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# Women in Engineering

## Snapshot 2014

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Women in Engineering

The bottom half of the page features a complex, abstract geometric pattern. It consists of numerous overlapping triangles and polygons in various shades of purple, blue, and grey, creating a faceted, crystalline appearance that resembles a low-poly mesh or a stylized architectural structure.

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## Acknowledgment

IPENZ acknowledges the 19 employers who provided data. Without their input, this report would not have been possible.



# Executive Summary

A survey of 19 employers of over 3,000 engineers shows the recruitment of women into engineering is low, with only 14 per cent being female.

Just 11 per cent of those enrolled in a Diploma of Engineering are female, while females account for 19 per cent of those studying a Level 7 or 8 engineering degree. Female students show preference for particular engineering specialisms, particularly process and resources engineering.

The 19 participating employers have hired 130 new engineering graduates in the past 12 months. Thirty-five per cent of these new hires are female, well above the proportion of women completing engineering qualifications.

Women appear to be under-represented in the IPENZ Professional, Technical and Associate classes of Membership. It is recommended that research be undertaken to determine whether there are barriers to women seeking these Membership classes.

There continues to be few women in technical leader, management or governance roles. Engineering employers are recommended to encourage their female employees to seek senior roles and titles, including IPENZ Fellowships.

Employers of engineers appear supportive of their employees, with the vast majority (over 84 per cent) of the 19 employers offering flexible hours, the ability to work remotely and to work part-time. However, IPENZ recommends engineering employers undertake the following actions to increase their support for diversity:

- Have diversity policies and programmes in place and that these are well-supported with management and governance level buy-in
- Support younger employees and encourage them to have a mentor
- Have part-time positions available that do not affect individuals' career paths or potential for advancement
- Have managers work part-time or flexibly to show that senior - not just junior - roles can be worked part-time or flexibly
- Investigate the uptake of flexible working in their organisation and address any issues identified
- Undertake pay equity audits to investigate gender pay gaps and address any issues raised.

*“Engineering employers are recommended to encourage their female employees to seek senior roles and titles, including IPENZ Fellowships.”*

# Introduction

Since 2011 IPENZ has been working to increase the involvement of women in engineering – at all stages from student to senior management and governance.

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IPENZ launched its women in engineering programme with the following vision: “As a result of its diversity, engineering is seen as making a highly relevant contribution to New Zealand’s economic growth and well-being. The engineering profession is recognised as an employer of the best and brightest. Engineering workplaces are diverse and have exemplary employment practices. The number of engineers is sustainable in the long term.” (IPENZ, 2011)

Monitoring and reporting are key to measuring progress towards the above vision. This report, *Snapshot 2014*, is one way in which progress is measured. *Snapshot 2014* is undertaken to understand gender balance in engineering organisations and the policies and practices engineering employers have in place to support their diverse employees.

The Snapshot survey was first undertaken in 2013. *Snapshot 2013* (IPENZ, 2013) showed women represent approximately 14 per cent of the participating employers’ engineers. Recruitment of female engineers appeared low despite the majority of participating employers using gender-balanced interview panels and more than 80 per cent offering flexibility to their employees, including flexible hours, the ability to work remotely and to work part-time.

*Snapshot 2013* noted a number of areas for improvement across the career continuum. IPENZ recommended employers assist employees, particularly young, less experienced employees, with finding mentors. For mid-career engineers, work was needed to understand the real and perceived limitations on employees who take up flexibility and to investigate an alternative business model so taking career breaks or working flexibly is not seen as career-limiting. Work was also needed to better support female engineers to retain their confidence and competence so they return to the workplace following career breaks. At the experienced end of the continuum, work was needed to increase female representation on organisations’ boards and management teams and in IPENZ Fellowships.

Since *Snapshot 2013*, IPENZ has begun a bi-monthly newsletter, *Engineering Diversity*, for engineering leaders. In these newsletters IPENZ shares best practice and encourages engineering leaders to challenge their thinking and organisations to better support their diverse employees. Through *Engineering Diversity*, IPENZ has encouraged engineering employees to support female engineers to apply for awards and to challenge bias in their organisations. Mentoring and flexible working will be themes of future issues of *Engineering Diversity*.

IPENZ has also continued to deliver Connect networking events, which provide an opportunity for female engineers to network and retain both confidence and connection with the profession.

Investigation has also begun on initiatives to better support mid-career women. Initiatives currently under investigation include mentoring and professional development to maintain an engineer’s knowledge and confidence.

This year’s survey, *Snapshot 2014*, was essentially a repeat of the 2013 survey, with the addition of five questions:

- At your organisation, how many engineering staff have technical leader roles? (This question was added to acknowledge that for some, a technical leader role is their ambition, rather than being a Chief Executive or board member)
- Does your organisation have a diversity council or other group to drive action to support diversity?
- Does your organisation have a programme to help develop potential leaders?
- Does your organisation have a programme to help support or develop female engineers?
- Has your organisation ever undertaken a pay equity audit to check employees’ remuneration is not affected by gender?

Employers were also asked if they were interested in being the subject of a case study. The full survey template is attached in the Appendix.

# Participating Employers

The 19 employers who participated in *Snapshot 2014* are a diverse group and include engineering consultancies, central and local government and engineering manufacturers.

They employ a total of 13,157 staff in New Zealand. The largest employer has over 3,500 employees and the smallest has 17 employees. The average employer has just over 690 employees.

Women represent 30 per cent of the 19 organisations' 13,157 employees. The representation of women ranges from 12 to 52 per cent in the individual organisations.

The 19 employers employ 3,296 engineers. One employer currently has over 800 engineers on staff, while another currently has no engineers on staff. The average participating employer has 178 engineers on staff.

Women make up 14 per cent of the 3,296 engineers employed. At the individual organisation level, the

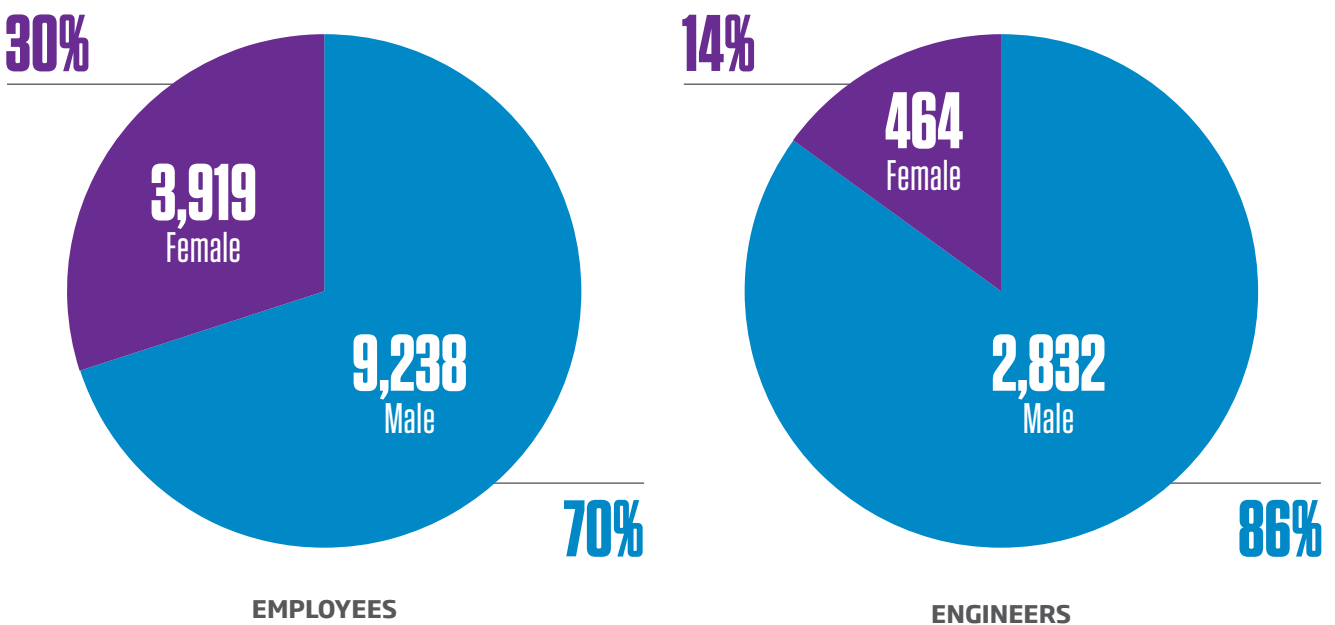
proportion of women on staff ranges from zero to 46 per cent in an organisation (six female engineers in an organisation with a total of 13 engineers on staff).

One employer noted that, "Whilst [their organisation] do[es] not have female engineers, it is not by design, in fact we encourage female employees, and have [...] female surveyors, [...] female planners etc. It is just that females have not applied for work."

Figure 1 summarises the representation of women in the 19 participating employers.

The participating employers are not named in this report to ensure confidentiality.

**Figure 1 - Gender composition of the 19 participating employers**





# Findings

These findings review the participation of women in engineering at all stages of the career continuum – from study through to senior roles in management and governance.

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## Participation at Tertiary Institutions

The participation of women studying engineering at tertiary institutions is shown in Figure 2 (Education Counts, 2014).

These figures are low when compared with other professions, as shown in Figure 3 (Education Counts, 2014).

IPENZ is contracted by the Government to deliver the Futureintech programme to:

- Increase the proportion of technology, engineering and science enrolments amongst total enrolments in tertiary study
- Raise the profile of careers in technology, engineering and science as highly desirable choices
- Offer school students realistic learning experiences in technology, engineering and science
- Establish co-operative relationships between industry and education communities (Futureintech, n.d.).

Futureintech takes young engineers and scientists into schools to act as ambassadors. They interact with schoolchildren to show them the potential careers open to them. Approximately 40 per cent of Futureintech ambassadors are female, which helps demonstrate careers in science, engineering and technology are a real option for young women. The ambassadors are also ethnically diverse.

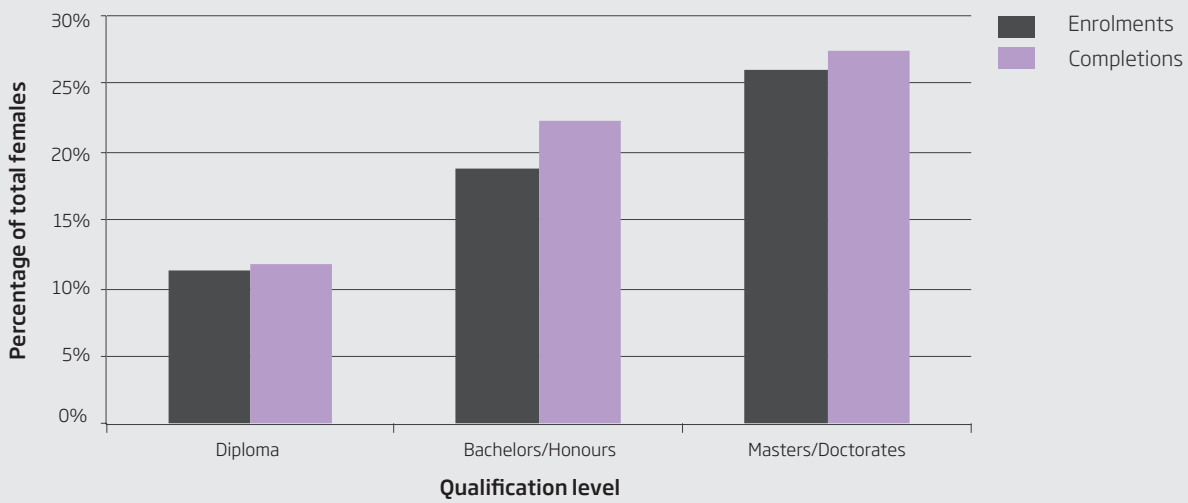
## Participation within Specialisms

Women tend to be more likely to study particular specialisms of engineering, notably process and resources engineering, where they represent 34 per cent of those enrolled in a Level 7 or 8 degree and 56 per cent of those enrolled in post-graduate study. Women also comprise a significant number (40 per cent) of those enrolled in a manufacturing-focused engineering diploma, as shown in Figure 4. In other specialisms, the participation of women is relatively low, at 20 per cent or less of total enrollees.

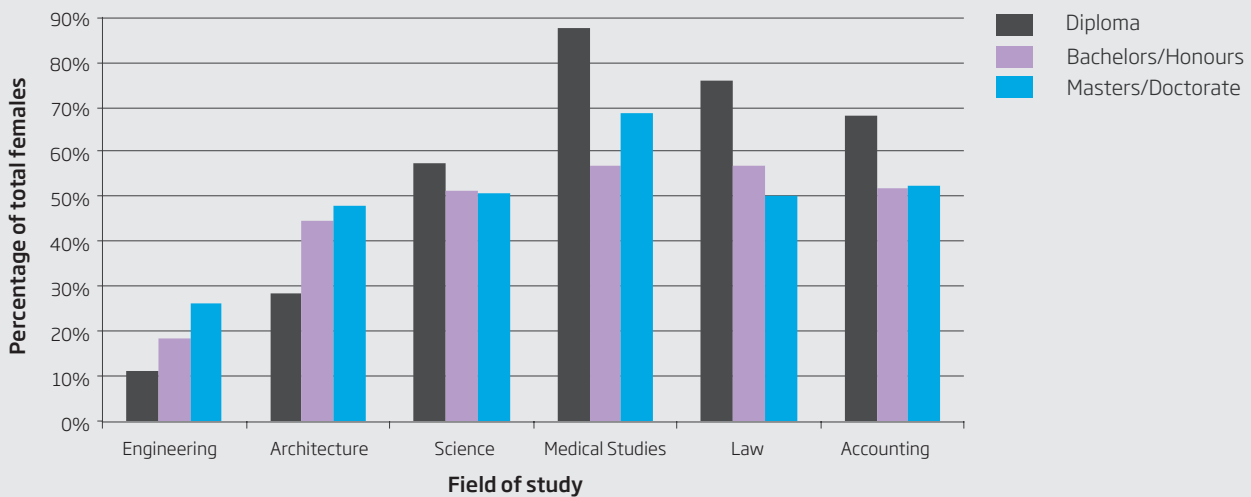
Those studying towards a tertiary qualification in engineering (Engineering Diploma, Bachelor of Engineering Technology or Bachelor of Engineering) in New Zealand are eligible for IPENZ Student Membership. At present, 21 per cent of IPENZ's 3,397 Student Members are female. This proportion is unchanged from 2013.

*“At present, **21 per cent** of IPENZ's **3,397** Student Members are female.”*

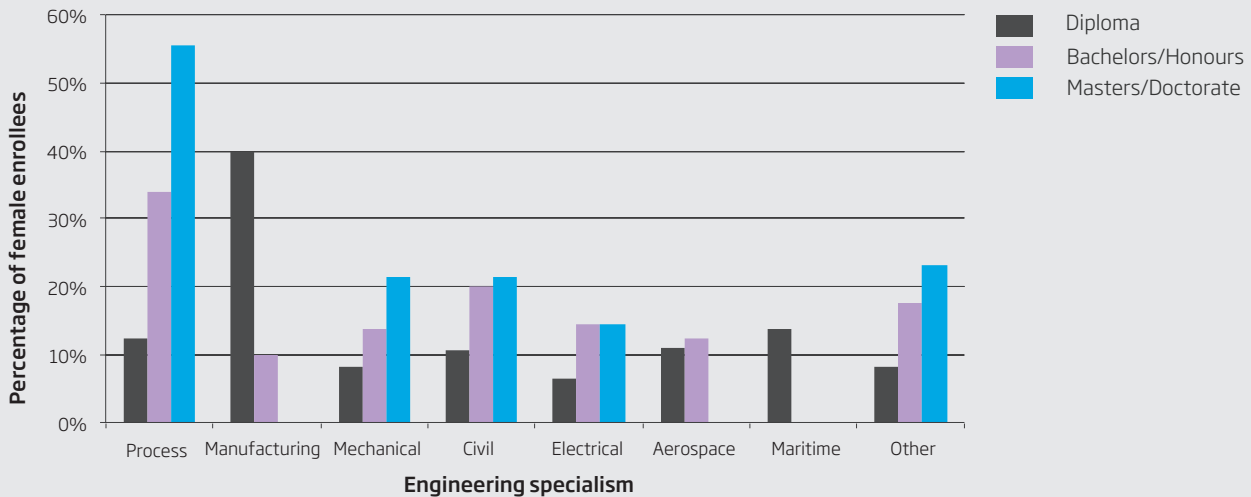
**Figure 2 - Participation of women in tertiary engineering studies (2013 data)**



**Figure 3 - Enrolment of women in tertiary studies by profession (2013 data)**



**Figure 4 - Proportion of enrollees who are female by engineering specialism**





## Entry to the Profession

In *Snapshot 2013*, we recommended all engineering employers use balanced interview panels to avoid bias influencing recruitment decisions. The vast majority (74 per cent) of the 19 participating employers ensure their interview panels are gender-balanced.

In the past 12 months, the 19 employers have taken on a total of 130 new engineering graduates, 35 per cent of whom are female. One employer has hired 19 new engineering graduates, 12 of whom (63 per cent) are female.

Figure 5 compares the gender composition of those completing tertiary qualifications in engineering with that of the 19 engineering employers' new employees, and of the IPENZ Student and Graduate Membership classes.

As shown, the proportion of female engineering graduates hired by the 19 employers is higher than the proportion of women completing engineering qualifications and the proportion of women in both the IPENZ Student and Graduate Membership classes.

IPENZ Graduate Membership is for graduates with an accredited or benchmarked tertiary qualification in engineering. Approximately 18 per cent of the 4,321 IPENZ Graduate Members are female. This proportion is the same as in 2013.

## Involvement in the Workforce

IPENZ has three Membership classes for engineers who have at least four years' work experience - Professional Membership, Technical Membership and Associate Membership:

- A Professional Member of IPENZ has demonstrated their competence for independent practice against the competence standard for professional engineers. They will have typically completed a four-year engineering degree.
- A Technical Member of IPENZ has demonstrated their competence for independent practice as an Engineering Technologist against the competence standard for Engineering Technologists. They will have typically completed a three-year degree with a strong "application" focus, usually in one engineering discipline.
- An Associate Member of IPENZ has demonstrated their competence for independent practice as an Engineering Technician against the competence standard for Engineering Technicians. This is achieved through an IPENZ competence assessment or by completing the New Zealand Diploma in Engineering Practice.

The gender profile of the 19 employers of engineers, the IPENZ Membership and Chartered Professional Engineers is shown in Figure 6.

As shown, the 19 employers have 3,919 female employees, out of a total of 13,157 (30 per cent). When only engineering employees are considered, the employers have 3,296 engineers on staff in total, 14 per cent of whom are women on average.

Six per cent (321) of IPENZ Professional Members are female, similar to the 2013 figure. Women comprise seven per cent of IPENZ's Technical Members, also similar to the 2013 figure. There are now 15 female Associate Members, up from eight in 2013. Women now comprise five per cent of Members in this class, up from three per cent in 2013.

The 19 participating employers have a total of 1,401 IPENZ Members (of any of the above classes), 13 per cent of whom are female.

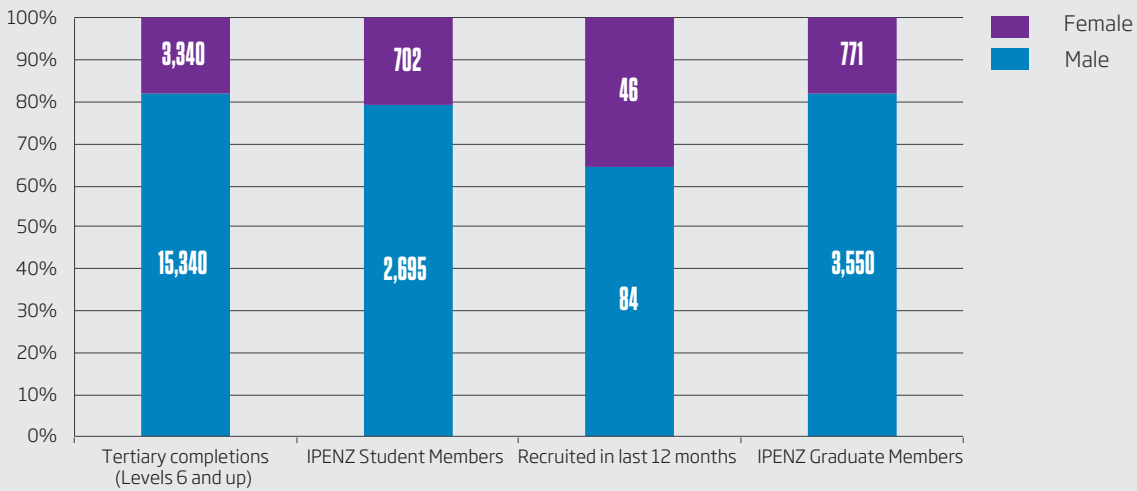
In addition to being a professional body, IPENZ is the Registration Authority for Chartered Professional Engineers under the Chartered Professional Engineers of New Zealand Act 2002. Under the Act, IPENZ assesses engineers to determine their current competence, with Chartered Professional Engineer being a quality mark for an engineer who has been assessed as being currently competent. There are 3,312 Chartered Professional Engineers in New Zealand, eight per cent of whom are female. The 19 employers who participated in *Snapshot 2014* employ 782 Chartered Professional Engineers, 13 per cent of whom are female.

## Representation at Senior Levels

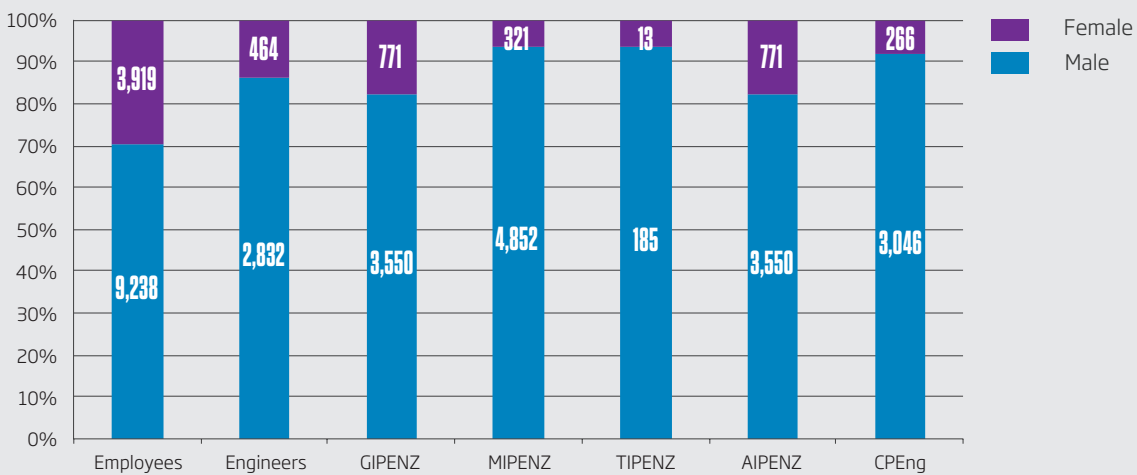
Within IPENZ, Fellowship is a measure of an individual's contribution to the profession or IPENZ. Honorary Fellow (generally for those with a background outside engineering), Fellow and Distinguished Fellow are offered at IPENZ. At present, IPENZ has a total of 843 Fellows, Distinguished Fellows and Honorary Fellows. Twenty-four (three per cent) of these are women. In 2013, IPENZ had a total of 802 Fellows, Distinguished Fellows and Honorary Fellows, three per cent of whom were female.

The loss of female engineers and the historic male domination of the engineering profession are reflected in the make-up of boards, senior management and management teams, as shown in Figures 7 and 8.

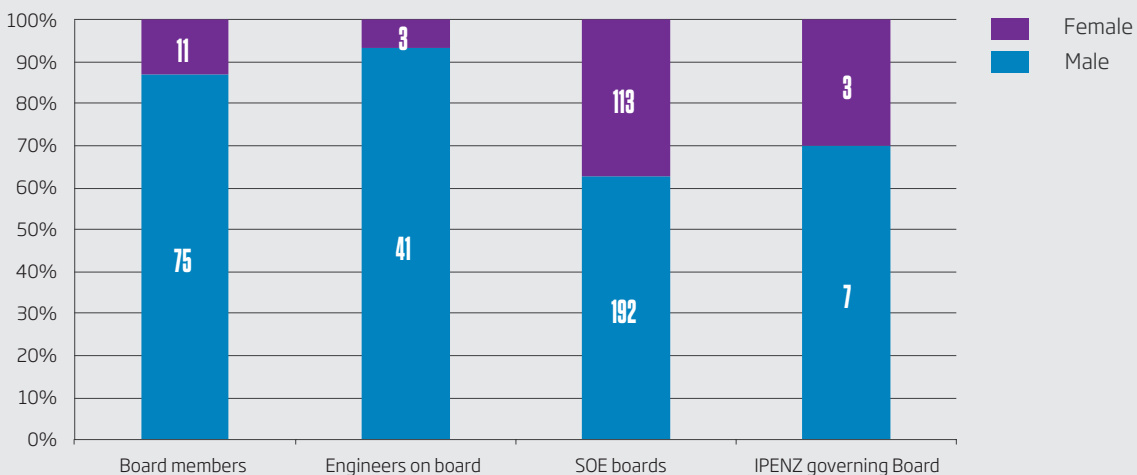
**Figure 5 - Gender of entrants to the engineering profession**



**Figure 6 - Gender profile of the engineering profession**



**Figure 7 - Gender composition of the 19 participating employers' boards, State-owned Enterprise boards and the IPENZ governing Board**



### At Governance Level

The gender composition of the 19 participating employers' boards is presented in Figure 7, along with data for boards administered by the Crown Ownership Monitoring Unit and the IPENZ governing Board.

As shown in Figure 7, the 19 participating employers have a total of 86 people on their boards, 13 per cent of whom are female. It should be noted that not all employers provided board figures as some employers are multi-national and this study was focused on New Zealand employees and board members.

The proportion of women on the 19 employers' boards (13 per cent) is lower than the comparative figure for the boards the Crown Ownership Monitoring Unit administers (largely State-owned Enterprises) for which 37 per cent of board members are female.

When only engineers are considered, the 19 employers have a total of 44 engineers on their boards, seven per cent of whom are female.

### At Senior Management and Management Level

The gender composition of the 19 participating employers' senior management and management teams is presented in Figure 8, along with data for those with direct reports.

At senior management level, 21 per cent of senior managers are female but this figure drops to just 13 per cent when only engineers on senior management teams are considered.

At management level (deemed here to be those with direct reports), the 19 employers employ a total of 636 engineers with direct reports, seven per cent of whom are women.

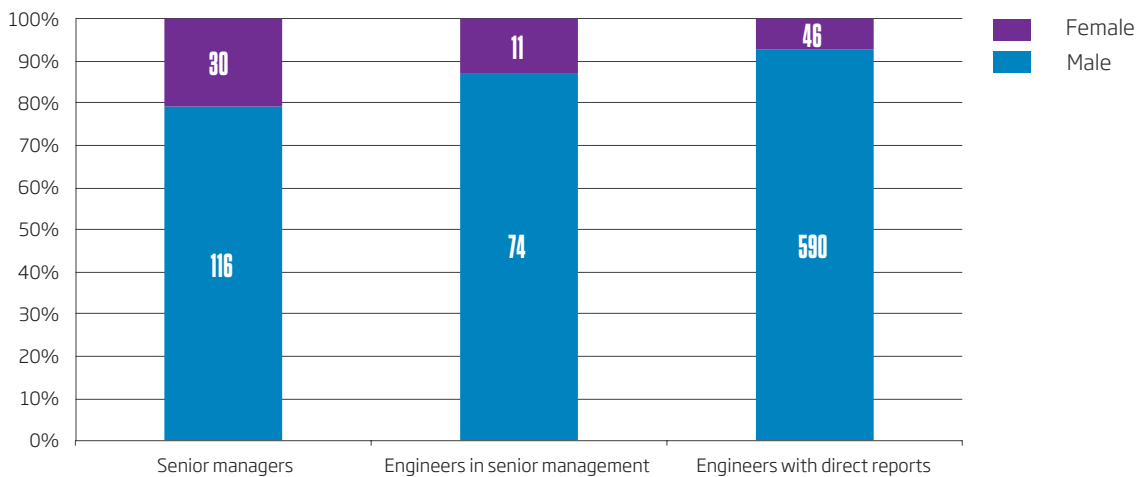
Almost all (17) of the 19 participating employers have a programme to help develop potential leaders. Just four of the employers (21 per cent) have a programme to specifically support or develop female engineers.

### At Technical Leader Level

As noted in the Introduction, not all engineers aspire to governance or management roles - some choose to take up technical leader roles. The 19 participating employers have 244 engineers with technical leader roles. Twenty (eight per cent) of these are women.

*“The 19 participating employers have a total of 86 people on their boards, 13 per cent of whom are female.”*

**Figure 8 - Gender composition of the 19 participating employers' senior management and management teams**





## Support for Diverse Employees

### Diversity Policies and Programmes

Data from the 19 participating employers shows just under half (47 per cent) have a diversity policy. Eight of the participating employers (42 per cent) have a programme to support diversity. Just five of the 19 employers have a diversity council or other group to drive action to support diversity in the organisation. One employer noted they are in the process of developing an awareness programme for diversity and inclusion, which is scheduled to be implemented in 2015.

## Flexible Working

According to *Snapshot 2014*, 89 per cent of employers offer the opportunity for employees to work part-time. Currently, just 275 of the 3,296 engineers across the 19 employers (eight per cent) are working part-time. Of these, 67 per cent are women.

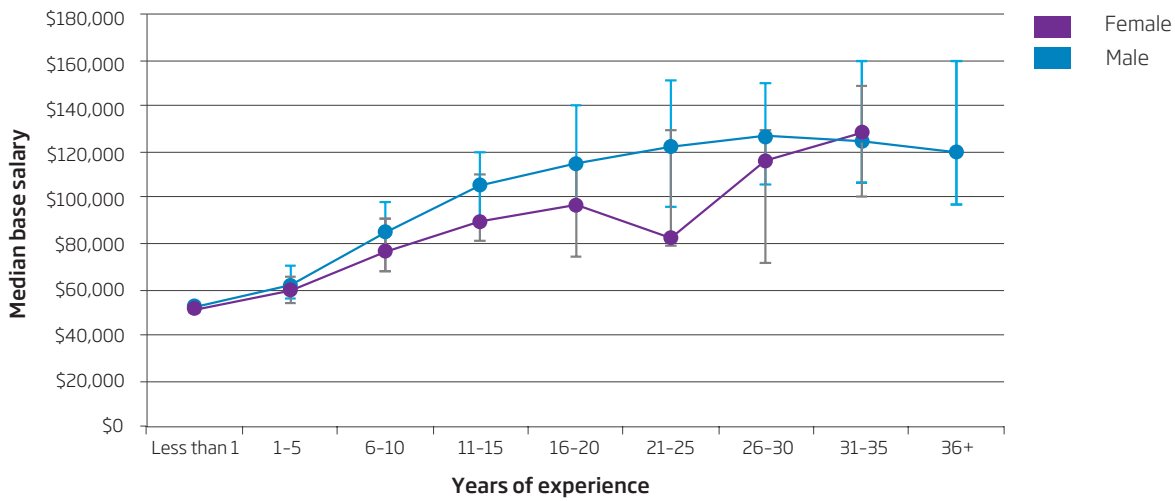
At management level, there are only 44 people working part-time. The majority (57 per cent) of these are women.

As was found in *Snapshot 2013*, many employers offer some form of flexibility. The table below shows the flexibility offered by the participating 19 employers.

**Table 1 - Flexibility offered by employers of engineers**

Flexibility or support offered	% of 19 employers offering this flexibility
Flexible hours	89
Opportunity to work remotely	84
Opportunity to work part-time	89
Opportunity to take career breaks/sabbaticals	89
Opportunity to buy additional leave	74
Paid employee assistance, counselling or support service	84

**Figure 9 - Median base salary of engineers by gender**



One organisation noted that “Many of the [above] are not within the resources of a smaller company to develop. However, this does not mean that we do not support these initiatives in practice and in other ways.”

**Mentoring**

Mentoring helps “aid and support a graduate’s progression by promoting a caring and genuine interest in developing their abilities and talents” (IPENZ, 2011). Of 19 employers’ 3,296 engineers, 626 engineers have a mentor. Thirty-four per cent of female engineers and 16 per cent of male engineers have a mentor.

**Supporting those on Career Breaks and Returning to Work**

Support for those on and returning from career breaks is important. The 19 participating employers have 41 engineering employees on parental leave - 37 women and four men. Eighty-six per cent of the employers’ 28 employees who have returned to the workforce in the past 12 months are female. All employers reported that they keep in touch with employees who are on career breaks.

One of the participating employers noted they have a number of engineers on extended leave without pay and that they actively encourage and support their young engineers to take leave rather than leave the organisation. While employees are on leave, the organisation maintains contact with their employees through an alumni-type process.

As noted in *Snapshot 2013*, Berry (2011) notes the importance of onsite childcare as a means of increasing employee attendance and productivity. As with *Snapshot 2013*, this year’s survey shows none of the participating engineering employers provide onsite childcare. One organisation noted they provide a childcare allowance on a case-by-case basis.

**Gender Pay Gap**

Under the Human Rights Act 1993, it is unlawful to discriminate on the grounds of sex (including pregnancy), marital status and family status. Despite this, New Zealand has a gender pay gap of 9.3 per cent (National Council of Women, n.d.).

IPENZ undertakes an annual survey of its Members’ remuneration. Figure 9 compares the median base salary of male and female engineers.

This figure shows male and female graduates start, appropriately, on the same salary. Their income diverges thereafter until later in their careers when women’s income catches up to that of their male counterparts.

Undertaking a pay equity audit is a means of assessing whether male and female employees are being paid equivalently for the same work. Fourteen of the 19 participating employers (74 per cent) have undertaken a pay equity audit.

# Conclusion

Recruitment of women into engineering remains low, with just 11 per cent and 19 per cent of those studying towards a Level 6 diploma and Level 7 or 8 degree respectively being female.

Women exhibit a preference for certain specialisms within engineering - with process, resources and manufacturing being relatively popular compared to the other specialisms where women represent less than 20 per cent of enrollees. Research is needed to determine why female students show this preference so female involvement in other specialisms can be increased.

The uptake of female graduates in the 19 participating employers was relatively high, with 35 per cent of new graduates hired in the last year being female. This was higher than might be expected from IPENZ Membership data in which just 18 per cent of Graduate Members are female. This suggests the employers surveyed were actively seeking to employ more female engineers and is worth investigating further.

There are relatively low numbers of women in IPENZ's competence assessed grades of Membership, with just six, seven and three per cent in the Professional, Technical and Associate Membership classes respectively. Investigation is needed to determine whether there are barriers to women seeking these classes of Membership.

There continues to be few female engineers in technical leader, management and governance roles and this is an area requiring further action.

Data from *Snapshot 2014* shows the vast majority (74 per cent) of employers use gender balanced interview panels. IPENZ is encouraged by this and continues to recommend that engineering employers use gender and ethnically balanced interview panels whenever possible

*“Engineering employers are supportive of their employees, with **89 per cent** of employers offering the opportunity for employees to work part-time.”*

to reduce the potential for unconscious bias to influence recruitment.

According to the data provided, engineering employers are supportive of their employees, with 89 per cent of employers offering the opportunity for employees to work part-time. Employers can increase their support for diversity by ensuring they:

- Have diversity policies and programmes in place and that these are well supported with management and governance level buy-in. There are many useful tools and resources available including the online resource **“Parlour Guides”** which, while written for architects, are very relevant to engineering. The “Parlour Guides” cover topics including pay equity, long hours, part-time work, flexibility, recruitment, career progression, negotiation, career breaks, leadership, mentoring and registration. The EEO Trust also has a number of resources available including its **“10 tips to increase diversity in your organisation”**, **“Diversity case studies”** and **“policy templates”** (both available online). DiverseNZ Inc. is also developing a toolkit of materials to help employers build their ability to manage diversity and inclusion. They have already prepared the **“Business case for diversity and inclusion”** and **“Core frameworks”** (both available online). IPENZ supports the work of DiverseNZ Inc.
- Support younger employees and encourage them to have a mentor
- Have part-time positions available that do not affect individuals' career paths or potential for advancement
- Have managers work part-time or flexibly to show that senior roles, not just junior roles, can be worked part-time or flexibly
- Investigate the uptake of flexible working in their organisation and address any issues identified
- Encourage female engineers to seek advancement to technical leader, management and governance roles
- Nominate female engineers for IPENZ Fellowship
- Undertake pay equity audits to investigate gender pay gaps and address any issues that arise.

# Appendix: Snapshot 2014 Survey Template

## Gender Diversity in Engineering Organisations: Snapshot 2014

### Introduction

This template enables engineering organisations to provide confidential information to IPENZ for the purpose of IPENZ producing a report on gender diversity in the engineering profession. Information provided to IPENZ will not be used or shared in its raw, disaggregated form. Any queries or concerns can be discussed with Tracey Ayre, Project Manager - Women in Engineering at IPENZ ([tayre@ipenz.org.nz](mailto:tayre@ipenz.org.nz)).

### Using this template

To use this template, please enter your data into the shaded cells. For organisations with more than one office, please provide overall figures for your New Zealand workforce. If you are unsure of precise numbers, please provide an estimate. If you do not know the answer to a question or a question is not applicable to your organisation, please leave the field blank.

Name of organisation		
Diversity data	Male	Female
Total number of employees		
Number of people on your organisation's Board		
Number of engineers on your organisation's Board		
Number of people in your senior management team		
Number of engineers in your senior management team		
Number of engineers on staff		
Number of Chartered Professional Engineers on staff		
Number of IPENZ Members (Graduate, Professional Member, Fellow, Honorary Fellow or Distinguished Fellow) on staff		
Number of engineering staff with direct reports		
Number of engineering staff with technical leader roles		
Number of engineering staff with a mentor		
Number of engineering staff working part-time		



Diversity data	Male	Female
Number of managers working part-time		
Number of engineering staff on parental leave		
Number of engineering staff who have returned from parental leave in last 12 months		
Number of new engineering graduates recruited in last 12 months		
Diversity Policy	Yes	No
Does your organisation have a diversity policy?		
When was the policy introduced? (please insert a year in column B)		
Diversity Practices	Yes	No
Does your organisation have a programme to support diversity?		
When did this programme start? (please insert a year in column B)		
Does your organisation have a diversity council or other group to drive action to support diversity?		
Does your organisation have a programme to help develop potential leaders?		
Does your organisation have a programme to help support or develop female engineers?		
Has your organisation ever undertaken a pay equity audit to check employees' remuneration is not affected by gender?		
Does your organisation offer:		
Flexi hours		
The opportunity to work remotely		
The opportunity to work part-time		
The opportunity to take career breaks/sabbaticals		
The opportunity to buy additional leave		
A paid employee assistance, counselling or support service		
Onsite childcare		
Do interview panels include both female and male interviewers?		
Does your organisation keep in contact with employees when they are on parental leave or other career breaks?		
IPENZ is looking to prepare case studies to share best practice. Would your organisation be interested in being the subject of case study?		
Any other comments?		




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