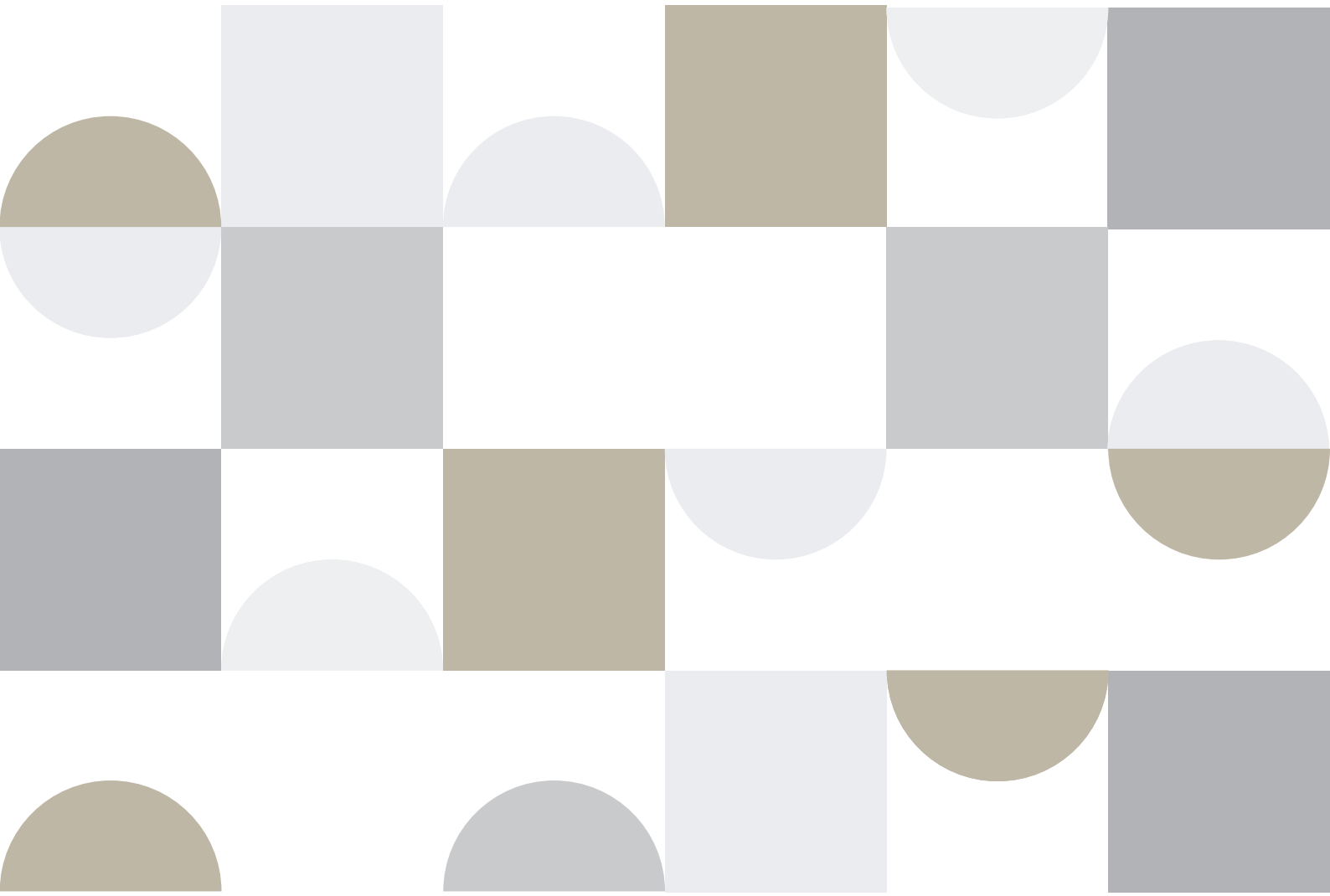
Australian Government

# STEM EQUITY MONITOR

## Data Highlights 2021



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These data highlights are compiled from the *STEM Equity Monitor* available at www.industry.gov.au/stemequitymonitor.

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## 2019-20 RESULTS – YOUTH IN STEM (12-17 YEAR OLDS)

| | SCIENCE | TECHNOLOGY | ENGINEERING | MATHEMATICS |
|---|---|---|---|---|
| **IMPORTANCE OF STEM SKILLS FOR GETTING A GOOD JOB** | | | | |
| ♀ GIRLS | 72% | 79% | 55% | 79% |
| ♂ BOYS | 70% | 78% | 68% | 75% |
| **CONFIDENCE IN STEM SUBJECTS** | | | | |
| ♀ GIRLS | 62% | 56% | 33% | 64% |
| ♂ BOYS | 61% | 70% | 55% | 64% |

## STEM WOMEN AT UNIVERSITY

**2019 UNDERGRADUATE ENROLMENTS AND COMPLETIONS**

- % OF UNIVERSITY STEM ENROLMENTS: ♀ 36%
- % OF UNIVERSITY STEM COMPLETIONS: ♀ 38%

**2020 UNDERGRADUATE EARNINGS**

The median income was similar for women and men who graduated from undergraduate courses in all STEM fields.

**2020 POSTGRADUATE EARNINGS**

Women earned less than men in all 4 STEM fields following postgraduate coursework.

## 2020 WOMEN RESEARCHERS

**28%** OF RESEARCH WORKFORCE

| ARC | NHMRC |
|---|---|
| 24% | 35% |

% of women chief investigators on applications funded by ARC and NHMRC

## 2020 WOMEN AT LEVEL E

**18%**

PATHWAY

SCHOOLING → UNDERGRADUATE/VOCATIONAL EDUCATION AND TRAINING → POST EDUCATION → ENTRY LEVEL CAREER → ACADEMIA → PROFESSOR

STEM WORKFORCE → LEADERSHIP

## 2020-21 RESULTS – PARENTS, TEACHERS & CAREER ADVISERS

| | SCIENCE | TECHNOLOGY | ENGINEERING | MATHEMATICS |
|---|---|---|---|---|
| **IMPORTANCE OF STEM SKILLS FOR GETTING A GOOD JOB** | | | | |
| ♀ MOTHERS | 78% | 87% | 72% | 90% |
| ♂ FATHERS | 84% | 91% | 79% | 87% |
| ♀ SECONDARY STEM TEACHER - WOMEN | 91% | 96% | 72% | 96% |
| ♂ SECONDARY STEM TEACHER - MEN | 91% | 84% | 83% | 96% |
| **PARENTS' PERCEPTIONS OF BOYS' AND GIRLS' CONFIDENCE IN STEM SUBJECTS** | | | | |
| ♀ GIRLS MORE CONFIDENT | 9% | 5% | 3% | 11% |
| ♂ BOYS MORE CONFIDENT | 24% | 35% | 51% | 23% |
| **EDUCATORS' PERCEPTIONS OF BOYS' AND GIRLS' CONFIDENCE IN STEM SUBJECTS** | | | | |
| ♀ GIRLS MORE CONFIDENT | 5% | 3% | 2% | 7% |
| ♂ BOYS MORE CONFIDENT | 29% | 40% | 61% | 33% |

## STEM WOMEN IN VET

**2019 VET STEM ENROLMENTS AND COMPLETIONS**

- % OF VET STEM ENROLMENTS: ♀ 15%
- % OF VET STEM COMPLETIONS: ♀ 19%

**2020 VET STEM GRADUATE EARNINGS**

Women earned less than men after graduating from 3 out of 4 STEM fields

## 2020 STEM-QUALIFIED INDUSTRIES

**STEM-QUALIFIED INDUSTRY EMPLOYEES**

♀ 28% WOMEN

**GENDER PAY GAP**

- 20% ALL INDUSTRIES $29,071 p.a.
- 19% ALL STEM INDUSTRIES $25,558 p.a.

**STEM-QUALIFIED OCCUPATIONS**

♀ 13% WOMEN

## 2020 WOMEN IN LEADERSHIP POSITIONS

**REPRESENTATION OF WOMEN AT SENIOR LEVELS IN MOST STEM INDUSTRIES**

23%

**REPRESENTATION OF WOMEN AT CEO/HEAD OF BUSINESS LEVEL IN STEM-QUALIFIED INDUSTRIES**

11%

# ACKNOWLEDGEMENTS

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The department would like to thank the following agencies, departments and other organisations who contributed data that has been used for the *STEM Equity Monitor*:

- The Australian Antarctic Division (AAD)
- Australian Bureau of Statistics (ABS)
- Australian Curriculum, Assessment and Reporting Authority (ACARA)
- The Australian Centre for International Agricultural Research (ACIAR)
- The Australian Institute of Marine Science (AIMS)
- Australia's Nuclear Science and Technology Organisation (ANSTO)
- Australian Public Service Commission (APSC)
- Australian Research Council (ARC)
- The Bureau of Meteorology (BoM)
- The Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Department of Education, Skills and Employment (DESE)
- The Defence and Science Technology Group (DST)
- Geoscience Australia (GA)
- National Centre for Vocational Education Research (NCVER)
- Organization for Economic Co-operation and Development (OECD)
- National Health and Medical Research Council (NHMRC)
- The Social Research Centre
- Youth Insight – Student Edge
- Workplace Gender Equality Agency (WGEA)

We would also like to thank the Office of the Chief Scientist, Australia's Women in STEM Ambassador (Professor Lisa Harvey-Smith), and all those who have contributed support and advice through the development of the *Monitor*.

# ABOUT THE MONITOR

This is the second edition of the *STEM Equity Monitor* (the *Monitor*), a national data report on girls' and women's participation in science, technology, engineering and mathematics (STEM). It presents the current state of gender equity in STEM in Australia. It can be used to measure change and trends over time in key sectors and career phases of girls' and women's engagement with STEM.

The *Monitor* follows the pathway of girls' and women's participation in STEM through:

- schooling
- higher education
- graduate outcomes
- the workforce.

The *Monitor* collects and integrates data from a range of sources and brings them together in one place. Each section highlights particular areas of interest and some high-level observations from the data. As the relevant issues are different for each stage of the pathway, data examined in each section is not comparable to other sections.

## STEM DEFINITIONS AND GENDER DATA LABELS

The *Monitor* defines STEM as science, technology engineering and mathematics and uses the relevant education fields sourced from the Australian Standard Classification of Education (ASCED). This is consistent with the approach taken in the report, *Australia's STEM workforce* (Office of the Chief Scientist 2016). It also matches these to research fields from the Australian and New Zealand Standard Research Classification (ANZSRC). Further, it considers an occupation or industry to be STEM-qualified if the majority of people in the occupation or industry reported a qualification in a STEM field of education in the 2016 *Census of Population and Housing* (ABS 2016).

However, the *Monitor* also recognises that STEM-qualified graduates work in wide range of sectors across the workforce, including health fields. The *Monitor* does not include health in the definition of STEM. However it is recognised as a closely related field that people with STEM qualifications may enter and is often included in broader definitions of STEM. The full web version of the *Monitor* allows users to combine health and STEM data, for results on STEMM – science, technology, engineering, mathematics and medicine.

The terms 'women' and 'men' (and 'girls' and 'boys' for minors) encompass cisgender (personal gender identity corresponding with sex assigned at birth), transgender, non-binary and intersex persons who identify as women (girls) or men (boys). There may be instances of data which have been collected and recorded by sex. However, consistent with the *Australian Government guidelines on the recognition of sex and gender* (Attorney-General's Department 2015) and for consistency, the terms gender, women and men will be used throughout.

## DATA INTERPRETATION AND METHODOLOGY

When interpreting data reported in the *Monitor*, it should be noted that significance testing has not been carried out.

The full methodology and a comprehensive list of sources and definitions can be found in the Methodology section of the full version of the *STEM Equity Monitor*.

## STEM and gender definition references

ABS (Australian Bureau of Statistics) (2016) *Census of Population and Housing*, ABS, Australian Government, accessed 29 October 2019.

AGD (Attorney General's Department) (2015) *Australian government guidelines on the recognition of sex and gender*, AGD, Australian Government, accessed 24 September 2019.

OCS (Office of the Chief Scientist) (2016) *Australia's STEM workforce*, OCS, Australian Government, accessed 29 January 2020.

# SCHOOLING

## KEY INFLUENCERS' ATTITUDES AND PERCEPTIONS

Development of confidence and interest in STEM begins at a young age and can be influenced by many factors. Understanding the perceptions and attitudes to STEM of key influencers such as parents and educators, will help inform how to further support girls and women to engage in STEM and to consider future STEM-related careers.

Almost 1,500 parents and 850 educators were surveyed by YouthInsight, to help provide these insights.

### KEY DATA ON STUDENT EDGE PARENTS AND TEACHERS RESULTS

The survey found a strong correlation between parents' own employment and education circumstances and their perceptions and attitudes to STEM and their children's study and careers. A significantly larger proportion of fathers reported having higher education qualifications compared to mothers (68% of fathers, 54% of mothers). This gap was even greater when focusing on STEM with fathers more than twice as likely to have a STEM qualification as mothers (47% of fathers, 20% of mothers). Similarly, men educators were more likely than women to obtain a STEM qualification prior to teaching (47% of men, compared to 33% of women). STEM qualifications were also more common among secondary teachers of STEM (60%) compared to secondary teachers who do not teach STEM (31%).

#### STEM IMPORTANCE

The majority of parents agreed that a STEM-skilled workforce is important for the Australian economy (90%). They were also in agreement that mathematics (89%) and technology skills (89%) are important for future employment. Fathers recorded higher levels than mothers of perceived importance across the STEM subjects.

Almost all educators agreed that STEM skills are important for the Australian economy (97%) and that STEM skills will provide job security to future workers (89%), irrespective of whether a teacher was actively teaching STEM subjects or not. There were some gender differences around the importance of specific subjects, with men educators being more likely than women to say science (31% more likely) and engineering (43% more likely) are very important to acquire a good job in the future.

#### STEM ENGAGEMENT

Seventy-eight per cent of parents said they had a general interest in STEM, with technology (79%) and science (76%) the most popular subjects. Interest levels were higher among fathers compared to mothers across all STEM subjects.

Almost half (45%) of all parents reported having at least weekly discussions with their children about STEM topics and 15% reported they did not discuss STEM with their children at all. Weekly conversations were more common among fathers (51%) compared to mothers (38%) and among parents of boys compared to parents of girls (47% for boys, 42% for girls). STEM conversations were also found be more frequent among families where at least one parent works in a STEM-related occupation (59%) compared to those in non-STEM careers (43%). Three quarters (76%) of parents reported having medium to high confidence in their ability to support their children with STEM. Parents reported the least confidence in engineering (61%). A significantly higher proportion of fathers (85%) also reported to be confident in supporting their children with STEM school work compared to mothers (67%). For educators, 90% of men felt qualified to teach at least one STEM topic area compared with 80% of women.

#### STUDENT GENDER AND STEM CAREERS

Most educators believed boys and girls are equally confident in science (66%), technology (57%) and mathematics (60%), but not in engineering (37%). Across all STEM subjects, where educators perceived a gendered difference in confidence this was heavily skewed towards boys, for example:

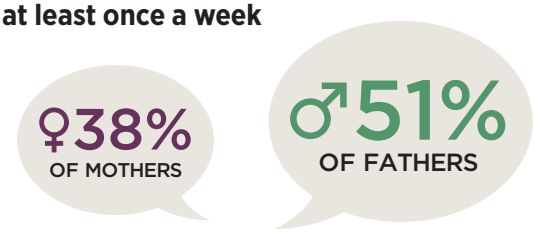
- science – 29% believed boys are more confident, 5% believed girls are more confident
- technology – 40% believed boys are more confident, 3% believed girls are more confident
- engineering – 61% believed boys are more confident, 2% believed girls are more confident
- mathematics – 33% believed boys are more confident, 7% believed girls are more confident
- arts – 58% believed girls are more confident, 1% believed boys are more confident
- English – 61% believed girls are more confident, 1% believed boys are more confident.

Half of all parents (52%) agreed that it's easier to engage boys in STEM compared to girls. Parents of boys were more likely to agree with this than parents of girls. Forty per cent of parents agreed that it's easier to engage girls in STEM compared to boys.

When presented with two opposing statements that 'boys or girls have a better chance to succeed in STEM', fathers were just as likely to agree that boys have a better chance to succeed in STEM (52%), as they were to say that girls have a better chance (48%). In contrast, a higher proportion of mothers agreed that boys have a better chance of success in STEM compared to girls (39% for boys, compared to 29% for girls).

Engineering was the most recommended STEM career by educators for both boys and girls. However, educators were significantly more likely to recommend engineering (70% for boys, 50% for girls) and trade careers (18% for boys, 2% for girls) to boys than girls. Science (27% for girls, 18% for boys) and health careers (33% for girls, 19% for boys) were more likely to be recommended to girls, compared to boys.

**Percentage of parents who discuss STEM at least once a week**




**Engineering is the most recommended STEM career**

## IN FOCUS: ENGAGING ABORIGINAL AND/OR TORRES STRAIT ISLANDER GIRLS IN STEM

Qualitative research by YouthInsight, commissioned by the Department of Industry, Science, Energy and Resources, sought the views and experiences of educators on engaging Aboriginal and Torres Strait Islander girls in STEM.

High level findings from the interviews identified specific challenges and opportunities to help educators and policy makers support Aboriginal and Torres Strait Islander girls engage with STEM education and consider future STEM-related careers. Educators highlighted the importance of building confidence, greater visibility of STEM role models, and awareness of opportunities among all Aboriginal and Torres Strait Islander students. However, they felt this was more important for the girls. Gendered expectations of career opportunities for girls were also noted to be a barrier to engaging in STEM.

However, the majority of barriers that were common to all Aboriginal and Torres Strait Islander students, were not gender specific and extended beyond STEM to broader education. These included:

- lower rates of numeracy and English literacy
- feelings of shame, self-doubt and impacts of intergenerational trauma
- time and distance away from family and country, and schooling
- disconnect with western education
- challenges of ensuring culturally appropriate learning environments and styles
- complexities of incorporating Aboriginal and Torres Strait Islander knowledge in a meaningful and appropriate way.

For more information, view 'In focus: Engaging Aboriginal and/or Torres Strait Islander girls in STEM' in the web version of the *Monitor*.

## Schooling data sources

YouthInsight (2020–21a), *Youth in STEM research – Parents' perceptions and attitudes to STEM survey*, report to the Australian Government Department of Industry, Science, Energy and Resources, Student Edge, accessed 25 March 2021.

—— (2020–21b) *Youth in STEM research – Teachers' perceptions and attitudes to STEM survey*, report to the Australian Government Department of Industry, Science, Energy and Resources, YouthInsight, accessed 25 March 2021.

—— (unpublished) *2020–21 STEM Influencer – Aboriginal and/or Torres Strait Islander educator survey*, report to the Australian Government Department of Industry, Science, Energy and Resources, YouthInsight, accessed 25 March 2021.

—— (2019–20) Youth in STEM research 2019–20, report to the Australian Government Department of Industry, Science, Energy and Resources, accessed 26 March 2020.

# HIGHER EDUCATION

## UNIVERSITY AND VET ENROLMENTS AND COMPLETIONS

Students who study STEM at primary and secondary school may choose to enrol and continue their STEM studies through university or through vocational education and training (VET). Understanding how women participate in STEM higher education can assist the government and other sectors to provide better targeted support for women as they progress from schooling through to the workforce. In addition, it can help focus support on particular fields and education types.

### KEY DATA ON UNIVERSITY AND VET ENROLMENTS AND COMPLETIONS

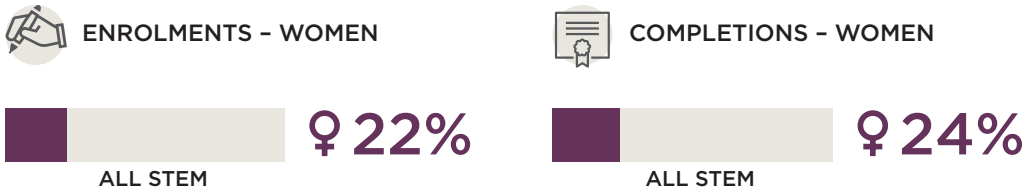
Between 2015 and 2019, approximately 9% of women enrolled in university and VET higher education were enrolled in STEM. Between 8% and 9% of women who completed university or VET qualifications over the same period did so in STEM.

When considering university and VET together, women comprised only 22% of total STEM qualification enrolments and 24% of total STEM qualification completions in 2019. In comparison, women comprised 57% of total non-STEM qualification enrolments and 58% of total non-STEM qualification completions in 2019.

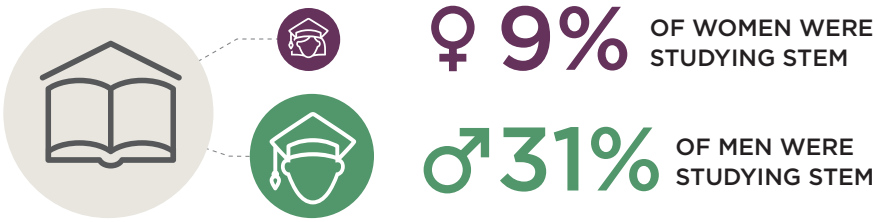
At university, women comprised 36% of STEM qualification enrolments and 38% of STEM qualification completions in 2019. In contrast, women comprised 61% of students in non-STEM university qualification enrolments and completions. This was the highest proportion in the period of data presented (2015 to 2019).

In 2019, participation of women in STEM VET qualification was particularly low — only 15% of enrolments and 19% of completions. Similar to non-STEM university participation, women comprised more than half of students in non-STEM VET qualification enrolments and completions in the same year.

**Women were underrepresented as a proportion of total STEM enrolments and completions in 2019**




**Of all higher education enrolments in 2019**




### Higher education data sources

DESE (Department of Education, Skills and Employment) (n.d.) 'Enrolment and completion by gender and year and field of education by course level' [data set], *Higher Education Statistics uCube*, DESE website, accessed 26 October 2020.

NCVER (National Centre for Vocational Education Research) (2020) 'VET enrolments and completions by gender and year and field of education' [data set], *DataBuilder*, NCVER website, accessed 2 November 2020.

# GRADUATE OUTCOMES

## UNIVERSITY AND VET GRADUATE OUTCOMES

Successful transition into the workforce can be impacted by job availability and working and pay conditions. Understanding graduate employment outcomes for STEM-qualified women can provide valuable insights into factors that continue to affect women's progression and retention in STEM.

### KEY DATA ON UNIVERSITY AND VET GRADUATE OUTCOMES

In 2020, women who graduated with VET STEM qualifications and entered the workforce as full-time employees earned a lower median income than men in 3 of the 4 STEM fields. The only STEM field where women's full-time median income was higher than men was 'Information technology'.

Women's (with STEM VET qualifications) full-time median incomes were:

- Agriculture, environmental and related studies — $47,000 ($5,000 less than men)
- Engineering and related technologies — $56,000 ($8,000 less than men)
- Natural and physical sciences — $45,000 ($12,000 less than men)
- Information technology – $59,000 ($7,000 more than men).

Of people entering the workforce from all VET fields of education, the median full-time annual income was $52,000 for women and $65,000 for men.

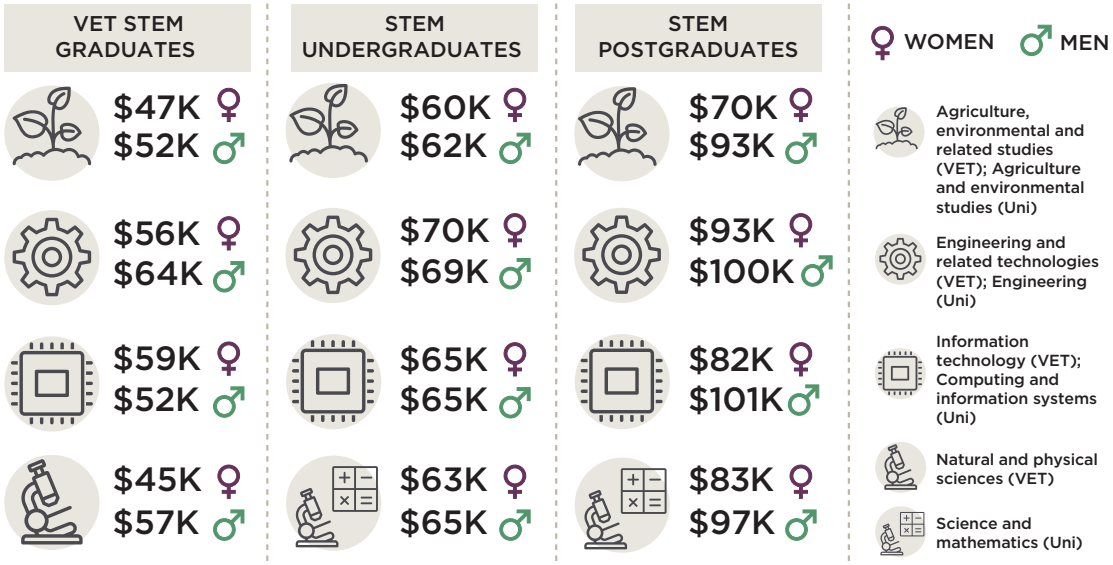
In 2020, women and men with undergraduate STEM university qualifications had similar median incomes.

In the same year, women who completed postgraduate coursework in STEM fields earned less median income than men in:

- Agriculture and environmental studies — $70,000 ($23,000 less than men)
- Science and mathematics — $83,000 ($14,000 less than men)
- Computing and information systems — $82,000 ($19,000 less than men).

This data does not reveal the occupation the graduate enters into or include part-time annual income information. For VET data used here, income values have been rounded and are presented as medians. Margins of error may impact results.

**In 2020, women earned less annual median income than men as VET STEM graduates, STEM postgraduates and similar amounts as STEM undergraduates**



# GRADUATE OUTCOMES

## LONGITUDINAL ANALYSIS OF 2011 GRADUATES

Over the first 5 years following graduation, people face many circumstances which lead them into different types of jobs and different ways in which working fits into their lives. These circumstances do not only depend on whether they pursue STEM beyond graduation. They also depend on whether people work part-time or full-time, have caring responsibilities and how much they earn. How these circumstances play out can also be impacted by a person's gender.

The ability to understand the progression of people following graduation from university provides significant insights that are unique to longitudinal data. Longitudinal analysis by the Australian Bureau of Statistics, commissioned by the Department of Industry, Science, Energy and Resources, looks at university graduates from 2011 and their first 5 years of transition into and through the workforce by examining the 2016 *Census of Population and Housing* and other data. Future editions of the *Monitor* will continue to examine the outcomes of this cohort, 10 and 15 years following graduation, as they progress further into their careers.

### KEY DATA ON ABS LONGITUDINAL DATA

In 2011, approximately 161,000 people graduated with a university qualification. Women accounted for 61% of these graduates. In the same year, graduates who received a STEM qualification accounted for 16% of the total number of university graduates. Women accounted for 38% of these STEM graduates.

By 2016, of the 2011 STEM graduates, men were 1.8 times more likely to be working in a STEM-qualified occupation (47% of men, compared to 26% of women).

When looking at the industry they were working in by 2016:

- 1 in 10 women with a STEM qualification worked in a STEM-qualified industry
- more than 1 in 5 men with a STEM qualification worked in a STEM-qualified industry.

In 2012–13, two years after graduating with their STEM qualification, 70% of the women who were employed in that year had an annual income of less than $50,000. Only 10% earned $75,000 or more. By comparison, 50% of employed STEM-qualified men earned less than $50,000, and 21% earned $75,000 or more.

By 2015–16, the proportion of employed men who earned $75,000 or more (38%) was almost double the proportion of women with that income (20%). Men were also 2.6 times more likely to have earned $100,000 or more than women (17% and 7% respectively) in 2015–16.

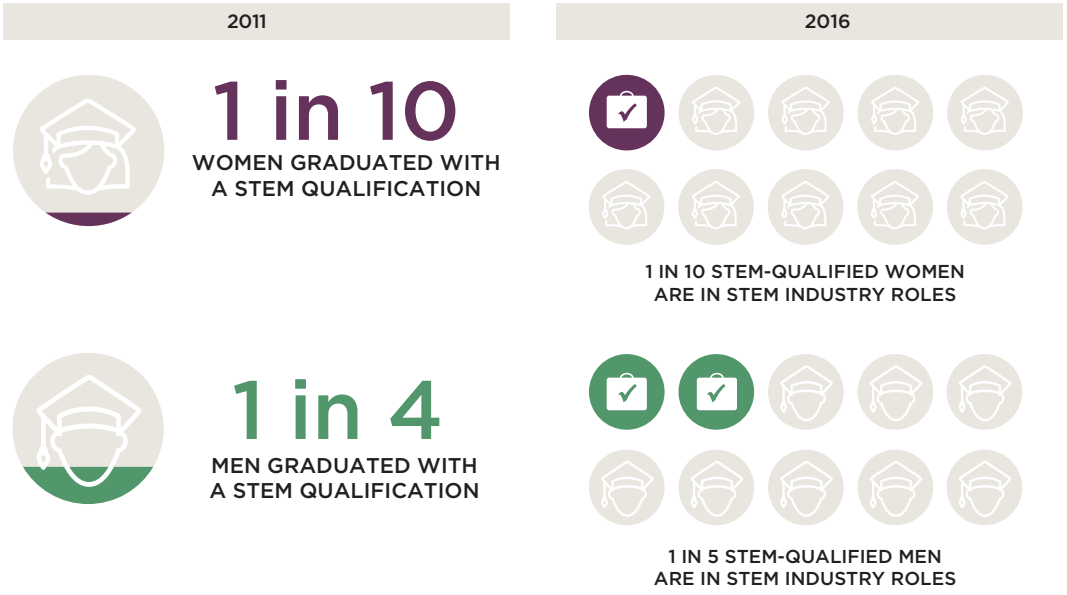
Notably, women were more than 3 years behind men in reaching earnings of $50,000 a year, with 50% of men earning over this threshold in 2012–13, compared to only 45% of women in 2015–16.

Employed STEM-qualified women were twice as likely to work part-time compared to STEM- qualified men (26% of women, 13% of men). Of the cohort of all STEM-qualified women (full-time and part-time), 17% were providing unpaid childcare to their own or other children, compared to 19% of men.

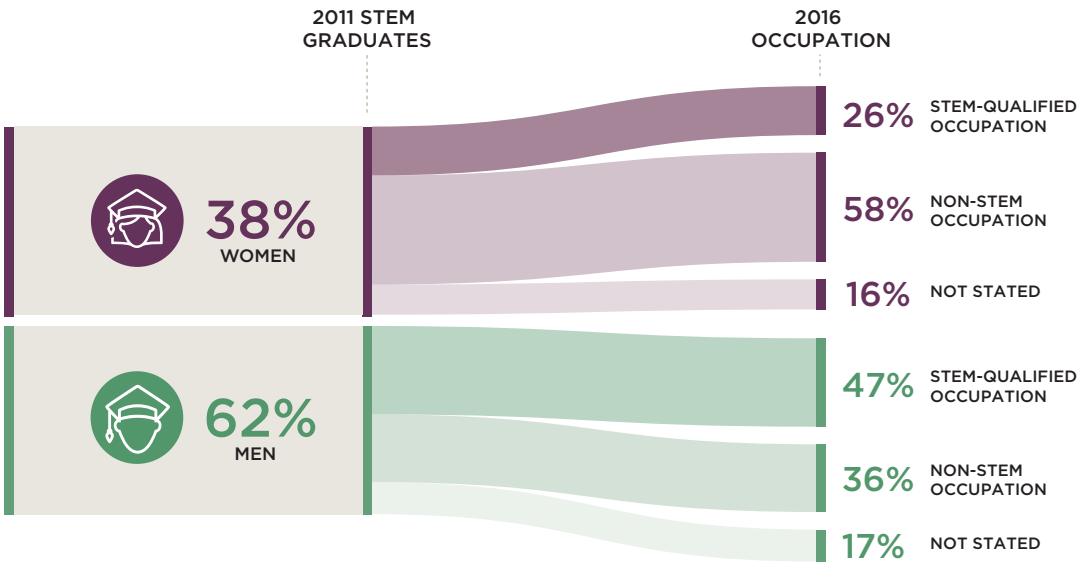
Nearly 13% of women with a STEM qualification were not in the labour force (NILF) and 3.6% were unemployed in 2016. This compares with 8.6% of men with a STEM qualification not in the labour force and 4.2% unemployed. Of women who were not employed (i.e. NILF or unemployed), 28% were providing unpaid childcare to their own or other children, compared to 10% of men in the same cohort.

In addition to showing the labour force and caring outcomes for the 2011 graduates, this data also provides context for the gender income gap data (described above).

## Men STEM graduates are more likely to end up working in STEM industry roles




## Five years after graduating, men were 1.8 times more likely to be working in a STEM-qualified occupation



# GRADUATE OUTCOMES

## CAREER BREAK ANALYSIS

Many people will take a career break during their time in the workforce for reasons such as:

- the arrival of a child
- unemployment
- returning to study

With women more likely to take a career break than men, it is important to understand what impacts these breaks may have on a career. These impacts are particularly important to know in fields where women are underrepresented such as STEM. Knowing these impacts help inform workplace and policy settings, so that any resulting barriers to retention and progression in STEM can be addressed.

## KEY DATA ON CAREER BREAK ANALYSIS

Across the 2011 university graduate cohort, women were more likely than men to take one or more career breaks over the data period from 2012 to 2016 (40% for women and 32% for men). This includes breaks (indicated by social security payments) for further study, the arrival of a child or a period of unemployment or very low income.

This was also the case for STEM graduates. Approximately half (49%) of women and a third (33%) of men took a career break over the same period.

**Arrival of a child**

STEM-qualified women were more likely than STEM-qualified men to take a break during the data period (2012 to 2016) for the arrival of a child (10% of women and 5% of men). All STEM graduates were more likely to take breaks for the arrival of a child at the end of the data period (2016), than directly following graduation (2012).

Men working with a STEM qualification who took a career break for the arrival of a child were likely to earn more by 2016, compared to men who didn't. They were also more likely to earn more than women regardless of whether they took a career break. This was the case in both the full and part-time cohorts. For example, 58% of men and 32% of women who took a career break and worked full-time, earned $75,000 or more in 2016.

Both STEM-qualified women and men who took a career break were more likely to end up in a STEM-qualified occupation in 2016 than those who didn't take a career break. Of this group who were in STEM-qualified occupations in 2016, 11% of women and 6% of men took a career break for the arrival of a child during the data period (2012 to 2016).

**Women working full-time in STEM who took a career break for the arrival of a child were likely to earn less by 2016 than those who didn't.**

| | TOOK CAREER BREAK FOR A NEW CHILD | INCOME OVER $75,000 AFTER BREAK |
|---|---|---|
| ♀ WOMEN | 10% | 32% |
| ♂ MEN | 5% | 58% |

| | DIDN'T TAKE ANY CAREER BREAK | INCOME OVER $75,000 BY 2016 |
|---|---|---|
| ♀ WOMEN | 51% | 42% |
| ♂ MEN | 67% | 57% |

## KEY DATA ON CAREER BREAK ANALYSIS (CONT.)

**Period of unemployment or very low income**

STEM-qualified women were more likely than STEM-qualified men to have a period of unemployment or low income over the period from 2012 to 2016 (36% of women and 26% of men). STEM-qualified women and men were far more likely to have a period of unemployment or very low income in the year following graduation (26% of women and 19% of men in 2012), than at the end of the data period (9% of women and 7% of men in 2016).

STEM-qualified women who had a period of unemployment or low income were less likely to be in a STEM-qualified occupation in 2016 than those who didn't, and they were also likely to earn less. For example, of those employed full-time in 2016, 16% of women who had a break and 41% of women who didn't were earning $75,000 or more. STEM-qualified men who had a period of unemployment or low income were also less likely to earn $75,000 or more in 2016, compared to those who didn't (24% compared to 57%).

Of the cohort who were in STEM-qualified occupations in 2016, 25% of STEM-qualified women and 17% of STEM-qualified men experienced unemployment or very low income during the data period (2012 to 2016). It should be noted that this data does not reflect the reasons for these periods of unemployment or very low income.

**Further study**

STEM-qualified women from the 2011 cohort were also much more likely to do further study after their qualification, than STEM-qualified men (27% of women and 16% of men).

STEM-qualified women and men were far more likely to undertake further study directly following graduation (16% of women and 10% of men in 2012) than at the end of the data period (5% of women and 3% of men in 2016).

Eleven per cent of STEM-qualified women and 6% of STEM-qualified men who undertook further study during the data period (2012 to 2016) were in STEM-qualified occupations in 2016.

STEM-qualified women who did further study after their qualification were less likely to be in a STEM-qualified occupation in 2016, than those who didn't, and were also likely to earn less. For example, of those employed full-time in 2016, 14% of women who had a break and 32% of women who didn't, were earning $75,000 or more. STEM-qualified men who had a period of unemployment or low income were also less likely to earn $75,000 or more in 2016, compared to those who didn't (16% compared to 57%).

**Women working full-time in STEM who took a career break for further study were likely to earn less by 2016 than those who didn't.**

| | TOOK CAREER BREAK FOR STUDY | INCOME OVER $75,000 AFTER BREAK |
|---|---|---|
| ♀ WOMEN | 27% | 14% |
| ♂ MEN | 16% | 16% |

| | DIDN'T TAKE ANY CAREER BREAK | INCOME OVER $75,000 BY 2016 |
|---|---|---|
| ♀ WOMEN | 51% | 42% |
| ♂ MEN | 67% | 57% |

## IN FOCUS: UNDERSTANDING THE PROGRESSION OF DIFFERENT DEMOGRAPHIC GROUPS IN STEM

Longitudinal analysis by the Australian Bureau of Statistics, commissioned by the Department of Industry, Science, Energy and Resources, has quantified how people with intersectional identities travelled through the STEM pathway from their graduation from university in 2011 to their occupation in 2016.

The data showed that historically underrepresented demographic groups completed university in 2011 in disproportionately low numbers compared to their proportion of the population. This included Aboriginal and/or Torres Strait Islander peoples (1%), people with disability (6%) and people who spoke languages other than English at home (18%).

The completion of STEM qualifications across demographic groups was fairly consistent within the 2011 cohort, ranging from 15% to 18%. Higher rates of STEM qualifications were completed by people who spoke languages other than English at home (19%). Aboriginal and/or Torres Strait Islander people completed STEM qualifications at lower rates (10%) than all other demographic groups.

Women comprised 61% of all graduates across the 2011 cohort, however they made up 38% of those with a STEM qualification. Distribution of women across demographic groups was mostly between 37% to 42% of STEM graduates, with women with disability having higher representation (46%).

A much smaller proportion of women than men were in a STEM-qualified occupation in 2016 (32% of women STEM graduates and 57% of men). Demographic groups with higher proportions of women STEM graduates in STEM-qualified occupations in 2016 were Aboriginal and/or Torres Strait Islander (29%) and people who only spoke English at home (28%).

The next analysis, to be released in 2023, will follow this cohort through to the 2021 Census, providing insights for 10 years of the STEM pathway following graduation.

For more information, view the 'In focus: Understanding the progression of different demographic groups in STEM' section in the web version of the *Monitor*.

## Graduate outcomes data sources

ABS (Australian Bureau of Statistics) (unpublished) *Women in STEM longitudinal analysis of the 2011 higher education cohort*, analysis provided to the Australian Government Department of Industry, Science, Energy and Resources, ABS, Australian Government, accessed 22 January 2021.

NCVER (National Centre for Vocational Education Research) (unpublished) *Income data*, data set provided to the Australian Government Department of Industry, Science, Energy and Resources, NCVER, accessed 17 February 2021.

—— (2021) 'Total VET student outcomes 2016–2020' [data set], *VOCSTATS*, NCVER website, accessed 17 February 2021.

Social Research Centre (2020) 'Graduate Outcomes Survey (GOS) 2020 National Tables' [data set], *Graduate Employment*, QILT (Quality Indicators for Learning and Teaching) website, accessed 13 January 2021.

—— (unpublished) *Skill utilisation*, data set provided to the Australian Government Department of Industry, Science, Energy and Resources, Social Research Centre, accessed 4 January 2021.

# WORKFORCE

## RESEARCH WORKFORCE AND GRANT OUTCOMES

STEM skills are important for people working in the research workforce, including academic staff who perform research and have teaching responsibilities.

Understanding women's current participation in the STEM research workforce can inform action to build inclusive and diverse workplaces in the future. This has been shown to lead to higher quality science and greater scientific impact.

### KEY DATA ON RESEARCH WORKFORCE AND GRANT OUTCOMES

Women comprised 28% of the university 'teaching and research workforce' in STEM fields in 2020.

While some STEM fields had greater representation of women at junior levels, representation of women at senior levels was extremely low across STEM fields. In 2020, women comprised only 18% of the highest academic seniority level (Level E – Professor).

Women and men researchers in STEM fields had similar success rates in obtaining funding grants from the Australian Research Council (ARC) (26% for women and 25% for men) and the National Health and Medical Research Council (NHMRC) in 2020 (13% for women and 11% for men).

However, fewer women in STEM fields submitted funding applications compared to men:

- 23% of chief investigators on applications submitted for ARC funding were women
- 34% of chief investigators on applications submitted for NHMRC funding were women.

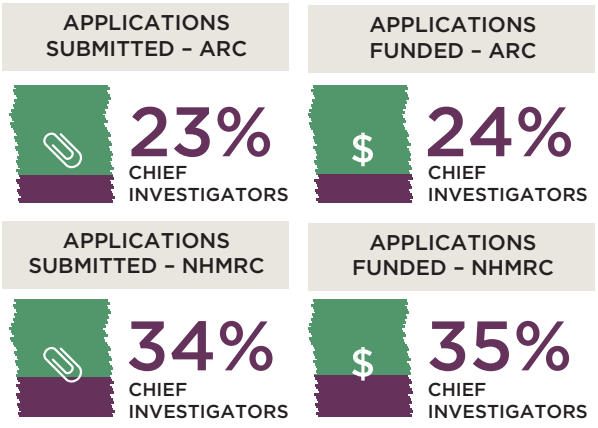
This resulted in an underrepresentation of women in successful research grants:

- 24% of chief investigators on applications funded by ARC were women
- 35% of chief investigators on applications funded by NHMRC were women.

**In STEM fields of research, women account for less than a third of the workforce in 2020**

**28%**
OF RESEARCH WORKFORCE

**Women were also underrepresented in chief investigators applying for and receiving research grants from ARC and NHMRC**




## Research workforce and grant outcomes data sources

ARC (Australian Research Council) (unpublished) *Gender outcomes: National Competitive Grants Program (NCGP) trend data*, data set provided to the Australian Government Department of Industry, Science, Energy and Resources, ARC, accessed 12 January 2021.

DESE (Department of Education, Skills and Employment) (unpublished) *Research staff by field of education, duty classification and year*, data set provided to the Australian Government Department of Industry, Science, Energy and Resources, DESE, Australian Government, accessed 24 February 2021.

NHMRC (National Health and Medical Research Council) (unpublished) *Research funding statistics and data*, data set provided to the Australian Government Department of Industry, Science, Energy and Resources, NHMRC, accessed 7 January 2021.

# WORKFORCE

## INDUSTRIES AND OCCUPATIONS

STEM skills are widely valued and can be used in many different occupations and industries. Understanding women's participation in STEM-qualified occupations and how STEM-qualified industries are taking action to support women's participation, can highlight industries that are driving change and where more effort still needs to occur. (OCS 2020)

### KEY DATA ON INDUSTRIES AND OCCUPATIONS

STEM-qualified industries and STEM-qualified occupations are those where more than half the workforce reported a STEM qualification in the 2016 *Census of Population and Housing*.

Between 2009 and 2020, women's participation in STEM-qualified occupations increased by 2 percentage points, from 11% to 13%. The highest point over this period was in 2019, at 14%.

For comparison, women have comprised almost half of people in non-STEM occupations since 2009 and approximately three-quarters of those in defined health occupations.

In 2020, women comprised 28% of the people working in STEM-qualified industries.

Representation of women at senior levels in most STEM industries (with available data) was low at 23% in 2020. For all but one STEM industry, the proportion of women at senior levels was less than the proportion across all industries (37%). Only the 'Scientific research services' industry had a larger proportion of women (48%) in senior management.

In 2020, women's average full-time remuneration was 19% less than men's in STEM-qualified industries, compared to 20% in all industries. This equates to an average pay gap of $28,994 in STEM-qualified industries, compared to $25,534 across all industries.

Seven of the 12 STEM-qualified industries (with available data) had a smaller pay gap percentage than the average pay gap across all industries.

### Workforce data sources

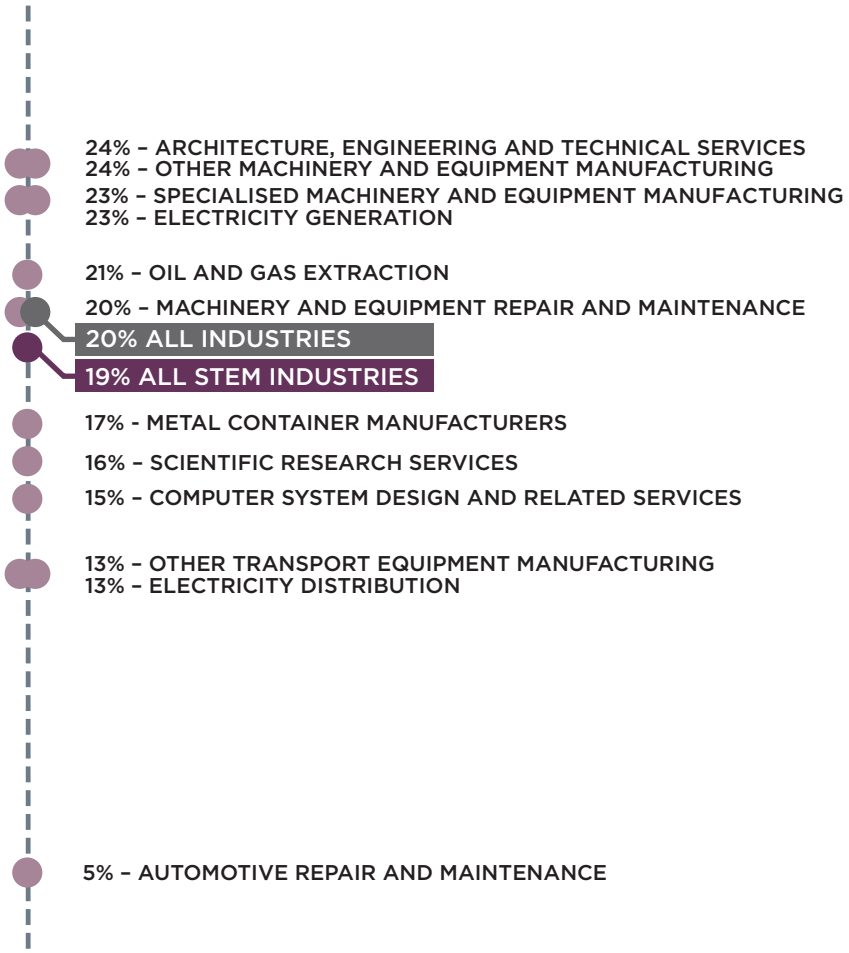

ABS (Australian Bureau of Statistics) (2019) 'EQ08 – Employed persons by occupation unit group of main job (ANZSCO), sex, state and territory, August 1986 onwards' [data table], *Labour Force, Australia, Detailed, Quarterly,* November, cat. no. 6291.0.55.003, ABS website, accessed 16 January 2021.

ABS (Australian Bureau of Statistics) (unpublished) *Women in STEM longitudinal analysis of the 2011 higher education cohort*, analysis provided to the Australian Government Department of Industry, Science, Energy and Resources, ABS, Australian Government, accessed 22 January 2021.

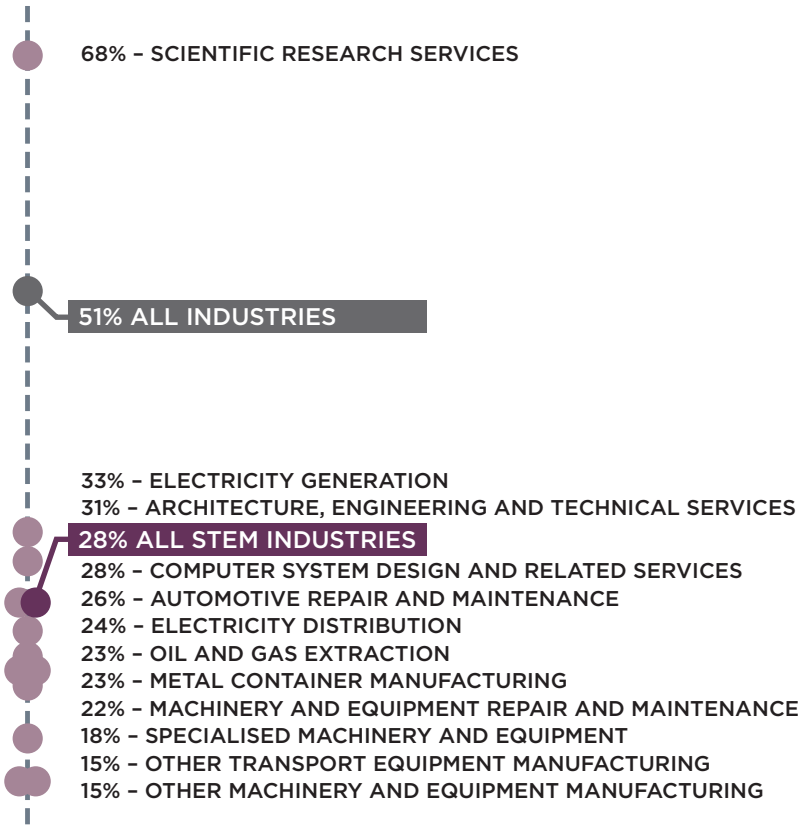
OCS (Office of the Chief Scientist) (2020) *Australia's STEM workforce*, OCS, Australian Government, accessed 29 January 2020.

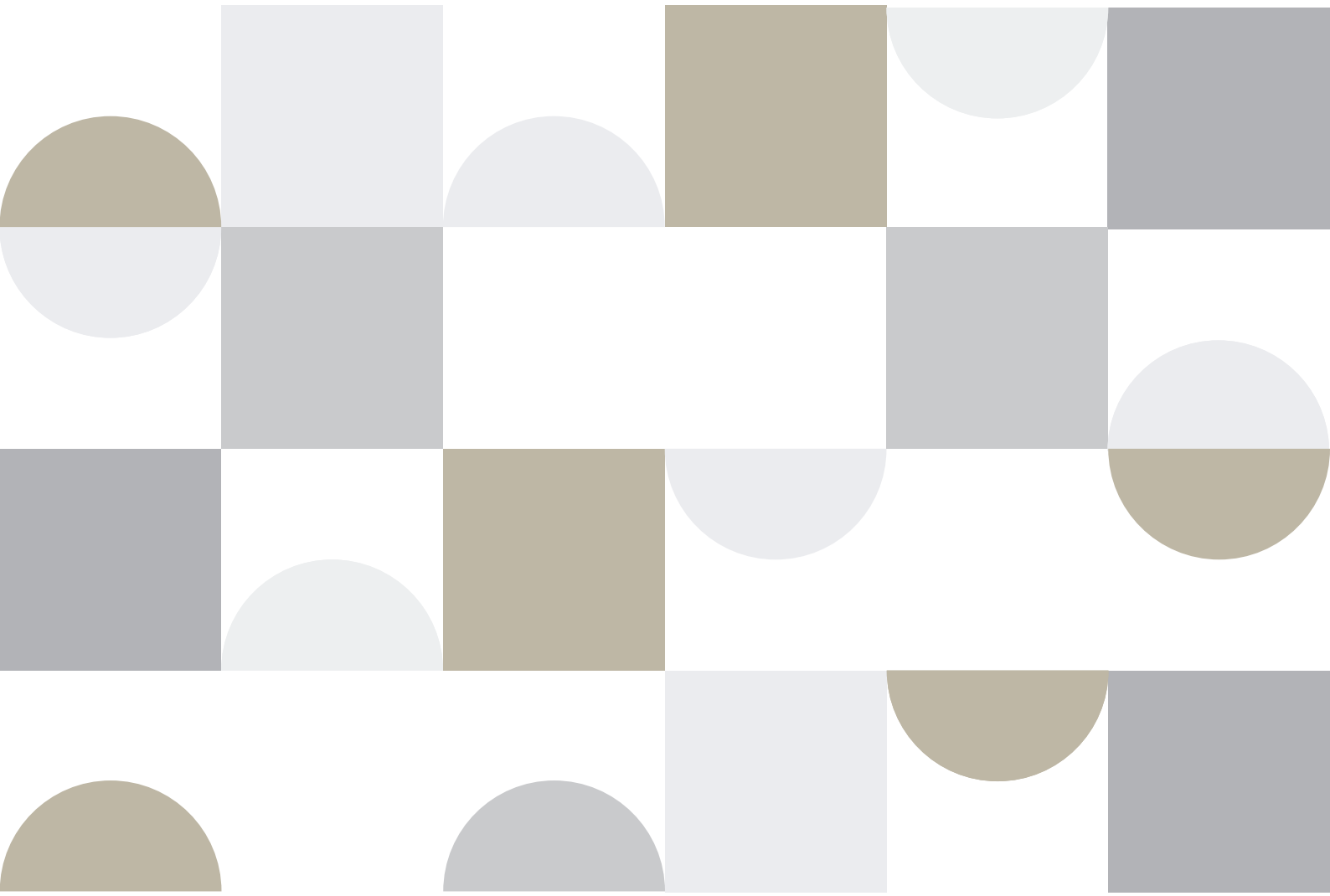
WGEA (Workplace Gender Equality Agency) (unpublished) *WGEA data 2020*, data set provided to the Australian Government Department of Industry, Science, Energy and Resources, WGEA, Australian Government, accessed 19 January 2021.

**The gender pay gap in STEM-qualified industries was $28,994 compared to $25,534 in all industries in 2020**




**The percentage of women in senior management positions was low in most STEM industries in 2020**





industry.gov.au/stemequitymonitor