The Deliberate and Sustained Oversupply of the Engineering Labour Market by the Australian Federal Government

2012-13 onwards

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Summary

Background
Over the last several years, the Australian Federal Government has deliberately created a major oversupply in the engineering labour market. The evidence to demonstrate this, and the reasons driving the strategy, are discussed in this report. The means to prevent further oversupply and to bring the market back into balance are outlined.

In the two phases of the resources boom, which occurred in 2004-08 and 2010-12, demand for engineers was exceptionally strong. During these boom years, immigration provided an important source of engineering labour. Following the second phase of the resources boom, as demand for engineers fell sharply, the engineering labour market arrived at a point where, according to Government assessments, there was no shortage of engineers in most engineering occupations. This was in 2012-13.

Since that time, overall job vacancies for engineers have plummeted to about third of what they were during the peak of the second phase of the resources boom. For most engineering occupations, vacancies in December 2016 were between 20% and 25% of their peak in 2011 or 2012. The only sustained increase in vacancies has occurred for Civil Engineering Professionals; there has been no increase for the other engineering branches.

Even with the dramatic fall in demand for engineering labour, the Federal Government has continued to maintain very high levels of engineering immigration. This is despite a generally bleak outlook for engineering occupations over the five years to the end of 2020, based on forecasts by the Australian Government's Department of Employment. The outlook is moderately positive for Civil Engineering Professionals.

Oversupply
The number of applicants per engineering vacancy more than tripled between 2011-12 and 2015-16 as the many unemployed and underemployed professional and graduate engineers, as well as those displaced into other occupations, sought to find a suitable place in the engineering workforce. The number of applicants per vacancy in engineering in 2015-16 was far higher than for any other profession monitored by the Department of Employment. As well as this, due to the Federal Government's decision not to moderate the annual level of engineering immigration, the ratio of migrant engineers to job vacancies increased dramatically between 2012-13 and 2015-16. By setting the ratio of migrant engineers:vacancies to an index of 1.00 in 2012-13, the increase in the ratio by 2015-16 for each engineering Unit Group can be readily seen, as shown in Table S1.

It is estimated that since 2012-13, the Government has admitted at least 10,800 migrant engineers in excess of labour market requirements. Consistent with the general oversupply of engineers, many Australian graduate engineers are having difficulty finding full-time work that is broadly relevant to their field of study. Table S2 documents the latest (2015) data for recent Australian graduate engineers working full-time in engineering, scientific, technical or management roles as a percentage of those available for full-time work.

Table S1 Ratio of migrant engineers to vacancies

ANZSCO Code	Unit Group	Ratio in 2012-13	Ratio in 2015-16
2331	Chemical and Materials Engineers	1.00	3.23
2332	Civil Engineering Professionals	1.00	1.35
2333	Electrical Engineers	1.00	3.14
2334	Electronics Engineers	1.00	3.26
2335	Industrial, Mechanical and Production Engineers	1.00	2.40
2336	Mining Engineers	1.00	4.28
2339	Other Engineering Professionals	1.00	1.65

Table S2 Graduate engineers

Engineering discipline	% Working in relevant job
Aeronautical	42.0
Chemical	50.8
Civil	68.0
Electrical	70.2
Electronic/computer	71.0
Mechanical	59.9
Mining	63.9
Other engineering	57.4

Reasons

The Federal Government has persisted with the deliberate oversupply of the engineering labour market for two main reasons. The first is to satisfy the incessant, self-interested demands of the business, migration and university sectors. The second is to help meet its massive annual immigration targets, designed to bolster short-term gross domestic product following the decline of the second stage of the resources boom. Engineers, along with ICT professionals and accountants, have been targeted by the Government to make up a disproportionately large percentage of the skilled migration program, particularly the permanent migration component. These three professional groups are easy targets because they are largely non-unionised, and they are not part of the core constituencies of the major political parties.

Solutions

The solution to the major oversupply of the Australian engineering labour market is to stop engineering immigration until the market is brought back into balance. This will allow time for unemployed, underemployed and displaced engineers to be absorbed into suitable positions in the workforce. This will benefit Australian professional engineers, Australian graduate engineers, and recent migrant engineers who have been granted permanent residency.

To achieve this, the first step is for the Federal Government to remove all engineering occupations associated with the Unit Groups in Table S1 from the Medium and Long-term Strategic Skills List (MLTSSL), known prior to April 2017 as the Skilled Occupation List (SOL). This will prevent access to three main visa subclasses, in particular the subclass 189 permanent residence visa. At present, most engineering immigration occurs via the subclass 189 visa. Access will also be prevented to the subclass 485 (Graduate Work Stream) temporary residence visa, which allows international students who have graduated from an Australian institution to gain entry to the Australian engineering labour market. All engineering occupations should be removed from the MLTSSL for three years, with the exception of those associated with Unit Groups '2332 Civil Engineering Professionals' and '2339 Other Engineering Professionals', which should be removed for two years to account for the lower levels of oversupply.

The second step is to remove all engineering occupations associated with the Unit Groups in Table S1 from the Short-term Skilled Occupation List (STSOL), known prior to April 2017 as the Consolidated Sponsored Occupation List (CSOL). This will prevent access to another three main visa subclasses, in particular the notorious subclass 457 temporary residence visa, and the subclass 186 permanent residence visa. All engineering occupations should be removed from the STSOL for three years, with the exception of those associated with Unit Groups '2332 Civil Engineering Professionals' and '2339 Other Engineering Professionals', which should be removed for one year to account for the lower levels of oversupply.

Access should also be removed to another four visa subclasses which do not require occupations to be listed on the MLTSSL or STSOL. These include the subclass 485 (Post-Study Work Stream) temporary residence visa and the subclass 476 temporary residence visa, both of which – subject to specific requirements – allow international students access to the Australian engineering labour market. Access to these visas should cease for three years.

Federal Government expertise in understanding and predicting labour market requirements resides with the Department of Employment, and to a lesser extent with the Department of Education and Training. The occupations listed on the MLTSSL and the STSOL should be determined by the Department of Employment, and the Department of Immigration and Border Protection must no longer have any power to change the composition of these lists.

The current focus of the MLTSSL on including occupations based on the skills needs of the economy in five-to-ten year's time is irrational. Apart from the fact that it is not possible to make accurate labour market predictions for individual occupations so far in advance, the concept of bringing in migrant workers now to meet demand in five-to-ten years' time defies the reality of the labour market. In the case of engineering occupations, most of which are substantially oversupplied, the ongoing influx of immigrant engineers creates and entrenches unemployment and displacement from the profession. Once an engineer has not been able to practice in the profession for a few years, the probability of being able to return to the profession is low due to the recruitment preferences of employers. Given that migrant engineers can effectively be brought into Australia 'on tap' within three to six months depending on the visa, the

focus of the MLTSSL for engineers and other occupations should be changed to address occupational skills needs up to two years into the future.

Acronyms

ABS	Australian Bureau of Statistics
ACED	Australian Council of Engineering Deans
AIG	Australian Industry Group
ANZSCO	Australian and New Zealand Standard Classification of Occupations
AusIMM	Australasian Institute of Mining and Metallurgy
AWPA	Australian Workforce Productivity Agency
CSOL	Consolidated Sponsored Occupation List
DoE	Department of Employment
DE&T	Department of Education and Training
DIBP	Department of Immigration and Border Protection
GCA	Graduate Careers Australia
GDP	Gross Domestic Product
GFC	Global Financial Crisis
ICT	Information and Communication Technology
MACSM	Ministerial Advisory Council on Skilled Migration
MLTSSL	Medium and Long-term Strategic Skills List
NOM	Net Overseas Migration
SEW	Survey of Education and Work
SOL	Skilled Occupation List
STSOL	Short-term Skilled Occupation List
TSS	Temporary Skills Shortage (visa)

1. Introduction

The recent two-stage resources boom in Australia resulted in an increase in Australia's terms of trade that was unprecedented in our history (Bishop et al. 2013; Karunaratne 2015). The first stage of the resources boom ran from 2004 until the onset of the global financial crisis (GFC) in 2008. Following the GFC, further resource-based activity boosted the economy during 2010-12. Since then the economy has been subdued, with some sectors performing better than others.

During the resources boom, Australia's immigration policies promoted large annual permanent and temporary skilled migration intakes to supplement the local workforce in a seemingly insatiable job market. Nearly five years after the resources boom began its final decline, immigration policies still reflect these previous economic conditions. However, the reality of the employment market now is very different, and the Federal Government's deliberately inflexible approach to immigration policy has had a severely negative impact on employment prospects in some sectors.

This report examines how the skilled migration program has been used to create a massive oversupply in the engineering profession, to the detriment of unemployed, underemployed and displaced Australian professional engineers, Australian graduate engineers, and recent migrant engineers.

2. Engineering Occupations Considered in this Report

The engineering occupations included in this report are those listed in the Australian and New Zealand Standard Classification of Occupations (ANZSCO) minor grouping for Engineering Professionals (ABS 2013a).

ANZSCO Classification:

Major Group:	2	Professionals
Sub-Major Group:	23	Design, Engineering, Science and Transport Professionals
Minor Group:	233	Engineering Professionals

Unit Groups:

2331 Chemical and Materials Engineers
2332 Civil Engineering Professionals
2333 Electrical Engineers
2334 Electronics Engineers
2335 Industrial, Mechanical and Production Engineers
2336 Mining Engineers
2339 Other Engineering Professionals.

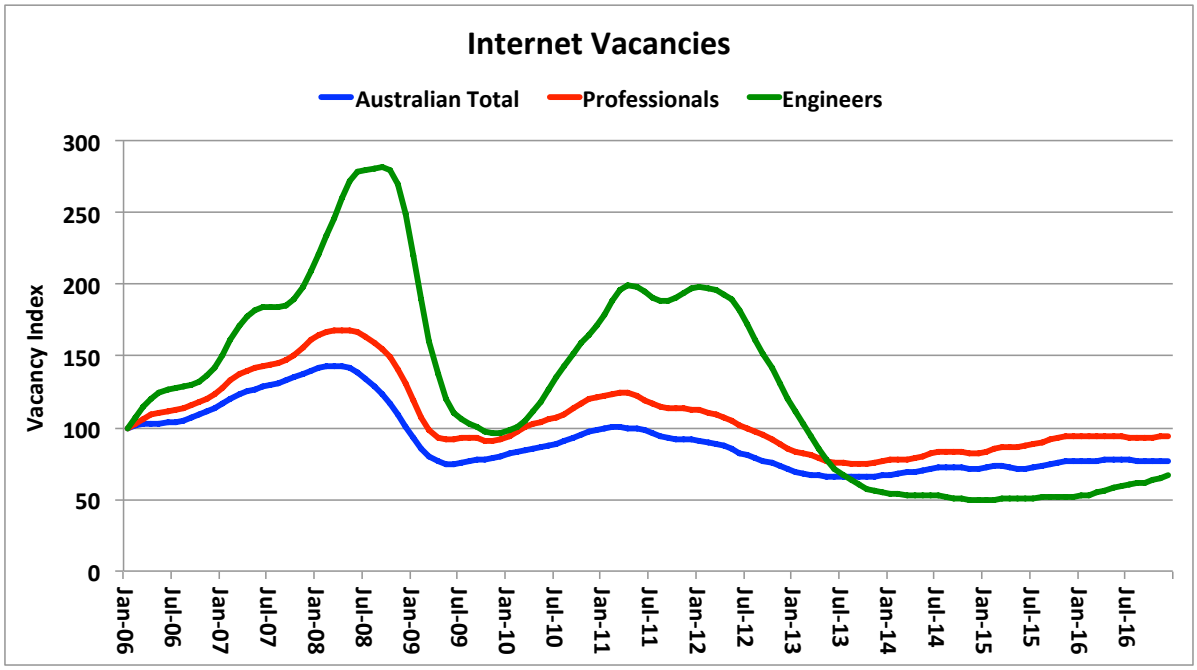
The individual occupations associated with each Unit Group are listed in Appendix 1.

3. Internet Job Vacancies

3.1 Internet vacancy data

Figure 1 shows the impact of the resources boom on job vacancies for three groups: professional engineers; all professionals; and all Australian occupations. The boom had flow-on effects for the broader economy, but the relative impact on vacancies was more pronounced for engineering than for other professions generally. The three curves in Figure 1 are based on trend data from the Department of Employment (DoE) for job vacancies listed on SEEK, CareerOne and Australian JobSearch (DoE 2017a, 2017b). For professional engineers, SEEK covers probably more than 95% of advertised vacancies. For ease of comparison, the data in Figure 1 are indexed so that each curve has a value of 100 at January 2006.

Figure 1
Internet job vacancies to December 2016 for engineers, professionals, and the total Australian labour market, indexed (January 2006 = 100) (DoE 2017a)

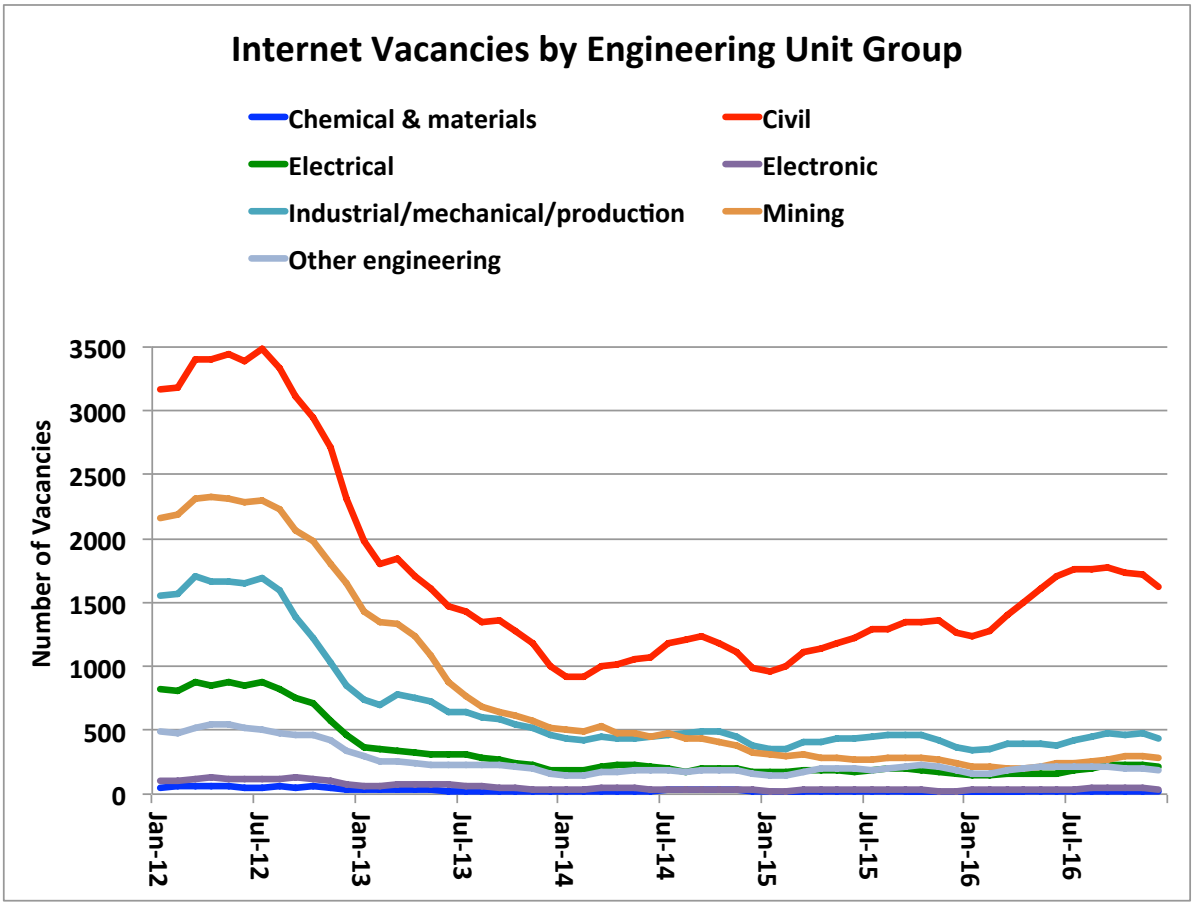


The impact of the rise and decline of the resources boom on engineering vacancies has been profound, as can be seen from Figure 1. Following a steep fall beginning in early 2012, the number of engineering vacancies in December 2016 was only 34% of what it was in January 2012. Looking at a longer time period, the number of engineering vacancies in December 2016 was 67% of what it was in January 2006, despite the economy being 32% larger in September 2016 than it was in March 2006, as expressed in constant September 2016 dollar gross domestic product (GDP) terms (ABS 2016a, 2017a). In fact, the current employment market for most engineering Unit Groups is worse than at any time in the last 25 years (Engineers Australia 2015a), if not ever, and it has been that way since the middle of 2013.

Figure 2 shows internet job vacancies by engineering Unit Group commencing at the beginning of 2012, using the actual numbers of vacancies. It is only for '2332 Civil Engineering Professionals' that any sustained increase in job vacancies has occurred

during the last five years. The slowly rising trend for this Unit Group began in early 2015, and is related to activity in the residential construction sector (DoE 2016a). Charts showing vacancies for individual Unit Groups are presented in Appendices 2 to 8.

Figure 2
Monthly internet job vacancies to December 2016 for engineers by ANZSCO Unit Group (actual numbers based on three month moving average, not indexed) (DoE 2017c)



Because the Unit Group vacancies in Figure 2 are based on a three month moving average calculation, the Unit Group charts are more sensitive to recent changes than the broader vacancy charts presented in Figure 1, which are based on a trend calculation averaged over a significantly longer time period.

3.2 Understanding vacancies

It is important to understand what a job vacancy represents. When a company advertises an engineering job publicly, applicants come from several sources: engineers who are already employed in the profession; engineers who have been displaced from the profession but who are employed in other occupations; and unemployed engineers. Most advertised jobs are allocated to engineers who are already employed as engineers. In general, it is more difficult for unemployed engineers and engineers working in non-engineering jobs to win advertised engineering positions.

When an engineering job is advertised and awarded to an employee of another company, that second company may then advertise its resulting vacancy which arises when its employee moves across to the first company. The job advertised by the second

company may be awarded to an employee of a third company, and so on. Somewhere along the line an unemployed engineer, or an engineer currently working in a non-engineering occupation, may be appointed to an advertised engineering position. Thus a substantial proportion of the vacancy numbers actually result from 'churn' amongst employed engineers.

Advertised vacancies should not be mistaken for new jobs for the engineering profession; only a minority of advertised vacancies are newly created positions. It is for this reason that the number of internet vacancies sometimes looks very high in relation to the size of the workforce of an engineering occupation. At the macro level, it is only newly created jobs which allow unemployed and displaced engineers to be absorbed into the engineering workforce.

Vacancies can, however, be regarded as an index of opportunity. They represent an *opportunity* for unemployed and displaced engineers to return to the engineering workforce. It is for this reason that it is not the absolute number of vacancies that is important, but rather the trend in vacancies over time. For example, when vacancies are half of what they were at a previous time, the opportunities have also been halved. Because it is the trend that is important, in subsequent discussion in this report vacancies are generally expressed as an index rather than as absolute values.

Not all vacancies are advertised. For the general labour market, DoE research indicates that employers use word of mouth to recruit for about 16% of vacancies. Direct approaches to employers by job seekers account for filling about 10% of vacancies (DoE 2016d). The corresponding numbers for the engineering profession are not publicly available even if they are known, but the DoE takes this 'hidden' jobs market into account when determining whether or not an engineering occupation is in shortage (Table 1). The reasonable assumption used in this report is that the number of vacancies in the 'hidden' jobs market for engineers varies in proportion to that for advertised jobs.

4. DoE Labour Market Ratings

The DoE surveys a cross-section of engineering disciplines each year to determine whether there is, or is not, a shortage of engineers in those disciplines. The results for the last five years are detailed in Table 1.

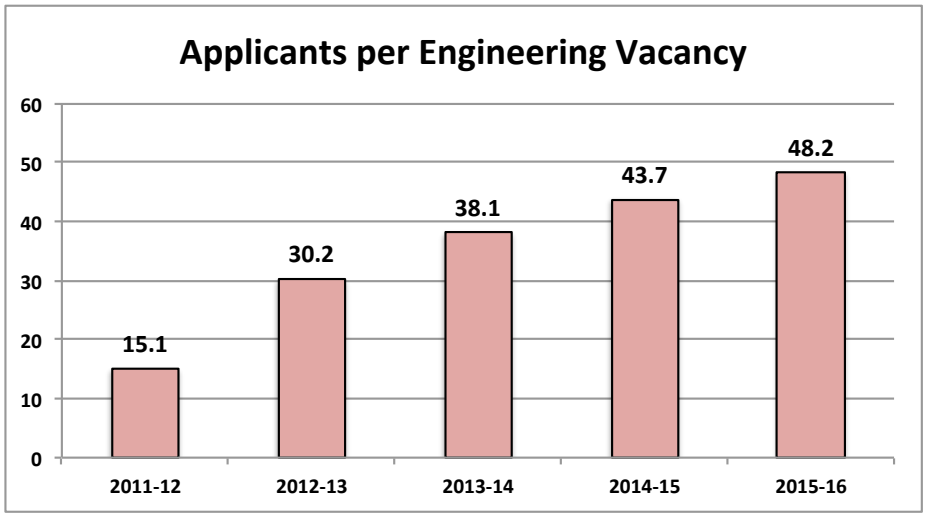
Table 1
Labour market ratings for engineers for the five years to 2015-16 (DoE 2016a)

ANZSCO Code	Occupation	2011-12	2012-13	2013-14	2014-15	2015-16
2332-11,12,14,15	Civil engineering professionals	S	NS	NS	NS	RD
233311	Electrical engineer	S	NS	NS	NS	NS
233512	Mechanical engineer	S	NS	NS	NS	NS
233611	Mining engineer (ex. Petroleum)	S	S	NS	NS	NS

S = shortage NS = no shortage RD = recruitment difficulty

The recruitment difficulty reported for '2332 Civil Engineering Professionals' in 2015-16 pertained only to senior positions and roles requiring specialised experience (DoE 2016a). It can be seen from Table 1 that there has been no shortage of engineers across most of the assessed occupations from 2012-13 onwards. This assessment is supported by the data for the number of applicants per vacancy (Figure 3)(DoE 2016a).

Figure 3
Number of applicants per vacancy for engineers (DoE 2016a)



The level of competition for engineering jobs is currently the highest among all professions monitored by the DoE (2016f) (see Table 2).

Table 2
Applications per vacancy by profession 2015-16 (DoE 2016c)

Profession	Applications per vacancy
Engineering professions	48.2
Accountants	29.4
Information technology professions	29
Solicitors	14.6
School teachers	10.3
Health professions	6.7
Nurses	6.7

The DoE bases much of its information on data collected during its annual Survey of Employers' Recruitment Experiences (DoE 2013, 2016g). Because no information is collected about the experiences of engineering job seekers (employed or unemployed), interpretations such as those in Table 1 about labour market shortages are inherently biased towards the employers' perspective, ie. the circumstance of 'no shortage' is likely to be declared at a later year than if the experiences of all key stakeholders were accounted for in the analysis.

This employer bias can be seen in the statistic for the number of 'suitable' applicants per engineering vacancy, which is given by the DoE (2016a) as 2.9 on average for 2015-16, compared with the average of 48.2 applicants per vacancy. Employers typically

interview at least three people per vacancy, but that does not necessarily equate to the number of 'suitable' candidates. In the current difficult market conditions for jobseekers, many experienced engineers seeking work or seeking to change employers cannot get an interview in their own area of expertise, even though there is no question about their suitability. Other factors such as age can lead to some engineers being 'less preferred'; and in the modern business environment, with some employers seeking to balance female-to-male ratios within their organisations, gender can play a real role in who is deemed 'suitable' and gets selected for an interview.

Larger companies commonly use software to screen resumes. But many smaller ones don't. When faced with 150-200 applicants for a vacancy advertised on SEEK (which is not uncommon for chemical engineering roles, for example), there can be a temptation for the employer to do an initial screening based on the brief summary information provided by SEEK, which effectively means screening based on job titles. This is not a particularly effective technique for determining the most 'suitable' candidates.

Employer survey responses about the number of 'suitable' applicants per vacancy cannot be seen as an objective measure reflecting the real situation. On the contrary, these assessments are subjective, and are heavily influenced by market conditions. For example, in 2015-16 in a period of major oversupply of engineering labour, the percentage of 'suitable' applicants per vacancy was reported to be 6.0% (2.9/48.2). Yet in a period of significant labour shortage in 2007-08, the number of suitable applicants was reported to be 19.4% (0.7/3.4) (DoE 2016a).

Despite the wide range in the number of applicants per vacancy across professions (Table 2), the number of 'suitable' applicants is remarkably consistent. In 2015-16, the highest number of 'suitable' applicants was recorded for Information Technology Professions (3.1 per vacancy), and the lowest was for Nurses (1.6 per vacancy). That the respective numbers of 'suitable' applicants are so closely clustered, despite the wide variation in the number of applicants per vacancy, is not some highly improbable coincidence. It is closely aligned with the number of people interviewed for each role.

Notwithstanding these criticisms, in the author's opinion the DoE produces the best available data about the state of the engineering labour market.

5. Engineering Unemployment

The national level of unemployment is measured by the ABS using surveys, according to the following criteria (ABS 2013b):

- the unemployed person is aged 15 or over and was not employed during the reference week (ie. the week the survey was conducted); and
- had actively looked for full-time or part-time work at any time in the four weeks up to the end of the reference week; and
- was available for work in the reference week.

A person is considered to be employed if they have worked at least one hour in the reference week.

Occupational unemployment statistics differ from the national labour force unemployment statistics in that the occupational statistics exclude two groups of people: those who have been unemployed for longer than two years; and those seeking their first job (DE&T 2015b). In this report the term 'labour force' refers to both employed and unemployed engineers, as per the Australian Bureau of Statistics definition (ABS 2017b). The term 'workforce' refers to the employed component of the labour force.

As described in Section 2, the focus of the current report is on the 21 occupations in the ANZSCO Minor Group '233 Engineering Professionals' (Appendix 1). The data relating to engineers used in this report are for those in this Minor Group.

Using Federal Government data not publically available, Engineers Australia periodically reports the estimated unemployment rate for the engineering labour force (Engineers Australia 2015b, 2016e, 2017). It does this by utilising the annual Survey of Education and Work (SEW) conducted by the ABS. Full details of the methodology used by Engineers Australia to determine the unemployment rate associated with the engineering labour force only recently became available (Engineers Australia 2017).

Engineers Australia has determined that 51 ANZSCO occupations represent its 'engineering team', which includes not just degree-qualified engineers but also associate engineers with lower level qualifications. Having determined the educational qualifications associated with these 51 occupations, Engineers Australia then extracts aggregated data from the SEW about engineering supply, demand and unemployment based on people with these educational qualifications. This cohort includes people who are working in engineering occupations and those who are not. The data are aggregated because the small sample sizes of engineering occupations in the SEW make the standard errors high, and to maintain statistical validity a larger grouping is required (Engineers Australia 2017).

Engineers Australia thus basis its engineering 'labour force' on educational qualifications rather than on occupational groupings. By this measure, in 2014 just over 40% of the engineering labour force was not working in engineering occupations (Engineers Australia 2015b), and in 2016 this percentage had increased to approximately 43% (Engineers Australia 2017).

From the above discussion it can be seen that it is impossible to use the unemployment data calculated by Engineers Australia to make any conclusions about the unemployment rate for the occupations or occupational groupings considered in the current report.

At present there are competing forces impacting the unemployment rate of engineers. The rise in the number of vacancies for '2332 Civil Engineering Professionals' (Figure 2) will help to reduce the unemployment rate, recognising that this Unit Group comprises approximately 30% of all Engineering Professionals considered in this report (Table 4). In contrast, other engineering Unit Groups continue to be negatively affected by a range of countervailing factors such as:

- the oil price collapse which commenced in August 2014, affecting capital expenditure by oil and gas companies, with flow-on affects to employment in service and supply companies in subsequent years
- the completion of the construction and commissioning of LNG plants in Queensland and Western Australia
- continuing cost cutting in the mining industry
- difficulties in the manufacturing sector, with ongoing layoffs in the steel, automotive and power industries
- subdued conditions in other industries in which engineers work.

The impact of all these factors is spread widely throughout the economy. On top of this, the migration of engineers to Australia has remained at very high levels (Figure 4). This also contributes to the tally of unemployed engineers. Engineering migration is the subject of further analysis in Section 9.

When engineers lose their jobs – nearly always through retrenchment – there are several possible outcomes. Some engineers find full-time or (increasingly) part-time work elsewhere in their occupation. Others, who cannot find work in their profession, find full-time or part-time work in another occupation, nearly always lower skilled and lower paid. In this report these engineers are called displaced engineers. And other engineers remain unemployed.

Table 3 documents the average size of the professional engineering workforce in Australia each year for the last five years.

Table 3
Average workforce size for '233 Engineering Professionals'
(ABS 2017c)

	2011-12	2012-13	2013-14	2014-15	2015-16
Workforce (thousand)	134.9	144.7	140.6	142.3	130.6

Based on the data in Table 3, between 2011-12 and 2015-16 the engineering workforce size decreased by 3%. The difference between the maximum and minimum values in Table 3 is about 10%. Yet, as shown in Figure 3 the number of applicants per job vacancy increased by 219% over the time period covered in Table 3. Using the reasonable assumption that the number of applications from engineers employed full-time in the profession varies in proportion to the size of the workforce of full-time employed engineers, the continual increase in the number of applications per vacancy is therefore a result of a continual increase in the size of the cohort of engineers who are unemployed, underemployed and displaced from the profession. It is not possible to identify the relative magnitudes of these three groups.

For unemployed and displaced engineers, it is very difficult to find work outside the profession at a skill level and salary level comparable to that which they had in the engineering profession. This is because to move to another profession, or even into a skilled trade, requires a major commitment of time (years) and financial resources to obtain suitable qualifications. This is frequently not possible for people with family and/or financial commitments. Others may not have the interest or desire to complete

yet another degree. When engineers apply for jobs outside their field of expertise they are competing against others who have qualifications and experience more directly relevant to the position. Experienced engineers may have skills in project management and general management, and might find roles in these areas. Other than that, in the absence of further qualifications, alternative career options requiring the skills possessed by engineers are very limited.

There is a belief among bureaucrats in Canberra that displaced engineers are appropriately utilised in the general skilled labour market, and that the country benefits from this 'diffusion' of skills. In the current economic climate employers ensure that this belief remains a fantasy, as they are very focused on recruiting candidates with qualifications and experience directly relevant to their needs.

The impact of unemployment on individuals is significant. In Australia, as of November 2015, the average duration of unemployment for 25-54 year olds was 49 weeks, and for those 55 years and over it was 68 weeks (Australian Human Rights Commission 2016). The corresponding numbers for engineers are unknown, but in an extremely subdued employment market where competition for each vacancy is intense, many thousands of engineers face a long wait to get back into the profession, assuming they can achieve that outcome.

Commenting on skilled migrants who can't get work in their profession, the Productivity Commission (2016) observed that:

> "…after several years in a low-skilled job, professional skills are likely to degenerate, a 'gap' in the curriculum vitae appears, and the likelihood of ever acquiring a job at the previous skill level decreases…" (Productivity Commission 2016, p.268).

This comment also applies to Australians who can't get work in their profession. One of the principal aims of the current report is to prevent this undesirable outcome from happening to Australian professional engineers, Australian graduate engineers, and recent migrant engineers who have been granted permanent residency.

6. Outlook until November 2020

The DoE's (2016d) predictions for the change in the engineering workforce between November 2015 and November 2020 are presented in Table 4. The far right-hand column represents the total projected growth in the employment levels over the five-year period to November 2020.

Overall, the outlook ranges from very subdued to very poor, except for '2332 Civil Engineering Professionals' for which modest annual growth is predicted. This is reflected in the increase in vacancies for this Unit Group (Figure 2 and Appendix 3). The small growth predicted for '2333 Electrical Engineers' has not yet eventuated, based on vacancies (Figure 2 and Appendix 4).

Table 4
Projected employment levels in November 2020 by engineering Unit Group (DoE 2016b)

ANZSCO Code	Unit group	Employment level November 2015 (thousand)	Projected employment level November 2020 (thousand)	Projected employment growth to November 2020 (%)
2331	Chemical and Materials Engineers	7.2	7.2	-0.4
2332	Civil Engineering Professionals	43.0	47.2	9.8
2333	Electrical Engineers	20.8	21.9	5.4
2334	Electronics Engineers	3.8	3.7	-3.4
2335	Industrial, Mechanical and Production Engineers	31.4	29.5	-5.9
2336	Mining Engineers	11.7	9.0	-22.7
2339	Other Engineering Professionals	23.2	23.9	3.4
	Total	141.0	142.5	1.0

The task of predicting employment levels and labour market requirements for individual Unit Groups is difficult, and becomes less accurate for each additional year into the future that projections are made. The projections in Table 4 reflect the view of DoE in late 2015 that there are no foreseeable drivers of growth for most engineering Unit Groups.

The DoE's 'Job Outlook' website provides detailed information on occupations, including predicted future growth and job openings, listed by Unit Groups (DoE 2016e). This is a comprehensive resource. Because of the small sample sizes for engineering occupations in the ABS Labour Force Survey and its associated SEW, standard errors are high (Engineers Australia 2015b). This makes unemployment data and labour force data unreliable for engineering occupations and Unit Groups. For example, employment levels for '2331 Chemical and Material Engineers' did not increase by 57% between 2013 and 2014 as claimed on the 'Job Outlook' website (DoE 2016f); and employment levels for '2334 Electronics Engineers' did not decrease by 54% between 2014 and 2015 as claimed (DoE 2016g). These numbers are nonsensical.

7. The Picture So Far…

Engineering job vacancies in December 2016 were just 34% of what they were when the engineering jobs market commenced its precipitous collapse in early 2012 (Figure 1). The job market has remained at low levels since at least mid-2013 for all engineering Unit Groups considered here, except for '2332 Civil Engineering Professionals' which has shown a moderate upturn since the beginning of 2015 (Figure 2).

The DoE monitors the labour market status of a cross-section of engineering occupations each year, and concluded that there has been no shortage of engineers in the assessed occupations after 2011-12, with the exception of '233611 Mining engineers

(ex petroleum)', for which there has been no shortage after 2012-13 (Table 1). This overall assessment is supported by the fact that the number of applicants per engineering vacancy has increased each year since 2011-12 (Figure 3), and that the applicants-to-vacancy ratio for engineering is now significantly higher than for any of the other professions monitored by DoE (Table 2).

Collectively unemployment, underemployment and displacement among Australian engineers have been rising since 2011-2012. Global events such as the oil price crash, and significant national events such as the completion of massive resources projects and the decline of major manufacturing industries have helped to ensure that throughout the country there has been, and continues to be, a substantial cohort of engineers who are seeking to rejoin the profession.

The projected employment growth until November 2020 is negative for four of the seven engineering Unit Groups listed in Table 4. The greatest positive growth is expected for '2332 Civil Engineering Professionals', with an annual growth rate of just 1.9% per annum.

8. Factors Influencing the Ability to Rejoin the Profession

Engineers overwhelmingly work as employees – as staff or contractors – for three main reasons: 1) many engineering projects or operations require multidisciplinary input; 2) the work is of a scale or complexity that is too great for an individual engineer to complete in the required timeframe; and 3) the cost of engineering software is often prohibitive for an individual to purchase.

Therefore, from the perspective of an engineer who is unemployed or who has been displaced from the engineering profession, the ability to return to the profession is a function of the number of available vacancies, and the extent of competition for those vacancies (ie. the number of applicants per vacancy).

The number of vacancies is largely a function of the state of the economy. Even with infrastructure spending, governments cannot significantly influence the number of vacancies for most engineering occupations.

The competition for vacancies comes from several sources: from those already in the engineering workforce; from unemployed or displaced engineers; and from migrant engineers who have been granted entry to Australia's skilled migration program. The Federal Government has complete control over the number of migrant engineers entering the program.

Mechanisms exist within the skilled migration program that can prevent the job market from being oversupplied with applicants through excessive levels of immigration. The major impact of an oversupply of migrant engineers is felt by unemployed, underemployed and displaced Australian engineers, as well as by the migrant engineers, who are all competing for the same limited number of engineering vacancies.

9. Migration Oversupply

9.1 Total engineering migration

The mechanisms that exist within the skilled migration program to prevent the engineering job market as a whole from being oversupplied with migrant engineers have not been exercised by the Federal Government. The Government has maintained very high levels of engineering immigration despite the huge fall in the number of engineering vacancies, along with significant unemployment, underemployment and displacement from the profession in the Australian engineering community.

The annual level of engineering migration – encompassing both permanent skilled and temporary skilled migration – is shown in Figure 4. The available permanent skilled migration data cover all relevant permanent visas, whereas the temporary skilled migration data are for the subclass 457 visa only. Information about the number of visas issued to graduate migrant engineers in the following visa categories is not publicly available:

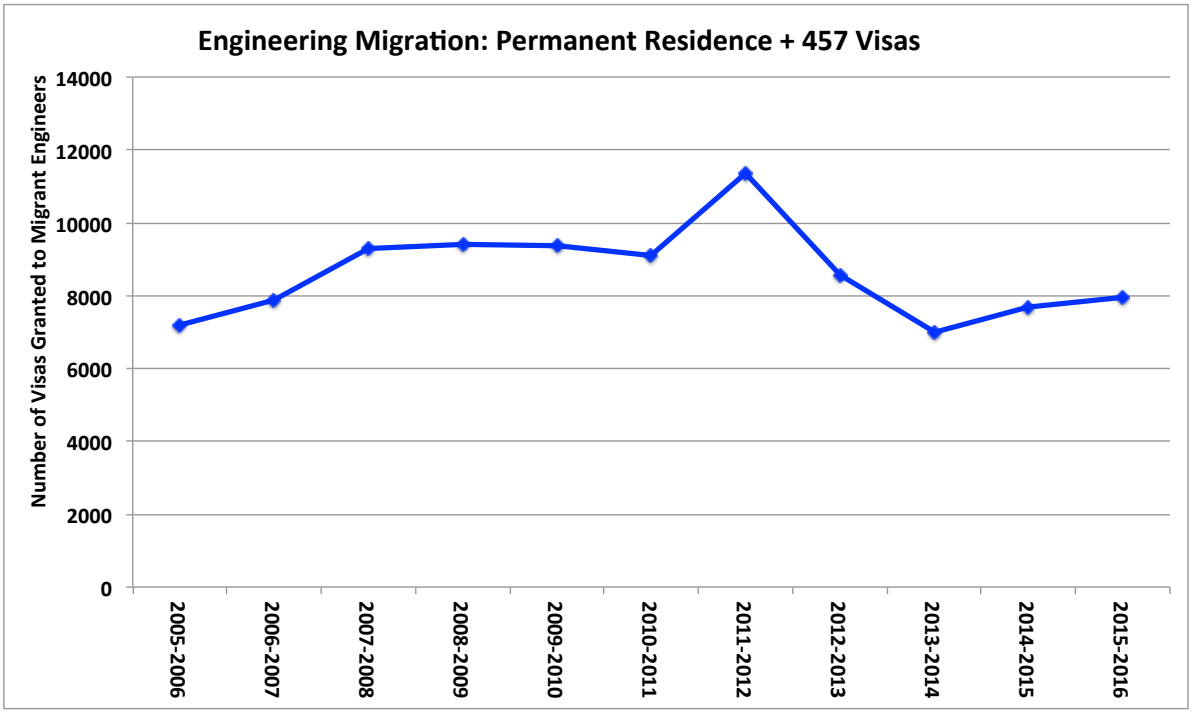
- Temporary Graduate visa (subclass 485)(Graduate Work Stream) visas (see Figure 6)
- Temporary Graduate visa (subclass 485)(Post-Study Work Stream) visas (see Figure 8)
- Skilled – Recognised Graduate visa (subclass 476) (see Figure 8).

Some commentators (eg. Sloan 2017) have stated or implied that international graduates from Australian universities (ie. migrants with degrees but minimal work experience in their respective fields) are being granted an increasing proportion of the visas available for the general skilled migration program. Little hard evidence has been presented to support or refute this contention, which is not surprising since the Federal Government keeps the information out of the public domain. The percentage of recent graduates in the annual permanent skilled migration scheme and the subclass 457 visa scheme is unknown.

It has been reported that about half of migrant engineers who are points-tested come from overseas (Birrell et al. 2016). These people are primarily granted the subclass 189 permanent residence visa for independent migrants (Figure 6 and Table 11 in Section 10) and to a lesser extent the State and Territory-nominated subclass 190 permanent residence visa (Figure 7 and Table 11 in Section 10). Points-testing favours migrants who are between 25 and 39 years of age and who have had five-to-ten years relevant experience within the previous ten years (Productivity Commission 2016, Box 13.1).

Engineers in this age bracket who have worked for eight-to-ten years are potentially competitive for senior and lead engineer roles. Those who have 12-15 years experience can potentially compete for principal engineer roles, depending on the nature of their experience and the company advertising the vacancy.

Figure 4
Engineering migration – permanent and temporary (actual numbers, not indexed) (Engineers Australia 2017; DIBP 2017a)



Some migrant engineers receive an employer-sponsored temporary subclass 457 visa to work in Australia, then at a later date move onto a permanent residence visa while maintaining the same job. From the perspective of an Australian engineer trying to re-enter the engineering workforce, this is the same as if the engineer on the subclass 457 visa had returned home and another migrant had come into the country on a permanent visa.

Considering the extent of the oversupply of the engineering labour market (Section 9.4), it is reasonable to expect that a migrant engineer on a subclass 457 visa should return home at the expiry of the visa, and that the vacated job – if still available – should be advertised to the Australian engineering labour market (see Section 10.5). Based on this reasoning, when a migrant engineer transitions from a subclass 457 visa to a permanent residence visa, both occasions when a visa was granted should be included in the engineering migration statistics. This is the case in Figure 4 where subclass 457 visa and permanent visa statistics are combined.

9.2 Flagged occupations and the Medium and Long-term Strategic Skills List (formerly the Skilled Occupation List)

As shown in Table 1, in 2012-13 there was no shortage of engineers in all but one of the engineering occupations assessed by the DoE, and by the following financial year there was no shortage in any of them.

The Department of Education and Training (DE&T) reviews the Medium and Long-term Strategic Skills List (MLTSSL) each year. Prior to April 2017, this list was known as the Skilled Occupation List (SOL). If an occupation is on the list, then potential migrants in that occupation can be considered for a permanent residence Skilled Independent visa (subclass 189), as well as for two temporary visas (Figure 6 in Section 10). The Skilled Independent visa (subclass 189) is currently the visa most commonly granted to migrant engineers. If an occupation is not on the MLTSSL, there can be no admission via this route.

After each MLTSSL review, some occupations are flagged for removal from the MLTSSL in the future. According to DE&T,

> "Generally, occupations are flagged when there is emerging evidence of excess supply in the labour market" (DE&T 2016a).

Table 5 documents engineering Unit Groups and the years in which their respective occupations were flagged for removal from the SOL by the DE&T and the previous Federal Government departments which undertook this task, including the Australian Workforce Productivity Agency (AWPA).

Table 5
Engineering Unit Groups flagged on the SOL

ANZSCO Code	Unit Group	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
2331	Chemical and Materials Engineers (Note 1)	✗	✗	✔	✔	✔	✔
2332	Civil Engineering Professionals	✔	✔	✔	✔	✔	✔
2333	Electrical Engineers	✗	✗	✗	✗	✗	✗
2334	Electronics Engineers	✔	✔	✔	✔	✔	✔
2335	Industrial, Mechanical and Production Engineers	✔	✔	✔	✔	✔	✔
2336	Mining Engineers	✗	✗	✗	✗	✔	Note 2
2339	Other Engineering Professionals	✔	✔	✔	✔	✔	✔

✔ = flagged ✗ = not flagged

Note 1: Only '233111 Chemical engineer' has been flagged for removal
Note 2: '2336 Mining Engineers' was removed from the SOL for 2016-17
Sources for Table 5: (EMSA 2013) for 2011-12 and 2012-13; (Iscah 2013) for 2013-14; (No Borders 2014) for 2014-15; DE&T 2015a and Iscah 2015 for 2015-16; and DE&T 2016b for 2016-17.

It is noteworthy in Table 5 that the single occupation covered by '2333 Electrical Engineers' has never been flagged for removal from the SOL, even though vacancies for this occupation (ie. '233311 Electrical engineer') have remained at low levels since early in 2013 and immigration has remained high (Appendix 4). As per Table 1, this occupation was assessed by the DoE as having no shortage from 2012-13 onwards.

Similarly, Unit Group '2336 Mining Engineers' was not flagged for removal from the SOL until 2015-16, whereas it can be seen from Table 1 that one of the two occupations in this Unit Group, that is '233611 Mining engineer (ex. Petroleum)', was deemed to have no shortage from 2013-14 onwards. This Unit Group had suffered a huge drop in vacancies by mid-2013, and demand has deteriorated further since then (Appendix 7).

Discrepancies such as these can be explained at least in part by the way in which the respective federal departments do their assessments. The DoE, whose assessments appear in Table 1, does its evaluation in-house, utilising information from its annual Survey of Employers' Recruitment Experiences (DoE 2013, 2016d). The DE&T on the other hand, like its predecessor departments, seeks submissions from stakeholders:

> "To help inform its labour market analysis, the Department is seeking expert advice and evidence on the suitability of occupations for inclusion on the SOL. Relevant stakeholders, including representatives of industry, employee, trade and professional organisations are welcome to make a submission…" (DE&T 2016a).

The submission process presents an opportunity for lobby groups to influence the outcome of the MLTSSL review. Lobby groups include the powerful 'assessing authorities' (DE&T 2016c) that evaluate the professional qualifications and experience of migrants for a fee, and make substantial sums of money from this activity and from any subsequent annual membership fees paid by new migrants.

Once the DE&T has completed its annual review of the MLTSSL, it makes a recommendation about the occupations to be included on the MLTSSL to the Minister for Immigration and Border Protection. The Minister decides what the final contents of the MLTSSL will be.

9.3 Migration and vacancy index trends

Taking into account the assessments of the DoE (Table 1), the DE&T (Table 5), and the commentary about discrepancies, it is reasonable to take the year 2012-13 as the first point at which there was no shortage of engineers in the profession as a whole.

In Figure 5, the engineering migration data shown in Figure 4 are plotted as an index, with the year 2012-13 being given the value of 100. This is achieved by dividing the data for each year in Figure 4 by the value for 2012-13, then multiplying by 100. Only data from 2011-12 onwards are shown.

Also shown in Figure 5 are the engineering vacancies, as per Figure 1, but this time plotted as an index using annual data rather than monthly data (to enable comparison with migration data which are only available on an annualised basis). The vacancy index has also been calculated so that it has a value of 100 in the year 2012-13. This enables the trend in engineering migration to be easily compared with the trend in vacancies after 2012-13.

Given that unemployment, underemployment and displacement from the engineering profession have collectively increased since 2012-13, the divergence of the migration

and vacancy index curves (Figure 5) indicates that the profession has been oversupplied with migrants since then.

In numerical terms, the ratio of the migration index to the vacancy index in 2012-13 was 1 (ie. 100/100). In 2015-16, the ratio was 2.26 (93.0/41.1). This means that in 2015-16, the country admitted 126% more migrant engineers per engineering vacancy than it did in 2012-13 when, on balance, there was no shortage of engineers in the country.

Note that the same ratio is arrived at when the raw data (ie. non-indexed data) are used. The number of engineering migrants admitted in 2012-13 was 8559. In the same year the number of engineering vacancies was 71623, yielding a migrant-to-vacancy ratio of 0.1195. In 2015-16, the number of engineering migrants was 7962, and the number of engineering vacancies was 29431, yielding a migrant-to-vacancy ratio of 0.2705. The ratio of these two ratios is 2.26 (0.2705/0.1195).

Figure 5
Total engineering migration and vacancies, indexed (2012-13 = 100) (Engineers Australia 2017; DIBP 2017a; DoE 2017a)

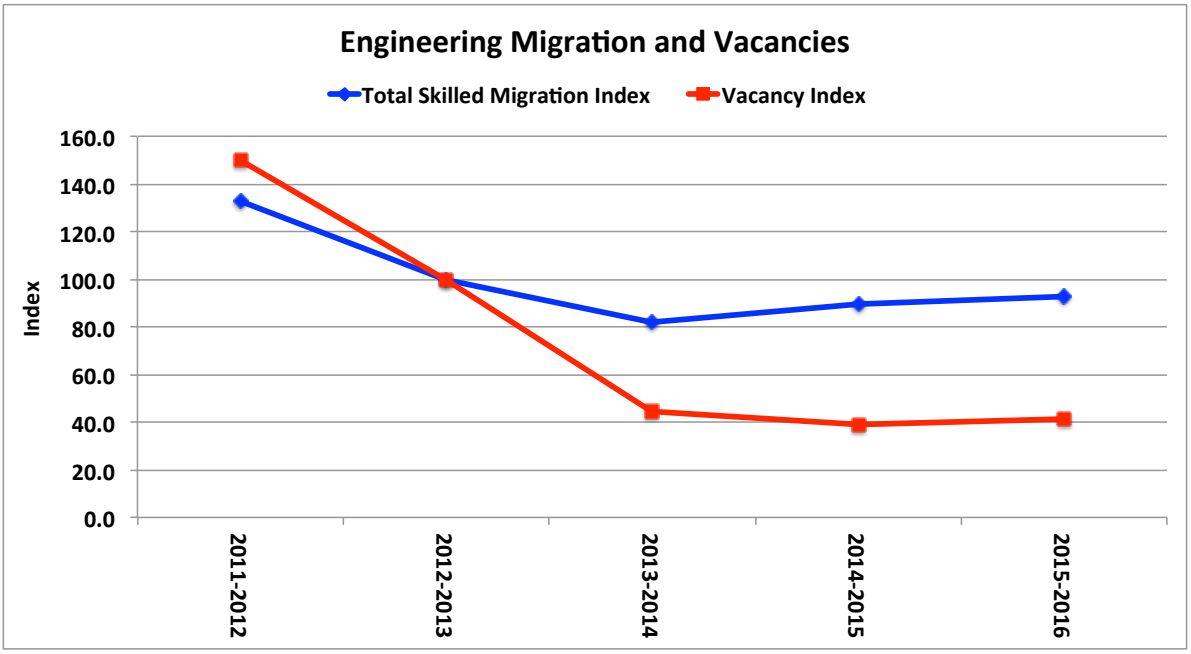


Table 6a documents the change in the ratio of the migrant index to the vacancy index for each engineering Unit Group between 2012-13 and 2015-16.

On this measure, '2331 Chemical and Materials Engineers', '2334 Electronics Engineers' and '2336 Mining Engineers' are the most oversupplied Unit Groups. As of mid-2016, the ratio for '2332 Civil Engineering Professionals' was moving closer to where it was in 2012-13 after a period of divergence (Appendix 3).

Table 6a
Ratio of engineering migration index to vacancy index for engineering Unit Groups in 2012-13 and 2015-16

ANZSCO Code	Unit Group	Ratio in 2012-13	Ratio in 2015-16
2331	Chemical and Materials Engineers	1.00	3.23
2332	Civil Engineering Professionals	1.00	1.35
2333	Electrical Engineers	1.00	3.14
2334	Electronics Engineers	1.00	3.26
2335	Industrial, Mechanical and Production Engineers	1.00	2.40
2336	Mining Engineers	1.00	4.28
2339	Other Engineering Professionals	1.00	1.65

For completeness, Table 6b documents the change in the ratio of the migrant index to the vacancy index from the time each Unit Group was first flagged for removal from the SOL until 2015-16.

Table 6b
Ratio of engineering migration index to vacancy index for engineering Unit Groups from the time they were flagged on the SOL until 2015-16

ANZSCO Code	Unit Group	Year first flagged on the SOL	Ratio when first flagged on the SOL	Ratio in 2015-16
2331	Chemical and Materials Engineers (Note 1)	2013-14	1.00	1.59
2332	Civil Engineering Professionals	2011-12	1.00	1.43
2334	Electronics Engineers	2011-12	1.00	3.00
2335	Industrial, Mechanical and Production Engineers	2011-12	1.00	3.29
2339	Other Engineering Professionals	2011-12	1.00	2.07

Note 1: Only '233111 Chemical engineer' has been flagged for removal from the SOL

It is astonishing that the ratios for '2334 Electronics Engineers' and '2335 Industrial, Mechanical and Production Engineers' have increased so much since these Unit Groups were first flagged on the SOL, ie. when there was the first emerging evidence of excess supply in these Unit Groups; yet they still remain on the MLTSSL today.

Table 7 shows the actual numbers of migrants and vacancies in 2012-13 and 2015-16 for each Unit Group.

Table 7
Number of engineering migrants and vacancies in engineering Unit Groups in 2012-13 and 2015-16

		2012-13			2015-16		
ANZSCO Code	**Unit Group**	**No. of migrants**	**No. of vacancies**	**Ratio of migrants to vacancies**	**No. of migrants**	**No. of vacancies**	**Ratio of migrants to vacancies**
2331	Chemical and Materials Engineers	396	493	0.80	490	189	2.59
2332	Civil Engineering Professionals	2443	28284	0.09	1934	16605	0.12
2333	Electrical Engineers	759	6197	0.12	791	2058	0.38
2334	Electronics Engineers	706	1083	0.65	837	394	2.12
2335	Industrial, Mechanical and Production Engineers	2150	12110	0.18	2092	4900	0.43
2336	Mining Engineers	583	19296	0.03	375	2901	0.13
2339	Other Engineering Professionals	1522	4160	0.37	1443	2384	0.61

For the year 2012-13, at which time there was no shortage of engineers in most engineering Unit Groups, the numbers in Table 7 are consistent with the discussion about internet vacancies in Section 3: most vacancies are created by people who have moved from a one job to another, and are therefore mostly filled by people who already have a job. As a result, in most instances the number of vacancies for a Unit Group is far greater than the number of migrant engineers (Table 7) or the number of unemployed engineers.

In 2012-13, the difference between the number of migrant engineers and vacancies for '2331 Chemical and Materials Engineers' and '2334 Electronics Engineers' was relatively small. By 2015-16, the number of migrant engineers in Unit Group 2331 was larger than the number of vacancies by a factor of nearly 2.6. For Unit Group 2334, the number of migrant engineers was larger than the number of vacancies by a factor of 2.1. This is evidence of massive oversupply in these two Unit Groups.

9.4 Estimating the extent of the oversupply of engineers

Migrant Engineers

Using the ratio of migrant engineers to vacancies for each engineering Unit Group in 2012-13 when there was, for the first time since the GFC, no general shortage in the engineering labour market, it is possible to estimate the theoretical intake of migrant engineers in subsequent years that would not oversupply the labour market. This is done by multiplying the 2012-13 ratio for each Unit Group by the number of vacancies in each subsequent year. The number of migrant engineers calculated in this fashion for

each subsequent year can then be subtracted from the actual number of number of migrant engineers in that year to provide an estimate of the number of migrant engineers in excess of labour market requirements. This approach assumes that other factors – such as the extent of unemployment and the displacement of engineers – remain as they were in 2012-13, whereas in fact they have increased. Table 8 documents the results.

Table 8
Number of migrant engineers in excess of labour market requirements for each engineering Unit Group

ANZSCO Code	Unit Group	Excess in 2013-14	Excess in 2014-15	Excess in 2015-16	Total	Percent of Workforce (Note 1)
2331	Chemical and Materials Engineers	206	244	338	**788**	10.9
2332	Civil Engineering Professionals	786	804	500	**2090**	4.9
2333	Electrical Engineers	350	479	539	**1368**	6.6
2334	Electronics Engineers	176	408	580	**1164**	30.6
2335	Industrial, Mechanical and Production Engineers	831	1114	1222	**3166**	10.1
2336	Mining Engineers	255	318	287	**860**	7.4
2339	Other Engineering Professionals	230	549	571	**1350**	5.8
Total		**2834**	**3916**	**4037**	**10787**	

Note 1: Workforce employment data from Table 4 for November 2015.

Australian Graduate Engineers

The number of domestic (ie. Australian citizen and permanent resident) bachelor degree graduate engineers surplus to full-time engineering labour market requirements after 2012-13 can be estimated by utilising data from several sources.

For the years 2014 and 2015, the number of engineering bachelor degree graduates (ACED 2015, 2017) can be multiplied by the percentage of engineering bachelor degree graduates who are available for full-time work (GCA 2015, 2016), to yield the number of engineering bachelor graduates who are available for full-time work. Using a weighted average percentage of those available for full-time work who are working in a job broadly related to their field of study, allows the number of bachelor graduates working in a broadly related job to be calculated. From this, the number of bachelor degree graduate engineers who are available for full-time work but who cannot find a broadly related job can be estimated (see Table 9).

It is clear that any international student who graduates in Australia (or overseas) and is granted access to the engineering labour market is surplus to requirements. The number of international engineering graduates who are granted work visas is not made publicly available by DIBP.

Table 9
Estimate of the number of domestic bachelor degree graduate engineers in excess of full-time engineering labour market requirements

	2014	2015	2016 (Note 1)	Total
Number of engineering bachelor graduates available for full-time work	5720	5756	5756	
Weighted percentage of those in broadly related full-time work	61.5	61.7	61.7	
Number in broadly related full-time work	3519	3550	3550	
Number not in broadly related full-time work	2201	2206	2206	**6613**

Note 1: Numbers are not available for 2016, so the previous year's numbers have been used

Unemployed, Underemployed and Displaced Engineers

As discussed in Section 5, the number of unemployed, underemployed and displaced engineers is unknown. The evidence is that the collective size of this cohort of engineers has continued to grow since 2011-12.

Table 10 summarises the estimates.

Table 10
Summary of estimates

Category	Number
Migrant engineers in excess of labour market requirements after 2012-13	10800
Domestic graduate engineers in excess of requirements after 2013	6600
International graduate engineers granted working visas after 2013	Unknown
Unemployed, underemployed and displaced engineers	Unknown

10. Understanding Skilled Migration

To understand the mechanisms used by the Federal Government to create the oversupply of engineers, it is necessary to understand how Australia's skilled migration program operates. Skilled migration consists of permanent and temporary components.

Through a number of pathways, migrant engineers can be granted permanent or temporary residence visas allowing them to work in Australia. Many of the visas require the migrant's particular engineering discipline (as denoted by an ANZSCO occupation) to be contained on one of two lists. The first is the Medium and Long-term Strategic Skills List (MLTSSL) already mentioned in Section 9.2 above; and the second is the Short-term Skilled Occupation List (STSOL). Prior to April 2017, the MLTSSL was known as the

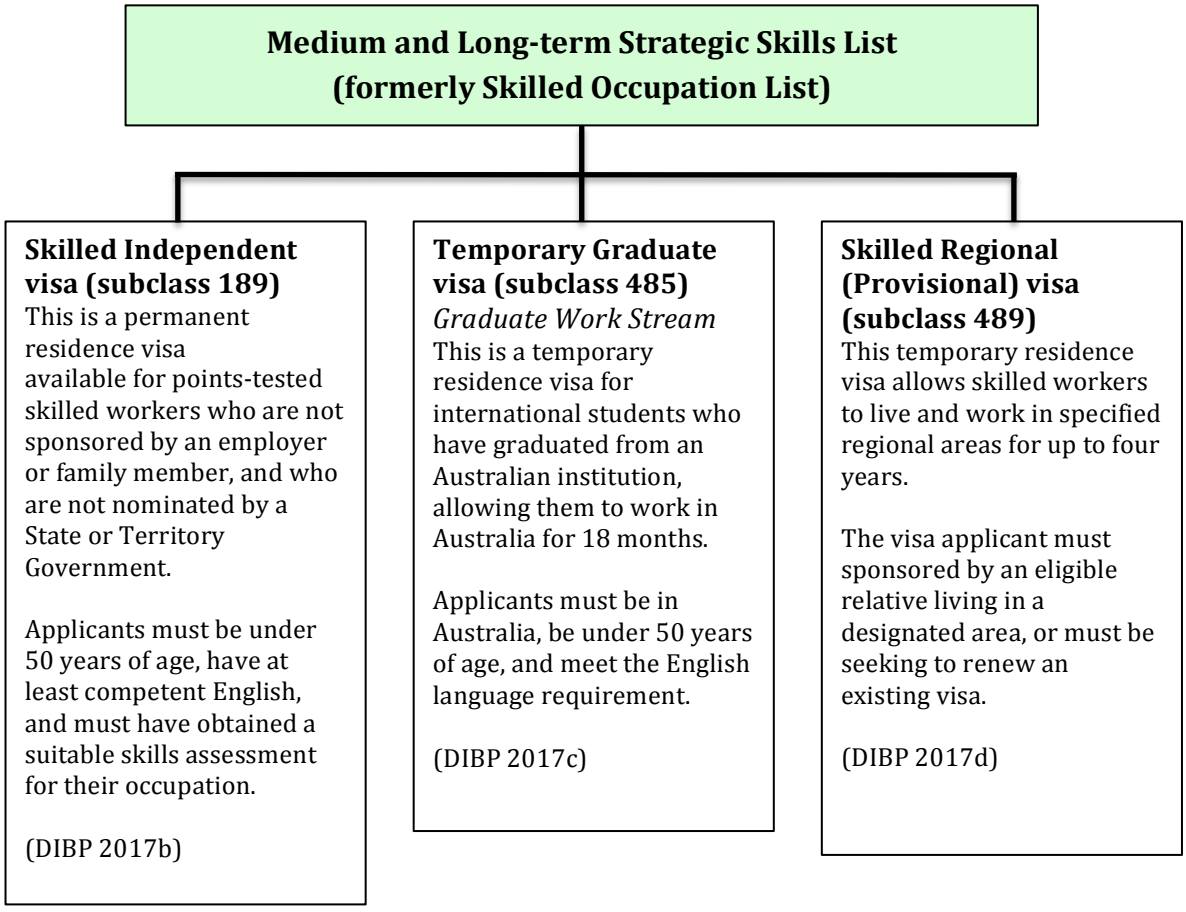
Skilled Occupation List (SOL) and the STSOL was known as the Consolidated Sponsored Occupation List (CSOL).

10.1 Medium and Long-term Strategic Skills List

Introduced in 2010 as the SOL (Azarias et al. 2014), the MLTSSL currently lists approximately 180 occupations, including all engineering occupations in the ANZSCO Minor Group 233 *Engineering Professionals*, with the exception of the two occupations in Unit Group '2336 Mining Engineers' which were removed from the list for the 2016-17 year (Commonwealth of Australia 2016a), as well as '233999 Engineering professionals (not elsewhere classified)' which was not listed after April 2017. The MLTSSL itself is maintained and updated by the DE&T, but its final composition for each year is determined by the Department of Immigration and Border Protection (DIBP). Applications for visas are assessed and granted by the DIBP. The visas that require an occupation to be listed on the MLTSSL are shown in Figure 6.

For the Skilled Independent visa (subclass 189), DIBP imposes an annual occupational ceiling, which limits the number of visas in this subclass that can be issued for each occupation. The ceiling for each occupation is determined as a percentage of the number of people employed in the occupation in Australia, but it is never less than 1000 visas (DIBP 2017e). No account is taken of the level of unemployment or number of available vacancies for an occupation.

Figure 6
Visas which require a skilled migrant's occupation to be listed on the MLTSSL



How the Composition of the MLTSSL is Determined

Each year the DE&T uses a two-stage process to determine if an occupation should be listed on the MLTSSL. The first stage involves identifying occupations to be shortlisted for further consideration in the second stage. Four criteria are used, with the aim being to identify occupations which are susceptible to supply constraints and/or which may need government intervention to address supply constraints. Occupations which have multi-year training requirements and/or for which a labour shortage will have a significant impact on the economy or the community are typically shortlisted at this stage (DE&T 2016d).

For the shortlisted occupations, the second stage

> "involves assessing the medium to long term skill needs of the economy for each occupation…to determine if it would benefit from skilled migration" (DE&T 2016d).

The Department advises that an occupation would generally not be included on the MLTSSL if it was determined that it is *likely* to be in surplus in the medium to long term. Conversely, an occupation generally would be included on the MLTSSL if a surplus was *unlikely* in the medium to long term (DE&T 2016d; DE&T 2016a).

It was emphasised by the Department in its 2016 online SOL review submission form that:

> "The SOL is concerned with 'medium to long-term' skills needs rather than immediate skills shortages" where "'medium to long-term' is defined as a period of five to ten years" (DE&T 2016e).

There are two primary problems with way the composition of the MLTSSL is currently established:

1. In terms of identifying which occupations should be *excluded* from the MLTSSL, there is significant practical difficulty in determining which individual occupations are likely to be in surplus (or balance or shortage) in five-to-ten years' time. Given the difficulties in making predictions about the labour market status of individual occupations so far into the future, it makes no sense to focus on medium- to long-term requirements when the time frame for bringing in skilled migrants is so much shorter. The processing time for most visas for skilled migrants is between three and 12 months (DIBP 2017k), and the majority of these are finalised within six months (Productivity Commission 2016). A focus for the MLTSSL of one-to-two years into the future would allow much improved labour market predictions, and skilled migration flows could then be better matched to areas of need.

2. The major flaw in the logic of determining the composition of the MLTSSL is the assumption that bringing in skilled workers in the next 12 months will help to alleviate potential skilled labour shortages five-to-ten years in the future. For a situation where an occupation is currently in substantial oversupply (as is the case with all engineering occupations), bringing in more skilled migrants to

compete for a limited number of vacancies results in additional unemployment or displacement, for both migrants and Australians. Once an individual has not been able to secure a position in their occupation for a couple of years or more, it becomes increasingly difficult for that individual to compete for job vacancies with people who are employed or who have more recent relevant experience (Australian Human rights Commission 2016; Productivity Commission 2016; ABS 2016d).

For engineers, this process has been ongoing since 2012-13. Many thousands of engineers remain unemployed or displaced from the profession. If there is a significant increase in demand for engineers in, say, seven years' time, employers will not look to employ those who have not practiced as engineers for the previous seven years. Rather, they will employ engineers whose experience is more current, or seek to bring in migrant engineers from overseas.

The DE&T subscribes to what is labeled here as the 'Stockpiling Theory' of the labour force. That is, skilled workers can be imported in the near term, regardless of whether or not they can secure employment in their area of expertise, so as to provide skilled labour five-to-ten years in the future when there is an anticipated upsurge in demand. Unfortunately, the labour market does not work in this fashion, and people who have not been able to practise and continue developing their area of expertise for a period of years are nearly always at an extreme disadvantage when trying to re-enter their occupation.

It only makes rational sense to bring skilled migrants into the country when the labour market for their occupation is in shortage or balance, and they have a reasonable likelihood of securing employment in their area of expertise soon after they arrive. In its discussion of points-based skilled migration, DIBP states that:

"Independent migrants are selected on the basis of their skills, attributes and suitability for employment so they are in a position to contribute quickly to the Australian economy" (DIBP 2017l).

Chief among independent, points-based skilled migrants are those who are granted the subclass 189 Skilled Independent visa, the permanent residence visa that requires the applicant's occupation to be listed on the MLTSSL (see Figure 6). Clearly DIBP views the MLTSSL as a means of identifying migrants who can assist with the immediate needs of the economy, rather than with potential needs which may arise in five or more years' time.

The irrational focus of the MLTSSL on potential medium- to-long term skill needs gives credence to the views of some immigration researchers that the MLTSSL has little to do with future skills shortages. Rather it is contended that its dual purposes are to help meet Australia's massive population growth targets, and to provide support to the lucrative overseas student industry by facilitating post-study work for these students through the subclass 485 visa. This then subsequently opens to the students the possibility of obtaining a much sought-after permanent residency visa (Birrell et al. 2016).

10.2 Short-term Skilled Occupation List

The STSOL came into effect in July 2012 (Azarias et al. 2014) as the CSOL. It is used for visas applicable to migrants who are sponsored by a State or Territory Government, or by an employer. Prior to April 2017, there were in effect two CSOLs. Each year, as an amendment to the *Migration Regulations 1994*, DIBP published a SOL and a CSOL. The latter was the legislated CSOL (Commonwealth of Australia 2016a). However, when applied in practice, DIBP's CSOL consisted of all the occupations listed on the legislated SOL, plus those on the legislated CSOL, giving a total of about 680 occupations in 2016. The practice was revealed by a question on notice to DIBP from the Senate Education and Employment References Committee (The Senate Education and Employment References Committee 2016, p.65).

This approach was formalised in April 2017 with the advent of the MLTSSL and STSOL. Employer and State and Territory Government nominations are now available to any occupation that is on the combined MLTSSL and STSOL. Some occupations are specifically excluded from the combined list. These include:

233111	Chemical engineer
233112	Materials engineer
233411	Electronics engineer
233511	Industrial engineer
233513	Production or plant engineer
233612	Petroleum engineer

The first five of these nonetheless remain on the standalone MLTSSL.

In general, employers and governments can recruit skilled migrants via the visas associated with the combined list (see Figure 7) without any 'market testing', ie. without ever advertising the jobs in Australia, if they so choose. This means that Australian citizens and existing permanent residents can be denied the opportunity to apply for these jobs. There is currently some market testing required for subclass 457 visas, but this is limited (see Section 10.5 below).

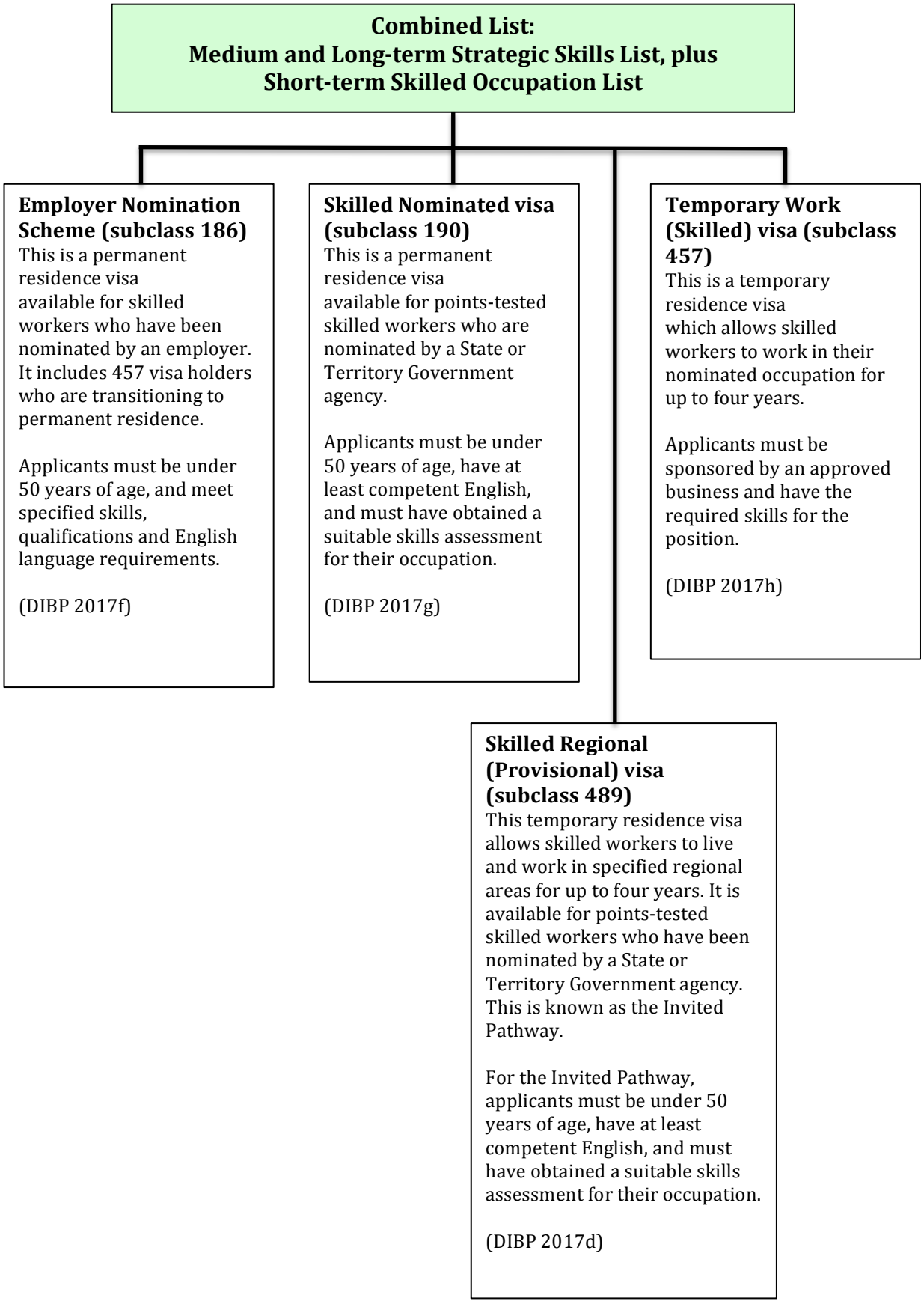
The STSOL is maintained and updated by DIBP taking into account advice from the DoE and, unlike the MLTSSL, its composition is determined in-house (DIBP 2017r).

Over the years, the composition of the CSOL has drawn considerable criticism, nearly all of it in relation to the subclass 457 visa. For example, the CSOL has been described as

> "an indiscriminate listing of a vast range of skilled occupations which takes no account of the state of the labour market" (Birrell & Healy 2012, p.12).

The Independent Review into the Integrity of the Subclass 457 Program (Azarias et al. 2014) recommended that a tripartite ministerial advisory council be formed to advise the Federal Government on skilled migration in general, and on the subclass 457 visa in particular, including advice on which occupations may be in oversupply.

Figure 7
Visas which require a skilled migrant's occupation to be listed on the combined list



In response, the Federal Government supported the recommendation and re-established the Ministerial Advisory Council on Skilled Migration (MACSM) (Commonwealth of Australia 2017). The Council held its inaugural meeting in June 2015. The Council's terms of reference include providing advice to the Minister for Immigration and Border Protection about the composition of the CSOL

> "with a view to increasing the productivity contribution of sponsored migration" (Department of Finance 2017).

What this means in practice is unknown. Another task for the MACSM is to advise on policies:

> "to ensure that Australian workers are afforded priority in the labour market" (Department of Finance 2017).

The majority of the seven-member Council is comprised of representatives of industry and employer groups. There is one member from a company with a financial interest in the immigration industry, and one member from the Australian Council of Trade Unions (ACTU) (Commonwealth of Australia 2017; Clancy 2015). There is no-one representing the interests of largely non-unionised groups of professionals such as engineers, ICT professionals and accountants; and there is no-one representing the interests of unemployed and displaced Australian citizens and permanent residents who are trying to find a place in their profession when the job market is in a state of oversupply.

In December 2016, the Minister for Immigration and Border Protection asked the MACSM to review the existing CSOL

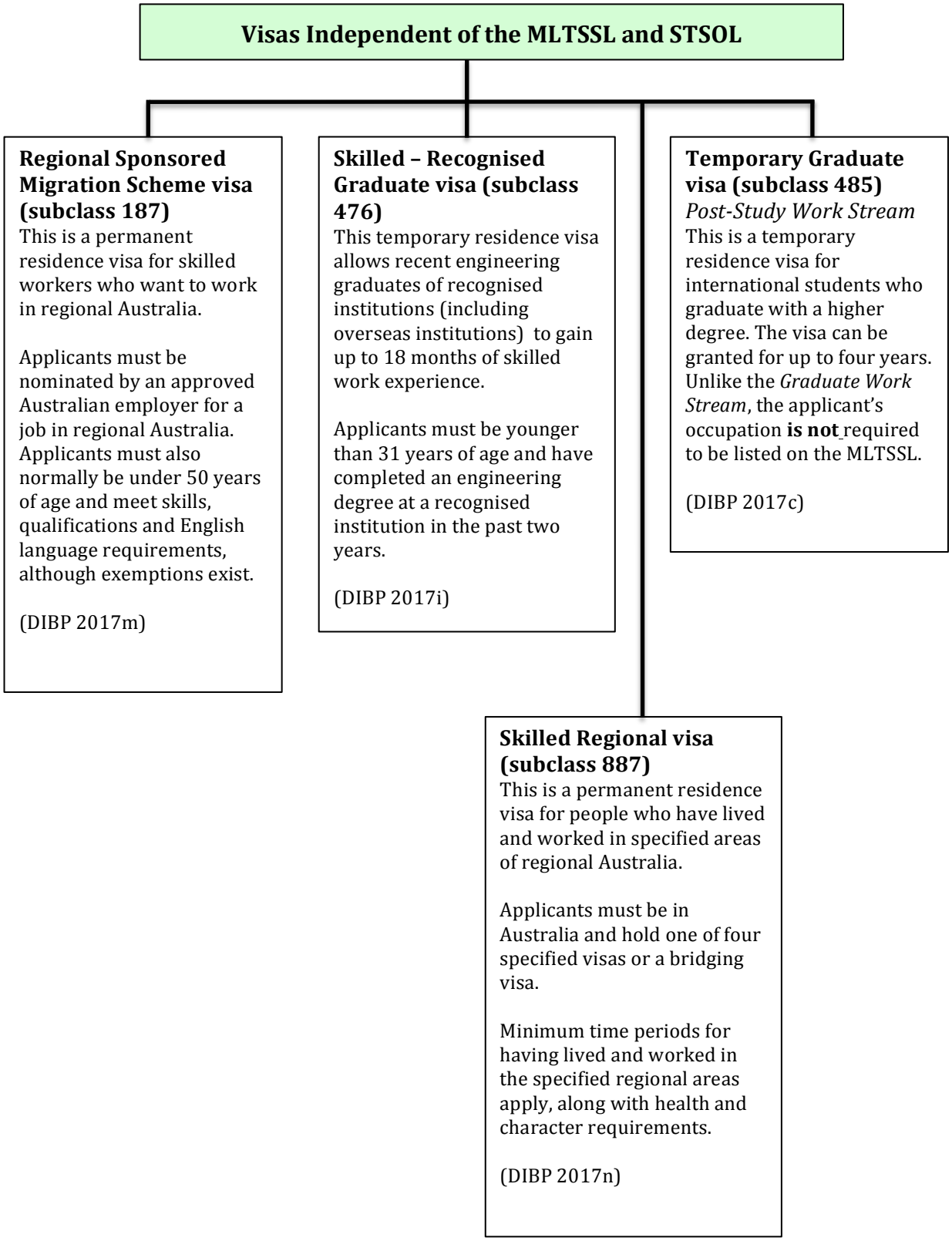
> "to ensure it better reflects genuine labour market needs… The CSOL review is part of a suite of reforms which are being progressed by the Government to ensure that Australian workers have priority" (Dutton 2016).

In April 2017 the Federal Government detailed its plans to scrap the subclass 457 visa, and at the same time removed a range of occupations from the new STSOL (the list which replaced the CSOL). However, the Government did not consult the MACSM about the changes, effectively rendering it irrelevant. The ACTU representative subsequently resigned from the committee (Patty 2017b).

10.3 Visas not required to be on either list

There are another four visas relevant to migrant engineers which do not require the applicant's occupation to be listed on the MLTSSL or STSOL. These are shown in Figure 8. The Skilled – Recognised Graduate visa (subclass 476) is unique among Australian visas in that it is focused on just one occupational grouping – graduate engineers. It was introduced in September 2007 when skilled labour shortages were being experienced during the first phase of the resources boom (Commonwealth of Australia 2007); however, it still remains in place even when the labour market for engineering graduates is very unfavourable due to intense competition for a significantly diminished number of positions.

Figure 8
Visas which do not require a skilled migrant's occupation to be listed on the MLTSSL or the STSOL



10.4 Summary of skilled migration visas

Table 11 summarises the suite of skilled migration visas that are used to facilitate the migration of engineers through both onshore and offshore applications.

Table 11
Summary of major skilled immigration visas

Visa subclass	Visa title	Occupation required to be on list	Permanent or temporary visa	Points-tested visa
189	Skilled Independent	MLTSSL	Permanent	Yes
485	Temporary Graduate (Graduate Work Stream)	MLTSSL	Temporary	No
489	Skilled Regional (Provisional)	MLTSSL	Temporary	No
186	Employer Nomination Scheme	Combined	Permanent	No
190	Skilled Nominated	Combined	Permanent	Yes
457	Temporary Work (Skilled)	Combined	Temporary	No
489	Skilled Regional (Provisional) (Invited Pathway)	Combined	Temporary	Yes
187	Regional Sponsored Migration Scheme	No list	Permanent	No
476	Skilled – Recognised Graduate	No list	Temporary	No
485	Temporary Graduate (Post-Study Work Stream)	No list	Temporary	No
887	Skilled Regional	No list	Permanent	No

The term 'regional' means anywhere in Australia except Sydney, Newcastle, NSW Central Coast, Wollongong, Melbourne, Brisbane, Gold Coast, Perth and the ACT (DIBP 2017o).

10.5 Temporary skilled migration

Of the six temporary skilled migration visas in Table 11, three (subclasses 476 and 485) are for recent university graduates. The number of these visas awarded each year to engineering graduates is not made available by DIBP. Of the remaining three visas, the subclass 457 visa is by far the most significant, and data for the number of 457 visas issued each year for individual occupations are publicly available (DIBP 2017a).

The subclass 457 visa has probably been the most notorious visa in Australian immigration history. Since its introduction in 1996, this visa has been the subject of ten reviews and inquiries, including the 'Robust New Foundations' report (Azarias et. al. 2014) and the recent Senate review into the exploitation of temporary work visa holders (The Senate Education and Employment References Committee 2016). As the application of the visa has broadened over time from its original intent, controversy has grown about the role it plays in the displacement of Australian workers by foreign workers, and in the exploitation of foreign workers who are working in the country with this visa.

It can be seen from Figure 9 that the number of subclass 457 visas issued to engineers has fallen each year since 2011-12. Figure 10 shows that the decline in the issue of 457 visas tracks the decline in engineering vacancies over that time.

Figure 9
New subclass 457 visa grants for engineers (actual data, not indexed) (DIBP 2017a)

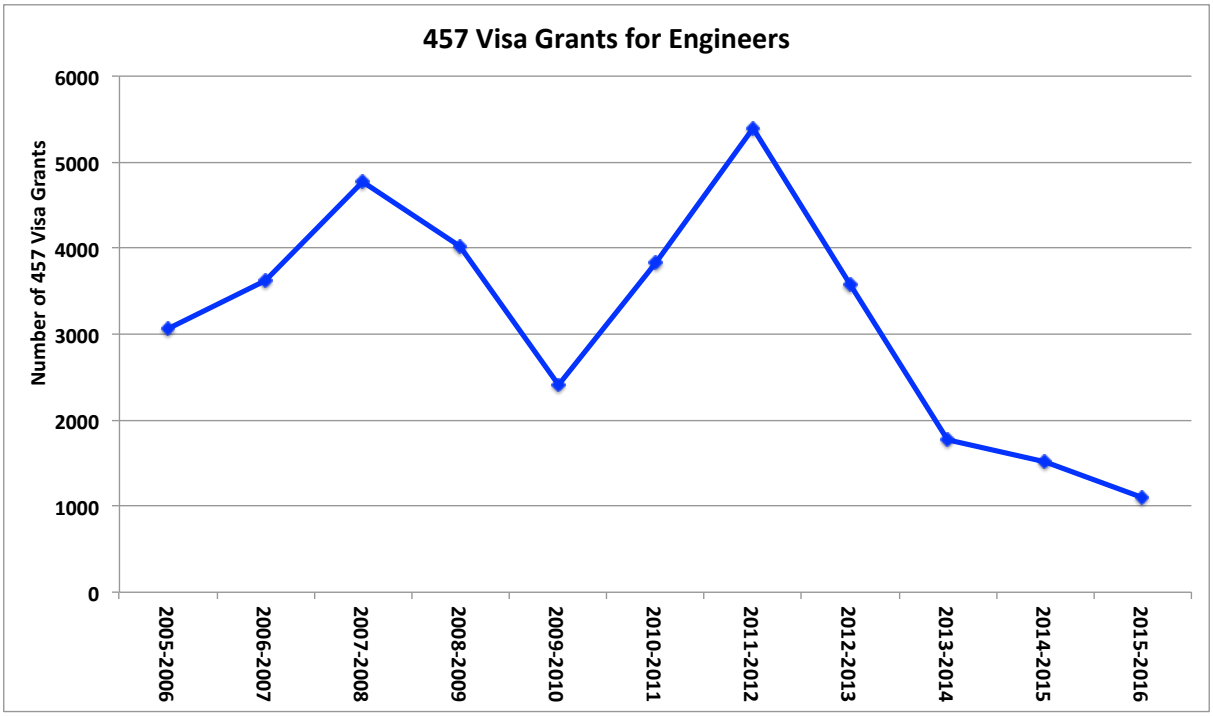
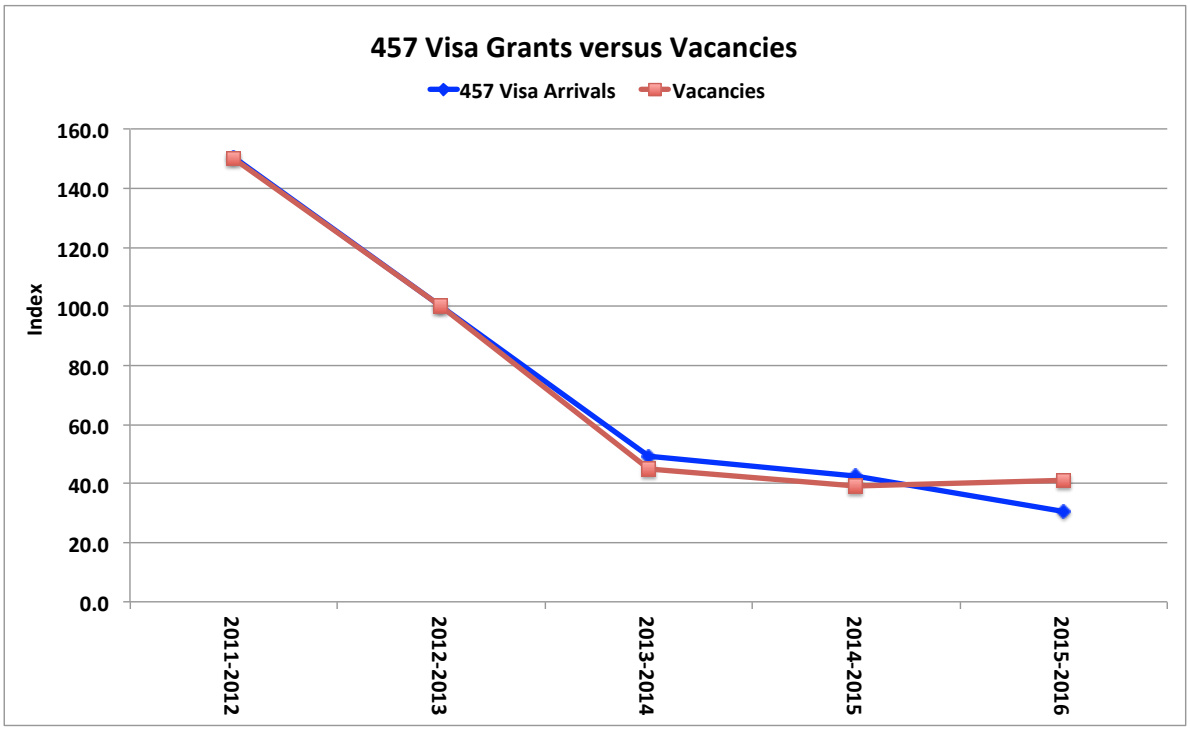


Figure 10
New subclass 457 visa grants versus vacancies for engineers (indexed, 2012-13=100) (DIBP 2017a; DoE 2017c)



The subclass 457 visa can be issued for a period of up to four years. At the end of June 2012 there were 7303 migrant engineers working in Australia on 457 visas. By the end of June 2016, the number had fallen to 2327 (DIBP 2017p).

Superficially it could be seen as appropriate that the issue of new subclass 457 visas to migrant engineers has declined in proportion to the decline in vacancies. This would be a plausible argument if there had also been a corresponding decline in the levels of permanent skilled migration. However, permanent skilled migration has increased and kept total engineering migration at high levels (Figure 4); and the number of applicants per engineering vacancy has continued to rise each year (Figure 3) as unemployment, underemployment and displacement of engineers has increased. It is therefore reasonable to question why there is a requirement for any engineers to be brought into the country using this temporary visa.

Engineering and nursing are the only two professions (as opposed to trades) for which market testing is required before a 457 visa can be issued (Commonwealth of Australia 2016b; Azarias et al. 2014). The market testing requirement can be bypassed if there is any conflict with Australia's international trade obligations. Thus, if the visa applicant is a citizen of China, Japan, Thailand, Chile, Korea or New Zealand, no market testing is required. If the applicant is a current employee of a business that is an associated entity of the sponsoring business in Australia, then no market testing is required if the associated business is located in any of the ten ASEAN countries or Chile, China, Japan, Korea or New Zealand (DIBP 2016). With these rules, there is ample scope for employers to bring in migrant engineers on 457 visas with no market testing, regardless of the state of the engineering employment market.

For professional occupations, the subclass 457 visa is granted with no independent examination of the qualifications or experience of applicants. A longstanding concern of Engineers Australia is that migrants on this visa can work as engineers in Australia based on the approval of their sponsoring employer alone (Engineers Australia 2015d, 2016b). In contrast, 30 trade occupations are subject to independent skills assessment if the applicant comes from any of ten particular countries (Azarias et al. 2014). In the view of the author, considering the safety and quality issues at stake, migrants who wish to enter the Australian engineering workforce on 457 visas should undergo formal skills assessment by the assessing authority, ie. Engineers Australia.

Despite the purpose of the 'Temporary Work' subclass 457 visa scheme being to alleviate temporary skill shortages in the Australian labour market (The Senate Education and Employment References Committee 2016), this objective has been distorted, allowing it to become a transition visa for many migrants seeking permanent residence in the country (Azarias et al. 2014). For example, migrants can transfer from a subclass 457 visa to a permanent residence subclass 186 visa when they have worked for a sponsoring employer for at least two years in the same occupation, and the employer wants to offer them a permanent position in that same occupation. No market testing is required (DIBP 2017f; Productivity Commission 2016).

This arrangement is satisfactory when a labour shortage exists in an occupation. But when an occupation or group of occupations is in a chronic state of major oversupply (as is the case with engineering occupations), this form of transition to a permanent

residence visa denies unemployed, underemployed and displaced citizens and existing permanent residents in the same occupation the opportunity of applying for the job. In these circumstances, the visa regulations privilege a foreign national in Australia on a temporary work subclass 457 visa, over and above Australian citizens and permanent residents. For Australian citizens who are trying to find work in their occupation, this is a form of dispossession.

The ability of migrants in engineering occupations to transition from subclass 457 visas to permanent residence visas must end. Once the 457 visa term has expired, the migrant engineer must leave the country and the job be made available to citizens and existing permanent residents. Removal of engineering occupations from the STSOL will facilitate this, and will also prevent new 457 visas being granted to engineers.

In April 2017, the Federal government announced that the subclass 457 visa would be scrapped in March 2018, to be replaced with the Temporary Skills Shortage (TSS) visa. Labour market testing will be mandatory for the TSS, except where there is a conflict with Australia's international trade obligations (DIBP 2017s).

There will be two streams associated with the TSS. The Short-term stream will be a visa of up to two years' duration. To access this visa, an applicant will be required to have an occupation listed on the STSOL. With this stream, there will be no pathway to permanent residency. The Medium-term stream will be a visa of up to four years' duration. To access this visa, an applicant will be required to have an occupation listed on the MLTSSL. There is a pathway to permanent residency with this stream (DIBP 2017r).

10.6 Permanent skilled migration

The permanent skilled migration data for engineers used in this report have been obtained from data supplied to Engineers Australia by DIBP (Engineers Australia 2017). The data cover all permanent visa classes for both independent and sponsored migrant engineers (Engineers Australia 2012).

Migrant engineers can obtain permanent residency through any of five major visa pathways, as documented in Table 11. Between 2001 and 2011, the skilled independent visa was the most commonly granted permanent residence visa for migrant engineers (Engineers Australia 2012). This is the Skilled Independent subclass 189 visa in Table 11. The next most commonly granted permanent residence visas for engineers were employer-sponsored (subclasses 186 and 187 in Table 11), followed by State and Territory sponsored visas (subclass 190 in Table 11) and then other visas (Engineers Australia 2012).

Permanent residence visas can be granted to both offshore and onshore applicants. Offshore applicants are living outside Australia at the time of their application, whereas onshore applicants apply when they are already in the country. Offshore applicants largely utilise the subclass 189 (Skilled Independent) visa, available for skilled independent workers. Onshore applicants, such as those transitioning from temporary visas or student visas, can potentially access the subclass 189 (Skilled Independent) and/or the subclass 186 (Employer Nomination) visa, among others.

Permanent engineering migration rose by 36% between 2012-13 and 2015-16 (Figure 11) and permanent visa applicants dominate the annual migrant engineering intake based on the available data (Figure 12) (Engineers Australia 2017; DIBP 2017a).

Figure 11
New permanent residence visa grants for engineers (actual data, not indexed) (Engineers Australia 2017)

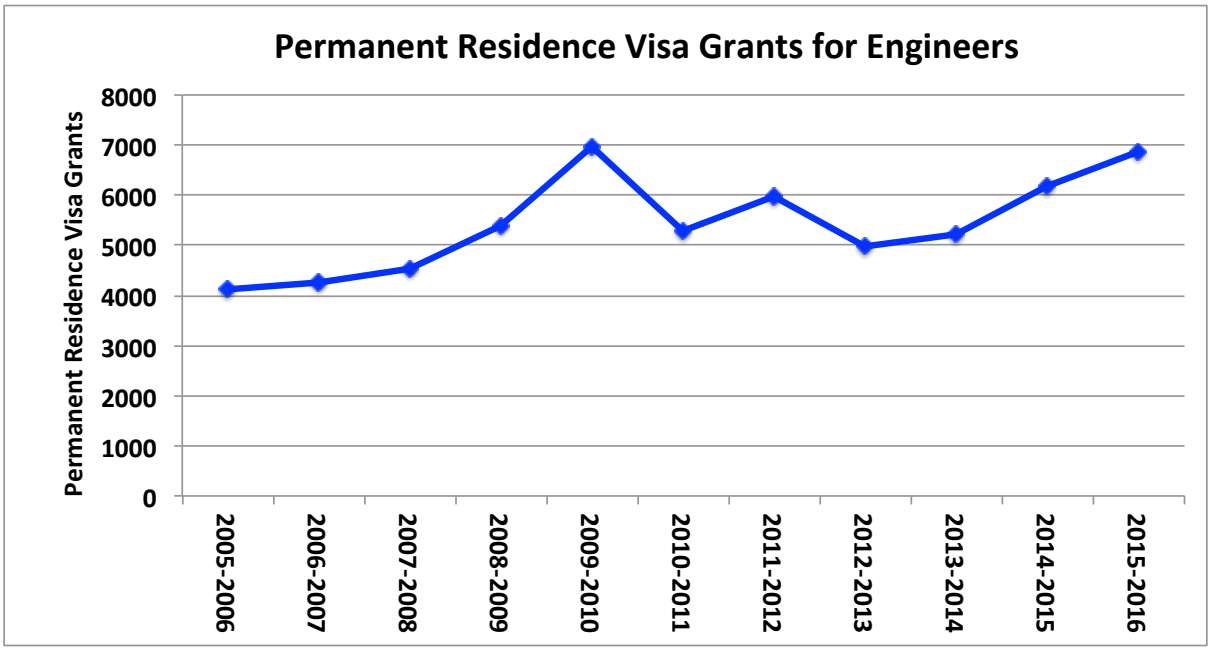
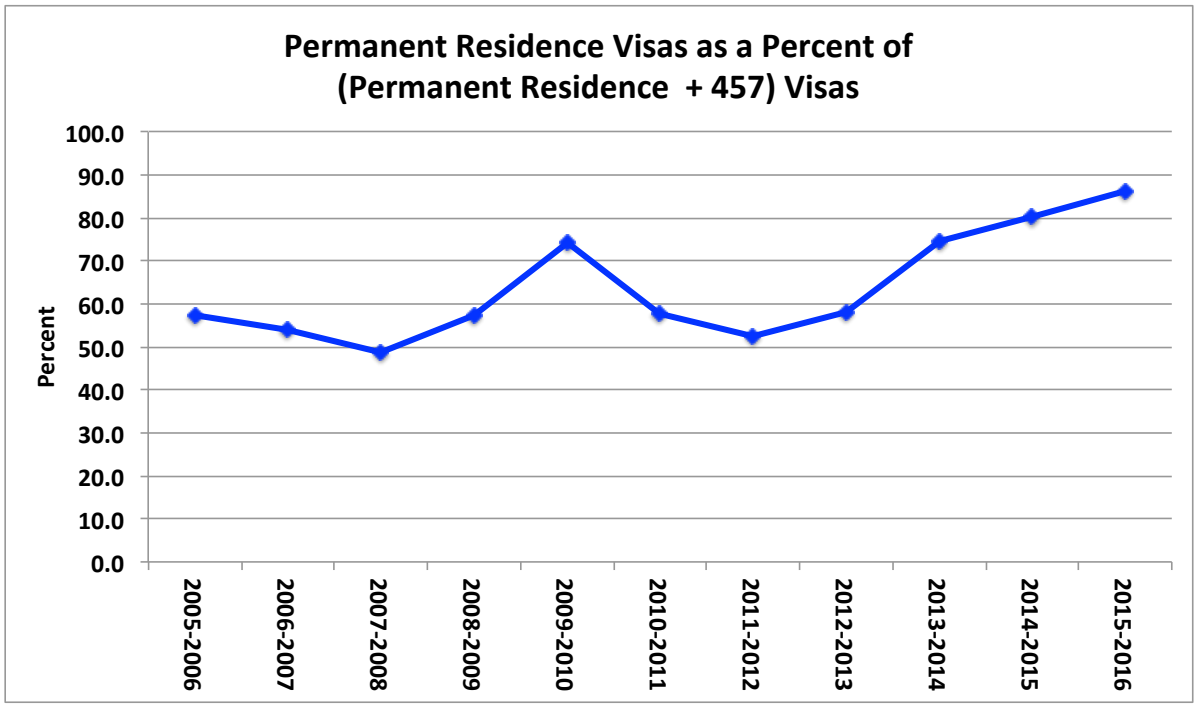


Figure 12
Permanent residence visa grants for engineers as a percentage of permanent residence plus 457 visa grants (actual data, not indexed) (Engineers Australia 2017; DIBP 2017a)

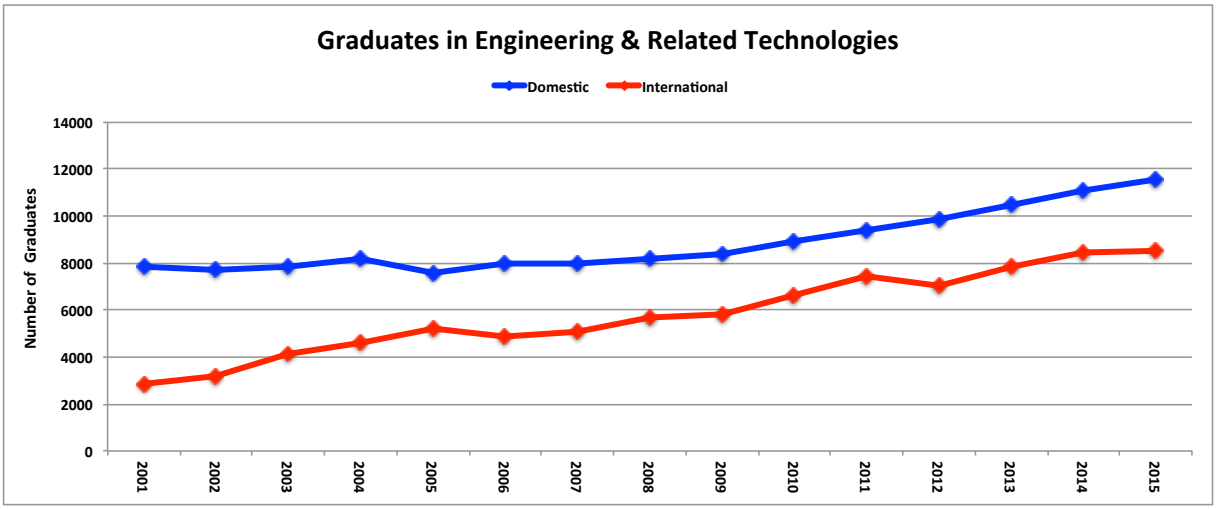


The preponderance of migrant engineers granted permanent residence makes the engineering employment market even more difficult. These migrants do not return to their countries of origin when their visas expire, in contrast to some of those on 457 visas. Instead, they are able to remain in Australia and compete for engineering jobs indefinitely, should they so choose.

11. Recent Domestic University Graduates

Figure 13 shows the number of award completions in the Australian Standard Classification of Education (ASCED)(ABS 2001) category '03 Engineering and Related Technologies' in Australia since 2001. 'Awards' cover degrees, diplomas and graduate certificates. There are two curves in Figure 13: one for domestic graduates (ie. Australian citizens and permanent residents); and the other for international students who have graduated from an Australian institution. Both curves indicate an ongoing increase in graduate numbers.

Figure 13
New graduates in Engineering & Related Technologies (actual data, not indexed) (DE&T 2016f; ACED 2017)



The employment outcomes for recent domestic bachelor degree engineering graduates are surveyed by Graduate Careers Australia (GCA). For graduates who complete their degree studies at the end of a year, the GCA survey is forwarded to them at the end of April in the following year (GCA 2011). This is five-to-six months after the completion of the graduates' final exams.

Across engineering disciplines, since 2012 there has been a significant decline in the percentage of recent domestic graduates in full-time employment, according to GCA data. The exception is Electronic/Computer Engineering, which has experienced just a small decline (GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures'). Figure 14 illustrates the decline in full-time employment for three engineering disciplines. The X-axis of Figure 14 refers to the year in which the GCA survey was done. The shape of the curves for the three engineering disciplines roughly corresponds to that for engineering vacancies shown in Figure 1; that is, it is likely that domestic

graduate engineer full-time employment outcomes to an extent reflect the general state of the engineering employment market.

Not all of these domestic engineering graduates are employed in jobs related to their field of study. Depending on the discipline, between 70% and 90% of recent graduate engineers who are employed full-time are working in a job broadly related to their training (GCA 2016. See Table 23a in GCA's 'Supplementary Tables & Figures').

Figure 14
Bachelor degree graduates in full-time employment as a percentage of those available for full-time employment, for selected engineering disciplines (actual data, not indexed)
(GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

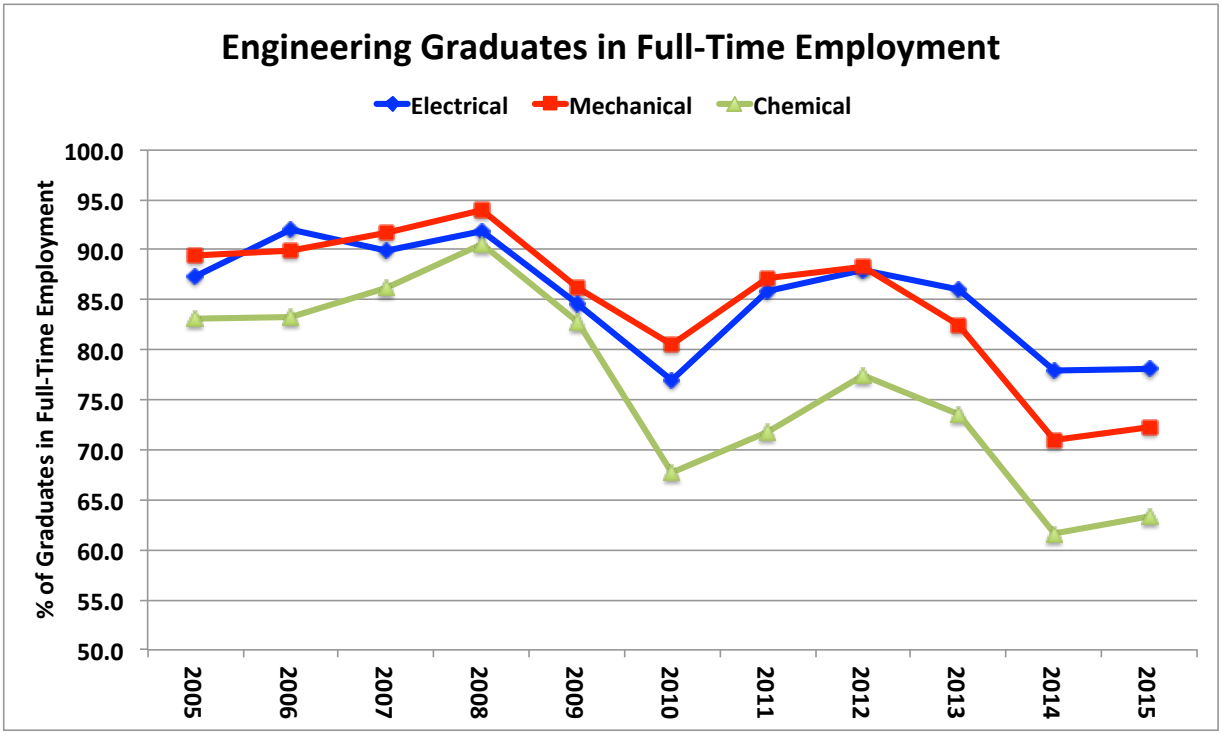


Table 12 shows the number of recent domestic engineering bachelor graduates who are working full-time in a job broadly related to their field of study, as a percentage of all recent domestic engineering bachelor graduates who are available for full-time work, using 2015 data. It documents a dismal outcome for domestic engineering bachelor graduates. Note that 'broadly related' means engineering, scientific, technical and managerial roles (GCA 2016. See Table 23a in GCA's 'Supplementary Tables & Figures').

Engineering degrees are among the most difficult university degrees in both complexity and workload, and they usually take at least four years to finish. Students completing engineering bachelor degrees incur costs of the order of $36,000 if they take out a HECS-HELP loan, based on 2016 rates (Norton 2016). It is irrational to believe that any but a small percentage of students embarking on engineering degrees do so with the intention that they will not work in an engineering-related field.

The deterioration in job prospects for domestic graduate engineers has been partially reflected in a 10% decline in acceptances in engineering courses through Tertiary

Admission Centres (TACs) between 2013 and 2015. However, direct admissions to engineering courses increased by nearly 33% during that time, leaving the overall level of acceptances virtually unchanged (Engineers Australia 2016c).

Table 12
Number of recent domestic engineering bachelor graduates working full-time in a job broadly related to their field of study, as a percentage of all recent domestic engineering bachelor graduates available for full-time employment (actual 2015 data, not indexed)
(GCA 2016. Calculated from data in Tables 5 and 23a in GCA's 'Supplementary Tables & Figures')

Engineering discipline	% Working in relevant job
Aeronautical	42.0
Chemical	50.8
Civil	68.0
Electrical	70.2
Electronic/computer	71.0
Mechanical	59.9
Mining	63.9
Other engineering	57.4

It is very likely that the domestic 'market' for university engineering courses – consisting of high school students, their parents and careers advisers, and mature age students – is not well informed about the true state of the Australian employment market for graduate engineers in particular, and engineers in general. Coupled with this, they are unlikely to be aware of the outlook for the engineering profession prepared by the DoE (Table 4).

Part of this lack of understanding may be due to the spruiking of misinformation by universities. In 2015, the author received a survey from university engineering academics who were genuinely of the belief that Australia was in the grip of a severe shortage of engineers. While universities may disseminate misinformation in good faith, there is little excuse for them doing so.

In conjunction with this, the Federal Government and private organisations have been articulating a view that Australia needs more high school students to study Science, Technology, Engineering and Mathematics (STEM) subjects. It is hoped that this will increase the number of Australians enrolling in these courses at the tertiary level and ultimately entering the workforce, for the benefit of the economy (Norton 2016; PwC 2016). This advocacy will help to encourage students to enroll in STEM courses, including engineering.

Domestic engineering degree enrollments and graduations have risen continuously since the beginning of the resources boom (Figure 13), and have continued to increase long after the resources boom drew to a close. The boom was a once-in-200 year event, and one that will not be repeated in the foreseeable future. The labour market for

engineering graduates is, and will probably continue to be, in a state of oversupply unless graduate numbers reduce.

There is a perspective pushed by universities and some in the federal bureaucracy that it doesn't matter if engineering graduates don't find a place in the profession, as they will be able to find a place in the general skilled workforce. It is true that it is easier for graduate engineers to move into new professional fields than it is for experienced engineers; even so, graduate engineers have to compete with other graduates who have undertaken courses of study more suited to alternative occupations. About 28% of domestic engineering bachelor graduates do a double degree (Engineers Australia 2015c), and this assists these individuals to find placements outside the profession. However, many will be left unable to find work appropriate to the skill level to which they have been trained. Given that engineering students will incur substantial costs in terms of time spent studying and debts accrued (or paid), seeking a career in engineering will for some effectively turn out to be a source of self-harm.

There is an ethical imperative for the Federal Government and universities to ensure potential engineering students are fully informed of the current and anticipated future state of the engineering labour market. This will then allow potential students and those who advise them to decide if engineering is an appropriate career path, or whether another profession would be more suitable.

Nearly all Australian universities publish and promote their 'values' which govern the behaviour expected of staff, students and the institution itself. Google the phrase 'Australia university values' for plenty of examples. Words such as 'honesty', 'openness' and 'integrity' frequently appear in statements of values, and should guide university behavior towards potential students. Unfortunately, universities have a major conflict of interest in that they make more money when they enroll more students, a situation which has existed since 2012 when the Federal Government moved to a demand-driven funding system for universities, and removed caps on enrollments in most Commonwealth-funded bachelor degrees (Norton 2016). Universities have a financial incentive to enroll as many students as possible, and to do this they promote all their courses to potential students.

Overlaid on the oversupply of domestic engineering graduates is the growing number of international students graduating with engineering qualifications from Australian institutions (Figure 13). These individuals – who are not Australian citizens or permanent residents – can gain access to the Australian employment market through the subclass 476 and 485 temporary visas, and through permanent visas such as the subclass 189 Skilled Independent visa. The international graduates then compete with domestic engineering graduates for a limited number of entry-level places in the profession.

That this is allowed to continue is intolerable, considering the poor employment outcomes for domestic engineering graduates (Table 12). The Federal Government is allowing domestic engineering graduates to become collateral damage in its drive to attract ever more international students to study in Australia. The possibility of post-study work experience and permanent residence in Australia is attractive to many international students (Birrell and Healy 2012; Birrell et al. 2016).

By placing the interests of international graduates, and the vested interests who make money out of them, ahead of the interests of Australian engineering graduates, the Federal Government is causing harm to innocent Australians who have invested much in their engineering education. At the same time, the Government is diminishing the value of their citizenship by allowing foreign nationals on temporary visas equal access to the very limited number of available jobs. This is profoundly unethical, and is inconsistent with sound democratic governance.

In order to protect the interests of domestic engineering graduates and the integrity of the Australian engineering labour market, access of international engineering graduates to temporary and permanent visas must cease. With these changes, international engineering students will still come to study in Australia; the cohort may change, but the numbers will still be there.

12. Migrant Engineers

12.1 Economic issues

Although there are many reasons why people migrate to Australia, some of the key reasons for professionals are to access the higher rates of pay and presumed job opportunities in Australia compared with those in their home countries; and to access opportunities to remain in Australia on a permanent residence visa or ultimately as a citizen.

Most migrant engineers come from developing countries (Engineers Australia 2016a), so for these people the issue of pay differentials between Australia and their home countries is a material factor in the decision to migrate. Salaries between countries can be compared using a purchasing power parity (PPP) dollar. A PPP of 1 represents one US dollar spent in the USA. The same basket of goods purchased in the USA for one US dollar can be bought in developing countries for some fraction of this. However, salaries in developing countries on a PPP basis are generally lower than in developed countries such as Australia. As an example, based on 2012 PPP data the average salary in Australia has 3.35 times the purchasing power as the average salary in Brazil. Relative average salaries, calculated on a PPP basis, are available on the BBC website (BBC News Magazine 2012).

The substantially higher purchasing power of Australian salaries allows migrants to send valuable remittances to families in their home countries. Savings accrued in Australia have even greater value if the migrants return to their home countries and spend the money there.

The downside for migrants is that if they remain in Australia permanently, the savings they accrued in their home countries prior to immigration have a diminished purchasing power if spent in Australia. This favours younger migrants who have accumulated less wealth in their home countries than older workers. The downside for Australians in the same occupations as the migrants is that the large increase in purchasing power afforded by Australian salaries can encourage some migrants to accept offers of work at salary rates below market rates. This has been highlighted in the media over the years

for unskilled and semi-skilled workers, where migrants have been exploited. There has been little exposure about the extent of this phenomenon in professional occupations.

A recent study of migrant Information and Communication Technology (ICT) professionals in Australia shed some light on the matter (Birrell et al. 2016). It was found that 61% of experienced Indian ICT professionals working in Australia on 457 visas had a salary which was at least 30% below the average salary for Australian ICT professionals. Incredibly, 28% of Indian ICT professionals had a salary below the starting salary of Australian ICT graduates, even though only eight percent of the Indians were under the age of 25 (Birrell et al. 2016).

If this can happen in ICT, it can certainly happen in the engineering profession where competition for each job is at its most intense ever. DIBP must release the equivalent 457 visa salary data for engineering occupations.

12.2 Luring migrant engineers from overseas

Migrant engineers who are admitted via offshore applications often do not have a good understanding of the current status and outlook of the Australian employment market. This can have a major negative impact if they are arriving on subclass 189 (Skilled Independent) visas, and are therefore not sponsored by an employer.

Some potential migrants form the impression that their skills will be in demand in Australia because their occupation appears on the MLTSSL, which they can view online from their countries of origin (Dengate 2016a). In the case of engineers, this false impression is entirely the fault of the Federal Government in general, and DIBP in particular (see Section 10.1 above).

Others have been deceived by migration agents, who have been known to lure potential migrants to their services by intentionally or unintentionally providing them with outdated and even false information about the current state of the Australian employment market. This type of advertising is potentially a form of immigration fraud (DIBP 2017q).

There are serious financial and career consequences for migrant engineers when they arrive in Australia and find that engineering work is difficult to obtain. The following statement from a skilled migrant (occupation unstated) also reflects the experience of some migrant engineers:

> "In general, many skilled migrants that I have met they feel deceived when they come here to find a job in their area of expertise and are unable to even get an interview." (Gale 2014, p.4).

The voices of migrant engineers, like those of domestic graduate engineers, are rarely heard. The views of some migrant engineers who have recently arrived in Australia, and who have become disillusioned because they have not been able to find work in their profession, are presented in 'The Huffington Post' by Dengate (2016a, 2016b) and on the website of Professionals Australia (2016a).

It is worth noting that the United Nations definition of human trafficking has three constituent elements: The Act; The Means; and The Purpose (United Nations Office on Drugs and Crime 2017). The Act includes the act of recruitment (among others). The Means includes the use of deception (among others); and The Purpose includes exploitation. When the three elements are present, human trafficking may exist, depending on the legislation of the countries in which the events occurred. At least two of the three elements are represented when engineers are recruited from overseas using false or misleading information about the Australian economy and job prospects for engineers. The Federal Government is complicit in this unethical process by continuing to maintain all engineering occupations (except those in the ANZSCO Unit Group '2336 Mining Engineers') on the MLTSSL years after the oversupply of those occupations first became evident.

12.3 Migrant unemployment and assistance

Engineers Australia has frequently noted that the unemployment rate of overseas born engineers is higher than that for Australian born engineers. More recent arrivals experience higher rates of unemployment, and the longer migrant engineers are in Australia, the lower their unemployment rate becomes (Engineers Australia 2014a). The numbers may be accurate, but this type of comparison between Australian born and overseas born engineers can be misleading, and can lead to wrong conclusions.

For the engineering occupations considered in this report, the total workforce is about 141,000 (Table 4), and a hypothetical unemployment rate of 5.0% for this group corresponds to just over 7,400 unemployed people. The total number of new permanent and temporary migrant engineers recorded for 2015-16 was 7962. If the unemployment rate among these new migrants is 20% (18% was the highest rate quoted by Engineers Australia (2014a)), this means that the other 80% found work, or were placed into positions, before the 7,400 unemployed Australian engineers, and the unknown thousands of underemployed and displaced Australian engineers who were also trying to find a suitable position in the profession. Although not all new migrant engineers may be employed in engineering roles, what superficially can appear to be an inequitable outcome for migrant engineers is more likely to be an inequitable outcome for Australian engineers. A more sensible approach would be to compare outcomes for unemployed recent migrant engineers and unemployed Australian engineers.

In 2016, Engineers Australia made a recommendation to the Federal Government that migrant engineers who have been granted permanent visas should receive assistance packages to help them adjust to Australian labour market conditions (Engineers Australia 2016b). In the view of the current author, a better solution would be to a) ensure all migrant engineers have strong English language skills before they are issued with visas; and b) only issue visas when the engineering labour market in is shortage or in balance. Bringing in more engineers to a market which is in a state of massive oversupply creates poor outcomes for unemployed, underemployed and displaced engineers, regardless of whether they are Australian professional engineers, Australian graduate engineers, or recent migrant engineers.

Providing assistance to new migrant engineers, as suggested by Engineers Australia (2016b), will inevitably require taxpayer money, one way or the other. In the current and foreseeable engineering labour market with many Australian engineers and

graduates seeking work in the profession, such a program would be an unjustifiable example of the Federal Government redistributing the wealth of Australians to foreign nationals, an activity which the Government should not be involved in (Matta 2015).

The migration of engineers to Australia since 2012 has contributed substantially to the huge surplus of professional engineers in the country. This is not in any way due to wrongdoing by migrants. It is entirely due to Federal Government policy settings and decisions which have been deliberate in their nature, and damaging in their consequences.

13. Engineers Australia

As the assessing authority for engineers for DIBP, and as Australia's peak engineering body, Engineers Australia has more influence on Federal Government policy in relation to engineering matters than any other organisation or individual.

Over the years, Engineers Australia has produced some excellent reports covering topics such as the engineering labour market, demographics of the engineering workforce, and engineering education. The 'Statistical Overview' series, now in its 13th edition, is a core component of this (Engineers Australia 2016d).

One aspect of Engineers Australia's contribution warrants closer scrutiny. As mentioned in Section 9.2, each year the DE&T (like its predecessor organisations) seeks comments from interested parties about the composition of the MLTSSL (known as the SOL prior to April 2017). Since 2012, Engineers Australia has made several submissions as part of this process. On every occasion, and as recently as November 2016, it has recommended that no engineering occupations should be removed from the SOL. The reasons given by Engineers Australia for this position are examined critically here, with reference to its two most recent submissions.

13.1 Engineers Australia's submission to the review of the SOL for 2016-17 (October 2015)

In October 2015, in its submission to the review of the SOL for 2016-17, Engineers Australia presented a number of arguments in defence of its position that engineering occupations listed on the SOL at that time should remain on the SOL for the 2016-17 financial year. This includes all engineering occupations considered in this report.

457 Visas

In its submission, Engineers Australia stated:

> "While the SOL relates primarily to permanent skilled migration stream, temporary migration is an important indicator of demand in the absence of reliable statistics. The number of temporary engineers in Australia is large and equivalent to about one year's output from the education system."(Engineers Australia 2015e, p.1).
>
> and

> "However, both the stock of 457 visa holders and the number of new visas approved remain very high and suggest that employers are still experiencing difficulties in recruiting engineers. (Engineers Australia 2015e, pp.3-4).

Yet in its submission to the Senate Education and Employment References Committee on the *Impact of Australia's Temporary Work Visa Programs* in May 2015, the view of Engineers Australia was:

> "There is no general shortage of engineers in Australia and the number of 457 visa approved last year are far higher than one would expect if some employers experienced difficulties recruiting an engineer practicing in a particular area of engineering, especially in view of there being no skills assessment." (Engineers Australia 2015d, p.1).

In October 2015 in *Skilled Migration of Engineers, An Update*, Engineers Australia said:

> "Engineering has many areas of specialisation and is practiced in numerous locations throughout Australia. The scope for demand and supply to be out of balance is significant. However, even allowing for this possibility, the number of temporary migrant engineers now employed in Australia seems unusually large given labour market conditions." (Engineers Australia 2015f, p.8).

In November 2015 in *The Engineering Profession: A Statistical Overview*, this same view was reiterated:

> "One of the features of the collapse in the engineering labour market is that it has affected every jurisdiction and not just the resources States. The level of new 457 visa approvals does not seem consistent with these labour market conditions." (Engineers Australia 2015c, p.63).

The statements about 457 visas in Engineers Australia's submission to the DE&T's 2016-17 SOL review cannot be reconciled with its other three statements quoted here, all from 2015.

Demand for Engineers

Engineers Australia's arguments to retain all engineering occupations on the SOL relied heavily on the proposition that there was a robust demand for engineers at that time:

> "There is a synergy between the results in Table 3 [in the submission] and the temporary migration statistics that suggests the demand for engineers to do engineering work remains robust even though it is lower than in the boom years. This is a critical reason for continuing the present SOL list of engineering occupations." (Engineers Australia 2015e, p.4).

This statement can be contrasted with the one in Engineers Australia's *Annual Report 2014-15*, published in November 2015, which refers to engineering labour market conditions as being:

> "…the toughest engineering employment market experienced in Australia in the past 25 years" (Engineers Australia 2015a, p.8).

Engineers Australia estimates demand for engineers from the ABS Survey of Education and Work. This survey samples a small section of the engineering labour force, and standard errors arising from the small sample sizes make data at the occupational level unreliable, forcing Engineers Australia to only use data for the profession as a whole (ie. the three-digit ANZSCO Minor Group code) (Engineers Australia 2015e).

Listing of engineering occupations on the SOL (now the MLTSSL) results in a new supply of engineers via migration. In the opinion of the author, a far better method of determining the demand for that new supply of engineers is by using the DoE's vacancy data (Figures 1 and 2), which represents the *unmet* demand in the labour market (ABS 2013c). The vacancy data cover a substantial majority of the market openings for engineers.

These data are well known to Engineers Australia, and have been used in its 'Vacancies for Engineers' and 'Labour Market Analysis' reports for the last several years (Engineers Australia 2016i). This information is available at the four digit ANZSCO Code level and is not affected by sampling errors. This is a much more accurate and insightful method of determining the demand for an additional supply of engineers, and the relative demand at different time periods. The ANZSCO four digit Unit Groups for which vacancy data are collected are very specific to degree-qualified engineers, as a perusal of relevant job advertisements on SEEK will confirm.

Whether an engineering occupation should remain on the MLTSSL (formerly the SOL) is not just a function of demand for a new supply of engineers, but also of the available supply seeking to satisfy that demand (Figure 3 and Table 2). To say that demand for engineers is a "critical" reason to retain all engineering occupations on the MLTSSL, without considering the number of engineers in Australia available to satisfy that demand, is unjustified in the author's opinion. Engineers Australia has focused on demand only, when a more valid parameter is the supply:demand ratio.

The evidence presented in the preceding sections of the current report demonstrate a low level of demand for a new supply of engineers as indicated by a vacancy level in December 2016 sitting at just 67% of the level in January 2006, despite the economy having grown by approximately 32% during that time. Furthermore, for the profession as a whole, the ratio of migrant engineers to vacancies (a measure of the supply:demand ratio) was 226% greater in 2015-16 than it was in 2012-13, noting that 2012-13 was the year by which there was no shortage of engineers in most engineering occupations (Tables 1 and 5). The backlog of unemployed, underemployed and displaced Australian and migrant engineers was, and is, more than sufficient to supply Australia's unmet engineering demand without importing more engineers via visas associated with the MLTSSL.

The argument put forward by Engineers Australia to retain engineering occupations on the SOL gravitated to short-term demand requirements, once again emphasising that the SOL/MLTSSL impacts the near-term supply:demand ratio.

Infrastructure Projects

Engineers Australia also expressed concern that delays in non-resource sector infrastructure projects would mean that qualified engineers would be forced to seek work outside the profession, so that when the projects did commence the available pool of engineering labour would be "severely compromised". They proffered this as an additional reason that engineering occupations listed on the SOL should not be removed (Engineers Australia 2015e, pp.4-5).

The failure of the Engineers Australia submission to mention the engineering workforce projections by the DoE (Table 4) is difficult to understand. These projections take into account workforce demands of infrastructure projects, which mainly employ civil and electrical engineering professionals. Most other engineering occupations have a poor outlook. There is no basis for arguing that all engineering occupations should remain on the SOL/MLTSSL.

When experienced engineers are forced to seek employment outside the profession, they nearly always find themselves in lower paying, lower skilled jobs. Many would love the opportunity to return to the profession, but spending extended lengths of time outside engineering makes them less attractive to engineering employers. It is only through restricting the access of employers to an endless stream of migrant engineers that they will be forced to consider and employ Australian engineers who have been displaced from the profession. To do this requires removing engineering occupations – most of which are hugely oversupplied – from the SOL/MLTSSL.

The position taken in Engineers Australia's submission was too extreme even for DIBP which, following the SOL review, removed Unit Group '2336 Mining Engineers' from the list for the 2016-17 year.

13.2 Engineers Australia's submission to the review of the SOL for 2017-18 (November 2016)

In November 2016 Engineers Australia published its submission to the latest review of the SOL (Engineers Australia 2016e). It revisits some old themes and introduces some new ones not present in the previous year's submission.

Unemployment and Adjustment of the Labour Force

In its submission, Engineers Australia states that the end of the resources boom impacted the demand for engineers, and that:

> "As a consequence, there has been a period of pronounced adjustment in the engineering labour marker [sic] marked by a rise in the unemployment rate in 2014, reduced labour force participation and the retirement of large numbers of older engineers. In 2015, unemployment fell indicating that the adjustment is in its last phases and may only continue for another year or so. Once adjustment is complete, Australia will have an engineering profession whose size is geared to present economic circumstances." (Engineers Australia 2016e, p.3).

and

> "The unemployment rate for engineers increased to 5.4% in 2014 compared to an average 3.7% over the previous five years, but fell back to 4.4% in 2015." (Engineers Australia 2016e, p.8).

As explained in Section 5, it is not possible to determine the unemployment rate for the 21 professional engineering occupations considered in this report using unemployment data reported by Engineers Australia. This is because Engineers Australia aggregates the data for 51 occupations, and uses educational qualifications appropriate to these occupations as the basis for determining the engineering labour force for which the unemployment rate is estimated. This labour force includes people working in both engineering-related (57%) and non-engineering (43%) occupations. This methodology is not explained in Engineers Australia's submission. In terms of the SOL review, the use of such unemployment data provides no valid insight into the unemployment rate associated with engineering occupations, whether aggregated or not.

By focusing on the unemployment rate as the only measure of the state of the engineering labour market, Engineers Australia has not included all those engineers who, due to market conditions, have been forced to work part-time in their engineering occupation – in some cases only a few hours per week – and all those who have been displaced from the profession and who want to return. These people are also part of the cohort who are applying for full-time jobs and competing with the huge annual influx of migrant engineers for a limited number of available jobs. The number of applicants per engineering vacancy has increased every year since 2011-12 (when most engineering occupations were flagged on the SOL – Table 5), and has in fact tripled since then (Figure 3), despite potential fluctuations in the unemployment rate.

In each of its its Occupation Summary Sheets for the 2015-16 SOL review, the DE&T noted that:

> "A low occupational unemployment rate does not necessarily mean that individuals wanting to work in the occupation are finding appropriate employment. They may be working fewer hours than they want to or may be working in other occupations while they are looking for work. These individuals are not included in the unemployment rate." (DE&T 2015b).

It should also be noted that unlike national unemployment data, occupational unemployment estimates exclude first time job seekers and people who have been unemployed for more than two years (DE&T 2015b), therefore artificially lowering the reported figures.

Thus through its focus on the unemployment rate as the sole measure of the adjustment of the engineering labour market, Engineers Australia has excluded from its analysis any consideration of the following four groups in the engineering profession:

- Professional engineers who have been unemployed for more than two years
- Graduate engineers who are unemployed and who are still trying to obtain their first engineering job

- Professional engineers who have been forced to work part-time in their occupation
- Professional engineers and graduates who have been forced to seek work in other occupations but who want to find employment in the engineering profession.

This is a substantial cohort of people whose prospects will be diminished further if engineering occupations remain on the SOL/MLTSSL. Ironically, in its latest annual report Engineers Australia claims that it is "continuing to explore avenues for inclusion" (Engineers Australia 2016f, p.6).

Displacement of Engineers

On the subject of the displacement of engineers from the engineering labour force, in its submission Engineers Australia says:

> "The flexibility and adaptability of "qualified engineers" has enabled many to move into non-engineering work and this has assisted adjustment to present economic circumstances. Many will not return to engineering and experience shows that the longer they are away the lower the probability of a return." (Engineers Australia 2016e, pp.8-9).

What Engineers Australia does not point out is that many of the engineers who have been displaced have been forced to take employment in lower skilled, lower paid occupations and would re-enter the engineering workforce if they could. Many employers discriminate relentlessly against people who have not been able to practice their profession for an extended period of time. The most effective way to assist displaced engineers re-enter the profession is to halt the flow of migrant engineers so that employers have no choice but to consider displaced engineers for vacancies. The attitude of Engineers Australia appears to be that displaced engineers are just part of the 'collateral damage' of the economic downturn. Following on from this, since these people do not impact the engineering unemployment rate they can be ignored, thereby justifying yet another years' intake of thousands of migrant engineers.

457 Visas and Demand for Engineers

In its November 2016 submission for the 2017-18 SOL review, Engineers Australia repeats some of the arguments found in its previous year's submission:

> "As well as permanent skilled migration, at any given time there are large numbers of temporary migrant engineers working in Australia on the Temporary Work (Skilled) visa (subclass 457). The presence of temporary skilled migration is an indication of excess demand for engineers…The fact that the number of temporary migrant engineers has remained so high indicates that despite major adjustment in the engineering labour market, there is a strong underlying demand for engineers." (Engineers Australia 2016e, pp.6-7).

Yet in its *Skilled Migration Position Statement* published in the same month (November 2016) it observes:

> "Since late 2012, demand for engineers in Australia has fallen and there is no longer a widespread skills shortage. Yet, despite a small fall in the number of 457 visa holders, both the number of engineers employed on temporary visas and new 457 visa approvals are too high for current labour market conditions." (Engineers Australia 2016b, p.2).

Once again, the two statements cannot be reconciled. It is surprising that Engineers Australia can believe that the presence of engineers on subclass 457 visas equates to an "excess demand" for engineers, as stated in its SOL submission. When a 457 visa is granted, the duration of the visa can be up to four years. The migrant engineers working on these visas are not required to relinquish their positions in an economic downturn, so long as their own positions remain viable. No market testing is required if an engineer on a 457 visa wants to transfer to a permanent residence visa and remain in the same job. It is therefore entirely possible to have thousands of migrant engineers working on 457 visas during rising unemployment, underemployment and displacement of other engineers. New approvals of this employer-sponsored visa have fallen in line with the significant fall in professional engineering vacancies (Figure 10).

Engineers Australia has also assumed that employers resort to using workers on subclass 457 visas only because of a skills shortage. Studies on the motivations of employers who utilise the 457 visa system, as summarised by Howe (2015), have found that a significant minority do so because of the behavioural characteristics of such workers, and because of the nature of the visa itself, which limits worker mobility.

Ironically, Engineers Australia includes some ICT professionals as part of its 'Engineering Team'. The recent report from the Australian Population Research Institute about the abuse of subclass 457 visas in the ICT profession (Birrell at al. 2016) should be enough to cast doubts in anyone's mind about the integrity and market relevance of this visa program.

Future Workforce Requirements

Engineers Australia's submission moves on to look at future demand for engineers:

> "It is Engineers Australia's view that the government's medium term innovation ambitions require an enlarged engineering capability, especially in new and emerging technologies. To achieve this result, in the first instance, Australian universities need to continue increasing graduate engineers. However, statistics show that recent growth in this area is coming to an end because insufficient high school students are studying foundation mathematics and science subjects. Skilled migration is the means to backstop efforts to produce more Australian engineers." (Engineers Australia 2016e, pp.3-4).

As shown in Table 12, depending on the discipline, between 29% and 58% of engineering graduates available for full-time work could <u>not</u> find work in an engineering, scientific, technical or management role in 2015. Market conditions have deteriorated for some disciplines since then, and these disappointing numbers may be even worse when the results for 2016 and 2017 are published. The Federal Government's innovation initiatives will only ever involve a small proportion of the

engineering workforce, and there is no evidence at all that there will be any need for universities to increase the number of engineering graduates above current levels. On the contrary, it is likely that fewer graduate engineers will be required in the market, and that market forces will drive the number of domestic acceptances into engineering courses to lower levels as awareness grows among potential students about the very subdued job prospects for new graduates (Norton 2016).

Migrant engineers can be brought into the engineering labour force almost 'on tap' due to short visa processing times. However, bringing in migrant engineers when the labour market conditions are very poor is not a sound strategy. It puts additional pressure on Australian engineers trying to obtain work in the profession, and makes it even more difficult for domestic graduates to find engineering work, ultimately leading to fewer domestic enrolments in engineering courses.

In its submission, Engineers Australia also turns its attention to the other end of the career journey, retirement. In reviewing the number of engineers who are over the age of 55, 60 and 65 respectively, Engineers Australia uses 2011 census statistics for its definition of the engineering 'labour force'.

> "Census statistics show that in 2011 73,931 engineers or 28% of the labour force were aged 50 or more years. Now some five years later, this group is aged 55 or more years." (Engineers Australia 2016e, p.8).

Once again this is a broad 'labour force' grouping that includes professional engineers and associate engineers, and it also includes qualified engineers who are working in non-engineering occupations, as well as those who are working in engineering occupations. In 2011, only 62% of this 'labour force' was working in engineering occupations (Engineers Australia 2014a). By including qualified engineers who are not working in engineering occupations, Engineers Australia can quote numbers for potential retirements that are 61% greater than would be the case if only those actually working in engineering occupations were included. If a qualified engineer working in a non-engineering occupation retires, by definition that person does not need to be replaced by an engineer.

The retirement of engineers working in engineering occupations is a continuous occurrence. If an abnormally high number of retirements creates a demand for engineers to replace the retirees, this will ultimately show up in vacancy statistics (Figure 2) and projected demand (Table 4). Nothing is evident so far. There is no basis for bringing in more migrant engineers via listing of engineering occupations on the SOL/MLTSSL in order to address potential future retirements when the current labour market is so poor, and migrant visas can be processed in a short period of time, if necessary, at a later date.

In its Occupational Summary Sheets for the 2015-16 SOL review, the DE&T lists the proportion of people aged of 55 or older as a percentage of the workforce in that occupation, reported at the ANZSCO Unit Group level (DE&T 2015c). Table 13 presents a summary for engineering Unit Groups.

The DE&T (2015d) also reports that for Australian professionals as a group, the percentage of workers aged 55 or older is 17.5%, based on the 2011 Census. It can be seen that the engineering profession is younger than Australian professionals on average. There is no pressing need to admit more migrant engineers now to cope with future retirements.

Table 13
Proportion of engineers aged 55 or older as a percentage of the occupational workforce (DE&T 2015c)

ANZSCO Code	Unit group	Percent of workforce aged 55 or older
2331	Chemical and Materials Engineers	15.4
2332	Civil Engineering Professionals	17.1
2333	Electrical Engineers	16.9
2334	Electronics Engineers	19.3
2335	Industrial, Mechanical and Production Engineers	14.6
2336	Mining Engineers	12.8
2339	Other Engineering Professionals	13.4

While the Federal Government resorts to the unrealisable 'Stockpiling Theory' (Section 10.1) to justify its medium- to long-term skilled migration objectives, in the author's opinion Engineers Australia creates the clear impression that it has no interest at all in those Australian engineers who cannot find a place in the profession, dismissing them as casualties of the adjustment in the engineering labour market. Consider the following statement from the peak engineering organisation's submission to the 2017-18 SOL review:

> "Adjustment in the engineering labour market is not yet concluded and is likely to continue in the short term. Certainly, within the time horizon for permanent migration, adjustment will be well and truly completed. There have been painful consequences for many engineers who have changed career directions, who have experienced geographic dislocation to continue engineering careers and who have retired when they expected to continue working. Never-the-less, adjustment has occurred and when concluded will leave Australia with an engineering labour force geared to a slow growth, commodities based economy." (Engineers Australia 2016e, p.9).

If the market is still "adjusting", and the "time horizon for permanent immigration" relates to skills needs in five-to-ten years time as per the definition for the SOL review (DE&T 2016e), it makes no sense to continue to bring in any migrant engineers on permanent visas now, when the job market for engineers is in a dismal state. This is not a sustainable strategy.

Based on the evidence presented so far, the author's interpretation of Engineers Australia's perspective is that this organisation believes more migrant engineers need to be brought into the country each year as a fresh 'top up', so that the country can be ready for any future eventuality which might bring an increased demand for engineers. Those Australian and recent migrant engineers who have been waiting patiently for an opportunity to join or rejoin the profession are considered by Engineers Australia to have been "adjusted" out of the labour market, and are therefore presumed to be unaffected by the addition of thousands more migrant engineers each year. It is on this bizarre foundation that Engineers Australia builds its case for engineering disciplines to remain on the SOL for 2017-18.

13.3 Conclusions about Engineers Australia's submissions to the SOL reviews

In the opinion of the author, the two submissions of Engineers Australia to the SOL reviews discussed above have many shortcomings, and are not of a standard commensurate with that of an organisation which sees itself as the "trusted voice of the engineering profession" (Engineers Australia 2016f, p.1). The shortcomings are documented in Table 14.

In the author's opinion, to fully understand the context of the contradictory, selective and self-interested aspects of the submissions, it is necessary to understand the financial interest that Engineers Australia has in engineering migration. According to its *2015-16 Annual Report*, the organisation processed more than 12,000 applications for migration skills assessments from potential members of the 'engineering team' seeking a permanent residence visa (Engineers Australia 2016f). For this effort, it received from the potential migrants revenue of $8.8 million, representing 18.8% of its total revenue (Engineers Australia 2016g). For the occupations covered in the current report, approximately 6800 migration assessments would have been performed with a pro-rated revenue of around $5 million.

Engineers Australia claims that its migration skills assessments are done "at cost" (Patty 2017a). Even so, if only half the annual intake of migrant engineers on permanent visas become full members of Engineers Australia, for the 2015-16 financial year that represents an annual revenue from membership fees of approximately $1.9 million from this cohort alone (Engineers Australia 2016h). Furthermore, a steady flow of income and work from migration assessments can potentially help to smooth over work shortfalls in other areas of the organisation's operations. In the author's opinion, there is clearly a financial benefit for Engineers Australia when there is a steady, or increasing, number of migrant engineers seeking permanent working rights each year.

In the context of this discussion, it is noteworthy that in its 2013-14 and 2014-15 Annual Reports, Engineers Australia reported that it was continuing to build its relationship with the Migration Institute of Australia and DIBP (Engineers Australia 2014b, 2015a).

In the opinion of the author, Engineers Australia has a clear conflict of interest when it presents its case to the DE&T's annual SOL/MLTSSL review that engineering occupations should remain on the list. The actual extent to which the financial interest has influenced the recommendations of Engineers Australia – if at all – remains unknown to the author.

Table 14
Author's opinions of the shortcomings of Engineers Australia's submissions to the last two SOL reviews, and evidence to support those opinions

Shortcoming of Submissions	Evidence
Contradictory	Statements about 457 visas compared with statements made about this visa by Engineers Australia in other documents
Superficial/ill-informed	Emphasis on demand rather than the supply:demand ratio
	Statement that engineers on 457 visas are evidence of excess demand
Selective/obfuscating	Did not mention DoE engineering workforce projections
	Did not mention DoE engineering vacancy data
	Did not mention DoE statistics about number of applicants per engineering vacancy
	Did not explain how it derived its engineering unemployment statistics
	Ignored or downplayed four groups of engineers trying to re-enter the profession
	Did not mention DE&T data showing that the percentage of engineers aged 55 and older is lower than the average for professionals in Australia
Self-interested	Failed to properly consider the interests of those engineers who have become unemployed or displaced as part of the 'adjustment' of the labour market
	Overstated the foreseeable demand for engineers
	Overstated the potential number of future engineering retirements
	Recommended 'top ups' of thousands of migrant engineers via listing of engineering occupations on the SOL, regardless of poor current market conditions and the subdued market outlook for the foreseeable future.

In forming their own opinions about the material presented in this Section about Engineers Australia, readers are encouraged to review the original documents so that they can fully understand the context, nature and details of Engineers Australia's positions on different topics. The commentary and opinions presented in the current report reflect the perspectives of the author.

Note that in late February or early March 2017, after research for Section 13 had been completed by the author, Engineers Australia removed online public access to the following document:

- *Skilled Migration of Engineers, An Update* (Engineers Australia 2015f)

14. Australian Council of Engineering Deans

In November 2016, the Australian Council of Engineering Deans (ACED) made a short submission to the review of the SOL for 2017-18 (ACED 2016). The submission stated that removal of engineering occupations from the SOL would have four negative consequences. Beginning with the first:

> "(1) It is noted that the AI Group indices for both manufacturing and construction are rated as expanding and well above the low levels experienced up until 2015. The growth in demand for engineers in the defence sector, infrastructure sector and energy sector is growing rapidly and a shortage would severely curtail Australia's ability to respond. A state such as South Australia would be particularly impacted by an inability to re-position its industry to respond to new challenges." (ACED 2016, p.1).

The Australian Industry Group (AIG) indices mentioned are based on a scale of 0-100. Above a value of 50, the sector is considered to be expanding. Below 50, the sector is considered to be declining. A value of 50 is neutral. The distance from 50 is a measure of the strength of the expansion or decline. As of March 2017, the Australian Performance of Manufacturing Index had a value of 57.5, with a 12-month average of 53.1. For the same month, the Australian Performance of Construction Index had a value of 51.2 with a 12-month average of 49.3 (AIG 2017). The expansion is modest for manufacturing and very small for construction. These indices are not specific to employment, and do not correlate with demand for professional engineers.

The ACED comment about the growth in demand for engineers avoids any reference to the actual unmet demand for engineers (Figure 2), or the DoE's assessment of projected employment growth in each engineering Unit Group (Table 4). DoE projections take into account future Government programs which will require engineering resources. ACED has produced no evidence at all to support its claim of rapidly growing demand for engineers in three sectors. It is only for '2332 Civil Engineering Professionals' that any growth in demand is evident (Figure 2), and this is focused on infrastructure and high-rise apartment buildings.

ACED's solution to its unsubstantiated belief that there is rapid growth in demand for engineers in the defence and energy sectors is to keep engineering occupations on the SOL, which in 2017-18 will result in at least another 6500 engineers being given subclass 189 permanent residence visas to work in Australia, many of whom will have no expertise in either the defence or energy sectors. Defence jobs for engineers often require highly specialised skills along with Australian citizenship. The latter requirement, when present, automatically excludes migrant engineers who have been granted visas associated with engineering occupations listed on the SOL/MLTSSL.

In terms of the Australian energy sector, there is no growth in power generation or oil and gas. There is growth in coal prices, and Australia's exports of coal and coke jumped in the second half of 2016 (Austrade 2017). In its most recent (2016) survey on the employment of its members, the Australasian Institute of Mining and Metallurgy (AusIMM) reported that 12.6% of mining engineers were unemployed; 11.3% of metallurgical, materials and chemical engineers were unemployed; and 9.4 % of its professionals in the coal industry were unemployed (AusIMM 2016). Yet one of the reasons ACED wants engineering occupations to remain on the SOL/MLTSSL is because of presumed demand for engineers in the energy sector, without any regard for the highly qualified and experienced supply that is available to satisfy that demand.

The many thousands of unemployed and displaced Australian and recent migrant engineers who are seeking work in the profession have been completely ignored by ACED.

The submission then says:

> "(2) The education of engineers requires at least a five year timeframe. The removal of engineering from the SOL would be a short term action with longer term implications, particularly on student recruitment and the graduate pipeline. It is noted that the demand for engineering jobs is often cyclical as exemplified by the mining industry where the recent downturn in demand has already bottomed out and iron and coal prices are rebounding." (ACED 2016, p.2).

This statement ignores the 6,600 Australian bachelor degree graduates who have not been able to find work in an engineering, scientific, technical or management role since 2013 (Table 9), and the unknown thousands of international graduate engineers in the country in the same position. Many of these people would welcome the opportunity to work as an engineer. At present, approximately 38% of Australian engineering bachelor graduates who are available for full-time work cannot find any work even broadly related to their field of study. Based on DoE projections (Table 4), this will continue for the foreseeable future. It is this factor in particular which will continue to have a negative impact on *domestic* student recruitment and the graduate pipeline, as it makes engineering a less attractive career option. Access to the engineering labour market for international graduates must cease until the market improves.

In the next paragraph of its submission, ACED's financial interest is indirectly declared:

> "(3) There are approximately 38,000 international students studying Engineering and Related Technologies which (at an assumed $30k pa) represents approximately $1B in income to the University sector. Many of these are influenced by the SOL and much of the surplus generated from educating these international students is used to augment the Government's and the student's contribution for domestic engineering students." (ACED 2016, p.2).

Even if engineering occupations are removed from the SOL/MLTSSL, there is no evidence at all that international students will stop coming to study engineering in Australia. No individual on a temporary visa (such as an international student) is given any guarantee that a permanent residence visa will subsequently be available, and there can be no expectation that it will be. If Australia's skilled migration program is luring international students to study in Australia on the basis that a permanent residence visa will be waiting for them when their studies are complete – regardless of market demand for their qualifications – then in the opinion of the author the skilled migration program is corrupt.

If an argument is being made that engineering occupations should remain on the MLTSSL now because recent international graduates were influenced by the presence of an occupation on the SOL/MLTSSL five years ago when they decided to study in Australia, that argument is nonsensical. Using this logic, it is never possible to remove an occupation from the MLTSSL. It is also means that the control of the listing of occupations on the MLTSSL would be governed by the desires of foreign students rather than by the needs of the Australian employment market and the interests of Australian citizens.

The Federal Government, on behalf of the Australian community, will always fund engineering places for domestic students based on the importance of engineering to the economy and to society, regardless of the level of fees paid by international students. Any suggestion otherwise is misleading.

ACED's final point is that:

> "(4) The engineering industry is facing a generational replacement issue with an ageing workforce. Many engineers are reaching retirement age and the replacements will come from a blend of young graduates and experienced skilled engineers from overseas. Engineers Australia are currently developing a workforce development strategy to address this real concern." (ACED 2016, p.2).

The issue of the retirement of engineers was addressed in detail in Section 13.2 in the discussion about Engineers Australia's submission to the SOL review for 2017-18. The percentage of engineers aged over 55 in each Unit Group is lower than for Australian professionals as a whole, with the sole exception of '2334 Electronics Engineers' (Table 13). Experienced migrant engineers can be brought into the country quickly, as needed, when the market demand returns. Australia's current unmet demand for engineers can be satisfied by the pool of engineers already in the country who are unemployed, underemployed or displaced from the profession. ACED never even considers this group of engineers. There is no basis for retaining any engineering occupations on the MLTSSL.

In the opinion of the author, the ACED submission is superficial, poorly researched, and based on several unsubstantiated claims. Engineering deans occupy public positions funded by the taxpayer. The Australian public deserves better than this.

15. Professionals Australia

In August 2016, Professionals Australia wrote an open letter to the Minister for Immigration and Border Protection expressing concern about the retention of engineering occupations on the SOL when no shortages of engineers exist (Professionals Australia 2016b). More than 1000 supporters signed the letter (Professionals Australia 2016a). No response was received from the Minister.

On the first day of 2017, an article featuring comments from Professionals Australia and Engineers Australia on the subject of the listing of engineering occupations on the SOL appeared in the online versions of *The Sydney Morning Herald* and *The Age* (Patty 2017a).

Some of the comments from Engineers Australia that were reported in the article are summarised in the following items:

1) An engineering skills shortage would again emerge as part of a boom and bust cycle.
2) Domestic engineering graduations have been growing very slowly over recent decades, justifying a long-term pipeline of skilled migrants
3) The engineering employment market is again on the rise
4) Professionals Australia had an interest in forcing a skills shortage to reduce supply and drive up salaries.

In relation to the comment in Item 1, Engineers Australia made no attempt to explain what would happen to engineers who were unemployed or displaced during the unspecified time period until the next boom occurred, with immigration of engineers continuing unabated.

In relation to the comment in Item 2, the data from the DE&T (2016f) show that graduations in Engineering and Related Technologies increased by 45% between the end of 2006 and the end of 2014 (Figure 13). The employment market was in balance by 2012-13. Growth rates in graduate numbers in past decades are irrelevant to the current state of the job market and to the job prospects of new graduates now.

In relation to the comment in Item 3, engineering employment is only on the rise for '2332 Civil Engineering Professionals'. Vacancies for other engineering Unit Groups remain subdued and static (Figure 2).

In relation to the comment in Item 4, Professionals Australia was responding to the concerns of its members. The 1000 supporters who signed Professionals Australia's letter to the Minister for Immigration and Border Protection just want fair access to the engineering job market, which is very much hampered by bringing in more migrant engineers each year on permanent and temporary visas. In the opinion of the author, this is the most troubling aspect of Engineers Australia's attitude: the corollary that engineers as individuals count for nothing, and if they have been "adjusted" out of the workforce or prevented from entering the workforce by market conditions, that is of no consequence. In Engineers Australia's view, the addition of new migrant engineers must continue unabated.

Declaration: The author is not a member of Engineers Australia. The author is not a member of Professionals Australia, and is not a member of any union or union-affiliated organisation. At the time of writing, the author is an unemployed professional engineer.

16. Reasons Why the Federal Government has Deliberately Oversupplied the Engineering Labour Market

From the perspective of the author, there are four main reasons why the Federal Government has knowingly and deliberately continued to oversupply the engineering labour market. The reasons arise from a convergence of interests that support either this course of action in particular, or increased migration generally. The Government provides advantage to these interests at the expense of unemployed, underemployed and displaced Australian and migrant engineers. Consideration by the Government of the negative economic, social and governance consequences of its approach has been absent or suppressed.

16.1 Advantage to business

Engineering businesses benefit when there is an ample supply of labour. This means that it is more likely they will be able to find new employees who meet all essential and desired aspects of available positions, and who will therefore require no training. Importantly, an oversupply helps to turn the recruitment process into a bidding war, with sometimes desperate candidates seeking to undercut rivals by offering to accept salaries lower than the general market rate, thereby lowering the cost to companies of taking on new employees. This has been facilitated over the last few years as major companies have moved to an online submission process for job applications. Applicants are frequently asked to state their 'salary expectations'. Sometimes an answer to this question is compulsory, and sometimes it is optional. In any case, this question is asked at the time applicants are submitting their cover letters and resumes, when many details of the position and remuneration package may be unknown.

Not all engineering employers seek to recruit based on the lowest bidder, but the trend is evident in the market. As an extreme example in a related profession, the majority of the large number of Indian ICT professionals entering Australia on 457 visas are being paid *at least* $30,000 below the average Australian salary for an ICT professional, and almost 30% are being paid at or below the starting salary for a graduate ICT professional (Birrell et al. 2016). The dilemma for any Australian student considering a career as an ICT professional is clear: does it make sense to spend years studying and accruing student debt to enter the profession when it may be difficult to find a position, and the remuneration might turn out to be no better than for people in other occupations who did not go to university?

Employers enjoy the benefits of operating in Australia's advanced, developed economy. These benefits include a stable political system and bureaucracy; a comprehensive legal system where rights can be enforced; relatively modern infrastructure; relatively low crime rates; safe and healthy food and water; and a relatively clean environment. This is a situation in which businesses and their employees have the opportunity thrive. It is funded by a taxation system, but when Australians are displaced by overseas professionals who work for low salaries, less tax revenue is collected and more

unemployment benefits are paid by the Government. Some companies want the benefits Australia offers without making a fair contribution in return.

Business interests have a profound impact on Australian migration policy, not just through lobbying but also through active involvement. The Federal Government has allowed business viewpoints to dominate its approach to skilled migration, while giving scant attention to the impact of its policies on employees who constitute the vast majority of the country's labour force of 12.6 million people. Included in this labour force number are more than 700,000 unemployed persons (ABS 2016b). Here are three significant examples:

1) When the Federal Government established its review of the integrity of the subclass 457 visa system (Azarias et al. 2014), it appointed a four-member panel to conduct the review. The panel comprised one representative from the peak council for business organisations; two members with a financial interest in the migration industry; and an academic demographer. The panel conducted its work diligently and professionally, but its members represented a very narrow range of perspectives. There was no representation on the panel for Australian employees, or for those groups that had been among those most harmed by abuses of the subclass 457 visa, ie. non-unionised professionals.

In the opinion of the author, by far the biggest shortcoming of the review was the failure to address the absence of a market testing mechanism at the expiry of a 457 visa, or when the visa holder seeks to change to another visa. Addressing this issue was within the terms of reference given to the panel by the Government. Under the current system, which also prevailed at the time of the review, a temporary migrant on a 457 visa can apply for, and be granted, a permanent residency visa while remaining in the same job, regardless of market conditions. When the market is in a state of oversupply and jobs are difficult to obtain, there is no requirement for unemployed, underemployed and displaced Australian workers to be given the opportunity to apply for the job; rather, priority is given to the foreign national who is present in the country on a temporary visa. Very few Australian employees (and voters) would consider this fair and reasonable, but business interests argue against labour market testing in every circumstance.

2) As described in Section 10.2, the seven-member MACSM is comprised of business, employer and immigration industry representatives, and one union representative. There is no representation for the 85% of the labour force that is non-unionised (Toscano 2015). In the opinion of the author, the MACSM members have, and will continue to, discharge their duties diligently and professionally. Notwithstanding this, the interests of Australian employees cannot be adequately protected and represented when, once again, the Federal Government has appointed a committee with such a narrow, one-sided perspective. The Federal Government obviously has a firmly held view that Australian employees are not stakeholders in the immigration system and the consequences immigration has on the labour market.

3) In recent years the Federal Government has signed free trade agreements with several countries, most notably China. Despite an enormous public outcry about the potential negative impact on Australian jobs, the Federal Government pushed ahead

with the China-Australia Free Trade Agreement with few changes. In a comprehensive review of the agreement, Howe (2015) concluded that:

> "there are real concerns that the ChAFTA greatly increases the ability of Chinese workers to access the Australian labour market, without sufficient regard for the necessary regulatory framework to protect those workers from exploitation or to safeguard Australian job opportunities, wages and conditions." (Howe 2015, p.3).

Providing advantage to business without considering the impact on Australian citizens has been a hallmark of successive Federal Governments for most of the last decade. Howe (2015) notes:

> "Increasingly, there is an unquestioned economic philosophy that systems need to be less regulated by government and driven by the needs of employers, with market responsiveness, timeliness and flexibility as the drivers and indicators of success." (Howe 2015, p.3).

This observation is a fair description of one of the driving forces shaping immigration policy. This "economic philosophy" is just that: a philosophy. Government immigration decisions – for example, to massively oversupply the engineering labour market – are nearly always made without any quantitative economic or social analysis of the impacts. Over time, the value and primacy of the citizenship of Australians in their own country has been diminished as advantage and power have been handed over by Governments to business and migration interests.

16.2 Advantage to the migration industry

The migration industry, as defined here, consists of all those organisations and individuals who receive revenue from, or in relation to, immigration to Australia.

The migration industry constantly lobbies for increased immigration, advocating for absurdly high annual intakes – see, for example, the projections in *The Economic Impact of Migratio*n (Migration Council Australia 2015). The rationale is simple: every visa that is processed equates to more money for migration agents, and potentially others. This industry has a financial conflict of interest every time it seeks to maintain or boost annual migration levels. The oversupply of the engineering labour market is not one of the goals of the industry, but getting more migrants into the country is. When the Government does the former, it achieves the latter.

16.3 Advantage to universities

'Education-related travel services' were rated as Australia's third largest export product in 2015, valued at $18.8 billion and representing 5.9% of Australia's total exports (Parliament of Australia 2016). This category consists of money spent by international students on course fees and living expenses including accommodation. Of the 650,000 international students enrolled in Australia in 2015, at least 270,000 were enrolled in higher education courses, and about 170,000 were enrolled in vocational courses (Dodd 2016).

There has been a significant increase in the number of international students enrolled in courses in Australia in recent years. This has been driven by the lower Australian dollar, which makes Australian education less expensive for overseas students. The industry recognises that it cannot take this large annual growth rate for granted (Dodd 2016).
It can be seen that education services for international students are big business in Australia. This is true for universities, which benefit from the non-Government revenue streams provided by international students. This makes these organisations less reliant on Federal Government funding, a situation which suits both the universities and the Government. In the 2014 Federal Budget, a 20% cut to government subsidies for domestic students was announced, but has not yet been implemented (Knott 2016). Universities have a financial incentive to increase the number of international students they enroll, and this includes engineering students.

In terms of the engineering labour market, it makes no difference how many international students undergo engineering training in Australia. The problems occur when many of these students graduate and apply for, and receive, visas which allow them to compete for the limited number of entry level jobs in engineering, in a market where a significant proportion of domestic graduates cannot find work that is even broadly relevant to their field of study (Table 12).

Given the financial conflict of interest universities have in relation to international students, it is unrealistic to expect them to regulate their enrolments. However, as discussed in Section 11, they have an ethical imperative to ensure that prospective students are given realistic information about the future Australian engineering labour market. It is unacceptable that students considering a career in engineering "are being fed an illusion of bright prospects" (Birrell et al. 2016).

16.4 Population targets

The Federal Government's population projections documented in its 2015 Intergenerational Report include an annual net overseas migration (NOM) target of 215,000 people per year (Commonwealth of Australia 2015). This includes permanent and temporary skilled migrants, as well as other categories such as family and humanitarian migrants. Because the Government has persisted with such high annual levels of NOM, labour market oversupply has been a likely outcome for some occupations. When occupations are occasionally removed from the MLTSSL or STSOL due to oversupply, the Government makes no commensurate reduction in the NOM, meaning that oversupply then becomes more likely in other occupations.

Successive Federal Governments have argued that high immigration intakes are necessary because, over time, the ratio of people in the workforce to those being supported by pensions will be diminishing, with the implication that Governments in the future won't receive the necessary income tax revenue to support the growing number of pensioners. This was repeated in the 15th Intergenerational Report (Commonwealth of Australia 2015). This report and its underlying assumptions about population ageing and the associated fiscal impacts have been examined in detail by demographers, and found to be seriously misleading (Birrell and Betts 2015). Neither does the Productivity Commission agree with the report's stated reasons for maintaining high levels of NOM into the future:

> "Importantly, immigration cannot readily prevent Australia transitioning to an older population or alleviate the underlying future fiscal pressures of an ageing population. Immigration is only one tool to increase labour force participation, and importantly one that also has demographic, social and environmental impacts. Moreover, immigration does not address issues with the underlying long-term policy settings that lead to unsustainable rates of government expenditure and debt as projected in the 2015 Intergenerational Report.... These issues need to be better addressed through a range of policies including, for example, policies to enhance Australia's labour force participation amongst older workers and to improve productivity in health care delivery to reduce the future fiscal pressures of population ageing" (Productivity Commission 2016, p.361).

A far more likely reason the Federal Government is persisting with very high levels of NOM is to boost GDP in the short term, following the winding down of the resources boom. It is doing this by stimulating residential construction along the eastern seaboard in response to housing demand primarily from migrants; and by funding infrastructure projects.

The issue for the Government then becomes how to best distribute the massive supply of migrant labour so as to minimise the potential for political damage to itself. It does this by ensuring the key constituencies of the major political parties are the least adversely affected. For the Coalition parties, major constituencies include businesses (small and large), property developers and agents, and farmers. For the Labor Party, the major constituencies are skilled trades people, and semi-skilled and low-skilled workers, many of whom are union members. One Major Group (Appendix 1) that is not clearly devoted to one or other of the major parties is Professionals, most of whom are not unionised.

Professionals (as opposed to tradespeople) dominate Australia's permanent and temporary skilled migration programs. Four Minor Groups (ABS 2103a), accounting for 38 occupations, are significantly over-represented (Birrell et al. 2016). These are:

221 Accountants, Auditors and Company Secretaries
233 Engineering Professionals
261 Business and Systems Analysts, and Programmers
263 ICT Network and Support Professionals

In 2015-16, these four Minor Groups accounted for almost 38% of the permanent skilled migration program, and 22% of the subclass 457 visa program. These professions are largely non-unionised, and are easy targets for the Government to oversupply.

In contrast, the Government carefully avoids confrontation with unionised labour, which has the resources to monitor immigration developments and to fight back where necessary to prevent oversupply of any unionised occupations. This can be clearly seen from the immigration data: tradespeople accounted for only 10% of the permanent skilled migration program in 2015-16. Only 27% of these (or 2.7% of the permanent skilled migration total) were construction tradespeople, despite the significant

construction boom and infrastructure expenditure currently underway in Australia (Birrell et al. 2016).

This is a case where the Government has not done what is fair and reasonable for ICT, engineering and accounting professionals; rather, it has done what it thinks it can get away with.

The impacts of introducing a huge supply of skilled migrant labour into a relatively subdued economy have never been assessed by the Government. The oversupply of the engineering labour market has been pursued deliberately by the Federal Government, but the financial and social costs that have accrued to unemployed, underemployed and displaced engineers, have been ignored. This is consistent with the prevailing Government philosophy that it is acceptable for Australians to become collateral damage in the service of the interests of powerful lobby groups and unevaluated political agendas.

17. Solutions

17.1 Establishing a sustainable engineering immigration program

To stop the ongoing, damaging oversupply of the engineering labour market, the Federal Government needs to create conditions where all engineers – Australian citizens and existing Australian permanent residents – trying to enter or re-enter the profession can have a reasonable likelihood of doing so. As part of the process of establishing a sustainable engineering immigration program, all engineering immigration needs to cease for a defined period, before recommencing at levels dictated by genuine market need for supplementation of the Australian engineering workforce.
The following actions must be taken immediately:

1. Remove all the engineering occupations in the ANZSCO Minor Group '233 Engineering Professionals' (Appendix 1) from the MLTSSL. Unit Groups 2331, 2333, 2334, 2335 and 2336 should be removed from the MLTSSL for the next three years given their state of oversupply. Unit Groups '2332 Civil Engineering Professionals' and '2339 Other Engineering Professionals' should be removed from the MLTSSL for only two years, as the extent of oversupply is less in these Unit Groups. Refer to Figure 6 for the affected visas.

This will prevent the following groups from gaining access to the Skilled Independent visa (subclass 189) during that time:

- International engineering students who have graduated from Australian universities
- Overseas engineers in Australia on temporary work visas
- Overseas engineers making offshore applications.

It will also prevent international engineering students who have graduated from Australian universities from accessing the Temporary Graduate visa (subclass 485) (Graduate Work Stream).

2. Remove all the engineering occupations in the ANZSCO Minor Group '233 Engineering Professionals' (Appendix 1) from the STSOL. Unit Groups 2331, 2333, 2334, 2335 and 2336 should be removed from the STSOL for the next three years given their state of oversupply. Unit Groups '2332 Civil Engineering Professionals' and '2339 Other Engineering Professionals' should be removed from the STSOL for one year, as the extent of oversupply is less in these Unit Groups. Refer to Figure 7 for the affected visas.

This will prevent the following employer-nominated groups from gaining access to the Temporary Work (Skilled) visa (subclass 457) during that time:

- International engineering students who have graduated from Australian universities
- Overseas engineers in Australia on other temporary visas such as a working holiday visa
- Overseas engineers making offshore applications.

It will also prevent employer-nominated migrant engineers from gaining access to the Employer Nomination Scheme (subclass 186) permanent visa, including those in Australia on subclass 457 visas who wish to use this as a route to permanent residency.

It will stop State and Territory Governments from bringing in migrant engineers via the Skilled Nominated visa (subclass 190). At present, the governments of the ACT, NSW, Northern Territory, Queensland, Tasmania, Victoria and Western Australia have at least some engineering occupations listed on their own skilled occupations lists (ACT Government 2016; NSW Government 2016; Northern Territory Government 2017; State of Queensland 2016; Tasmanian Government 2016; Victoria State Government 2017; Government of Western Australia 2016).

The subclass 190 visa is only a minor source of permanent engineering migrants, given the ease with which the subclass 189 visa can be obtained. The former visa was recommended to be scrapped by a review of the skilled migration and temporary visa program in 2014, but the Federal Government has to date taken no action (DIBP 2014).

In the absence of access to the subclass 457 visa, if it proves necessary to bring a small number of overseas engineers with specialised skills into the country, the existing subclass 476 visa can be easily recast by regulation to be a short term visa for this purpose. For this to work, the visa must not be tied to the MLTSSL or STSOL; it must require genuine market testing to ensure suitable Australian engineers cannot be found; and it must be capped at a level of 100 issued visas. This visa would need to be monitored closely by DIBP to ensure that engineers with specialised skills and experience are the only ones admitted.

3. Engineering occupations in the ANZSCO Minor Group '233 Engineering Professionals' (Appendix 1) must no longer be able to access visas independent of the MLTSSL and STSOL for the next three years. Refer to Figure 8 for the affected visas.

This will eliminate access by engineering graduates to the Skilled – Recognised Graduate visa (subclass 476). It will also prevent access to the Skilled Regional visa (subclass 887). Both these visas were recommended to be scrapped in 2014 (DIBP 2014).

Importantly, the access of international students to the Temporary Graduate visa (subclass 485) (Post-Study Work Stream) must also cease. A significantly higher percentage (46.6%) of international students complete Master's degrees and PhDs than do domestic students (19.5%)(DE&T 2016f). Therefore, this visa of up to four years' duration could potentially remain a major pathway for international students to access the general engineering labour market. Entry level engineering jobs do not require postgraduate degrees.

There is nonetheless a strong case for international students who have completed Master's by research or PhD degrees to be able to enter the workforce in research jobs related to their field of postgraduate study. In this circumstance, they are unlikely to be competing with domestic graduates.

If the Regional Sponsored Migration Scheme visa (subclass 187) is to remain in place, the ridiculously broad definition of 'regional', as defined by DIBP (DIBP 2017o) must be modified to exclude all State and Territory capitals.

4. Reduce NOM by equivalent amount amount.
When the engineering occupations considered in this report are removed from the MLTSSL and STSOL, and there are no more engineering admissions via visas independent of the MLTSSL and STSOL, there will be at least 8,000 aspiring migrant engineers each year who do not receive visas they would otherwise have been granted. When partners and children of these engineers are accounted for, there could be as many as 12,000-14,000 people impacted. Some of these people are already in the country on temporary visas of one sort or another. In any event, the Federal Government's targets for annual NOM must be reduced by an equivalent number of people to account for engineers and their families who can no longer obtain visas that contribute to NOM. If no reduction is made, other occupations will then be at an increased risk of becoming oversupplied.

17.2 Implementing an immigration program that is transparent to the Australian public

Much information about the Australian immigration program is hidden from public view. The Federal Government has posted detailed data about the subclass 457 visa program on the DIBP website (DIBP 2017a, 2017p). Other information which must be made publicly available immediately is:

1. Data about grants of permanent visas, with the same level of detail as that provided for 457 visas.

2. Data about grants of temporary visas such as subclass 485 and 476 visas, with the same level of detail as that provided for 457 visas.
3. An annual list of the number of recent international engineering graduates from Australian universities who are granted working visas, listed by visa type.
4. Occupational unemployment data at the ANZSCO three digit level, eg. '233 Engineering Professionals'.
5. An annual list of occupations that have been recommended by the DE&T for removal from the MLTSSL.
6. Nominal base salary data for migrant engineers who have been granted 457 visas (given the very low salaries identified by Birrell et al. (2016) for ICT Professionals who have been granted 457 visas).

17.3 Implementing an immigration program that considers the Australian public as stakeholders

Too much of the skilled immigration program is controlled by business and migration interests, with little or no representation for Australian employees. Australia has nearly ten million employees, constituting 82% of the workforce (ABS 2016c). The MACSM, advising the Minister for Immigration and Border Protection, must have at least 50% of its membership made up of people who are not representing industry, employer, migration or university interests, and who can act in the interests of Australian employees to ensure individual occupations are not oversupplied through excessive immigration.

17.4 Implementing a skilled immigration program that is based on rational principles

As explained in Section 10.1, the current MLTSSL is supposed to be based on labour market conditions in five-to-ten year's time. Projections made now at this time scale for individual occupations are fanciful guesses of what might be. The MLTSSL needs to be based on projected market needs one-to-two years into the future, which can be more accurately predicted. At this shorter timescale, decisions made in the MLTSSL review can properly account for the current state of the labour market for each occupation.

Furthermore, because of its expertise in understanding and predicting labour market requirements, DoE should prepare the MLTSSL and STSOL listings with input from the DE&T. The DIBP must not be allowed to change any of the MLTSSL or STSOL listings. DIBP has no expertise in determining the state of the labour market for occupations. In the author's opinion, DIBP has kept engineering and some other occupations on the MLTSSL and STSOL year after year for cynical political purposes. In the process, it has caused harm to many Australians and new migrants.

18. Conclusions

The Australian engineering labour market has been in a state of increasing oversupply for nearly four years. This has had a negative impact on those many thousands of engineers who are, and have been, unemployed, underemployed and displaced from the profession. This includes Australian professional engineers and engineering graduates, and new migrant engineers.

The Federal Government has deliberately oversupplied the engineering labour market by maintaining engineering immigration at or close to resource boom levels, following the collapse in the number of monthly job vacancies which eventually fell to just 25% of the previous highs experienced in early 2012. The Government has done this to satisfy the demands of vested interests in the business, migration and university sectors; and to help bolster short term GDP. The Federal Government has never evaluated the impact of its approach on the economy or on the engineering labour force.

The solution to this disastrous situation is to halt all engineering immigration for up to three years to allow Australian unemployed and displaced engineers to have a reasonable prospect of returning to their profession, and to allow underemployed engineers to obtain a suitable level of work. This is the only fair means of dealing with the oversupply that the Government has created.

The engineering profession in Australia is currently at the lowest point in its history. With few job opportunities in all but one engineering discipline, combined with the greatest labour oversupply ever experienced in the profession, thousands of Australian engineers are facing poor work prospects now and into the future. In maintaining high levels of engineering immigration, the Federal Government has not sought to protect the value of Australian citizenship or the integrity of the immigration program. Instead it has acted to reinforce the privilege of the vested interests in the 'immigration club', and to further its own misguided goals. The policies, practices and attitudes that have contributed to this disaster will not go unchallenged.

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Appendix 1

Engineering Occupations Included in this Report

ANZSCO Classification (ABS 2013a):

Major Group: 2 Professionals
Sub-Major Group: 23 Design, Engineering, Science and Transport Professionals
Minor Group: 233 Engineering Professionals

Unit Group		Occupation	
2331	Chemical and Materials Engineers		
		233111	Chemical engineer
		233112	Materials engineer
2332	Civil Engineering Professionals		
		233211	Civil engineer
		233212	Geotechnical engineer
		233213	Quantity surveyor
		233214	Structural engineer
		233215	Transport engineer
2333	Electrical Engineers		
		233311	Electrical engineer
2334	Electronics Engineers		
		233411	Electronics engineer
2335	Industrial, Mechanical and Production Engineers		
		233511	Industrial engineer
		233512	Mechanical engineer
		233513	Production or plant engineer
2336	Mining Engineers		
		233611	Mining engineer (excluding petroleum)
		233612	Petroleum engineer
2339	Other Engineering Professionals		
		233911	Aeronautical engineer
		233912	Agricultural engineer
		233913	Biomedical engineer
		233914	Engineering technologist
		233915	Environmental engineer
		233916	Naval architect
		233999	Engineering professionals nec (not elsewhere classified)

Appendix 2

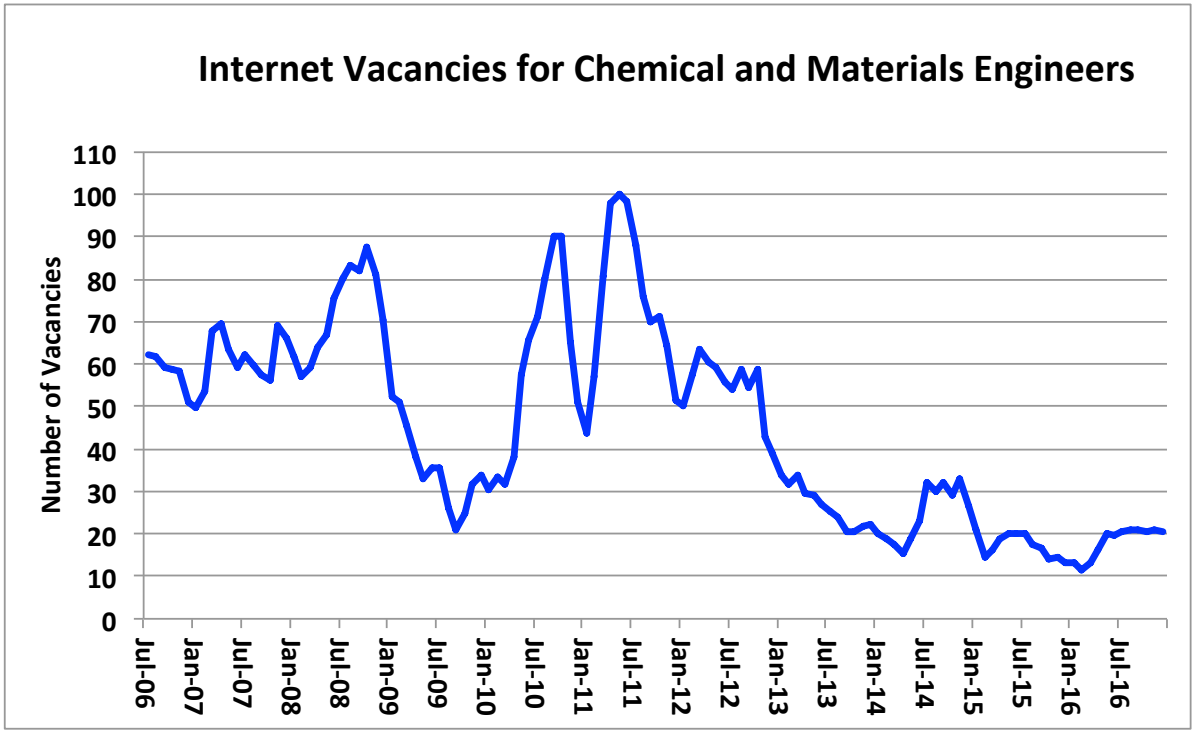
2331 Chemical and Material Engineers

This Unit Group includes the occupations:

233111 Chemical engineer
233112 Materials engineer.

From 2006-07 until 2015-16, for this Unit Group Materials engineers have constituted almost 14% of permanent skilled migration, and 20% of 457 visas (Engineers Australia 2017; DIBP 2017a), giving an overall contribution of just over 15%.

Figure A2-1
Number of internet vacancies for Chemical and Materials Engineers to December 2016 (actual monthly data, not indexed) (DoE 2017c)



In December 2016, the number of monthly vacancies was just 20% of the peak recorded in May 2011 (Figure A2-1). In 2012 AWPA – then responsible for compiling the SOL – received conflicting advice about whether the occupation 'Chemical engineer' should remain on the SOL. AWPA wrote to Engineers Australia to invite them to submit additional comments about this occupation. In 2013 Engineers Australia responded and recommended 'Chemical engineer' should remain on the SOL (Engineers Australia 2013). The occupation became flagged on the SOL for 2013-14.

However, in 2013-14 the annual number of migrant engineers (405) was 63% above the annual number of job vacancies (248). This is an astonishing statistic, considering that most vacancies are filled by engineers who already have a job in the profession (Section 3.2). This strongly suggests that the occupations of Chemical engineer and maybe

Materials engineer were in significant oversupply during 2013-14, and perhaps in prior years.

For Unit Group 2331, if the ratio of migrants to vacancies is indexed at 100 in 2012-13, the index value in 2015-16 is 323 (Figure A2-2). If the ratio is indexed at 100 in 2013-14, the ratio in 2015-16 is 159. This means that from whenever the occupations in this Unit Group first arrived at a state of no shortage, the ratio of migrant engineers to vacancies had increased very significantly by 2015-16.

Figure A2-2
Chemical & Materials Engineers: total engineering migration and vacancies, indexed (2012-13 = 100)
(Engineers Australia 2017; DIBP 2017a; DoE 2017a)

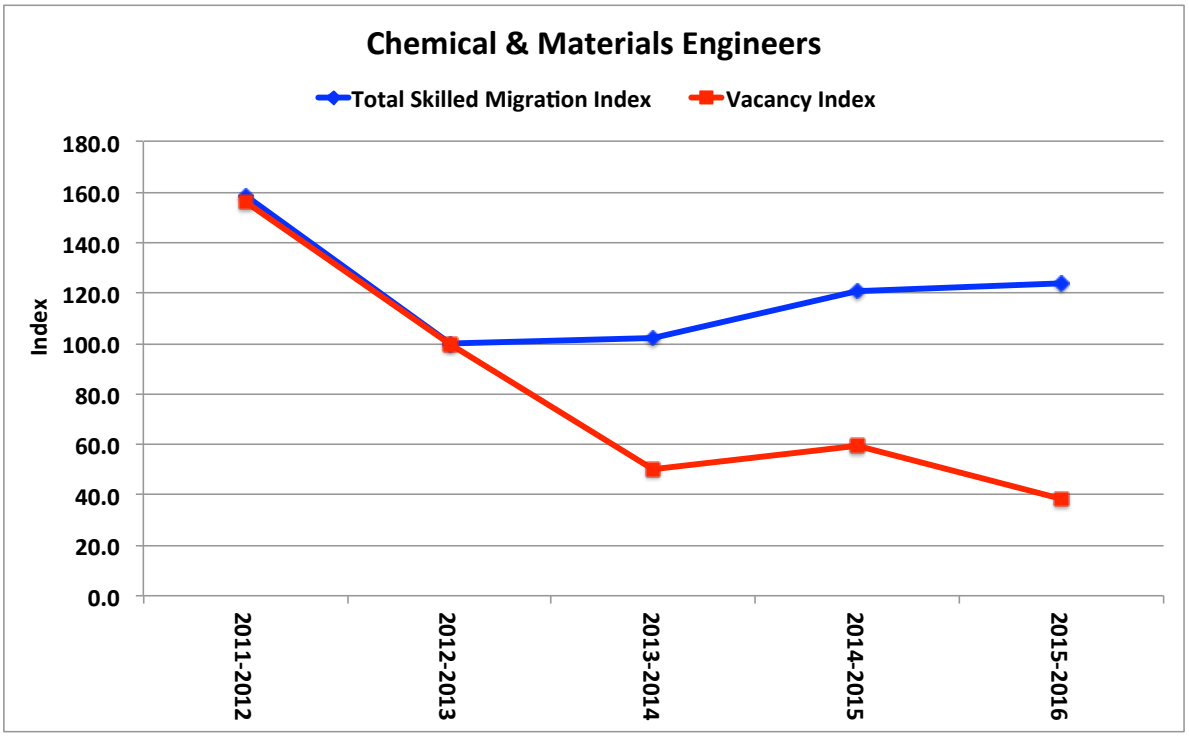


Figure A2-3 plots the proportion of domestic chemical engineering bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (also see Section 11). At the time of the 2015 GCA survey, this percentage was 63%; and only 51% were in a job broadly relevant to their field of study (Table 12 and Figure A2-4). The worrying decline in full-time employment of domestic graduates of 18% between 2012 and 2015 is a result of market conditions combined with the immense competition for jobs that has resulted from the Federal Government allowing international graduates easy access to the Australian graduate job market.

The inability of so many domestic graduates to find any full-time work (and this is not just work related to their field of study) five-to-six months after completing their final exams demonstrates the fallacy of the often-repeated proposition that engineering graduates have skills which are highly valued in other areas of the general skilled workforce. Because of the collapse in the oil price which occurred in late 2014, subsequent data points for 2016 and 2017 (ie. for students completing their final exams

in 2015 and 2016) may well show further reductions in the percentage of domestic chemical engineering graduates in full-time work.

Figure A2-3
Domestic chemical engineering bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (actual data, not indexed) (GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

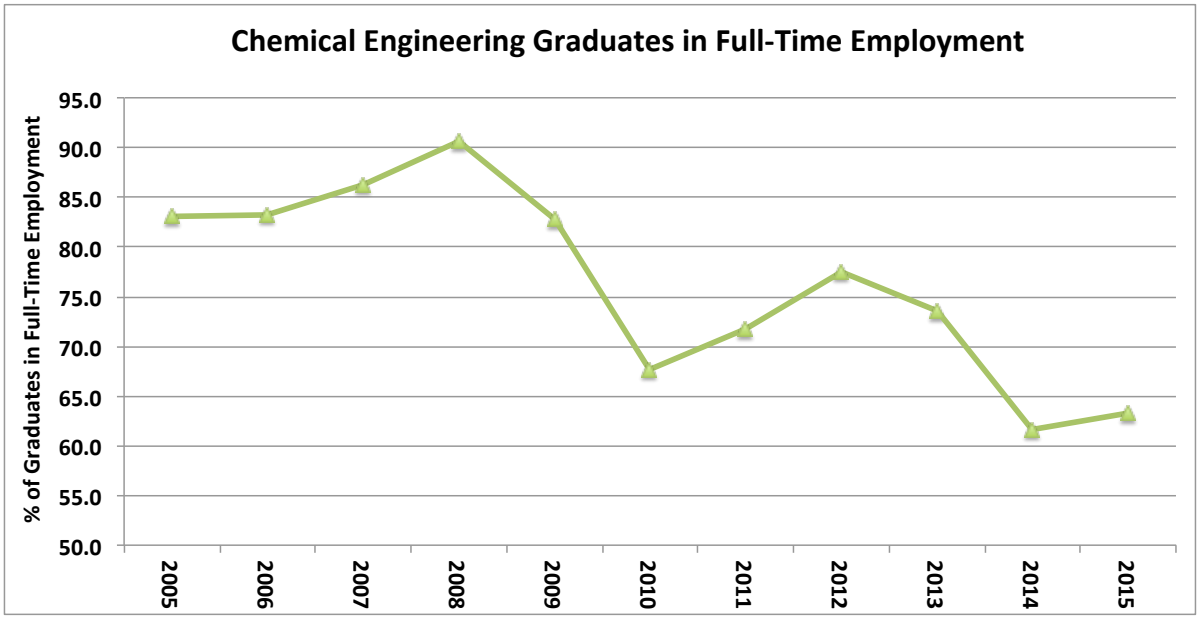
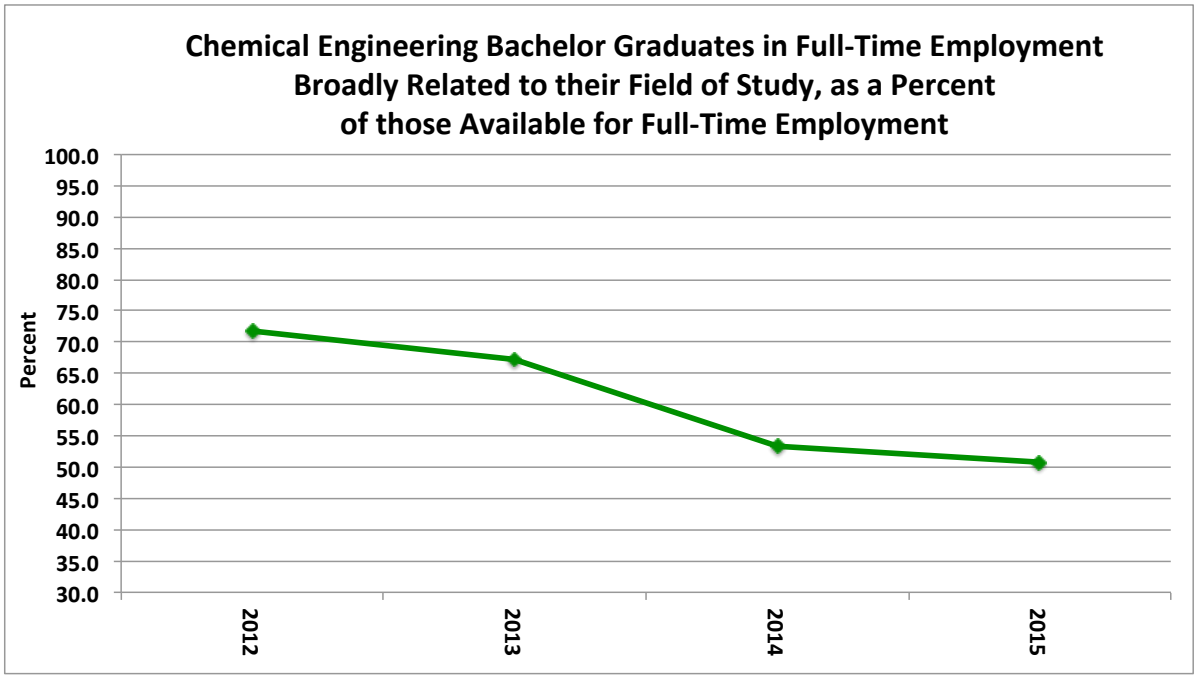


Figure A2-4
Domestic chemical engineering bachelor degree graduates in full-time employment in an engineering, scientific, technical or management role as a percentage of those available for full-time employment (actual data, not indexed) (GCA 2016. See Tables 5 and 23a in GCA's 'Supplementary Tables & Figures'. 2012 data do not include management roles)



Appendix 3

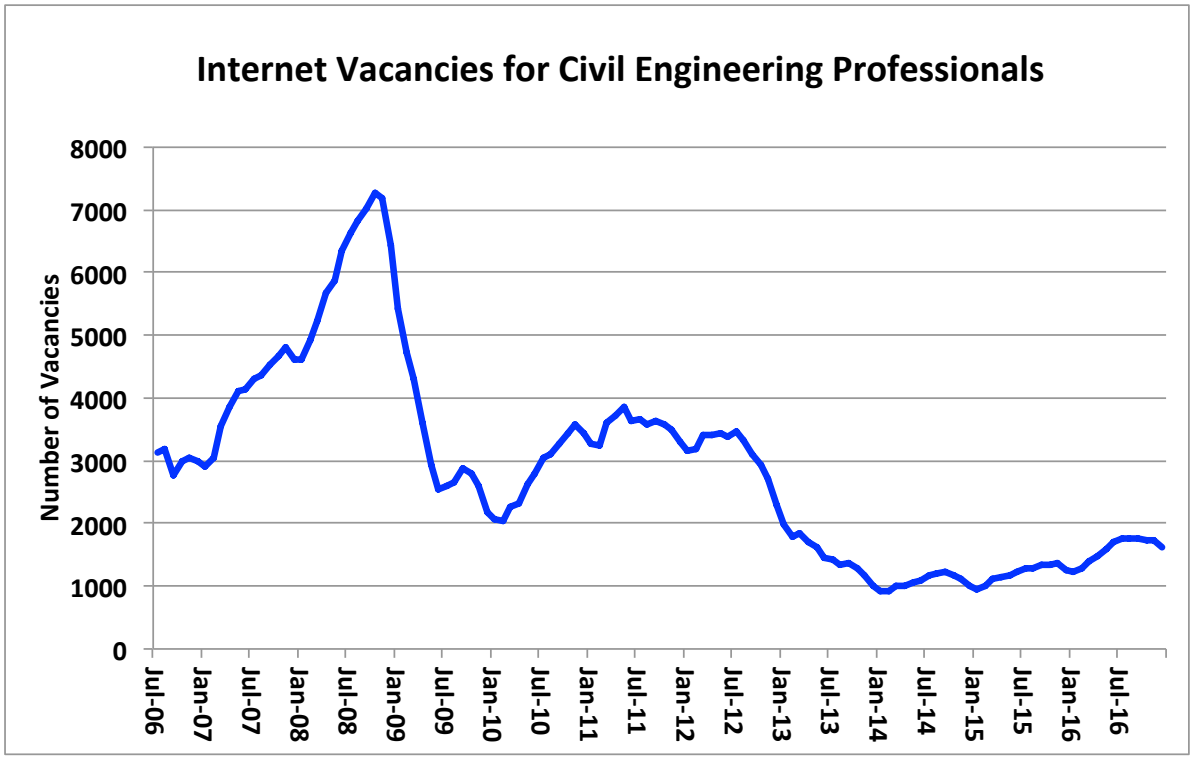
2332 Civil Engineering Professionals

This Unit Group includes the occupations:

233211 Civil engineer
233212 Geotechnical engineer
233213 Quantity surveyor
233214 Structural engineer
233215 Transport engineer.

In January 2015, for Civil Engineering Professionals the number of internet vacancies was just 25% of that recorded in May 2011. By December 2016, the number of internet vacancies had risen to 42% of that recorded in May 2011 (Figure A3-1). Civil Engineering Professionals is the only Unit Group to have shown any sustained increase in internet vacancies since 2012-13.

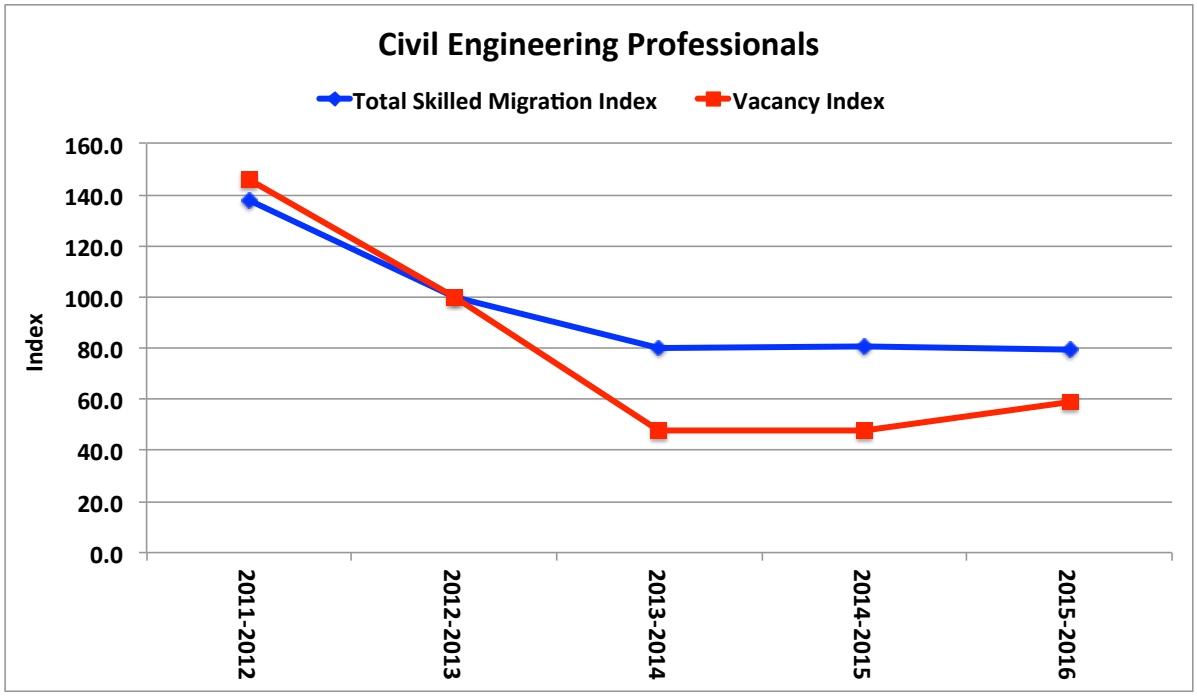
Figure A3-1
Number of internet vacancies for Civil Engineering Professionals to December 2016 (actual monthly data, not indexed) (DoE 2017c)



For Unit Group 2332, if the ratio of migrants to vacancies is indexed at 100 in 2012-13, the index value in 2015-16 is 135. If the ratio is indexed at 100 in 2011-12 when Unit Group 2332 was first flagged on the SOL, the ratio in 2015-16 is 143. It can be seen from Figure A3-2 that these ratios have narrowed in 2015-16, indicating that the Unit Group is slowly moving back to a position where the annual intake of new migrants per vacancy is similar to that when no shortages were first observed. As per Table 1, by

early 2016 recruitment difficulty was being experienced for senior managers and individuals with specialised experience, but not for general recruitment of this Unit Group.

Figure A3-2
Civil Engineering Professionals: total engineering migration and vacancies, indexed (2012-13 = 100)
(Engineers Australia 2017; DIBP 2017a; DoE 2017a)



As shown in Figure A3-3, the 2015 GCA survey revealed that of those domestic civil engineering bachelor graduates available for full-time work, only 78% could find any full-time work; and only 68% could find full-time work in a job broadly relevant to their field of study (Table 12 and Figure A3-4). Full-time employment for domestic graduates in the discipline declined by 14% between 2012 and 2015.

Figure A3-3
Domestic civil engineering bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (actual data, not indexed) (GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

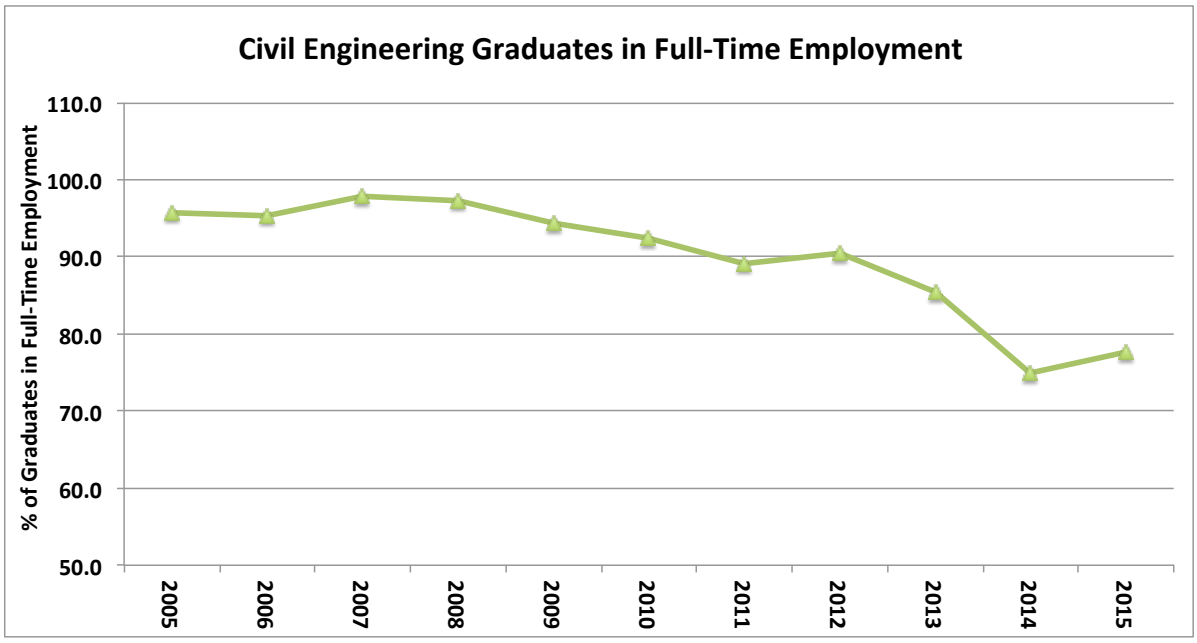
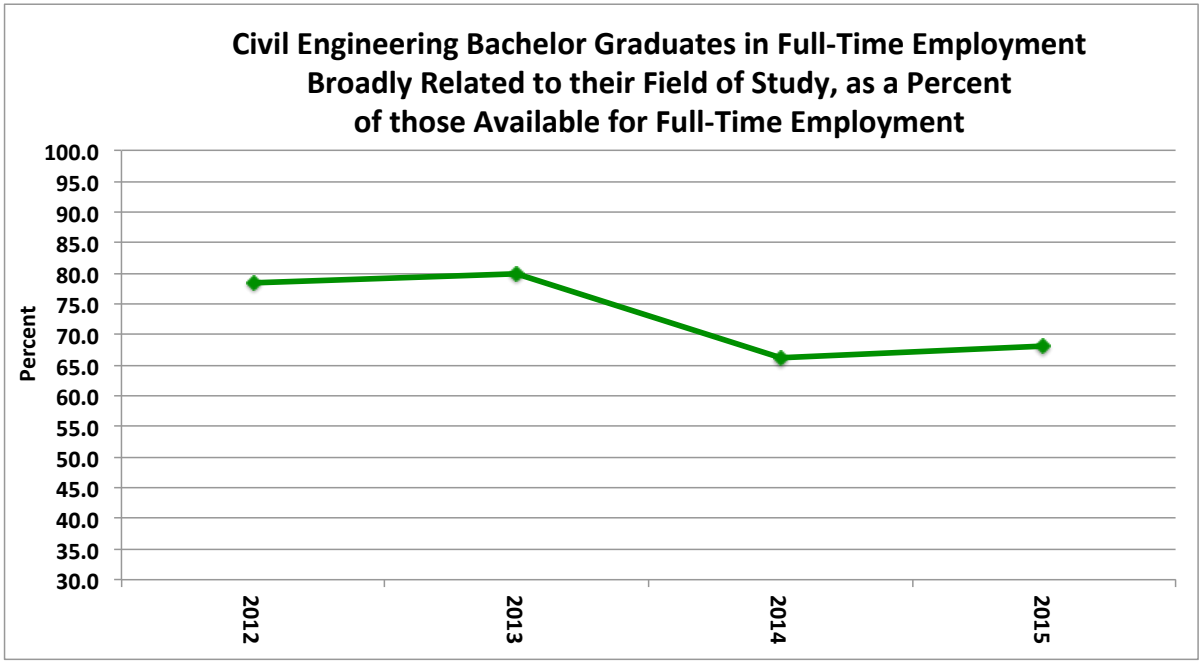


Figure A3-4
Domestic civil engineering bachelor degree graduates in full-time employment in an engineering, scientific, technical or management role as a percentage of those available for full-time employment (actual data, not indexed) (GCA 2016. See Tables 5 and 23a in GCA's 'Supplementary Tables & Figures'. 2012 data do not include management roles)



Appendix 4

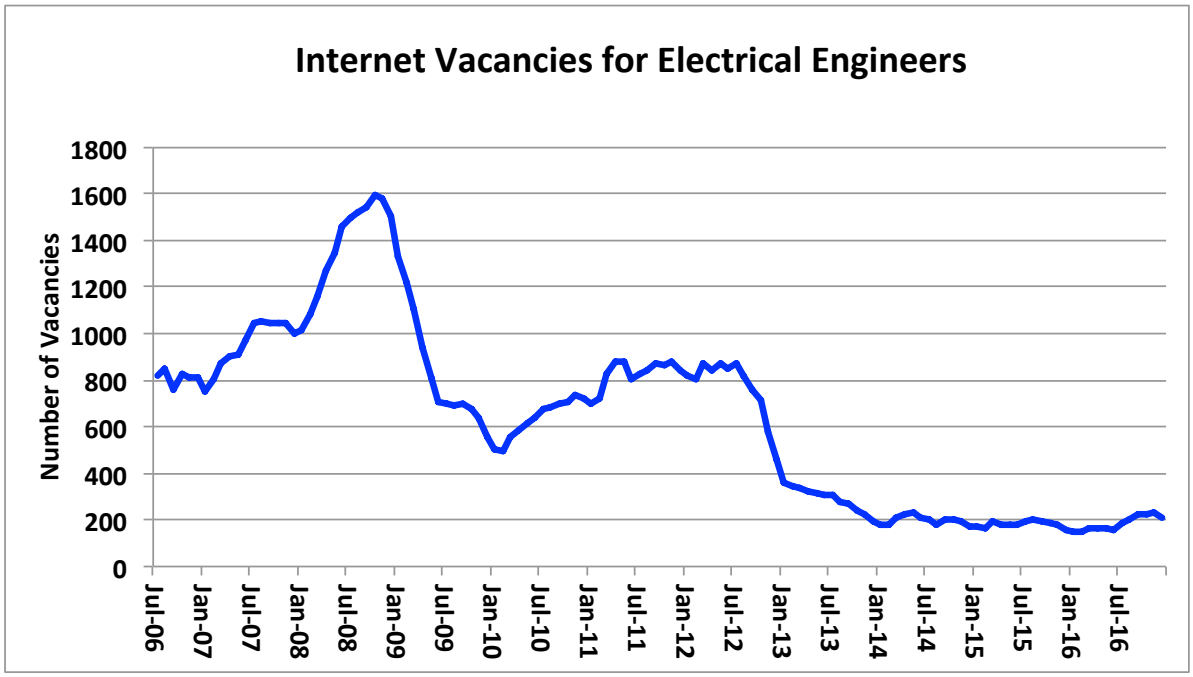
2333 Electrical Engineers

This Unit Group includes the occupation:

233311 Electrical engineer.

For Electrical Engineers, in December 2016 the number of internet vacancies was 24% of that recorded in July 2012 (Figure A4-1). This Unit Group has not experienced any sustained increase in vacancy numbers since the collapse of the employment market in 2012-13.

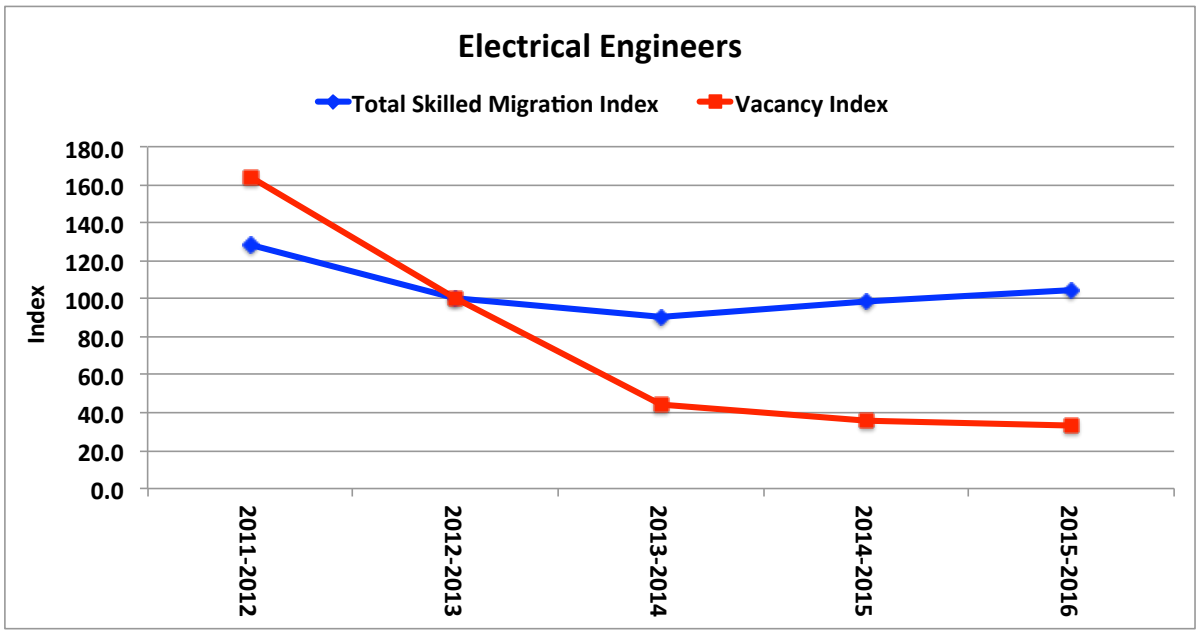
Figure A4-1
Number of internet vacancies for Electrical Engineers to December 2016 (actual monthly data, not indexed) (DoE 2017c)



For Unit Group 2333, if the ratio of migrants to vacancies is indexed at 100 in 2012-13, the index value in 2015-16 is 314 (Figure A4-2). This is a very large increase, and it is not surprising that the DoE has indicated there has been no shortage in this occupation after 2011-12 (Table 1).

What is surprising, and very concerning, is that the Unit Group '2333 Electrical Engineers' has never been flagged on the SOL from 2011-12 onwards (Table 5). The reason is unknown, but is potentially due to the influence of third parties on the SOL review process.

Figure A4-2
Electrical Engineers: total engineering migration and vacancies, indexed (2012-13 = 100)
(Engineers Australia 2017; DIBP 2017a; DoE 2017a)



As shown in Figure A4-3, the 2015 GCA survey revealed that of those domestic electrical engineering bachelor graduates available for full-time work, only 78% could find any full-time work; and only 70% could find full-time work in a job broadly relevant to their field of study (Table 12 and Figure A4-4). Full-time employment for domestic graduates in the discipline declined by 11% between 2012 and 2015.

Figure A4-3
Domestic electrical engineering bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (actual data, not indexed)
(GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

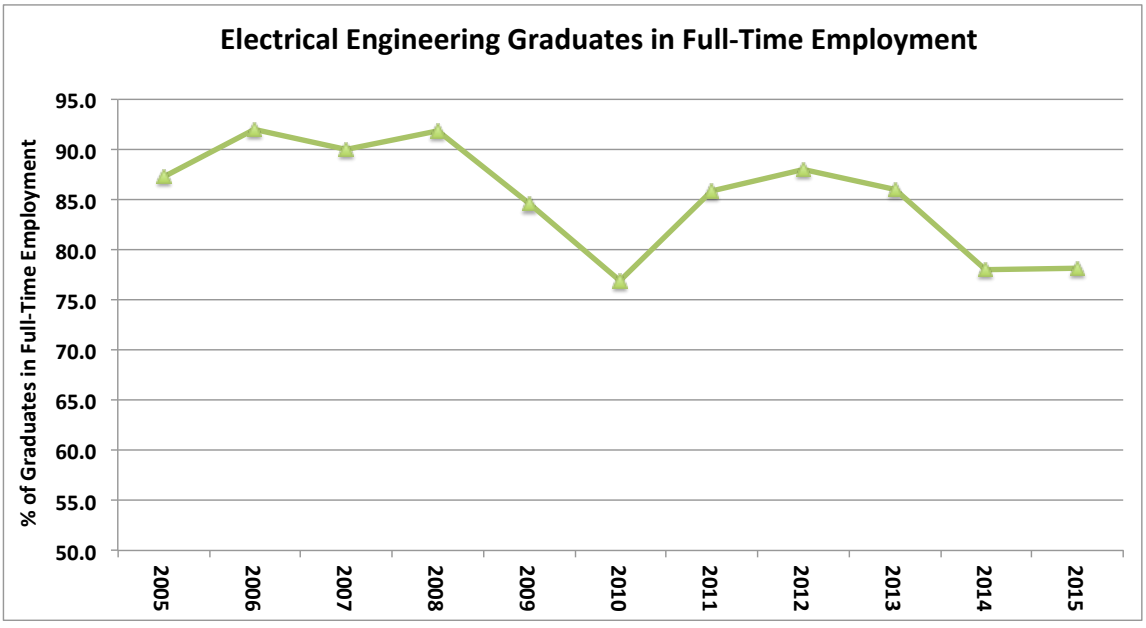
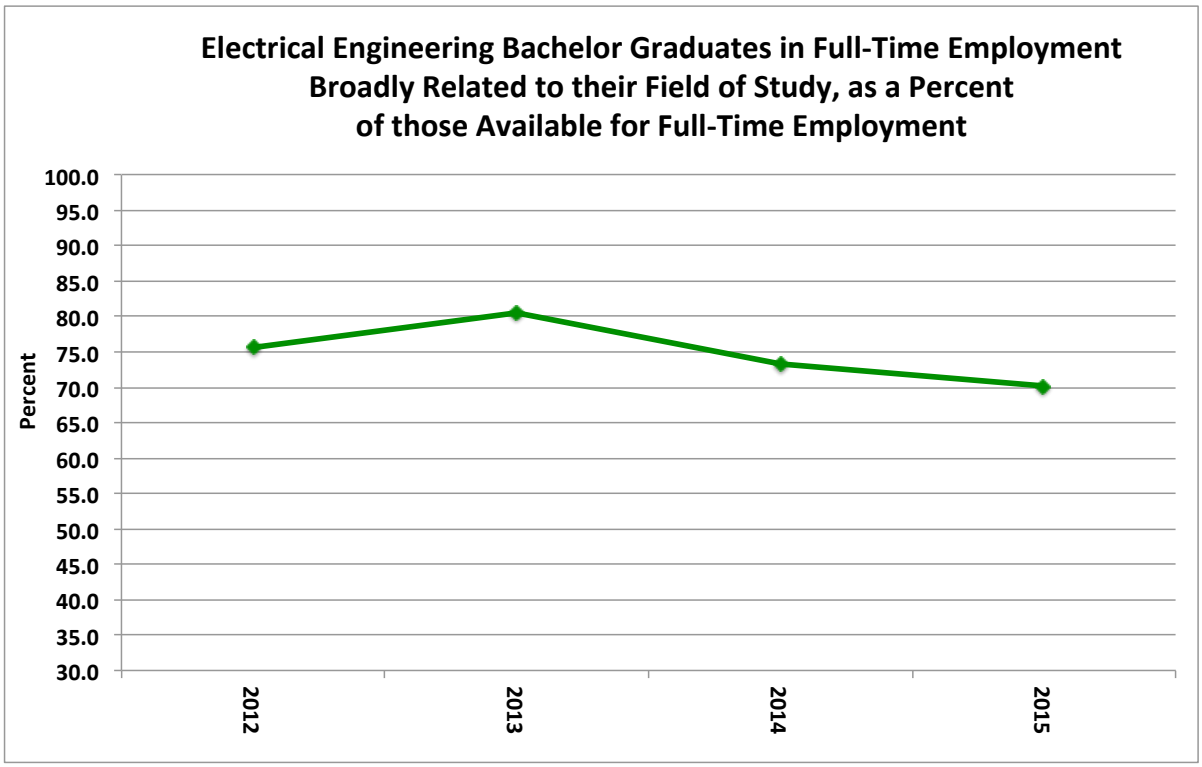


Figure A4-4
Domestic electrical engineering bachelor degree graduates in full-time employment in an engineering, scientific, technical or management role as a percentage of those available for full-time employment (actual data, not indexed)
(GCA 2016. See Tables 5 and 23a in GCA's 'Supplementary Tables & Figures'. 2012 data do not include management roles)



Appendix 5

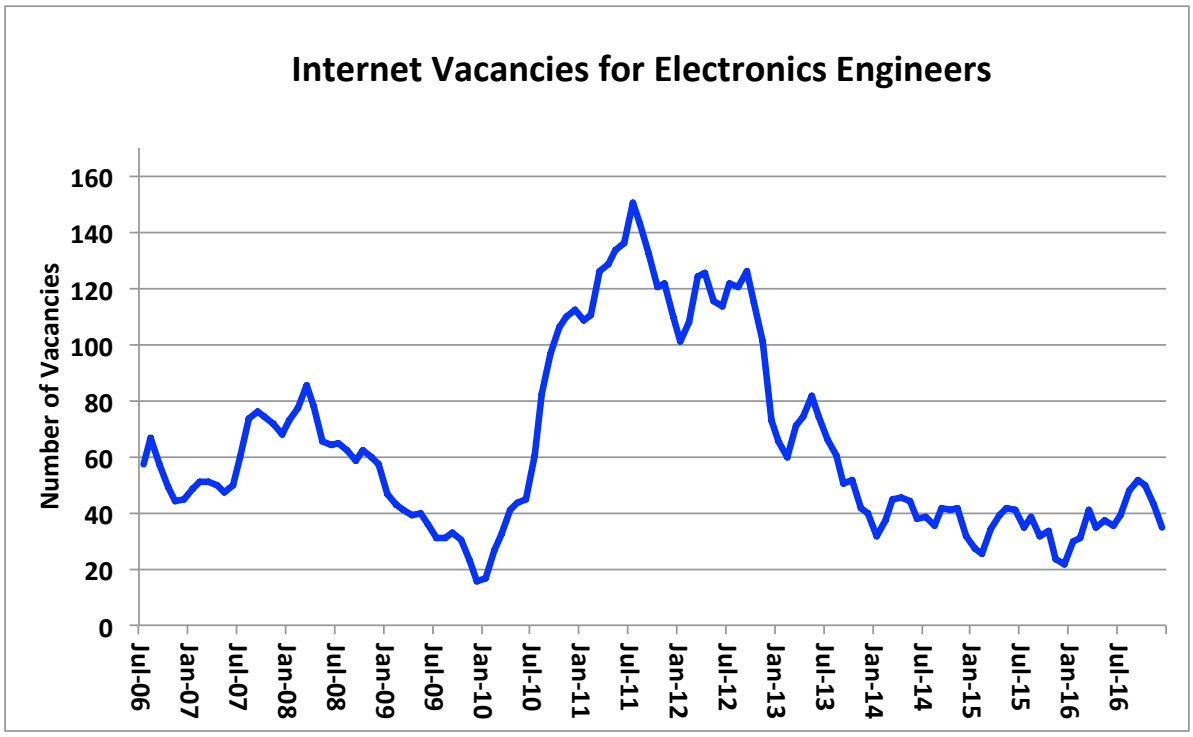
2334 Electronics Engineers

This Unit Group includes the occupation:

233411 Electronics engineer.

For Electronics Engineers, in December 2016 the number of internet vacancies was 23% of the peak recorded in July 2011 (Figure A5-1). This Unit Group has not experienced any sustained increase in vacancy numbers since the collapse of the employment market in 2012-13.

Figure A5-1
Number of internet vacancies for Electronics Engineers to December 2016 (actual monthly data, not indexed) (DoE 2017c).



For Unit Group 2334, if the ratio of migrants to vacancies is indexed at 100 in 2012-13, the index value in 2015-16 is 326 (Figure A5-2). If the ratio is indexed at 100 in 2011-12 – when Unit Group 2334 was first flagged on the SOL (Table 5) – the index value in 2015-16 is 300. These are very large increases. From 2014-15, the actual annual number of new migrant Electronic Engineers has exceeded the annual number of vacancies, suggesting that the labour market is significantly oversupplied.

As shown in Figure A5-3, the 2015 GCA survey revealed that of those domestic electronic/computer engineering bachelor graduates available for full-time work, only 79% could find any full-time work; and only 71% could find full-time work in a job broadly relevant to their field of study (Table 12 and Figure A5-4). Full-time employment for domestic graduates in the discipline declined by only 3% between 2013

and 2015, probably because this graduate group includes computer engineers for whom demand has been greater.

Figure A5-2
Electronics Engineers: total engineering migration and vacancies, indexed (2012-13 = 100)
(Engineers Australia 2017; DIBP 2017a; DoE 2017a)

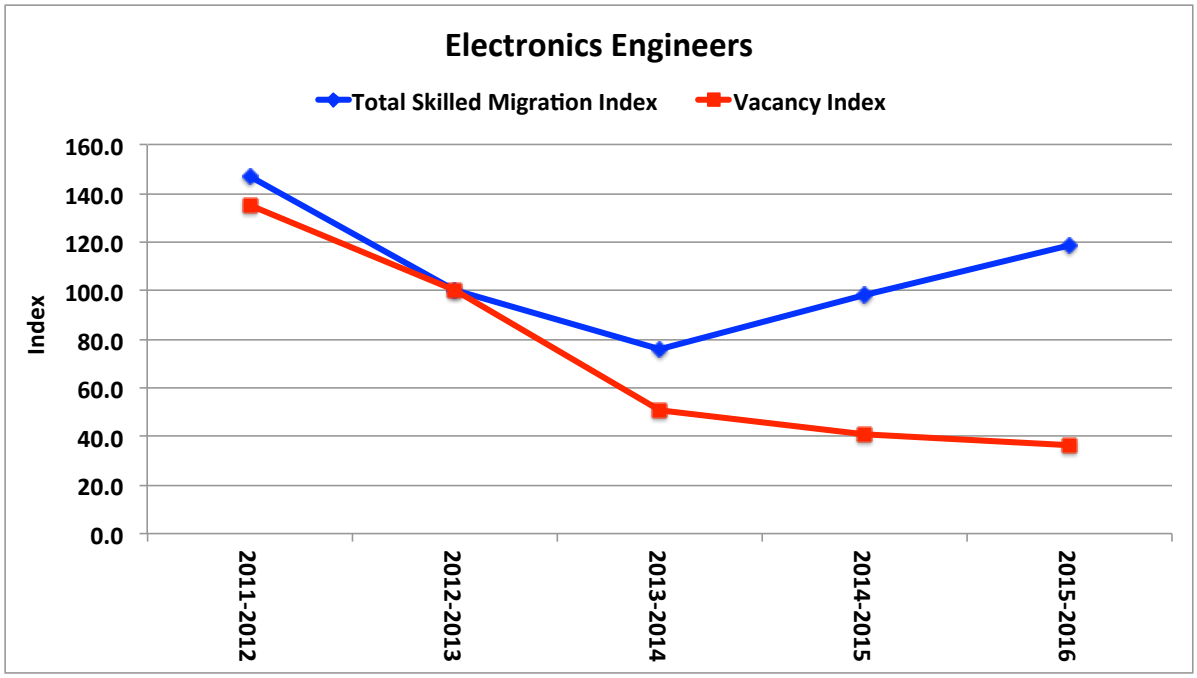


Figure A5-3
Domestic electronic/computer engineering bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (actual data, not indexed)
(GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

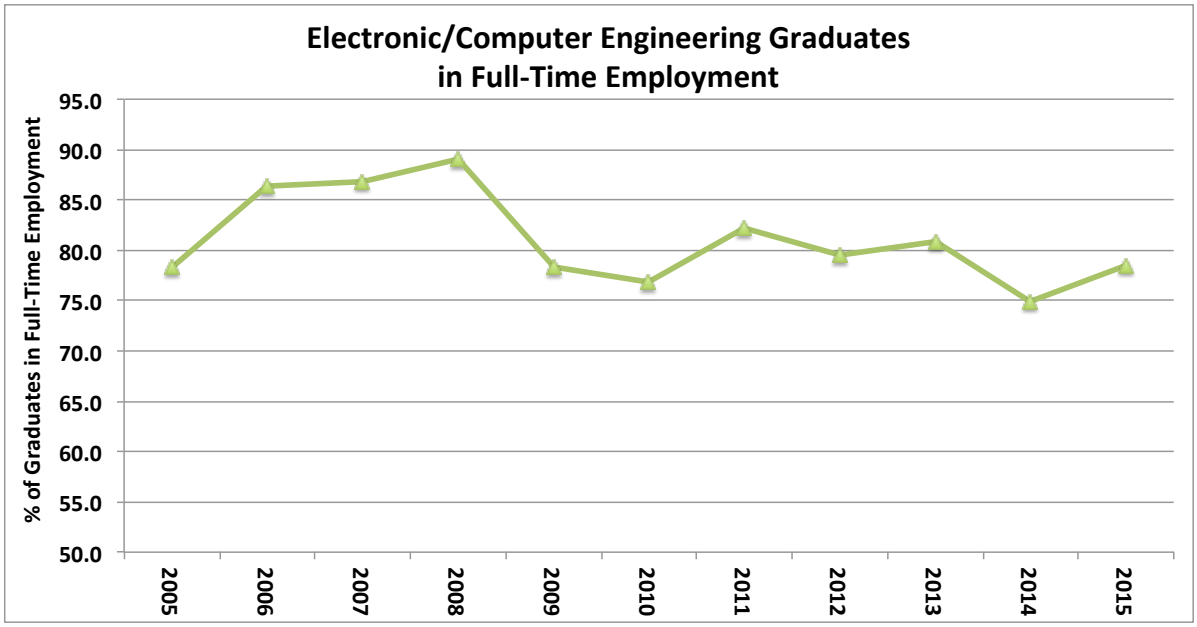
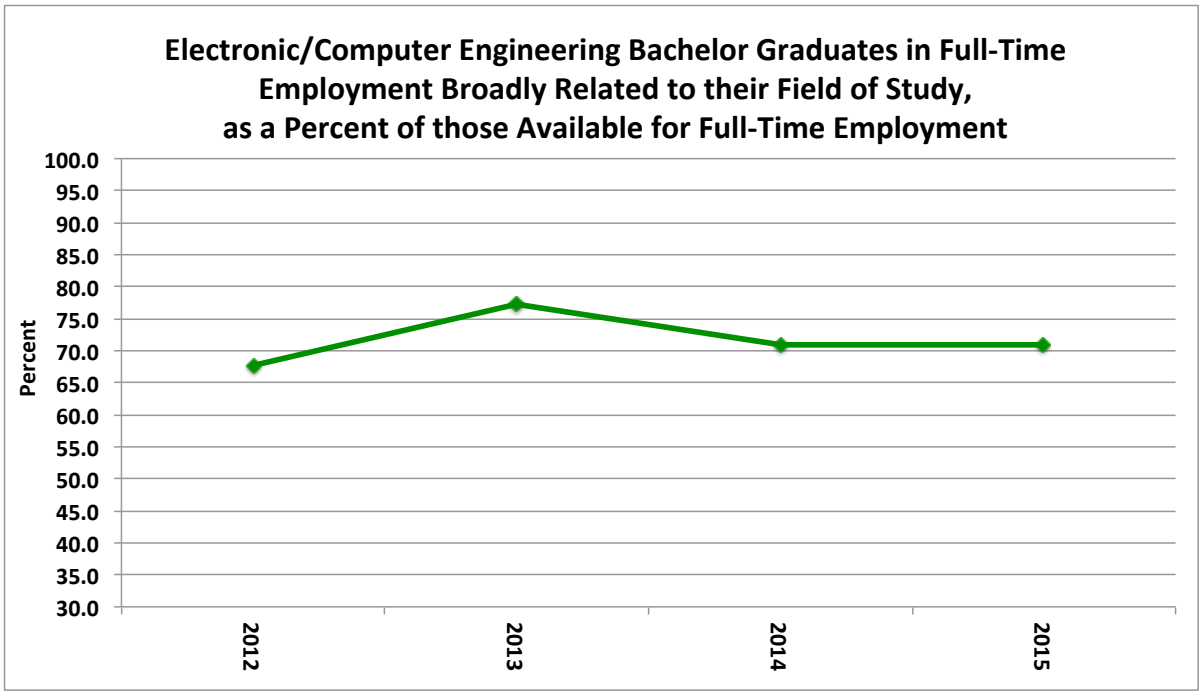


Figure A5-4
Domestic electronic/computer engineering bachelor degree graduates in full-time employment in an engineering, scientific, technical or management role as a percentage of those available for full-time employment (actual data, not indexed) (GCA 2016. See Tables 5 and 23a in GCA's 'Supplementary Tables & Figures'. 2012 data do not include management roles)



Appendix 6

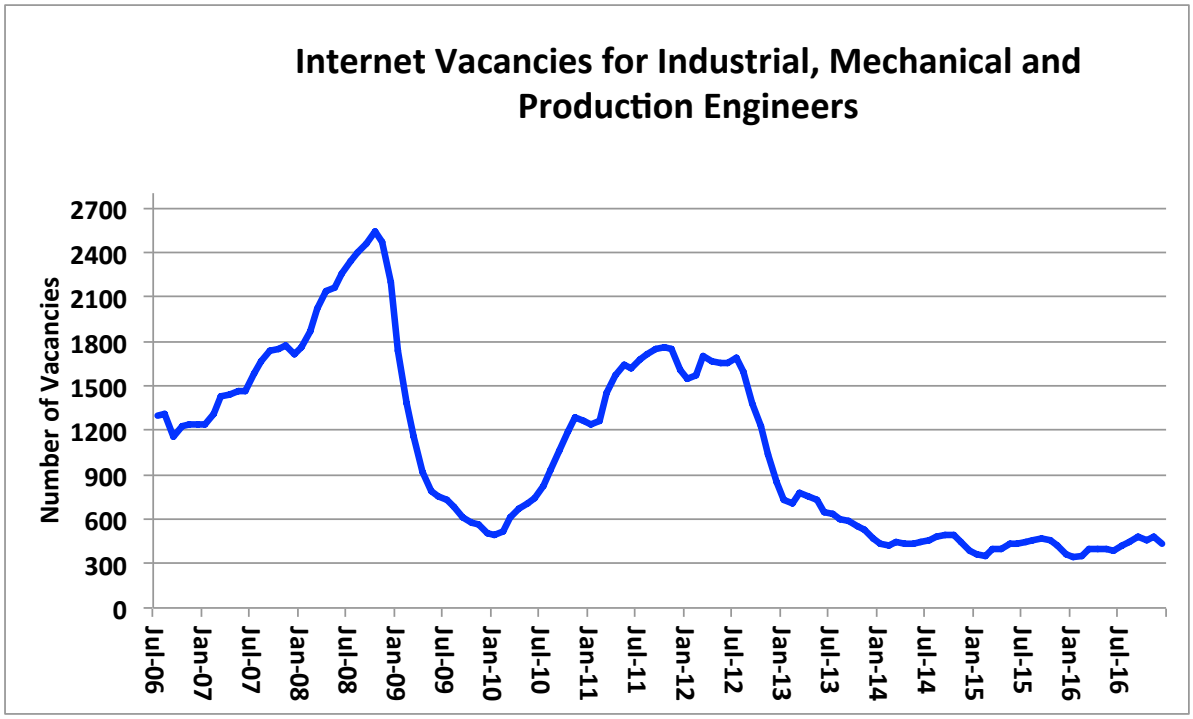
2335 Industrial, Mechanical and Production Engineers

This Unit Group includes the occupations:

233511 Industrial engineer
233512 Mechanical engineer
233513 Production or plant engineer.

For Industrial, Mechanical and Production Engineers, in December 2016 the number of internet vacancies was 25% of that recorded in October 2011 (Figure A6-1). This Unit Group has not experienced any sustained increase in vacancy numbers since the collapse of the employment market in 2012-13.

Figure A6-1
Number of internet vacancies for Industrial, Mechanical and Production Engineers to December 2016 (actual monthly data, not indexed) (DoE 2017c)



For Unit Group 2335, if the ratio of migrants to vacancies is indexed at 100 in 2012-13, the index value in 2015-16 is 240 (Figure A6-2). If the ratio is indexed at 100 in 2011-12 – when Unit Group 2335 was first flagged on the SOL (Table 5) – the index value in 2015-16 is 329. These are very large increases.

As shown in Figure A6-3, the 2015 GCA survey revealed that of those domestic mechanical engineering bachelor graduates available for full-time work, only 72% could find any full-time work; and only 60% could find full-time work in a job broadly relevant to their field of study (Table 12 and Figure A6-4). Full-time employment for domestic graduates in the discipline declined by 18% between 2012 and 2015, reflecting the lower number of opportunities and increased competition for jobs since then.

Figure A6-2
Industrial, Mechanical and Production Engineers: total engineering migration and vacancies, indexed (2012-13 = 100)
(Engineers Australia 2017; DIBP 2017a; DoE 2017a)

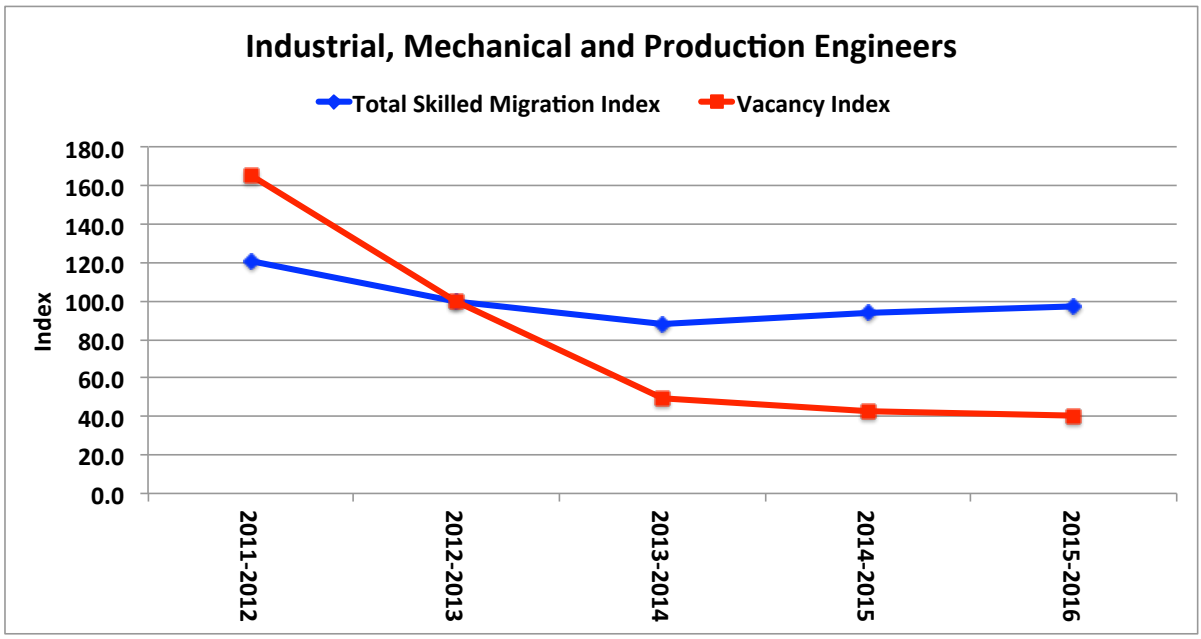


Figure A6-3
Domestic mechanical engineering bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (actual data, not indexed)
(GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

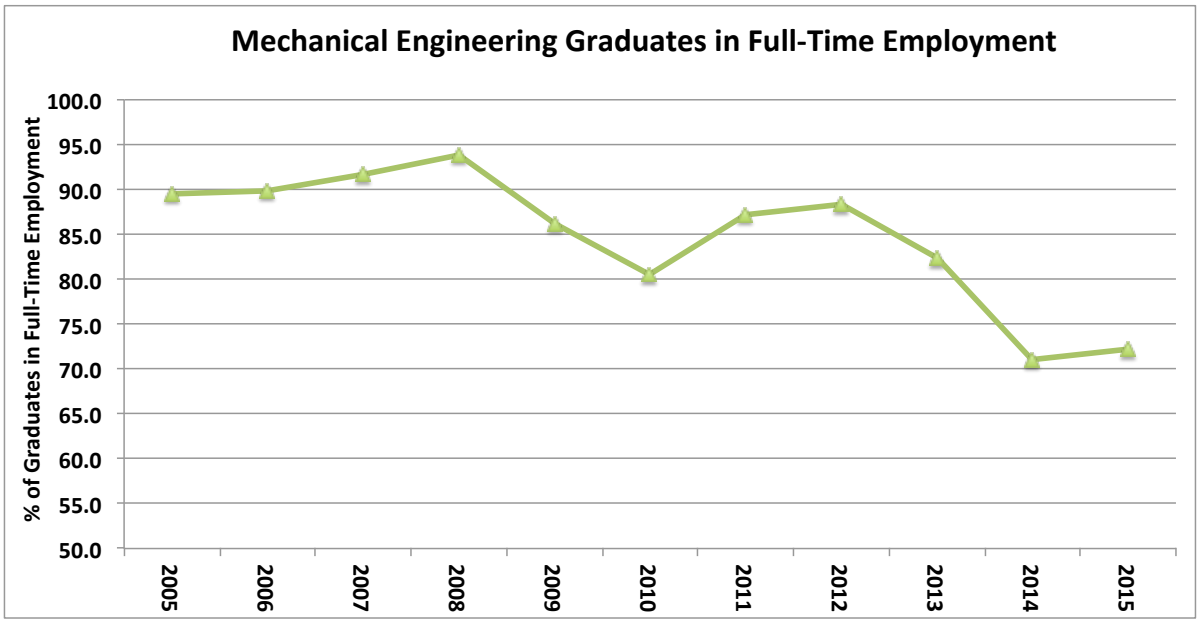
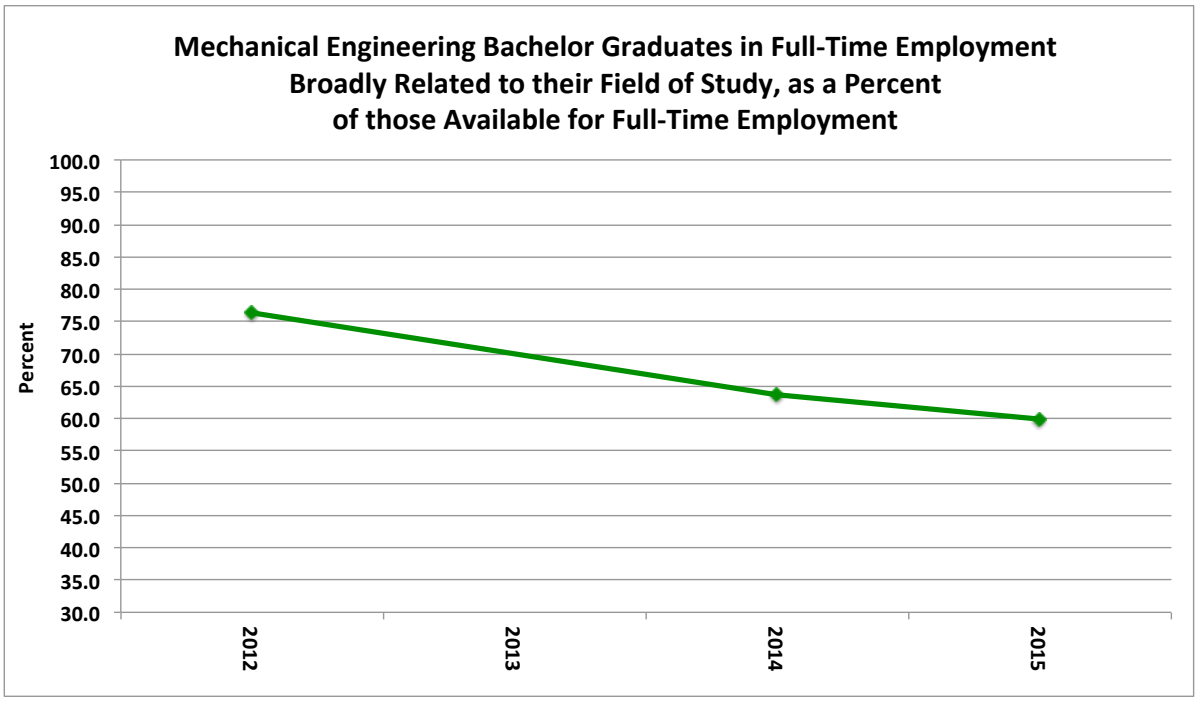


Figure A6-4
Domestic mechanical engineering bachelor degree graduates in full-time employment in an engineering, scientific, technical or management role as a percentage of those available for full-time employment (actual data, not indexed) (GCA 2016. See Tables 5 and 23a in GCA's 'Supplementary Tables & Figures'. 2012 data do not include management roles. 2013 data are not available)



Appendix 7

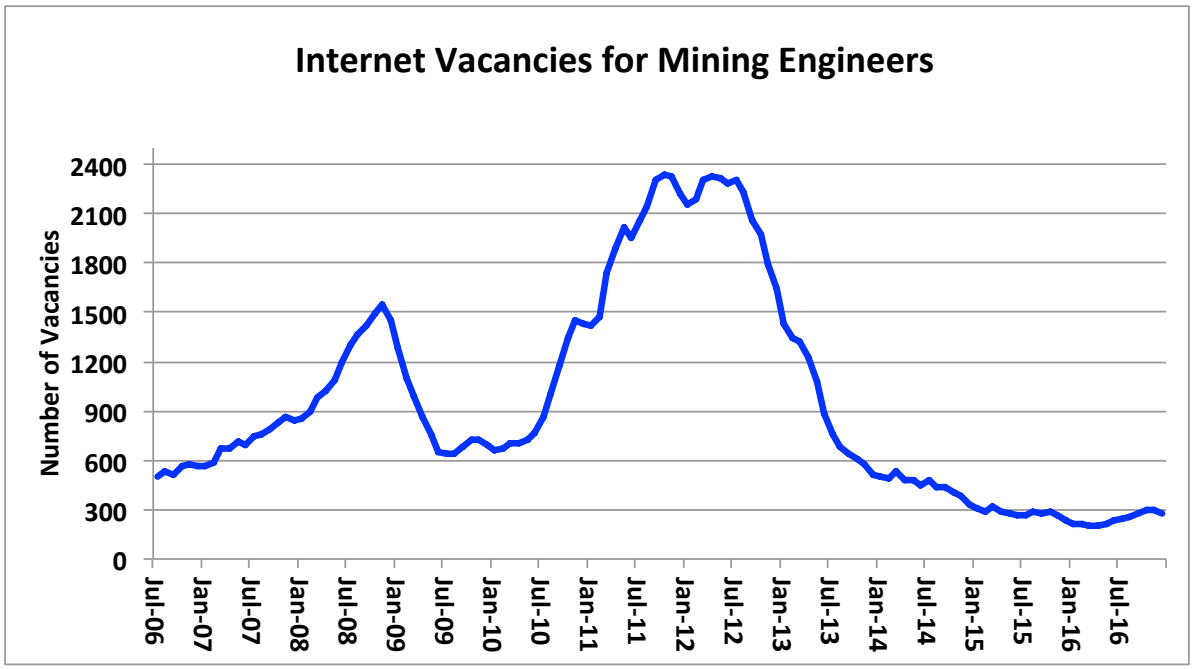
2336 Mining Engineers

This Unit Group includes the occupations:

233611 Mining engineer (excluding petroleum)
233612 Petroleum engineer.

For Mining Engineers, in December 2016 the number of internet vacancies was just 12% of the peak recorded in October 2011 (Figure A7-1). This Unit Group has suffered the most precipitous collapse in job vacancies of any engineering Unit Group.

Figure A7-1
Number of internet vacancies for Mining Engineers to December 2016 (actual monthly data, not indexed) (DoE 2017c)



For Unit Group 2336, if the ratio of migrants to vacancies is indexed at 100 in 2012-13, the index value in 2015-16 is 428 (Figure A7-2). If the ratio is indexed at 100 in 2013-14 – when 233611 'Mining engineer (excluding petroleum)' was stated by the DoE to have no shortage (Table 1) – the index value in 2015-16 is 190. Due to the sudden collapse in activity in the mining industry, the time from when there was no shortage in one occupation of the Unit Group, until both occupations in the Unit Group were removed from the SOL for the 2016-17 year, was short.

As shown in Figure A7-3, the 2015 GCA survey revealed that of those domestic mining engineering bachelor graduates available for full-time work, only 76% could find any full-time work; and only 64% could find full-time work in a job broadly relevant to their field of study (Table 12 and Figure A7-4). Full-time employment for domestic graduates in the discipline declined by 20% between 2013 and 2015, reflecting the lower number of opportunities and increased competition for jobs since then.

Figure A7-2
Mining Engineers: total engineering migration and vacancies, indexed (2012-13 = 100)
(Engineers Australia 2017; DIBP 2017a; DoE 2017a)

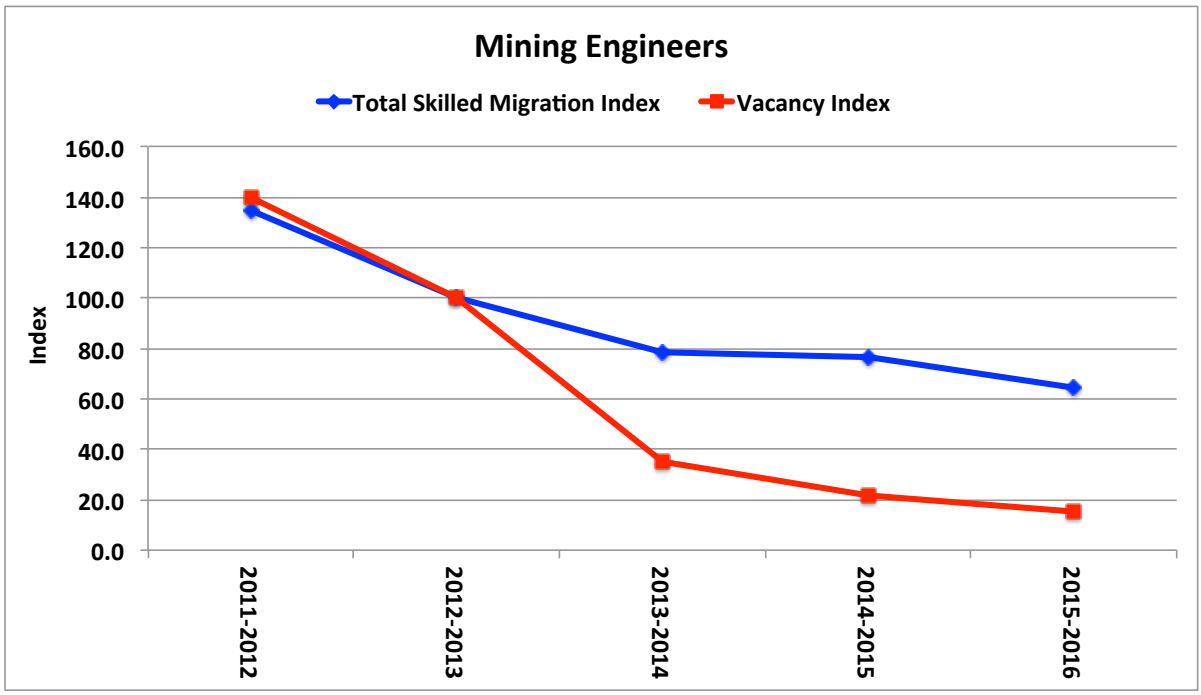


Figure A7-3
Domestic mining engineering bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (actual data, not indexed)
(GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

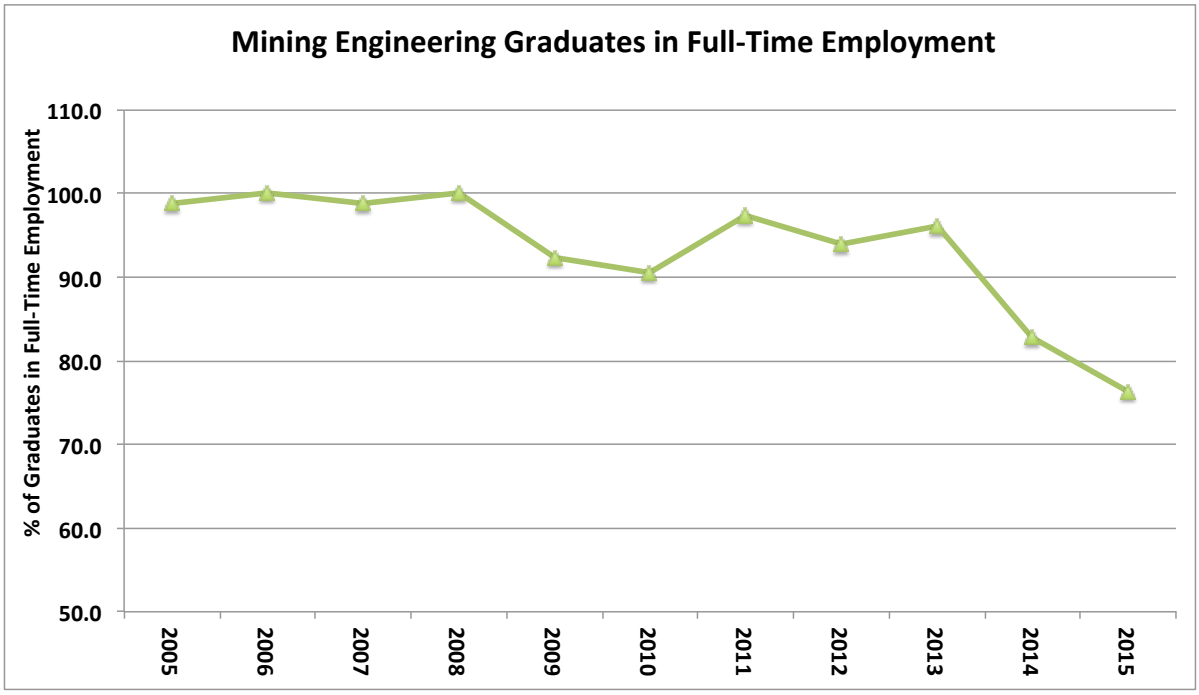
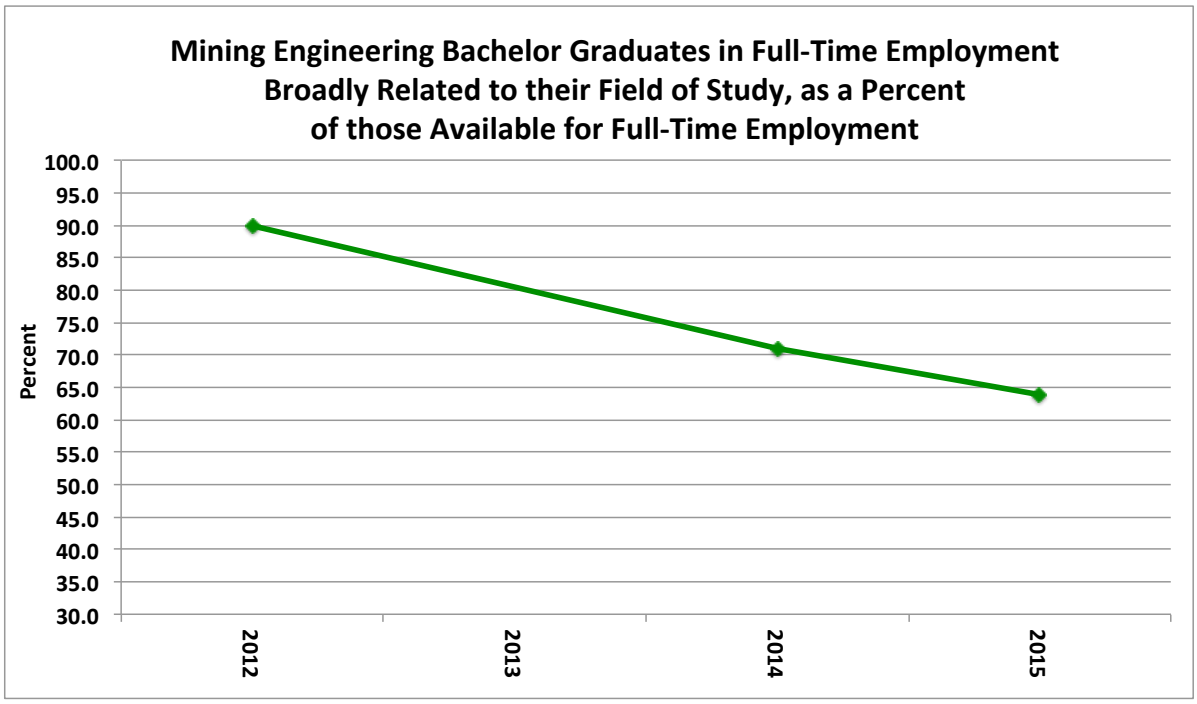


Figure A7-4
Domestic mining engineering bachelor degree graduates in full-time employment in an engineering, scientific, technical or management role as a percentage of those available for full-time employment (actual data, not indexed)
(GCA 2016. See Tables 5 and 23a in GCA's 'Supplementary Tables & Figures'. 2012 data do not include management roles. 2013 data are not available)



Appendix 8

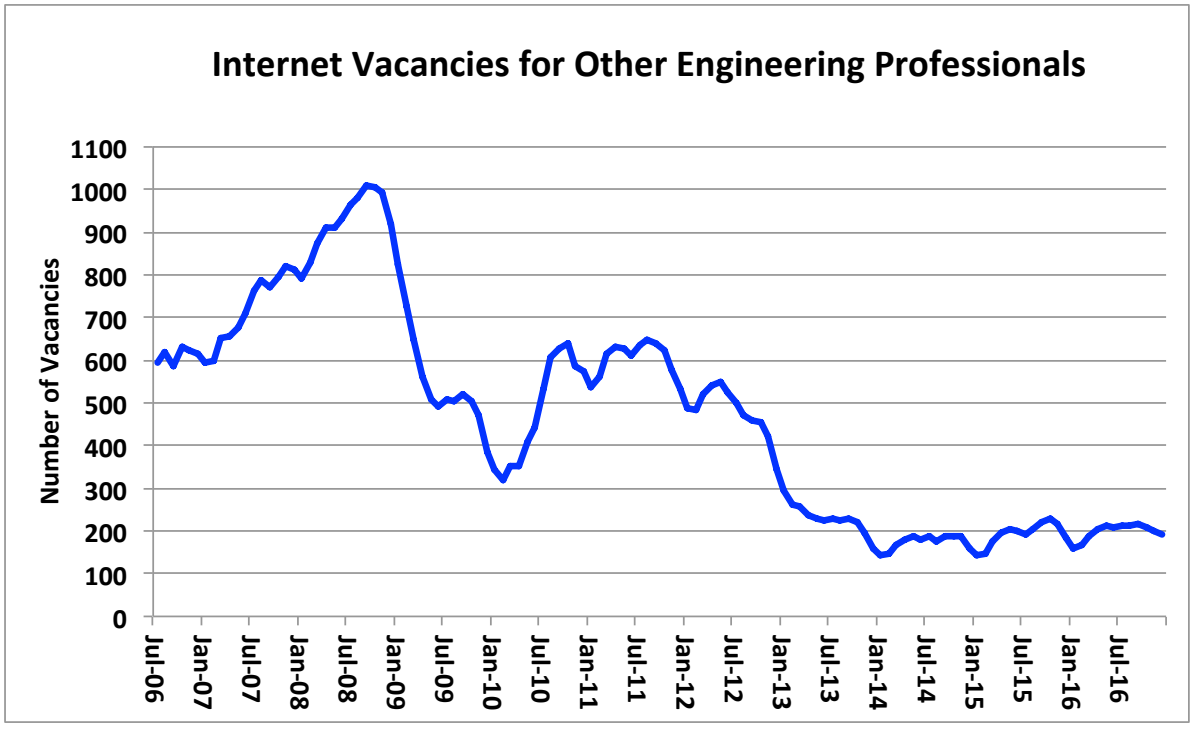
2339 Other Engineering Professionals

This Unit Group includes the occupations:

233911 Aeronautical engineer
233912 Agricultural engineer
233913 Biomedical engineer
233914 Engineering technologist
233915 Environmental engineer
233916 Naval architect
233999 Engineering professionals nec.

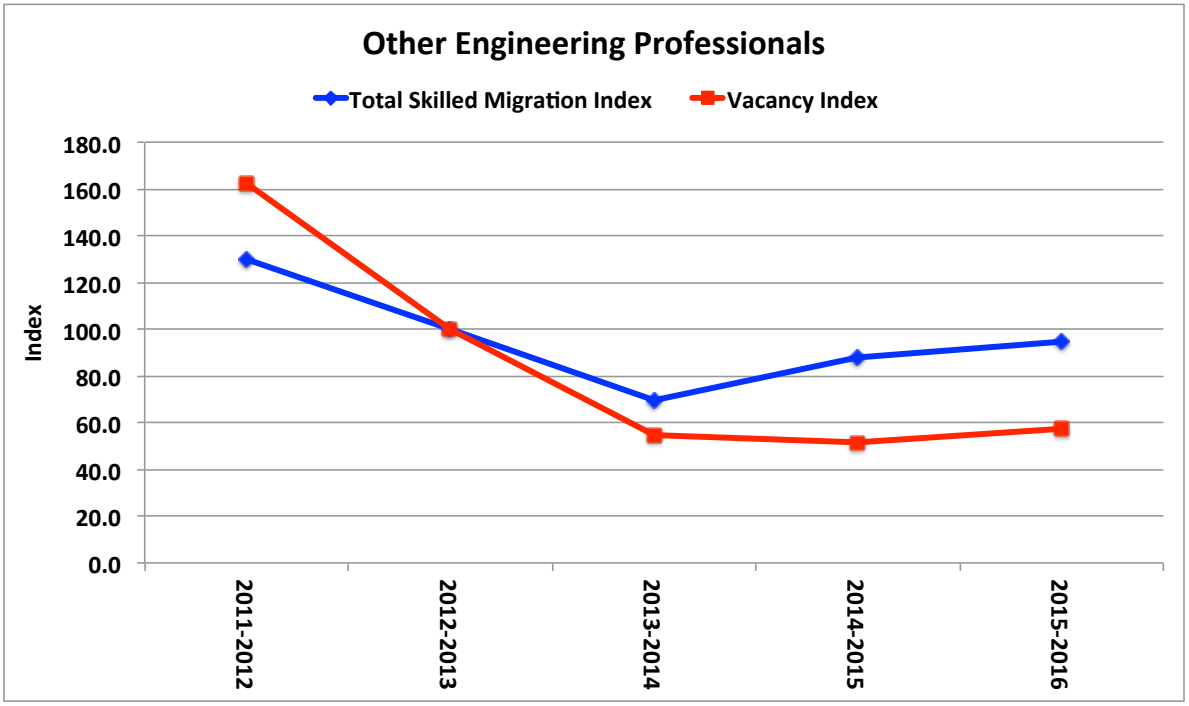
For Other Engineering Professionals, in December 2016 the number of internet vacancies was 30% of that recorded in August 2011 (Figure A8-1). This Unit Group has not experienced any sustained increase in vacancy numbers since the collapse of the employment market in 2012-13.

Figure A8-1
Number of internet vacancies for Other Engineering Professionals to December 2016 (actual monthly data, not indexed) (DoE 2017c)



For Unit Group 2339, if the ratio of migrants to vacancies is indexed at 100 in 2012-13, the index value in 2015-16 is 165 (Figure A8-2). If the ratio is indexed at 100 in 2011-12 – when the Unit Group was first flagged on the SOL (Table 5) – the index value in 2015-16 is 207. This Unit Group has experienced lower ratios of migrant engineers to vacancies than the other engineering Unit Groups (except for '2332 Civil Engineering Professionals'), partly due to a smaller percentage decline in vacancies.

Figure A8-2
Other Engineering Professionals: total engineering migration and vacancies, indexed (2012-13 = 100) (Engineers Australia 2017; DIBP 2017a; DoE 2017a)



As shown in Figure A8-3, the 2015 GCA survey revealed that of those domestic 'other engineering' bachelor graduates available for full-time work, only 71% could find any full-time work; and only 57% could find full-time work in a job broadly relevant to their field of study (Table 12 and Figure A8-4). Full-time employment for domestic graduates declined by 17% between 2012 and 2015.

Figure A8-3
Domestic 'other engineering' bachelor degree graduates in full-time employment as a percentage of those available for full-time employment (actual data, not indexed) (GCA 2016. See Table 5 in GCA's 'Supplementary Tables & Figures')

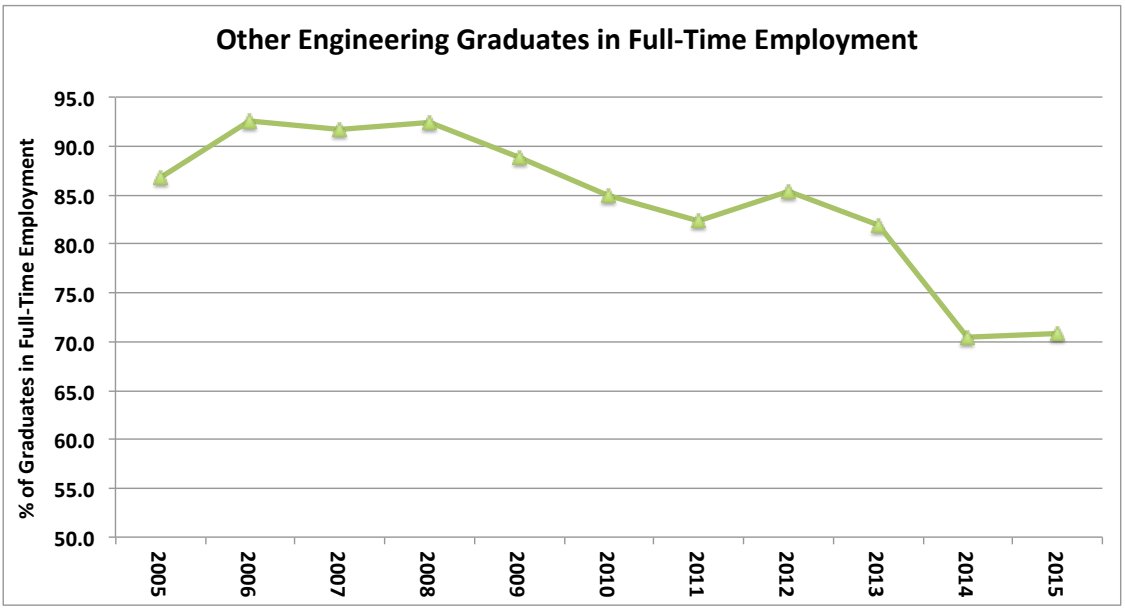


Figure A8-4
Domestic 'other' engineering bachelor degree graduates in full-time employment in an engineering, scientific, technical or management role as a percentage of those available for full-time employment (actual data, not indexed)
(GCA 2016. See Tables 5 and 23a in GCA's 'Supplementary Tables & Figures'. 2012 data do not include management roles. 2013 data are not available)