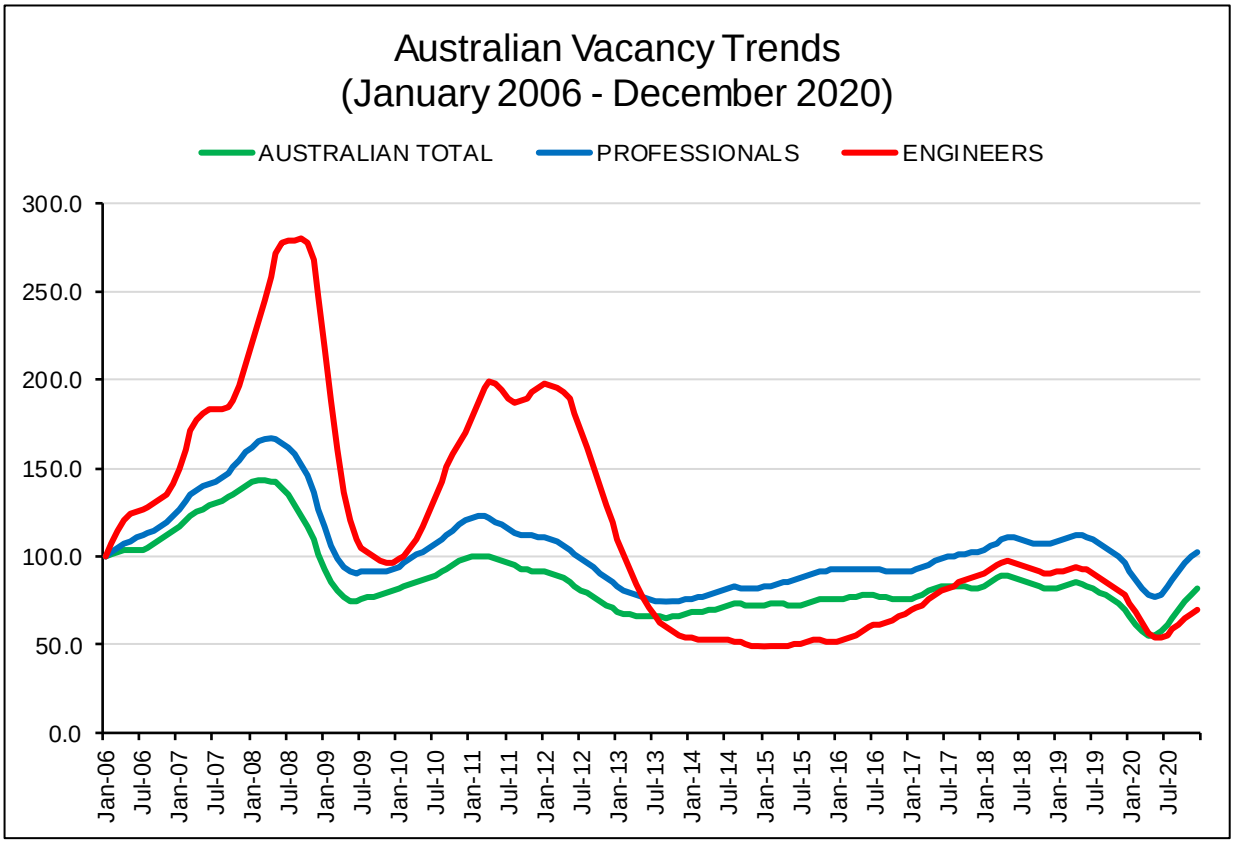
Job vacancy data offers trends (which should not be regarded as definitive numbers) and provides an indication of likely short-term demand, and a longer-term historical perspective.

Historical perspective

The following chart shows the changes in Australian engineering job vacancies since 2006. It compares engineering with other professional occupations, and with all vacancies.

The chart shows the extreme demand for engineering services during the mining boom in the early/mid-2000s, a sudden drop in demand at the beginning of the GFC in 2008, followed by a second mining-induced spike in 2011-2012 before the mining-related demand for engineers collapsed. The end of the mining investment boom coincided with longer term macro trends such as neglect and decline of manufacturing (the second largest industry of employment for engineers) and a widespread reluctance of governments to invest in essential public infrastructure.

A slow recovery commenced in 2016, though it was not nationally uniform and took a few years to reach all jurisdictions (recovery began in the south east, moved north and then washed over the continent to reach Western Australia last). By 2018-2019, demand for engineers had almost reached 2006 levels, but was already on a downward trend by the time the COVID-19 pandemic (and associated effects on global workforces) caused the third massive cut in demand in 12 years.

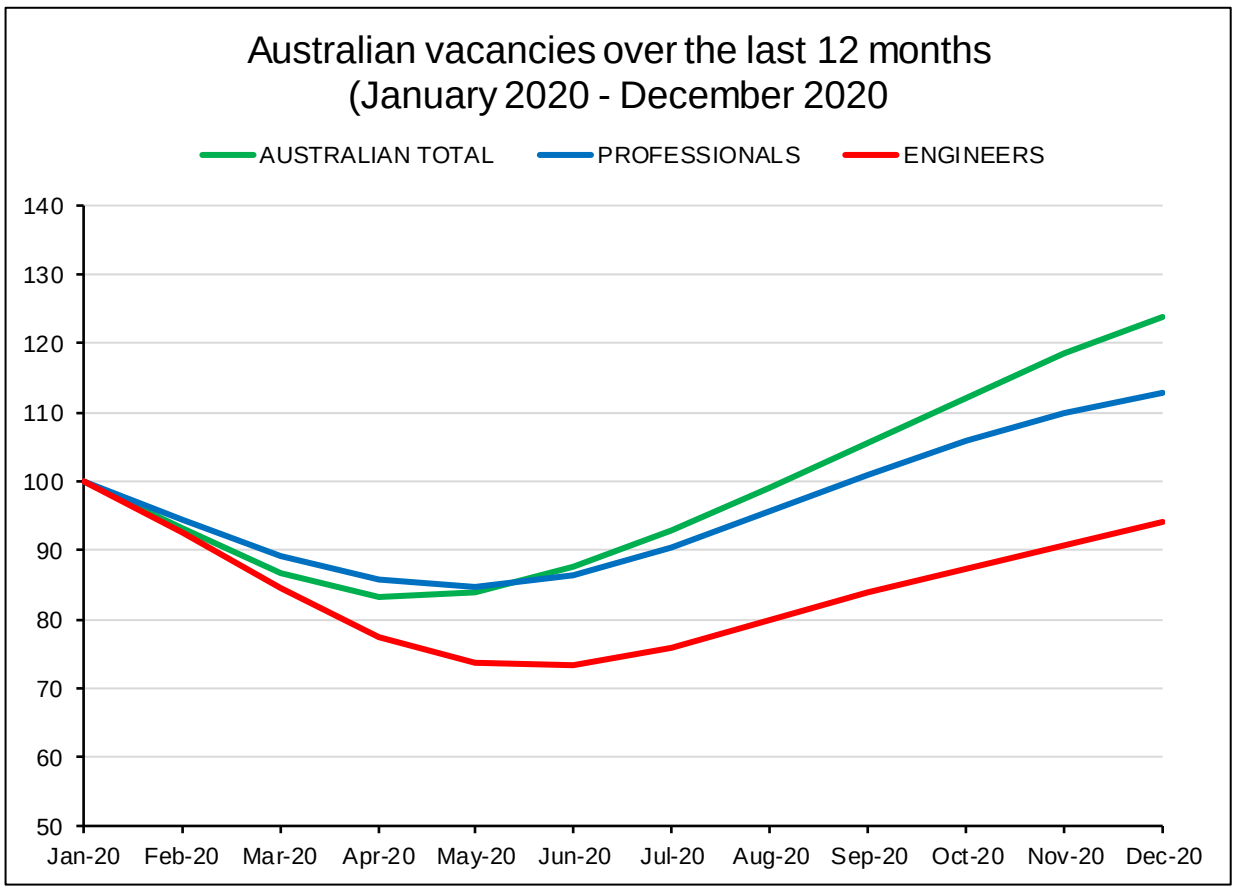


Current demand

Job vacancy data to January 2020 shows that, with the economy softening overall towards the end of 2019, engineering vacancies had still not recovered to pre–GFC levels at the beginning of 2020.

The onset of the COVID-19 pandemic and associated restrictions saw Australian vacancies trending downwards from March to June 2020. However, steady recovery is evident during the second half of 2020 and continues to trend upward. Some key points are as follows:

- Engineering vacancies across Australia in 2020 declined in response to COVID-19 restrictions, from May to June, but began a steady recovery from July 2020 onwards.
- Over the 12-month period, Australian engineering vacancies contracted by 6%. However, in the six months from July growth rates were up 8% and 24% in the last three months from October to December 2020.
- Except for the ACT, all states and territories were recording upward trends in engineering vacancies throughout the second half of 2020.
- South Australia, Western Australia, Tasmania, and the Northern Territory all finished the year recording higher numbers of advertised engineering vacancies in December than in January 2020.
- Civil engineers remain most in demand, followed by mining engineers, and industrial, mechanical and production engineers.
- The least vacancies were recorded for chemical engineers, followed by electronics engineers and telecommunications engineering professionals.



The need for more data on demand

Job vacancy data is a lag indicator of demand. For a well-planned migration program, lead indicators are necessary.

Example: Engineering Futures, 2035

An example of the profession seeking to identify national needs for engineers is a project by the Australian Council of Engineering Deans (ACED). ACED commissioned a scoping study in 2019 to explore the state of engineering education in Australia and the nature of education to produce graduates for Australian needs for professional engineers in 2035.

The Engineering Futures 2035 project identified required future skills, attributes and knowledge. The project included interviews with thought leaders from industry and the profession and a review of global future trends. A copy of the report and its findings is available from ACED.[13]

Subsequent work has included studies of future professional engineer education program structure, and how the changing nature of engineering is communicated to prospective students and an assessment of the readiness for change within university engineering schools.

The final ACED report is due in May 2021 with calls to action from government, education providers, industry and representative bodies such as Engineers Australia.

It should be noted that as Australian engineering programs change over time, there will be a need to ensure that the skilled migration program remains aligned.

Example: Infrastructure Australia

Engineers Australia applauds the delivery this year of Infrastructure Australia's annual report to the First Secretaries Group, consistent with the request from COAG, considering the capacity of the market to deliver the current infrastructure pipeline.

Undertaken in consultation with jurisdictions and industry, this work will see increased transparency in the pipeline of projects enabling an improved understanding of the demand for skills and materials, alongside increased analysis of supply-side constraints and risks.

A useful feature of this work is the extent to which leadership through COAG, and now National Cabinet, provides a mechanism for partnership and support in delivery in consultation with states and industry, and with the Department of Home Affairs in its design of a long-term migration program.

This kind of project can only be completed by national-level government agencies due to the scope and significant resources required to complete the task.

Engineers Australia recommends that the National Cabinet commission skills demand studies for every industrial sector that relies on skilled migration for a sustainable labour force.

[13] Caroline Crosthwaite, *Engineering Futures 2035: A scoping study* (2019) Australian Council of Engineering Deans <https://aced.edu.au/downloads/Engineering%20Futures%202035_Stage%201%20report%20for%20ACED_May_16_2019.pdf> at 15 March 2021.

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