



Women in Engineering

An update on progress in 2013

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Executive Summary

In March 2011 the Institution of Professional Engineers New Zealand (IPENZ) launched a programme to support and encourage women to enter, remain and advance in the engineering profession.

The IPENZ vision for women in engineering is that “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 recognized 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”.

Since the programme’s launch IPENZ has been working to ensure progress towards realisation of this vision. To date the number of women in all IPENZ Membership classes has increased, although the proportion of women in some classes has been stagnant or decreased.

As set out in this document, IPENZ has completed a number of work streams including research into barriers

women face in the profession, establishing the business case for diversity, and an audit of IPENZ National Office’s policies and practices. IPENZ has also established a number of on-going programmes to deliver networking events for female engineers, and six-monthly events with engineering chief executives to share best practice and promote improvement of the profession’s culture.

Providing leadership, improving the profession’s culture and recognizing successful female engineers are areas for further work and are prominent in the 2012/13 work plan which is set out in this document.

Beyond 2012/13, the IPENZ Women in Engineering programme will continue to focus on ensuring the engineering profession becomes gender neutral so it can realize the benefit of the pool of well-trained female engineers that enter the workforce.

It is well documented and recognized that diversity within organisations at all work levels enhances operational performance, and female engineers are part of the solution for the engineering profession.

Introduction

In March 2011 IPENZ launched a programme to support and encourage women to enter, remain and advance in the engineering profession. The rationale and objectives of this programme were set out in *The Retention and Renewal of Women in Engineering: An IPENZ Plan to encourage diversity in and sustainability of the engineering profession*, as was the IPENZ vision for women in engineering which is that:

“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 recognized 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”.

This vision recognizes female engineers’ value and the contribution they can make to engineering organisations, the economy and the country.

Progress towards this vision is measured through changes in education data, IPENZ Membership data and census data. Data about IPENZ Membership and Chartered Professional Engineers is presented in Table 1 below, as at the time of writing more recent Education Counts and census data was not available.

The 2011 programme outlined a series of actions and targets, and considerable effort has been directed to these by IPENZ staff under the guidance of the IPENZ Women in Engineering Oversight Body. The Oversight Body comprises business leaders and IPENZ Board Members; in 2013 its members are Graham Darlow (Chair), Peter Mathewson, Vanessa Stoddart and Elena Trout.

TABLE 1: IPENZ MEMBERSHIP AND CHARTERED PROFESSIONAL ENGINEERS

	Women as proportion of population		Number of women	
	Baseline (2011)	Trend	Baseline (2011)	Change since 2011
IPENZ Student Members	21%	≈	368	+383
IPENZ Graduate Members	19%	↓	626	+82
IPENZ Technical Members	7%	≈	Baseline not available – 2013 data presented on right	13
IPENZ Associate Members	2%	↑		8
IPENZ Professional Members	4%	↑	212	+82
Chartered Professional Engineers	6%	↑	156	+79
IPENZ Fellows, Distinguished Fellows, Honorary Fellows	2%	↑	14	+9

Progress to Date

The work programme outlined in *The Retention and Renewal of Women in Engineering: An IPENZ Plan to encourage diversity in and sustainability of the engineering profession* encompasses five areas of work – research, leadership, culture, recognition and IPENZ leadership. The progress achieved in each area is summarized below.

Research

The research area is focussed on closing gaps in knowledge as a means of informing the IPENZ Women in Engineering programme and engineers and engineering employers. In its 2011 Plan, IPENZ proposed investigating the:

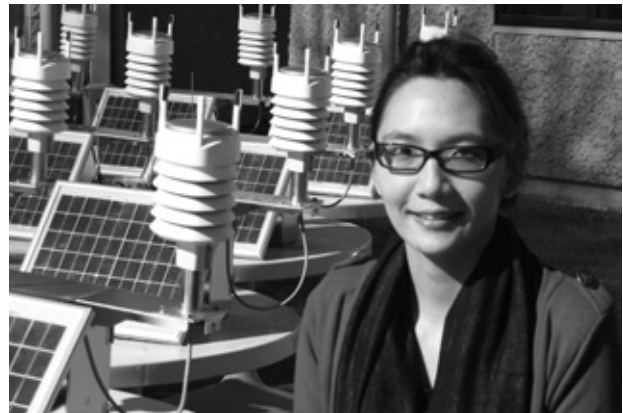
- Barriers to women remaining and advancing in the engineering profession
- Economic benefits of diversity in the engineering profession
- Choices of female students at secondary school and university.

Findings from each of these are summarized below.

Barriers to Women Remaining and Advancing in the Engineering Profession

A literature review by IPENZ was completed in October 2011. The [research showed](#) the most common barriers to women remaining and advancing in the engineering profession are:

- Workplace culture (including harassment, discrimination and being disadvantaged)
- Long working hours and difficulties balancing an engineering career and family
- A lack of support from management in their organisation
- A lack of networks or difficulty maintaining networks; isolation
- Pay, gender pay gaps or a lack of transparency in relation to pay
- A lack of visible role models
- The lack of a career path or lack of transparency regarding an engineer's career path.



A similar study was also completed in October 2011 to assess the barriers to women entering the profession. The [research showed](#) the most common barriers are:

- The stereotyping of the engineering profession as male-dominated
- Biases of caregivers/careers advisors who discourage girls and women from becoming engineers
- Girls' and young women's perceptions of their abilities
- The culture in tertiary institutions (including Schools of Engineering)
- The culture in the engineering profession.

Economic benefits of diversity in the engineering profession

A literature review was undertaken by IPENZ and completed in February 2012. The literature review showed increased diversity can result in improved financial performance, improved management and governance, improved representation of clients, increased innovation, improved corporate image, and more positive workplaces and teams.

Many of these benefits are likely to lead to other benefits, such as more positive workplaces resulting in reduced staff turnover and corresponding recruitment costs.

Thus, the review concluded, there is clearly a case for increased diversity in the workplace and more particularly in engineering where innovation is key and where understanding and relating to clients is vital.



Choices of female students at secondary school and university

A literature review was to be carried out by IPENZ. This review has not been undertaken as resources were instead focussed on a study into the career choices and career paths of male and female engineering graduates. This study was completed with the Ministry of Women's Affairs and resulted in a report *Does Gender Matter?* which is discussed in detail below.

Does Gender Matter?

Does Gender Matter? resulted from a two part study of men and women who graduated in engineering from the Universities of Canterbury or Auckland in 2000 or 2005. In the first part of the study the graduates answered an online survey. One hundred and fifty graduates responded, 62 of whom (41 per cent) were female. In the second part of the study in depth interviews were held with 13 female and eight male graduates.

Does Gender Matter? found:

- Career opportunities and parental influence were the most important factors for both men and women in choosing to study engineering
- Careers advice and guidance could be better for both men and women, with improved advice important for young women who receive little information about engineering as a career option
- Visits to schools by engineers seem to be effective in encouraging people to consider engineering as a study option
- The women surveyed did not generally perceive gender to be a barrier to career progression, although at the same time some women spoke about instances where they experienced gendered attitudes
- Women were more likely than men to specialize in chemical and material engineering or biomedical engineering, and men were more likely to specialize in mechanical engineering, electric and electronic engineering, software and computer systems engineering or mechatronics
- Women were more likely than men to be earning between \$30,000 and \$60,000; and men were more likely than women to be earning more than \$120,000. Some of this may be due to the areas of engineering in which men and women respectively choose to specialize.

- There is significant variation in workplace practices and attitudes towards flexible work. The ability to work part-time appears to be widely available, but the trade-off is that working part-time limits career progression as promotion is connected to hours worked. This is one of the reasons why having children has more of an impact on the career progression of women than men.
- Employers can make a difference to career paths for women who have had career breaks and are returning to work by considering alternative pathways for career progression.

Does Gender Matter? recommended the following next steps:

- Careers advice be improved to set out potential career paths and potential income
- Alternative career progression models be considered so periods of working part-time do not hinder engineers' long term career progression
- Support be established to assist the changing workforce, including improving the workplace culture
- Research be undertaken to investigate the diversity strategies and policies of engineering organisations.

Leadership

Identifying learning opportunities available to engineers, with particular focus on self-awareness and leadership courses

Work to fulfil this action is on-going.

Culture

Showcasing good employer practices

IPENZ invited good employers to be showcased in publications and continues to seek to promote good practice. IPENZ has also initiated six-monthly meetings with chief executives of engineering organisations as a means of discussing and sharing good practice and improving the culture of the engineering profession.

Recognition

Celebrating senior women in the profession

IPENZ has celebrated the success of senior female engineers by profiling them in *Engineering Insight*. Since the launch of the Women in Engineering programme in March 2011, 13 articles have included quotes or profiles of female engineers.

IPENZ has also acknowledged a number of female engineers by making them Fellows of the Institution. Since 2011 nine women have become Fellows, Honorary Fellows or Distinguished Fellows of IPENZ, taking the total number of female Fellows to twenty three (three per cent of the total number of Fellows).

IPENZ has also sought to encourage female engineers to consider taking up the opportunity to be Competence Assessors or to become involved in governance through a position on a board.

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IPENZ as a Leader

Audit of gender balance within IPENZ

In 2012 IPENZ audited the gender balance of its National Office and its policies and procedures to ensure they are not presenting barriers for those wanting to join IPENZ as staff members. Data from IPENZ was compared with two comparative membership organisations.

The audit showed:

- IPENZ National Office has a majority overall of women staff, equal numbers of men and women in the Director's team (senior management team), and a majority of women in management positions at all levels. These observations are similar to those of the two comparator membership organisations.
- IPENZ's policies (including those relating to flexible working hours, provision of parental leave, other leave, support for professional development and employee assistance) are the same or slightly more generous than those of the comparator organisations. IPENZ and its comparators are relatively small which means individual employees are able to negotiate with their managers as their needs (e.g. to work from home) change.
- The findings of the audit were shared with IPENZ Members as a means of sharing the audit process engineering organisations could follow to conduct their own audits.

Other Actions

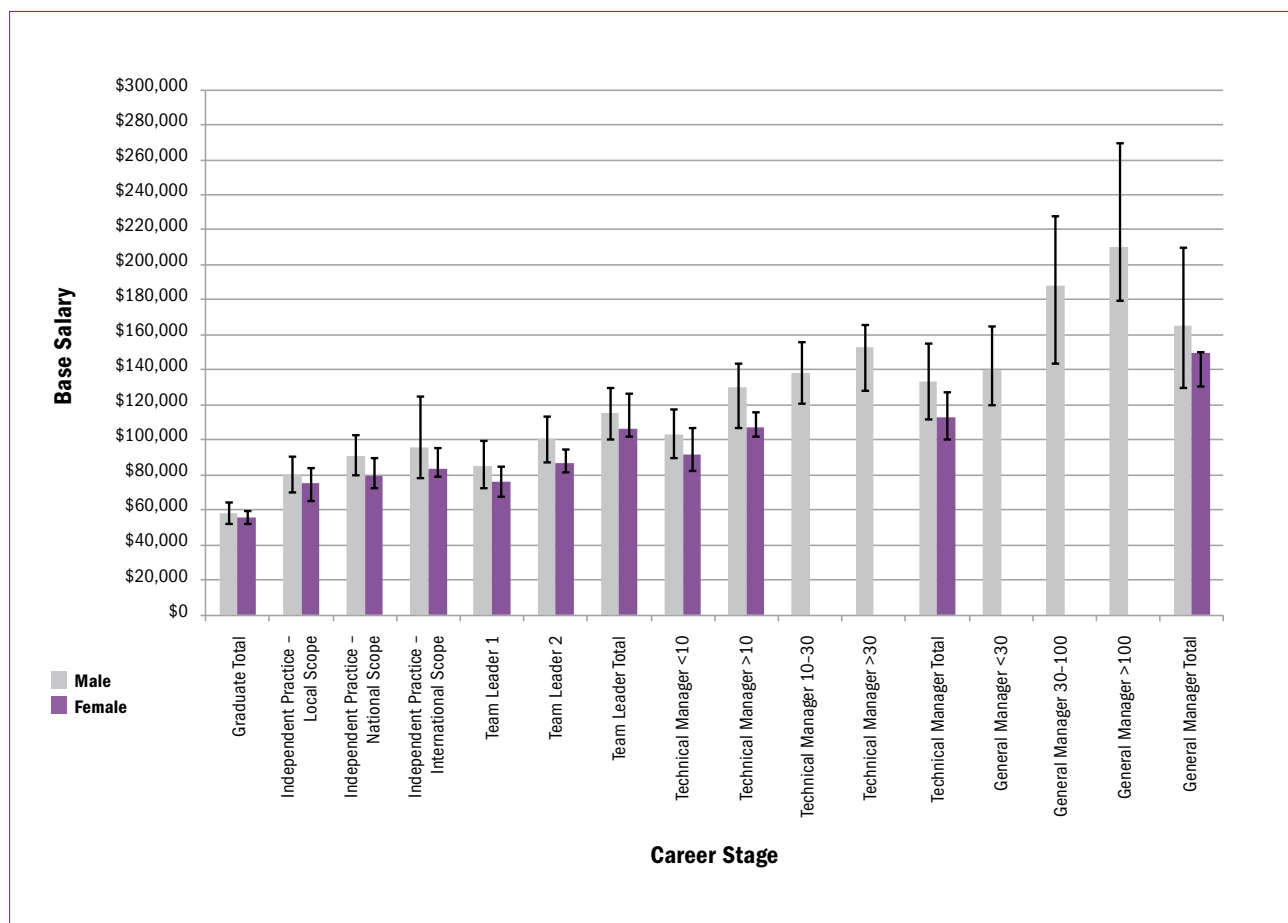
In addition to undertaking the new actions proposed in 2011 IPENZ has also:

- Continued to deliver Futureintech through which young engineers and scientists (Ambassadors) visit schools to encourage students to continue to study science and engineering and to consider careers in engineering, science and technology. Approximately 39 per cent of the Futureintech Ambassadors are female. They are also ethnically diverse as shown in Table 2 (page 7).
- Continued to present its annual Remuneration Survey by gender. The 2012 Remuneration Survey results are shown in Figure 1 (page 7).
- Instigated networking events for female engineers to enable them to hear inspirational speakers and share issues and successes. These events are hosted in collaboration with the National Association of Women in Construction (NAWIC) and the Institution of Civil Engineers UK (New Zealand division).
- Worked with other professions (particularly law and accounting) to identify areas where there is potential for collaboration (such as through shared networking events for mid- to senior-career women)
- Established itself as New Zealand's delegate to the Asia Pacific Nation Network of women engineers and scientists
- Developed networks with other organisations including the Ministry of Women's Affairs, Engineers Australia, Professionelle, the National Council of Women and others.

TABLE 2: FUTUREINTECH AMBASSADORS' ETHNIC DIVERSITY

Ethnicity	Number of Ambassadors	% of Ambassadors
Asian	93	13%
European	514	71%
Maori	32	4%
Samoan	9	1%
Other Pacific	14	2%
Other	25	3%
Unknown/not recorded	31	4%

FIGURE 1: BASE SALARY OF IPENZ MEMBERS BY GENDER (WITH UPPER AND LOWER QUARTILES SHOWN)



Next steps

With the completion of many actions, the IPENZ Women in Engineering programme is well underway. The plans for the current year and future years are set out below.

2012/13 Plans

In 2012/13 IPENZ is:

- Preparing a report on state of gender diversity in the profession, following a survey of engineering employers
- Developing a toolkit for CEOs to help them support diversity in their organisations
- Continuing its work with other professions to identify collaborative actions to undertake and deliver some networking events with the New Zealand Institute of Chartered Accountants and/or the New Zealand Law Society.
- Looking at opportunities to build awareness of unconscious bias
- Delivering networking events in Auckland, Hamilton, Wellington and Christchurch in collaboration with the National Association of Women in Construction (NAWIC) and the Institution of Civil Engineers UK (New Zealand division)
- Continuing to profile successful women, projects and organisations

- Continuing liaison with the Ministry of Women's Affairs, the National Council of Women, Engineers Australia and others
- Continuing to work with tertiary education providers to ensure the environment within these organisations is supportive of diversity
- Continuing to scan best practice and providing input into international networks (including the Asia Pacific Nation Network and the World Federation of Engineering Organisations)
- Continuing to report Remuneration Survey results by gender
- Continuing to deliver Futureintech.

Beyond 2012/13

The IPENZ Women in Engineering programme will continue to focus on ensuring the engineering profession becomes gender neutral so it can realize the benefit of the pool of well-trained female engineers that enter the workforce.

It is well documented and recognized that diversity within organisations at all work levels enhances operational performance. Female engineers are part of the solution for the engineering profession.

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The Institution of Professional Engineers New Zealand Incorporated (IPENZ) is the non-aligned professional body for engineering and technology professionals in New Zealand. It seeks to contribute to the community in matters of national interest. One part of its contribution is to issue position papers, which give a learned view on important issues, independently of any commercial interest. Such notes are not consensus papers of the Institution membership. Others are free to quote or use materials from this note.

May 2013