WOMEN IN ENGINEERING -
AN ACTION PLAN FOR ADDRESSING THE KEY DRIVERS OF ATTRITION OF WOMEN FROM THE ENGINEERING WORKFORCE
The Association of Professional Engineers Australia (2021). Women in Engineering - an action plan for addressing the key drivers of attrition of women from the Engineering workforce.

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FOREWORD

We are all agreed that ensuring a strong and sustainable Engineering capability into the future is part of the main game in building Australia’s innovation and productivity potential and rebuilding the Australian economy as we emerge from the COVID-19 pandemic.

Addressing the under-representation of women in Engineering should be part of a workforce development strategy that will play a major part in ensuring this capability in the longer-term.

There is no doubt that the current focus on encouraging greater numbers of women and girls to undertake STEM subjects at secondary school and Engineering courses at university is vital to improving the participation of women in Engineering - the problem is that this approach belies the complexity of the factors contributing to the under-representation of women in Engineering and is at best only half the story.

Addressing the attrition of women from the Engineering workforce is the vital second half of the equation. Removing the obstacles, barriers and biases which operate as disincentives for women to remain in Engineering is just as fundamental as increasing the participation of women and girls in Engineering education.

So, as well as efforts to encourage women and girls into Engineering, an effective long-term solution will require addressing the complex range of factors that operate to disadvantage women in employment generally, as well as the factors particular to the Engineering workforce that create disadvantage and lead to the attrition of women from the profession.

The contribution that a diverse workforce makes to organisational effectiveness is well-documented, and improving the level of participation and retention for female Engineers remains one of the most significant challenges in achieving a diverse and sustainable Engineering workforce. Women represent one of the largest under-represented pools of talent in Engineering and organisations will need to devote greater attention to addressing the workplace practices that create disadvantage for women if they wish to attract and retain their top talent.

Addressing the progression, attrition and retention issues for women in Engineering highlighted in this report should be a national reform priority. Ensuring a strong and sustainable workforce and fully realising our innovation and productivity potential over the coming decade will depend on it.

Jill McCabe
Professionals Australia CEO
INTRODUCTION
Welcome to the Professionals Australia Women in Engineering Report.
The report is set out in three parts.

PART 1
The first part of the report looks at the current status of women in Engineering in relation to:
• the low participation rates of women in the Engineering workforce;
• the low proportion of women commencing and completing graduate and post-graduate Engineering qualifications in Engineering;
• the low proportion of women working in most Engineering disciplines;
• the comparative proportion of women and men in Engineering who work part-time;
• the low representation of women at management and executive levels in Engineering;
• the gender pay gap in the Engineering workforce;
• attrition rates for women in the Engineering workforce;
• some of the reasons for the attrition of women from the Engineering workforce; and
• rates of sexual harassment and gender-based discrimination in Engineering.
This part of the report references data from a range of external sources including the Chief Scientist’s Office, the Department of Jobs and Small Business and the Workplace Gender Equality Agency (WGEA).

PART 2
The second part of this report sets out the findings from the Professionals Australia Professional Engineers Employment and Remuneration Survey and the persistent and ongoing drivers of the under-representation of women in Engineering, including:
• the gender pay gap;
• the attrition of women from the Engineering workforce;
• discrimination and sexual harassment; and
• lack of access to professional development and other career-building activities.

PART 3
While there is no-one-size-fits all approach, the third part of this report sets out a model action plan based on our findings from this and a range of other Professionals Australia surveys of STEM professionals from which organisations can draw on as needed to address the factors that contribute to women leaving the Engineering profession.
PART 1 - ENGINEERING EDUCATION AND THE ENGINEERING WORKFORCE
THE SIZE OF THE ENGINEERING WORKFORCE

The size of the professional Engineering workforce continues to hold at historically high levels (bachelor and post-graduate degree qualified). According to Australia’s most recent census data, there were 140,391 Professional Engineers employed across Australia in 2016 remaining fairly constant with the 2011 level of 140,425 up from around 108,000 in 2006. The number of qualified Engineers throughout Australia totalled 393,000 to 2019 and, based on historical growth, would normally have increased to around 412,000 to 2020 (including graduate diploma and graduate certificate level Engineers). The COVID-19 pandemic is likely to have an impact on employment growth but the extent and duration of that impact is at this stage difficult to forecast.

ENGINEERING WORKFORCE PARTICIPATION OF WOMEN

• Only 13.6 per cent of the Engineering workforce is female (2016 Census figures - up from 10.6 per cent in 2006). The main driver of this increase was skilled migration.

• The Office of the Chief Scientist puts the figure at 15.0 per cent, an increase of 2 percentage points since 2011. Engineering remains the STEM field with the lowest proportion of females.

ENGINEERING COURSE COMMENCEMENTS AND COMpletIONS

The most recent figures show that the number of students commencing a degree in Engineering increased by 0.2 per cent on the previous year driven by a 3.8 per cent increase in entry-level commencements offsetting a 14.8 per cent decline in post-graduate commencements. Completions were up, driven by a 7.3 per cent increase in entry-level course completions that offset a 2.6 per cent decline in post-graduate completions. It is also noteworthy that there was an increase in completions of 4.5 per cent marking a record high for completions of Engineering courses by domestic students.

Until 2015 there was a strong upward trend in the number of new Engineering graduates but this stalled in 2016 and 2017. In 2018 however, the drop was reversed with a 6.6 per cent increase in new course completions adding 8,444 new Engineers to Australia’s supply. The decline in international students able to continue their studies in Australia as a result of the pandemic is likely to impact completions and the impact is likely to have a ‘long tail’, but again the magnitude of the impact is difficult to predict.

Proportion of women commencing and completing Engineering courses

• In 2018, for entry level courses, 15 per cent of completions were by women compared to 16 per cent of commencements. 21 per cent of post-graduate completions were by women compared to 22 per cent of commencements.

• Women are underrepresented in all Engineering discipline enrolments but some more than others. Female enrolments in Chemical Engineering and Environmental Engineering typically exceed 40 per cent and enrolments in Biomedical Engineering approach, and can sometimes exceed, 50 per cent. In contrast, female enrolments in Civil and Electrical Engineering are typically at the average of around 14 per cent, while Mechanical and Computer Engineering are well below the average.
PROPORTION OF WOMEN IN VARIOUS DISCIPLINES IN THE ENGINEERING WORKFORCE

- Women are under-represented in the Engineering workforce across disciplines but in some more than others. The extent of under-representation was greatest in Mechanical and Industrial Engineering, Electronic and Electrical Engineering, Aerospace Engineering and Maritime Engineering. The percentages listed compare with an average the female average in the workforce overall of 48%.

**Process and Resource Engineering**
- 20 per cent of Chemical Engineers are female.
- 13 per cent of Mining Engineers are female.
- 17 per cent of Materials Engineers are female.

**Mechanical and Industrial Engineering**
- 5 per cent of Mechanical Engineers are female.
- 7 per cent of Industrial, Mechanical and Production Engineers are female.

**Civil Engineering**
- 12 per cent of Civil Engineers are female.
- 15 per cent of Transport Engineers are female.
- 14 per cent of Geotechnical Engineers are female.
- 11 per cent of Structural Engineers are female.

**Electrical and Electronic Engineering**
- 7 per cent of the Australian Electrical Engineers are female.
- 6 per cent of Electronics Engineers are female.
- 12 per cent of Software Engineers are female.
- 7 per cent of Computer Network and Systems Engineers are female.
- 17 per cent of Telecommunications Engineering Professionals are female.

**Aerospace Engineering**
- 8 per cent of Aeronautical Engineers are female.

**Maritime Engineering**
- 2 per cent of Marine Engineers are female.

**Other Engineering**
- 32 per cent of Environmental Engineers are female.
- 15 per cent of Biomedical Engineers are female.
- 5 per cent of Agricultural Engineers are female.
- 8 per cent of Naval Architects are female.
WORKING PART-TIME

• 30 per cent of females with Engineering bachelor degrees worked part-time compared to 14 per cent of males\textsuperscript{13}.

WOMEN AT SENIOR, MANAGEMENT AND EXECUTIVE LEVELS IN ENGINEERING

• The Engineering profession had the lowest representation of university-qualified females in senior occupations compared to other STEM professions. While 15 per cent of the total employed population were female, only 11 per cent of managers and 6 per cent of executives were female\textsuperscript{14}.

HIGH RATES OF ATTRITION FOR WOMEN IN ENGINEERING AFTER AGE 30

• The 2002 CREW report found “a striking disparity in the age profiles of female and male Engineers” They found that “after peaking at 51\% in the 20-29 age bracket, the age profile for all women surveyed [fell] steadily. Only 15\% of women [were] over 40 years of age. In contrast, the age profile of all male Engineers peak[ed] in the 30-39 age bracket, and after that [fell] gradually up to retirement age. Forty-three percent [were] over 40 years of age ... The age profile of women who [were] no longer working as Engineers [indicated] that women over thirty [were] leaving the profession\textsuperscript{15}.”

• The latest census data on the age distribution of the Engineering graduate workforce shows that 36 per cent of employed males with Engineering qualifications were aged 45 or older while only 22 per cent of employed female Engineering graduates were aged 45 or over\textsuperscript{16}.

• Almost half (47 per cent) of female Engineering graduates were younger than 35 compared to 36 per cent of male Engineering graduates\textsuperscript{17}. 
REASONS FOR THE HIGH ATTRITION RATE OF WOMEN

The 2002 CREW study showed that women left the Engineering profession due to:

- the cultures of many Engineering workplaces being female and family-unfriendly;
- limited opportunities for promotion, recognition and reward;
- unsatisfactory workplace communication and management;
- discrimination and paternalism;
- negative perceptions about women’s Engineering abilities;
- exclusion from mentoring and social networks;
- harassing behaviour from male managers, colleagues and clients; and
- a perception that women with carer responsibilities are less committed to their work.\(^{18}\)

HARASSMENT AND DISCRIMINATION

- The CREW report found that 50 per cent of women reported experiencing harassment and discrimination.\(^{19}\)

GENDER PAY GAP

- The Workplace Gender Equality Agency’s (WGEA) Gender Equality data show a gender pay gap of 22.0 per cent in the Professional, Scientific and Technical Services Industry (including Engineering) compared to an average pay gap of 14.0 per cent across all industries.\(^{20}\)
- In the top two industries that employ Engineers after the Professional, Scientific and Technical Services Industry - Manufacturing, and Construction - the national gender pay gap for professionals is 12 per cent and 26.1 per cent respectively in favour of men.\(^{21,22}\)
- Among Engineering bachelor degree holders, twice the percentage of males (43 per cent) than females (22 per cent) had an income in the highest bracket. At the other end of the scale, almost twice the percentage of females (24 per cent) than males (13 per cent) had an income in the lowest bracket.\(^{23}\)
- The percentage of Engineering bachelor graduates with earnings in the highest income bracket peaked between the ages of 40 to 44 for male and female graduates—58 per cent of males and 34 per cent of females in this age bracket earned $104,000 or above. From age 40, around double the percentage of males compared to females had an income in the highest bracket.\(^{24}\)
- The differences in income between genders for those with Engineering doctorates were not as large as for bachelor graduates. The majority (57 per cent) of males with Engineering doctorates had an income in the highest bracket compared to 36 per cent of females. Just 7 per cent of males and 12 per cent of females with Engineering doctorates were in the lowest income bracket. Among those with doctorates in Engineering, the percentage of graduates in the highest income bracket peaked at age 45 to 49 for males (76 per cent) and age 55 to 59 for females (64 per cent).\(^{25}\)
SUMMARY OF KEY RESULTS

The survey found that female respondents’ reported average earnings were 84.8 per cent of male respondents’ earnings - a gender pay gap of 15.2 per cent.

Female Engineers accounted for only 9.9 per cent of respondents, with males making up the other 90.1 per cent. This broadly reflects the gender imbalance in the Engineering workforce which is 11 per cent female and 89 per cent male.

While there was no significant gender difference in those considering leaving their current employer, for those who were considering leaving there were some gendered differences in the extent to which some factors would alter their intention to leave. A pay increase and professional development opportunities were the top two factors for both male and female respondents. Male and female respondents reported greater improved workplace culture, job security and working closer to home as factors that would alter their intention to leave at similar rates. However, female respondents reported promotion, opportunity for better management, improved work/life balance, flexible working arrangements and a more challenging workload as factors that would alter their intention to leave at higher rates than male respondents.

The findings around age and years of experience confirm that the Engineering workforce is characterised by the substantial attrition and lack of progression of its female workforce beyond the 20-29 age bracket, that females are under-represented in the over-40 Engineering workforce and that female Engineers are less likely than their male counterparts to have been working for a period of longer than 20 years.

The pay differential arose in part from differences in pay in comparing like-for-like roles but more substantively from the concentration of women in roles of lower levels of responsibility and in roles requiring years of experience. The data confirmed a clear difference in the distribution of male and female respondents across responsibility levels, with males being more likely to be employed at higher levels of responsibility, and females more likely to be employed at less senior responsibility levels.

Only 31.1 per cent of female Engineer respondents were aged over 40, compared to 39.2 per cent of their male counterparts.
32.7 per cent of female respondents reported having experienced sexual harassment in the course of their employment compared to 2.4 per cent of male respondents.

The top four work priorities of remuneration, job security, work/life balance and positive workplace culture were shared across gender lines.

While 80.5 per cent of respondents said their employer had in place formal policies to deal with discrimination and 72.5 per cent said their employer had in place formal policies to promote diversity, a concerning 14.9 per cent said that while their employer had formal policies in place around diversity and discrimination, they did not have strategies in place to actually implement them. This gap between policy and practice is a key obstacle to improving the retention of women in the Engineering workforce.

The survey found a decrease in the proportion of female Engineers between the 20-29 and 30-39 age groups (from 42.2 per cent to 26.8 per cent) compared with a marginal increase at that career stage for male Engineers (30.1 per cent to 30.7 per cent). 69.9 per cent of males compared with 57.9 per cent of females in the survey population were aged over 30 confirming substantial attrition of the female workforce beyond the 20-29 age bracket.

Over half (57.8 per cent) of female respondents reported that they had experienced discrimination on the basis of gender. Female respondents were also far more likely to report age discrimination than their male counterparts (25.3 per cent compared to 13.1 per cent).

Only 9.9 per cent of female respondents indicated that they had worked as an Engineer for over 20 years compared with 31.9 per cent of male respondents.
WAS THERE EVIDENCE OF A GENDER PAY GAP IN THE ENGINEERING WORKFORCE SURVEYED?

The Professional Engineers Employment and Remuneration Survey Report\textsuperscript{27} found a pay differential for the total survey sample with a median base salary of $97,500 for females compared to $115,000 for their male counterparts meaning female Engineers earned on average 84.8 per cent of male Engineers’ mean earnings and a gender pay gap of 15.2 per cent - slightly less than the 22.0 per cent found by WGEA.

DID THE SURVEY FIND A PAY GAP IN LIKE-FOR-LIKE ROLES?

There was evidence of female Engineers being paid on average less than their male counterparts at Level 3 and beyond, with a substantial gap between the median base salary of males and females employed at Level 5. The extent of the gap at Level 5 should be considered cautiously due to sample size at senior levels.

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**Figure 1 - Median male and female base salary for all respondents across survey sample**

<table>
<thead>
<tr>
<th>Full time respondents</th>
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</thead>
<tbody>
<tr>
<td>$85,000</td>
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<tr>
<td>$90,000</td>
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<tr>
<td>$95,000</td>
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<tr>
<td>$100,000</td>
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<tr>
<td>$105,000</td>
</tr>
<tr>
<td>$110,000</td>
</tr>
<tr>
<td>$115,000</td>
</tr>
</tbody>
</table>

**Male**

- $115,000

**Female**

- $97,500

**Figure 2 - Median base salary across responsibility levels by gender**

<table>
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<th>Full time respondents</th>
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<tbody>
<tr>
<td>$0</td>
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<tr>
<td>$50,000</td>
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<tr>
<td>$150,000</td>
</tr>
<tr>
<td>$200,000</td>
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<tr>
<td>$250,000</td>
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<th>1</th>
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<th>4</th>
<th>5</th>
<th>6</th>
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<tbody>
<tr>
<td>$65,166</td>
<td>$66,449</td>
<td>$81,754</td>
<td>$106,000</td>
<td>$115,000</td>
<td>$295,000</td>
</tr>
<tr>
<td>$66,000</td>
<td>$87,000</td>
<td>$103,000</td>
<td>$135,000</td>
<td>$133,436</td>
<td>$166,273</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>$151,000</td>
<td>$169,273</td>
</tr>
</tbody>
</table>
DID THE SURVEY FIND A PAY GAP ARISING FROM OCCUPATIONAL SEGREGATION?

As well as differences in pay for like-for like roles, the pay differential can be attributed to a concentration of female respondents in less senior roles and in roles requiring less experience in the survey population.

The data confirmed a clear difference in the distribution of male and female respondents across responsibility levels, with males being more likely to be employed at higher levels of responsibility, and females more likely to be employed at less senior levels. 75.8 per cent of female respondents reported being employed at Level 3 or below and only 24.2 per cent were employed at Level 4 or above. By comparison, 57.3 per cent of males were engaged at Level 3 or below, while 42.7 per cent were employed at Level 4 and above.

Figure 3 - Workforce distribution by responsibility level and gender

### Table 1 - All full-time respondents - Remuneration across responsibility levels by gender

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>BASE SALARY</th>
<th>TOTAL PACKAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LOWER QUARTILE</td>
<td>MEDIAN</td>
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<tr>
<td>MALE</td>
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<tr>
<td>LEVEL 1</td>
<td>116</td>
<td>$61,300</td>
<td>$65,616</td>
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<td>LEVEL 2</td>
<td>206</td>
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<td>$81,754</td>
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<tr>
<td>LEVEL 3</td>
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<td>$94,500</td>
<td>$106,000</td>
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<tr>
<td>LEVEL 4</td>
<td>426</td>
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<tr>
<td>LEVEL 5</td>
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<td>ABOVE</td>
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<td></td>
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<td>FEMALE</td>
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<td>LEVEL 1</td>
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<tr>
<td>LEVEL 2</td>
<td>34</td>
<td>$76,000</td>
<td>$87,000</td>
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<tr>
<td>LEVEL 3</td>
<td>35</td>
<td>$96,000</td>
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<td>LEVEL 4</td>
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<tr>
<td>LEVEL 5</td>
<td>4</td>
<td>-</td>
<td>$114,500</td>
</tr>
<tr>
<td>ABOVE</td>
<td>SNR</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
WAS THERE EVIDENCE OF THE ATTRITION OF WOMEN BY AGE?

The 2002 CREW report stated the following:

There is a striking disparity in the age profiles of female and male Engineers. After peaking at 51% in the 20-29 age bracket, the age profile for all women surveyed falls steadily. Only 15% of women are over 40 years of age. In contrast, the age profile of all male Engineers peaks in the 30-39 age bracket, and after that falls gradually up to retirement age. Forty-three percent are over 40 years of age...

The age profile of women who are no longer working as Engineers indicates that women over thirty are leaving the profession.

The Professionals Australia survey confirmed the CREW report findings. The distribution of male and female Engineers in the Professionals Australia survey population mirrored the CREW report findings regarding age profile with a decrease in the proportion of female Engineers between the 20-29 and 30-39 age groups (from 42.2 per cent to 26.8 per cent) compared with a marginal increase at that career stage for male Engineers (30.1 per cent to 30.7 per cent). 69.9 per cent of males compared with 57.9 per cent of females in the survey population were aged over 30.

The survey found that 31.1 per cent of female Engineer respondents were aged over 40, compared to 39.2 per cent of their male counterparts.

The findings around age and years of experience confirm that the Engineering workforce is characterised by the substantial attrition and lack of progression of its female workforce beyond the 20-29 age bracket - so the mid-career stage of their professional lives.

Figure 4 - Workforce distribution by age and gender

![Graph showing workforce distribution by age and gender.](image)
WHAT DOES THE WORKFORCE DISTRIBUTION BY YEARS OF EXPERIENCE TELL US ABOUT HOW LONG WOMEN ARE WORKING AS ENGINEERS?

Only 9.9 per cent of female respondents indicated that they had worked as an Engineer for over 20 years compared with 31.9 per cent of male respondents. While sample size means caution must be taken drawing broad conclusions, this suggests that female respondents are over-represented in Engineers with less than 20 years’ experience and under-represented in Engineers with more than 20 years’ experience.

Figure 5 - Workforce distribution by years of experience by gender

Table 2 - Workforce distribution by years of experience by gender
WHAT DOES THE WORKFORCE DISTRIBUTION BY YEARS OF EXPERIENCE SHOW ABOUT PAY?

The survey found a gender pay gap when comparing like-for-like roles based on years of experience.

A “scissor effect” was evident by years of experience suggesting that while female Engineers’ starting salaries may be slightly higher than for their male counterparts, the salaries of female Engineers increased at a much slower rate than those of male Engineers as they accrued experience. With the point of convergence at around five years’ experience, the data suggest this is the career stage at which contributing factors combine to produce a gender pay gap in favour of male Engineers.

Figure 6 - Trend lines - Median base salary by years of experience and gender ($)
### Table 3 - All full-time respondents - Remuneration across years of experience by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Less Than 2</th>
<th>2 to Less Than 4</th>
<th>4 to Less Than 6</th>
<th>6 to Less Than 8</th>
<th>8 to Less Than 10</th>
<th>10 to Less Than 15</th>
<th>15 to Less Than 20</th>
<th>20 to Less Than 25</th>
<th>25 to Less Than 30</th>
<th>30 to Less Than 35</th>
<th>35 or More</th>
<th>All Respondents</th>
</tr>
</thead>
<tbody>
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<td>N=106</td>
<td>N=100</td>
<td>N=101</td>
<td>N=215</td>
<td>N=138</td>
<td>N=137</td>
<td>N=90</td>
<td>N=107</td>
<td>N=104</td>
<td>N=1370</td>
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<td><strong>Base Salary</strong></td>
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<td></td>
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</tr>
<tr>
<td>Lower Quartile</td>
<td>$63,000</td>
<td>$66,000</td>
<td>$77,626</td>
<td>$92,575</td>
<td>$100,000</td>
<td>$100,552</td>
<td>$113,000</td>
<td>$100,000</td>
<td>$122,300</td>
<td>$120,000</td>
<td>$115,000</td>
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<td>Median</td>
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<td>$103,088</td>
<td>$112,000</td>
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<td>$116,000</td>
<td>$140,658</td>
<td>$127,500</td>
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<td>$115,000</td>
</tr>
<tr>
<td>Upper Quartile</td>
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<td>$85,925</td>
<td>$110,000</td>
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<td>Mean</td>
<td>$78,048</td>
<td>$79,181</td>
<td>$96,893</td>
<td>$108,040</td>
<td>$114,718</td>
<td>$123,165</td>
<td>$131,662</td>
<td>$132,500</td>
<td>$120,500</td>
<td>$135,242</td>
<td>$150,718</td>
<td>$119,600</td>
</tr>
<tr>
<td><strong>Total Package</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Lower Quartile</td>
<td>$69,801</td>
<td>$74,460</td>
<td>$89,250</td>
<td>$107,502</td>
<td>$110,147</td>
<td>$114,975</td>
<td>$130,500</td>
<td>$130,630</td>
<td>$139,019</td>
<td>$131,663</td>
<td>$115,000</td>
<td>$102,098</td>
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<tr>
<td>Median</td>
<td>$77,000</td>
<td>$84,338</td>
<td>$107,762</td>
<td>$120,450</td>
<td>$129,547</td>
<td>$136,875</td>
<td>$146,404</td>
<td>$156,300</td>
<td>$168,640</td>
<td>$164,250</td>
<td>$164,250</td>
<td>$132,862</td>
</tr>
<tr>
<td>Upper Quartile</td>
<td>$95,478</td>
<td>$97,304</td>
<td>$128,582</td>
<td>$136,453</td>
<td>$149,500</td>
<td>$141,894</td>
<td>$176,295</td>
<td>$193,775</td>
<td>$211,405</td>
<td>$197,100</td>
<td>$174,742</td>
<td>$164,250</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Notes
- SNR indicates insufficient data to calculate statistics.
- All figures are in US dollars.
DOES THE RECENT INCREASE IN THE NUMBER OF WOMEN DOING ENGINEERING DEGREES EXPLAIN THEIR CONCENTRATION IN LOWER RESPONSIBILITY LEVELS AND YEARS OF EXPERIENCE?

It was important to consider whether or not the increase in the number of women undertaking Engineering degrees over the last 15 years could account for the concentration of female Engineers at lower responsibility levels and fewer years of experience.

According to data published by the Australian Bureau of Statistics\textsuperscript{29} the number of women entering the Engineering profession as measured by domestic undergraduate university course completions in the fields of Engineering and related technologies has been increasing over the past 15 or so years. At the same time however, the number of men entering the profession has also been increasing, and at proportionally similar levels. As a result, the mix of male to female graduates entering the Engineering workforce appears to be unchanged over the period. An increase in women entering the profession is therefore unlikely to account for their concentration at lower levels of responsibility and fewer years of experience.

Figure 7 - Gender distribution of domestic undergraduate university completions in Engineering and related technologies, 2004 - 2019
WERE THERE ANY GENDER DIFFERENCES IN WORK PRIORITIES?

The top four work priorities of remuneration, job security, work/life balance and positive workplace culture were shared across gender lines though the extent to which they were a priority relative to each other varied. For female respondents, remuneration and work/life balance ranked highest while remuneration and job security were the top priorities for males.

<table>
<thead>
<tr>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranking</td>
<td>Priority</td>
</tr>
<tr>
<td>1</td>
<td>Remuneration</td>
</tr>
<tr>
<td>2</td>
<td>Job security</td>
</tr>
<tr>
<td>3</td>
<td>Work/life balance</td>
</tr>
<tr>
<td>4</td>
<td>Positive workplace culture</td>
</tr>
<tr>
<td>5</td>
<td>Career progression</td>
</tr>
<tr>
<td>6</td>
<td>Flexible work arrangements</td>
</tr>
<tr>
<td>7</td>
<td>Being close to home</td>
</tr>
<tr>
<td>8</td>
<td>Continuing professional development</td>
</tr>
<tr>
<td>9</td>
<td>A challenging workload</td>
</tr>
</tbody>
</table>

WERE THERE ANY GENDER DIFFERENCES IN INTENTIONS TO LEAVE AN EMPLOYER?

The survey asked respondents whether they were considering leaving their current employer and if they were, the factors that might alter their intention. The survey found over one-third (35.3 per cent) of respondents were dissatisfied with their current level of remuneration and over one-third (34.1 per cent) were considering leaving their current employer. For those considering leaving, 73.2 per cent cited pay as the most significant factor in their decision to leave, followed by opportunities for professional development (52.2 per cent) and promotion (43.1 per cent).

The survey found no significant difference in the rates at which male and female respondents were considering leaving their current employer.

<table>
<thead>
<tr>
<th>Percentage of respondents considering leaving their current employer by gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
</tr>
<tr>
<td>35.1%</td>
</tr>
<tr>
<td>64.9%</td>
</tr>
</tbody>
</table>
WERE THERE ANY GENDER DIFFERENCES IN THE FACTORS THAT WOULD ALTER INTENTION TO LEAVE?

While there was no significant gendered difference in those considering leaving their current employer, for those who were considering leaving, there were some gendered differences in the extent to which some factors would alter their intention to leave.

A pay increase and professional development opportunities were the top two factors for both male and female respondents; male and female respondents reported greater improved workplace culture, job security and working closer to home as factors that would alter their intention to leave at similar rates. However, female respondents reported promotion, opportunity for better management, improved work/life balance, flexible working arrangements and a more challenging workload as factors that would alter their intention to leave at higher rates than male respondents.

Figure 10 - Factors that would alter intention to leave by gender
WHAT DID WOMEN REPORT ABOUT THEIR EXPERIENCE OF DISCRIMINATION IN ENGINEERING WORKPLACES?

The survey asked respondents to report on whether or not they had experienced discrimination in their workplace over the previous three years and, if so, the type of discrimination they had experienced. A disturbing 57.8 per cent of female respondents reported that they had experienced discrimination on the basis of gender, a notable increase on the 48.2 per cent who reported discrimination on the basis of gender in the previous year. Discrimination on the basis of age was the second most frequently reported type of discrimination reported with 13.1 per cent of males and 25.3 per cent of females reporting age discrimination. Males were much more likely to have not experienced discrimination on any of the bases listed with 80.1 per cent of male respondents reporting no discrimination, compared with 35.7 per cent of female respondents.

Figure 11 - Types of discrimination experienced in the workplace over previous three years by gender
WHAT DID WOMEN REPORT ABOUT THEIR EXPERIENCE OF SEXUAL HARASSMENT?

32.7 per cent of female respondents reported having experienced sexual harassment in the course of their employment compared to 2.4 per cent of male respondents (a slightly lower incidence that the 50 per cent of women reported as experiencing harassment in the CREW Report)(30). 11.9 per cent of female respondents reported being sexually harassed once, 20.8 per cent on a number of occasions and 0.6 per cent frequently.

Table 4 - Engineers’ experience of sexual harassment by gender

<table>
<thead>
<tr>
<th>HAVE EXPERIENCED SEXUAL HARASSMENT IN ENGINEERING PROFESSION</th>
<th>MALE RESPONSE (%)</th>
<th>FEMALE RESPONSE (%)</th>
<th>ALL RESPONDENTS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>97.7</td>
<td>66.7</td>
<td>94.7</td>
</tr>
<tr>
<td>Yes, once</td>
<td>1.2</td>
<td>11.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Yes, on a number of occasions</td>
<td>1.1</td>
<td>20.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Yes, frequently</td>
<td>0.1</td>
<td>0.6</td>
<td>0.1</td>
</tr>
</tbody>
</table>

WHAT DID RESPONDENTS TELL US ABOUT DIVERSITY POLICY AND IMPLEMENTATION IN THEIR WORKPLACES?

80.5 per cent of respondents said their employer had in place formal policies to deal with discrimination.

72.5 per cent said their employer had in place formal policies to promote diversity.

14.9 per cent said that while their employer had formal policies in place around diversity and discrimination, they did not have strategies in place to actually implement them.

The survey confirmed that while over two-thirds of workplaces had policies in place to support diversity and deal with discrimination, many did not have the strategies in place to give effect to the policies. The challenge remains to ensure that policy is integrated with strategy and workplace culture and that incentives for cultural change and management accountabilities to measure progress are in place.
WERE THERE ANY GENDER DIFFERENCES RELATING TO PROFESSIONAL DEVELOPMENT?

The level of professional development undertaken by Engineers is a critical issue with it being a key enabler of career progression and advancement, and a means of gaining and maintaining professional Engineering registration. Any difference in the relative levels of continuing professional development (CPD) undertaken by survey respondents would be of interest.

The survey found a clear difference in the number of hours of CPD undertaken by male and female respondents, with males reporting an average 38 hours of CPD in the previous 12 months compared with 31 hours for females.

Figure 12 - Hours of CPD completed in previous 12 months

<table>
<thead>
<tr>
<th>GENDER</th>
<th>HOURS CPD COMPLETED OVER LAST 12 MONTHS (MEAN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>38</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
</tr>
</tbody>
</table>

While this survey did not explore the possible reasons for any identified differences in any further detail, other Professionals Australia research into the Science, Technology, Engineering and Mathematics (STEM) professions have shown that employers can assume that women are less interested in undertaking CPD, that CPD is offered at times that make it more difficult for women to undertake it and they therefore self-select out of it, or that CPD is either not offered at all or offered less frequently to those who work part-time. Gender bias on the part of employers in relation to CPD can play a role in differential access to career-building activities for women.

The latest Women in STEM Survey report found that:

- 41.2 per cent of respondents said limited access to training had significantly or moderately impeded their career advancement.
- 23.8 per cent said they were unnecessarily prevented from undertaking training and professional development due to working part-time.
- 59.9 per cent said the impact on personal or family time prevented them from commencing or completing professional development.

WHAT DID THE SURVEY TELL US ABOUT THE PARTICIPATION RATE OF WOMEN IN ENGINEERING?

Female Engineers accounted for only 10.2 per cent of survey respondents, with males making up the other 89.8 per cent. This broadly reflects the gender imbalance in the Australian Engineering workforce with 13.6 per cent of Engineering professionals being female.
IN SUMMARY

The Professionals Australia survey found evidence of industrial gender segregation (the low participation rate of female Engineers in the survey reflecting the low participation rate women in Engineering in the broader population), and occupational segregation (a concentration of women in less senior roles and underrepresentation at the senior/management level). The survey also found a decline in the number of female Engineers compared to their male counterparts in the survey population beyond the 20 to 29 age bracket, reflecting a similar point of attrition to that previously identified by the CREW Report in the broader Engineering workforce.

Given the concentration of female participants with fewer years of experience and at lower levels of responsibility, the Engineering workforce was shown to be characterised by the substantial attrition and lack of progression of its female workforce beyond the 20-29 age bracket - so the mid-career stage of their professional lives.

The survey also found high levels of discrimination on the basis of gender with women far more likely than their male counterparts to be discriminated against on the basis of gender. There was also a disturbing high incidence of sexual harassment for female respondents compared to their male counterparts and a link between gender and age discrimination. A gap between gender diversity policy and its effective implementation in the workplace was confirmed.

The survey showed that pay, professional development opportunities, improved workplace culture, promotion, opportunity for better management, improved work/life balance, flexible working arrangements and a challenging workload were major factors that need to be considered if retention of females in the Engineering at the workplace level is to occur. Female survey respondents reported engaging in less CPD than their male counterparts pointing to issues of differential access to, and/or self-selection out of, career-building activities that would normally underpin career progression.

In these ways, the survey confirmed the range and complexity of the drivers of attrition for women in the Engineering workforce.
PART 3 - TAKING ACTION
This report shows that as well as encouraging more women into the Engineering profession, the challenge is to remove the obstacles and barriers which operate as disincentives to women remaining in the Engineering workforce.

To be effective, there is a need to put proper diversity and anti-discrimination policies in place and then implement them ensuring management accountabilities are in place to incentivise change and to address workplace culture and practices that get in the way of making equitable, family-friendly and safe Engineering workplaces a reality.

While there is no-one-size-fits all approach, we provide below a model action plan based on our survey reports from which organisations can draw on as needed to address the factors that contribute to the attrition of women from the Engineering profession. The actions outlined below would help organisations come to terms with the complexities of the changes needed, and to deal with complacency or fatigue that WGEA found could be an issue for employers in its latest Scorecard report33.

Only then, will be employers have access to the broadest pool of high-quality Engineering talent, the structures and systems in place to ensure a sustained increase in the participation of women in Engineering and, in turn, for a diverse Engineering workforce to play the critical role it should in growing the Australian economy.

At the HR/policy level

1. ensure appropriate diversity, anti-discrimination and sexual harassment policies are in place, that these policies comply with relevant workplace and discrimination legislation and that existing policies are reviewed for potential direct and indirect discrimination;
2. ensure diversity and inclusiveness policies are effectively promulgated as part of the organisation’s core values - if diversity and anti-discrimination are not a priority at the policy level and prioritised by the leadership group, they won’t be a priority for managers and staff;
3. ensure diversity issues in the workplace are articulated and understood in terms of the removal of obstacles to merit-based advancement and recruiting and retaining the best talent - not as positive discrimination, tokenism or preferential treatment which can undermine individual appointments and respect for merit-based recruitment and progression processes; and
4. with research showing links between improved organisational performance and diverse boards, support women’s representation at Board level.

At the strategic and operational levels

5. put in place the strategies and management accountabilities to give effect to diversity and anti-discrimination policies so workplace culture does not override policy intent. As with any process of changing workplace culture, organisation-wide policies need to be in place and incentives and rewards aligned with these policies and part of managers’ performance indicators;
6. gather and monitor data on progress against gender equity policies including identifying over- and under-representation of women in particular areas or roles of the organisation that may indicate gendered occupational or role segregation within the organisation - it is important to collect and analyse gender-disaggregated data across all levels of an organisation;
7. monitor and manage resistance to change that may range from passive resistance, denial, claiming the organisation is a meritocracy and doesn’t need to change to more active forms of pushback;
8. ensure internal reporting mechanisms to identify biases and discrimination and resources for changing procedures and ways of working to address them; and
9. conduct confidential exit interviews to better understand whether gendered workplace practices are a factor in staff attrition.
To address bias in career-building activities

10. review workplace practices for bias in career building activities for women and those not working full-time. This includes ensuring access to training and development opportunities including management training, access to ‘stretch’ projects, formal and informal mentoring, access to inclusive opportunities for networking and clear criteria for advancement that are not restricted to years of experience only. Track and measure outcomes in career development practices;

11. ensure positive senior male and female role models and that mentorship and networking opportunities are in place and inclusive in nature;

12. address barriers to training and ensure that training and development opportunities are linked to requirements for promotion and career pathways; and

13. consider potential obstacles to women undertaking relevant registration, certification or accreditation and barriers to women undertaking the continuing professional development required to maintain certification/s.

To address the career penalties that can apply when working part-time or with flexibility

14. look to some of the changes in flexibility adopted during the COVID-19 pandemic that have the potential to reduce systemic barriers historically faced by women in IT at the enterprise level and consider how they could be embedded in permanent arrangements to create a more resilient and responsive workforce;

15. develop options for part-time and flexible work at senior, management and leadership levels;

16. provide a process for review of management approvals/refusals for women requesting part-time work or access to flexible work arrangements after a career break;

17. ensure performance pay systems do not exclude incentives and rewards for those in part-time work arrangements;

18. ensure workload and performance indicators are adjusted for part-time status;

19. ensure there are socialising, interaction and formal and informal networking available to those who work flexibly including working from home;

20. ensure promotion, recognition and reward are not solely linked with those doing long/full-time working hours;

21. ensure the leadership and management team model good work/life balance;

22. offer flexibility options broadly rather than just to women with carer responsibilities and ensure the culture of the organisation does not undermine respect and advancement options for those who use flexible arrangements; and

23. ensure the selection criteria for those being sponsored for registration, certification or accreditation are inclusive and that women are not under-represented in the number of professionals being provided with employer-provided support for undertaking the process.
To address the disadvantage that can arise from taking a career break

24. ensure pay reviews do not create extended disadvantage for women taking a career break - that is, no recognition or reward in the year preceding and year following maternity leave;

25. ensure compliance with return to work rights after a career break including the right to return to the same job as well as keep-in-touch arrangements and support for reintegration into the workforce on return to work;

26. put in place measures that support those on a career break including keep-in-touch arrangements, not deactivating email accounts, providing a handover period and notification of team and organisational changes, and on return to work, training as needed and project work that provides challenges, debriefings where meetings occur on non-work days and time to get back up-to-speed on return;

27. count paid and unpaid parental leave as service with no break in employment;

28. utilise the enterprise bargaining process to include additional paid parental leave in enterprise agreements;

29. offer paid parental leave to women and men and offer options to take parental leave concurrently; and

30. make wording on parental leave neutral on who provides the care (rather than primary and secondary carers).

To address unconscious bias in decision-making and recruitment

31. ensure inclusive recruitment, retention and promotion strategies by reviewing recruitment practices for unintended or unconscious bias. Work packages for senior, team leader and project manager roles, for example, should address work/life balance issues (such as role being available on a part-time basis and/or with flexible hours), use gender-neutral language and set out clear criteria for advancement; and

32. ensure accountability in recruitment processes and training in identifying unconscious biases where needed. Track and measure outcomes in hiring practices.

To address gender discrimination and sexual harassment

33. ensure a clear policy that accepts it is the employer’s responsibility to provide a safe workplace and to prevent sexual harassment and bullying in the workplace;

34. make it clear that sexual harassment is included the definition of serious misconduct and a basis for dismissal;

35. ensure a clear policy on the right to work free from sexual harassment in the workplace;

36. ensure individuals are not expected to “call out” discrimination and sexist behaviours and practices - rather that a broader strategy for organisation-wide cultural change and a systemic approach are in place. The former approach encourages backlash against individuals and simply leads to women leaving the workplace;

37. a sexual harassment complaints procedure is essential but not sufficient to deal with women’s safety in the workplace - ensure sexual harassment complaints procedure is transparent, objective and administered by trained personnel and protected by confidentiality and privacy arrangements;

38. ensure psychosocial hazards and injuries such as sexual harassment are considered as being equally as important as physical health and safety hazards and injuries in the workplace;

39. ensure removing the person being harassed from the area is not seen as a solution and that the individual investigating the complaint is at arms’ length from the person about whom the complaint is being made;

40. in cases where a manager is the subject of a sexual harassment complaint, ensure that individual is not appointed as the individual who will hear the complaint and decide the matter;

41. ensure appropriate training and performance counselling for a perpetrator;

42. ensure appropriate training including role plays and role reversals for staff generally (not a box ticking exercise);

43. ensure there is no penalty for an individual raising a complaint; and

44. ensure sexual harassment policies are working for the people they are meant to protect and monitor whether the reporting mechanisms are working.
To address gender stereotyping

45. ensure stereotypical assumptions of women with and without caregiver responsibilities as less serious about their careers or less suited to work in STEM fields are called out/not condoned and do not impact advancement opportunities or create bias in recruitment, promotion and development;

46. ensure women do not disproportionately undertake administration or support activities; and

47. ensure the technical expertise of women is respected at the leadership and management levels and not second-guessed at operational level.

To address the retirement savings gap

48. embed the superannuation guarantee increases into enterprise agreements;

49. include superannuation payments for paid and unpaid leave component of parental leave; and

50. encourage access to flexible work arrangements for those with carer responsibilities including those at senior level to encourage full-time flexible work options to maximise retirement savings.
ABOUT THE SURVEY

The Professional Engineer Remuneration Survey was conducted online during April/May 2019 using the present Engineering member base of Professionals Australia. Non-members were also invited to participate in the survey through a combination of social media and direct e-mail. Non-member Engineers contacted were those that had previously demonstrated interest in the association’s remuneration reports, surveys or campaigns. In total, 2,806 responses were used for the analyses contained in this report.

Duplicate responses were screened for using a variety of variables collected during the survey in conjunction with IP addresses associated with each response. Where a duplicate was identified the most complete response was retained.

Participants were not required to answer all questions in full. As a result many questions have a different sample size reported and the sum of all returned data in any given table may not add up to the total number of responses received. Where a specific analysis has less than three responses no results are reported. Means are reported where there are three or more responses and quartiles where there are four or more responses.

In order to provide comprehensive information on Professional Engineers’ remuneration, Professionals Australia publishes its main Engineering survey report annually. The survey is the largest of its kind undertaken in Australia and as such represents an authoritative picture of the remuneration and employment conditions of Professional Engineers.

The full report is available for only $330.00 (inc. GST). Purchase by visiting the following link https://www.professionalengineers.org.au/Engineers/What_we_do/Our_Services/Remuneration/Engineers/Content/Services_Content/Pay.aspx.

ABOUT US

Professionals Australia is an association that represents the industrial and professional interests of more than 24,000 members including professional Engineers, scientists, managers, architects, contractors and consultants and more.

Our members are employed in all sectors of the Australian economy, throughout all levels of government and across the private sector. Our professional Engineer members perform design, scoping and project management roles across essential industries and services in Australia, including roads, rail, local government, IT, water, power, construction, mining, oil and gas exploration, manufacturing and more.

Professionals Australia began as the Association of Professional Engineers, Australia (APEA) which formed in 1946 and registered as an industrial association in 1948. APEA was the first organisation to ensure that professionals were recognised and rewarded for the high-value work they do. The Professional Engineers Case finalised in 1961 saw Engineers across Australia receive salary increases averaging more than 40 per cent. Even more importantly it set the precedent for work value and benchmark salaries for professionals.

Professionals Australia has Government approval as an assessment entity for the only mandatory Engineering registration scheme in Australia – the Registered Professional Engineers of Queensland (RPEQ). Professionals Australia offer assessment in the areas of Civil, Electrical, Information, Technology and Telecommunications, Management, Mechanical and Structural Engineering.

Professionals Australia is a not-for profit organisation and is owned by its members.

<table>
<thead>
<tr>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,520</td>
</tr>
<tr>
<td>286</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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REFERENCES

12. All these discipline breakdowns are from Department of Jobs and Small Business, Job Outlook. Available at A-Z https://joboutlook.gov.au/.


27. Note that the 2020 survey findings about the gender pay gap were inconclusive so the 2019 survey is the reference for the data in this report. Professionals Australia (2019). Professional Engineers Employment and Remuneration Report.


29. Source: Department of Education and Training - Higher Education Statistics Data Cube (uCube) which is based on the student and staff data collections.


WOMEN IN ENGINEERING - AN ACTION PLAN FOR ADDRESSING THE KEY DRIVERS OF ATTRITION OF WOMEN FROM THE ENGINEERING WORKFORCE

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