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Women in the Engineering Workplace Snapshot 2015

Women in Engineering



Contents

Executive Summary	3
Introduction	4
Participating Organisations	5
Findings	6
Entry to the Profession	6
Involvement in the Workforce	8
Representaton at Senior Levels	10
In the IPENZ Fellowship	10
Support for Diverse Employees	12
Conclusion	15
References	16

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IPENZ acknowledges the 15 engineering organisations who provided data. Without their input, this report would not have been possible.

Executive Summary

A survey of 15 engineering organisations shows women remain greatly under-represented at all levels in the engineering profession.

The 15 participating organisations employ over 19,600 people, 32 per cent of whom are female. Within this workforce are 4,378 engineers, 16 per cent of whom are female.

In the past 12 months the 15 participating organisations have hired 189 new engineering graduates. Twenty five per cent of these new hires were female, above the proportion of women completing engineering qualifications (18 per cent).

The 15 participating organisations have 714 Chartered Professional Engineers (CPEngs) on staff, 10 per cent of whom are female. This proportion is slightly higher than that of the total pool of CPEngs – 8.1 per cent of all CPEngs are female.

Similarly, the 15 participating organisations have relatively high proportions of female IPENZ Members on staff. They have 2,028 Professional, Technical or Associate IPENZ Members or Fellows on staff, 17 per cent of whom are female.

In the later career stages – technical leader, management, senior management and governance roles – women are greatly under-represented. Just nine per cent of technical leaders are female. Only eight per cent of engineers on senior management teams and nine per cent of those in management positions are female.

At governance level the figures are similar. Of the 15 participating organisations' 90 board members, eight per cent are female engineers. The figures are slightly better if all board members (ie not limited to engineers) are considered. In this case 17 per cent of all board members are female. However, this is still well below female representation on Boards the Treasury administers, where 38 per cent of board members are female.

These low figures are disappointing since almost all of the 15 participating organisations have a programme to help develop potential leaders. Almost half also have a programme specifically focused on supporting and developing female engineers. To increase the recruitment, retention and advancement of women in engineering we recommend:

- A review of the way engineering is marketed to young women, to make sure it appeals to their motives and interests
- An increased focus on making parents/caregivers and teachers aware of the opportunities available to young woman in engineering
- Engineering organisations increase their awareness of unconscious bias to make sure all recruitment decisions are based on merit
- Research into why the uptake of Professional, Technical or Associate classes of IPENZ Membership by women is low and why so few female engineers become Chartered Professional Engineers
- Engineering organisations look at what they can do to increase retention of female engineers
- Senior leaders in engineering organisations encourage women to seek senior roles in their organisations and IPENZ Fellowship and Awards
- We continue to encourage female engineers to put themselves forward for Fellowship and Awards through targeted marketing and communications
- Undertake work to understand the take-up of workplace flexibility and whether there are any barriers to this. We've heard part-time work in particular can be career-limiting and can result in engineers leaving this profession. This needs investigating and remedying
- Engineering organisations, in particular managers, make sure all engineers have access to a mentor, as needed
- Engineering organisations maintain regular contact with employees while they are on career breaks and support them to maintain their knowledge and continuing professional development, where possible
- All engineering organisations undertake an audit to limit the possibility of male and female engineers being paid differently for the same work.

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.

IPENZ's vision is that: "As a result of its diversity, engineering is seen as making a highly relevant contribution to New Zealand's economic growth and wellbeing. 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).

This report, *Snapshot 2015*, is the result of a survey of engineering organisations and serves as a means of measuring progress towards the above vision. *Snapshot 2015*, as with other Snapshot reports, has been undertaken to understand where the role of women are in the engineering profession and what support engineering organisations provide their diverse employees.

The Snapshot survey was first undertaken in 2013 and involved 30 participating organisations. Those organisations had 18,216 people on staff, 4,324 of whom were engineers. Nineteen organisations participated in *Snapshot 2014*. They had 13,157 members of staff, 3,296 of whom were engineers.

Snapshot 2013 (IPENZ, 2013) and Snapshot 2014 (IPENZ, 2014), revealed only 14 per cent of the engineers in the participating organisations were female. Snapshot 2013 showed recruitment of female engineers was low. In contrast, Snapshot 2014 revealed 35 per cent of new hires in the participating organisations were female. This was well above the proportion of female engineers leaving universities and polytechnics. Both *Snapshot 2013 and 2014* demonstrated the participating organisations were using gender-balanced interview panels. More than 80 per cent offered flexibility to their employees such as flexible hours, working remotely and the option of working part-time.

As a result of *Snapshot 2013* and *2014*, we recommended engineering organisations:

- Have well-supported diversity policies
- Support younger, less experienced employees and encourage mentoring
- Make meaningful, satisfying part-time positions available
- Encourage managers to work part-time or flexibly to show all roles can be carried out in this way
- Investigate the limitations on employees who take up flexibility to make sure career breaks or working flexibly aren't seen as career-limiting
- Undertake pay equity audits and address any issues raised
- Better support female engineers to retain their confidence and competence so they return to the workplace following career breaks
- Encourage and support female engineers to seek boards and management roles and IPENZ Fellowship.

"**Snapshot 2015**, as with other Snapshot reports, has been undertaken to understand where the role of women are in the engineering profession and what support engineering organisations provide their diverse employees."

Participating Organisations

Fifteen engineering organisations participated in *Snapshot 2015.* They include engineering consultancies, central and local government and engineering manufacturers.

Ten of the 15 organisations had participated in a Snapshot survey before and six have now participated in all three Snapshot surveys.

The 15 participating organisations employ a total of 19,699 staff in New Zealand. The largest employer has more than 7,000 employees and the smallest has 29 employees. The average employer has just over 666 employees.

Women represent 32 per cent of the 15 organisation's 19,699 employees. The representation of women ranges from 13 per cent to 55 per cent in the individual organisations.

The 15 participating organisations have 4,378 engineers on staff. The number of engineers on staff ranges from 13 to 1,030 engineers across the organisations. The average participating employer has 292 engineers on staff.

Women make up 16 per cent of the 4,378 engineers employed. At the individual organisation level, the proportion of women on staff ranges from five per cent in two organisations (with total engineers of 37 and 1,459 respectively) to 54 per cent in an organisation with 19 engineers on staff. The organisation with the highest rate of female engineers noted they "do consciously try to employ equal numbers of male/female where possible".

Figure 1 summarises the gender composition of employees and engineers in the 15 participating organisations.

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

Figure 1 - Gender composition of the 15 participating organisations

Findings

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

Entry to the Profession

In *Snapshot 2013* we recommended engineering employers use gender-balanced interview panels to reduce the influence of bias in recruitment decisions. Eleven of the 15 participating organisations (73 per cent) always use gender-balanced interview panels. Two further organisations report their interview panels are sometimes gender-balanced.

Over the past year the 15 participating organisations have taken on 189 new engineering graduates, 25 per cent of whom are female. One organisation has hired 69 new engineering graduates, 24 of whom (35 per cent) are female.

Figure 2 compares the gender composition of those completing tertiary qualifications in engineering with those of the 15 participating organisations' new employees, and the Student and Graduate classes of IPENZ Membership.

As shown, the proportion of female engineering graduates hired by the 15 participating organisations was slightly above the proportion of women completing engineering qualifications and the proportion of women in both the Student and Graduate IPENZ Membership classes.

New Zealand-based students of an engineering Diploma, Bachelor of Engineering Technology or Bachelor of Engineering in New Zealand are eligible for IPENZ Student Membership. Twenty per cent of the 5,709 IPENZ Student Members are female. This proportion is down slightly from 21 per cent in 2014.

IPENZ Graduate Membership is for graduates with an accredited or benchmarked tertiary qualification in engineering. Eighteen per cent of the 4,905 IPENZ Graduate Members are female. This proportion is the same as in 2013, although the actual number of Graduate Members has risen over time, as shown in Figure 3.

Discussion

While there are great initiatives such as Futureintech in place to increase young women's awareness of engineering careers, uptake remains low. Our research (IPENZ, 2011) shows stereotyping of engineers, bias of students, teachers, parents/caregivers and employers, and culture in tertiary institutions and the profession can all put young women off a career in engineering.

Women who have chosen to become engineers report having made that choice due to the career opportunities available, parental influence and wanting to "make a difference" (Ministry of Women's Affairs and IPENZ, 2012).

We recommend a review into how engineering is marketed to young women to make sure it appeals to their motives for studying engineering. Parents/ caregivers and teachers need to be made aware of the opportunities available in engineering and to make sure it's not seen as a "man's job".

The 15 participating organisations appear to be hiring in a fair and equitable manner, with the rate of hiring of female engineers at or above the rate of females graduating. However, this may not be the case across the profession. Increased awareness of unconscious bias may be needed to make sure recruitment decisions are based on merit so all people are welcomed into the profession.

"**20 per cent** of the 5,709 IPENZ Student Members are female. This proportion is down slightly from **21 per cent** in 2014."

Figure 2 - Gender of new entrants to the engineering profession

Figure 3 - Gender of IPENZ's Student and Graduate Members

7

Involvement in the Workforce

The 15 participating organisations have 6,324 female employees, out of a total of 19,699 (32 per cent). When only engineering employees are considered, the 15 organisations have 4,378 engineers on staff in total, 16 per cent of whom are women. Overall, around 13 per cent of New Zealand's engineers are female (Department of Labour and IPENZ, 2008).

There are three IPENZ Membership classes for engineers who have at least four years work experience – Professional Membership (MIPENZ), Technical Membership (TIPENZ) and Associate Membership (AIPENZ):

The gender profile of the 15 participating organisations, the IPENZ Membership and Chartered Professional Engineers is shown in Figure 4.

The 15 participating organisations have a total of 2,028 IPENZ Members (of any of the above classes) on staff, 341 of whom (17 per cent) are female.

Seven per cent (351) of IPENZ Professional Members are female, up slightly from 2014's figure of six per cent. Women comprise seven per cent of IPENZ's Technical Members, similar to 2013 and 2014's figures. There are now 19 female Associate Members, up from eight in 2013. Women now comprise six per cent of Members in this class, up from five per cent and three per cent in 2014 and 2013 respectively.

The growth in numbers of male and female Professional, Technical and Associate Members is shown in Figure 5.

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 (CPEng) being a quality mark for an engineer who has been assessed as being currently competent. There are 3,358 Chartered Professional Engineers in New Zealand, eight per cent of whom are female. The 15 organisations that participated in Snapshot 2015 employ 782 Chartered Professional Engineers, 13 per cent of whom are female.

The growth in numbers of male and female Chartered Professional Engineers is shown in Figure 6.

Discussion

With 16 per cent of engineers on staff being female, the 15 participating organisations have a slightly higher proportion of female engineers than in the profession in general. They also have a comparatively higher proportion of female IPENZ Members.

However, relatively few women overall become Professional, Technical or Associate Members of IPENZ. We recommend research into the reasons for this. The number of women who become Chartered Professional Engineers is also low.

We're aware some engineers feel the time required to maintain their continued professional development and status as a Chartered Professional Engineer is excessive. This is particularly so for those returning from a career break. We're investigating what other professional bodies do to support these engineers and are considering whether we should offer more support or flexibility.

We're concerned that within five to ten years of graduating nearly 30 per cent of female engineers leave the profession (Ministry of Women's Affairs and IPENZ, 2012). This is to take up other opportunities, to take a break or because they didn't like engineering. Our research has also identified workplace culture, the expectation to work long hours, a lack of networks, role models, and transparency around pay and career progression put women off remaining in the profession (IPENZ, 2011).

We're working on addressing these barriers. We host networking events for female (and male) engineers to encourage networking and reduce female engineers' isolation. We also profile female engineers in our publications and undertake an annual remuneration survey, which is discussed later in this report.

We encourage engineering employers to look at what they can do to help address the barriers and increase the retention of female engineers. Many of the barriers may require changes in individual businesses' ways of operating and are beyond our control.

For example, increased awareness of unconscious bias may make sure the advancement of engineers is based on merit. This would mean all engineers, regardless of age, gender and ethnicity, are given the opportunities they want and deserve.

Figure 4 - Gender profile of participating organisations and IPENZ membership

Figure 5 - Gender profile of the Professional, Technical and Associate classes of IPENZ Membership

Figure 6 - Gender profile of Chartered Professional Engineers

Representaton at Senior levels

At Technical Leader level

Not all engineers aspire to governance or management roles – some choose to take up technical leader roles. The 15 participating organisations have 322 engineers in technical leader roles. Thirty (nine per cent) of these are women.

At Senior Management and Management level

The gender composition of the 15 participating organisations' senior management and management teams is shown in Figure 7, along with data for those with direct reports.

At senior management level 27 per cent of senior managers are female. This figure drops to just eight per cent when only engineers on senior management teams are considered.

At management level (deemed here to be those with direct reports), the 15 engineering organisations employ a total of 544 engineers with direct reports. Nine per cent of these are women.

Almost all (13) of the 15 participating organisations have a programme to help develop potential leaders. Seven of the engineering organisations (47 per cent) have a programme to specifically help support or develop female engineers.

At Governance level

The gender composition of the 15 participating organisations' boards is presented in Figure 8, along with data for boards administered by the Treasury and our governing Board.

As shown, the 15 participating organisations have a total of 90 people on their boards, 17 per cent of whom are female. It should be noted not all organisations provided board figures. Some are multinational and this study was focused on New Zealand employees and board members.

The proportion of women on the 15 participating organisations' boards (17 per cent) is lower than the comparative figure of 38 per cent for boards the Treasury administers (The Treasury, 2015).

When only engineers are considered, the 15 participating organisations have a total of 36 engineers on their boards, eight per cent of whom are female.

In the IPENZ Fellowship

Fellowship is a measure of an individual's contribution to the engineering profession or IPENZ. Our Fellowship classes include Honorary Fellow (generally for those with a background outside engineering), Fellow and Distinguished Fellow. We currently have a total of 838 Fellows, Distinguished Fellows and Honorary Fellows. Only 25 (three per cent) are women.

While men continue to dominate Fellowship, the number of female Fellows is rising slowly as shown in Figure 9.

Discussion

As shown, women are under-represented at Technical Leader level and in management, senior management and governance level in engineering organisations.

Women are also under-represented in IPENZ Fellowship, Fellowship nominations and in award nominations/ applications.

We recommend senior leaders in engineering organisations encourage women to seek senior roles in their organisations and IPENZ Fellowship and awards. We're also seeking to encourage female engineers to put themselves forward for Fellowship and awards through targeted marketing and communications.

"The proportion of women on the 15 participating organisations" boards (**17 per cent**) is lower than the comparative figure of **38 per cent** for boards the Treasury administers."

Figure 7 - Gender composition of the 15 participating organisations' senior management and management teams

Support for Diverse Employees

Diversity Policies and Programmes

Nine of the 15 participating organisations (60 per cent) have a diversity policy and one organisation is currently preparing one. The earliest policy was established in 2005. The majority of the others have been put in place since 2012.

One organisation noted it does not have a diversity policy but does "consciously try to employ equal numbers of male/female where possible".

Eight of the participating organisations (53 per cent) have a programme to support diversity. One organisation noted they have a programme and a group that supports and drives gender equality but not diversity.

Seven of the 15 participating organisations have a diversity council or other group to drive action to support diversity in the organisation.

Flexible Working

Of the participating organisations ,93 per cent offer the opportunity for employees to work part time. Currently, just 224 of the 4,378 engineers across the 15 participating organisations (five per cent) are working part time. Of these, 48 per cent are women.

At management level, there are only 24 people working part time. The majority (67 per cent) of these are women.

As was found in *Snapshot 2013* and *Snapshot 2014*, many engineering organisations offer some form of flexibility. The table below shows the flexibility offered by the 15 participating organisations.

Mentoring

Mentoring helps support engineers, particularly graduates, to progress by promoting a caring and genuine interest in developing their abilities and talents (IPENZ, 2011). Of the 15 organisations' 4,378 engineers, 2,270 (52 per cent) have a mentor. According to this year's survey, men are more likely to have a mentor. Compared with 60 per cent of male engineers, only 11 per cent of female engineers have a mentor.

Supporting Those on Career Breaks and Returning to Work

The 15 participating organisations have 25 engineers on parental leave – 21 women and four men. Eighty eight per cent of the participating organisations' 25 employees who have returned to the workforce in the past 12 months are female. The vast majority (13 of 15) of the participating organisations reported they keep in touch with their employees while they are on career breaks. The remaining organisations reported they manage this on a case-by-case or ad-hoc basis.

As with previous Snapshot surveys, this year's survey found none of the participating organisations provide on-site childcare.

Flexibility or support offered	% of 15 employers offering this flexibility	
Flexible hours	100	
Career breaks/Sabbaticals	100	
Paid employee support, counselling	100	
Work part time	93	
Work remotely	87	
Buy additional leave	73	
On-site childcare	0	

Table 1 - Flexibility offered to employees by the 15 participating organisations

Figure 11 - Median base salary of full-time engineers by gender and age

Gender Pay Gap

We undertake an annual survey of our Members' remuneration. The 2014 Remuneration Survey compared male and female engineers' salaries on two bases: age and stage of career. Figure 11 compares the median base salary of full-time male and female engineers by age.

Figure 11 shows young male and female graduates receive approximately the same salary. Their income diverges when they reach their mid to late 30s with the largest gap evident in the 45-49 year age bracket, showing a \$32,500 difference. The data also shows male and female engineers almost reach pay parity later in their careers.

Career stages are a measure of an engineer's responsibility, knowledge and skill. There are five main career stages used in the Remuneration Survey:

- Graduate these engineers work under supervision, perhaps with the support of a mentor, to develop the skills and competencies required for independent practice. Their work is largely planned by someone else and responsibilities for decisions are limited, with accountability for results resting with their supervisor or team leader
- Independent Practitioner these engineers apply technical knowledge and skills without supervision.
 They take responsibility for their own decisions as a member of a wider team or as independent contributors to wider projects, but do not supervise or manage others

- Team Leader these engineers are experienced practitioners who apply technical knowledge and skill, primarily through supervising others and providing the team with technical leadership. Team Leaders are directly responsible for the training, development and performance of team members and accountable for team results. They also contribute to planning programmes, projects, activities and related budgets
- Technical Manager these engineers apply engineering management skills to develop plans, systems and business plans for a major operational function within an organisation. They are responsible for directing and controlling managers, team leaders or senior experts who may have higher levels of technical expertise. They are accountable for the results produced by a major function or multiple business units. Advocacy, persuasion and negotiation skills are core requirements of the role
- General Manager these engineers are strategic leaders who apply engineering management skills and/or an engineering mind-set to develop plans, strategies and business plans for an entire organisation or a major part of a large and diverse organisation. They are focused on defining strategic goals and business plans for the medium to long term, and identifying associated resource requirements. General Managers are responsible for directing and controlling senior managers and are accountable for all, or a major part, of an organisation's results.

FINDINGS

Figure 12 - Median base salary of full-time engineers by gender and career stage

Figure 12 shows a conclusive salary difference between male and female engineers across all career stages.

Overall the gender pay gap is five per cent. This is lower than the gender pay gap for the whole economy which is 9.9 per cent (Ministry for Women, 2014).

Undertaking a pay equity audit is a means of assessing whether male and female employees are being paid the same for the same work. Eleven of the 15 participating organisations (73 per cent) have undertaken a pay equity audit.

Discussion

As shown in this section, the 15 participating organisations offer a range of flexible working. This is applauded. Work is needed to better understand how well this flexibility is taken up and whether there are barriers to its uptake. We've heard parttime work in particular can be career limiting and can result in engineers leaving this profession. This needs investigating and remedying once properly understood.

We note the rates of mentoring of male and female engineers at the 15 participating organisations differ. We recommend engineering organisations, in particular managers, make sure all engineers have access to a mentor, as needed.

Support for those on, and returning from, career breaks is vital to keep these qualified, experienced workers engaged and enthusiastic about returning to the workforce. While many of the participating organisations report they keep in touch with employees while they are on a career break, it's unclear how supported the employees are. We encourage engineering organisations to maintain regular contact with employees and to support them to maintain their knowledge and continuing professional development where possible. This will help engineers to remain up-to-date, connected and informed so they can resume work and are keen to advance.

As shown in the 2014 Remuneration Survey, the current gender pay gap in the engineering profession is around five per cent. While this is below the national rate of 9.9 per cent (Ministry for Women, 2014), there is still room for improvement. We commend the 11 participating organisations that have undertaken a gender pay audit. We recommend all engineering organisations perform such an audit to limit the possibility of male and female engineers being paid differently for the same work.

It's pleasing to see many of the 15 participating organisations are actively working to attract, retain and advance female engineers in the profession. For those just starting out on this journey there are many resources available:

- The EEO Trust has a number of resources on their website and offers services such as the Diversity Stocktake and Diversity Diagnostic.
 See www.eeotrust.org.nz
- The Parlour Guides to Equitable Practice offer advice and guidance. The Guides were developed to help Australian architecture firms move towards a more equitable profession but is applicable to engineering organisations in New Zealand.
 See www.archiparlour.org/parlour-guides/
- The Ministry for Women has information and can support organisations that need some assistance.
 See www.women.govt.nz
- IPENZ can also share any information and resources it has with engineering organisations.

Conclusion

Women remain under-represented at all levels of the engineering workforce. Work is needed to increase their recruitment, retention and advancement – for the benefit of engineering organisations, the profession and society.

While great initiatives such as Futureintech are in place to increase young women's awareness of engineering careers, uptake remains low.

There's a need for a review of how engineering is marketed to young women to make sure it appeals to their motives and interests. Work is also needed to make sure parents/caregivers and teachers are aware of the opportunities.

The 15 participating organisations have hired 189 new engineering graduates, 25 per cent of whom are female. This proportion is slightly higher than the proportion of women leaving tertiary education (18 per cent) and of female Student and Graduate IPENZ Members (20 and 18 per cent respectively).

This suggests the 15 participating organisations are hiring in a fair and equitable manner. This may not be the case in all organisations and we recommend organisations increase their awareness of unconscious bias to make sure it does not influence recruitment decisions.

The 15 participating organisations have 4,378 engineers on staff, 16 per cent of whom are female. This is above the figure for the whole profession, which is 13 per cent.

The 15 participating organisations have 2,028 Professional, Technical or Associate IPENZ Members on staff, 17 per cent of whom are female. This figure is well above the overall figures of six or seven per cent in these Membership classes. There are also few female Chartered Professional Engineers in New Zealand.

IPENZ needs to research why the uptake of Professional, Technical or Associate classes of IPENZ Membership by women is low and why so few female engineers become Chartered Professional Engineers.

Disappointingly high numbers of women leave the engineering profession. Work is needed to remedy this. The loss of skilled, experienced engineers is a loss to individual organisations, the leadership pipeline and the profession as a whole. There continue to be few female engineers in technical leader, management, senior management and governance roles. There are also very few - just 25 - female IPENZ Fellows, Distinguished Fellows or Honorary Fellows. We recommend senior leaders in engineering organisations encourage women to seek senior roles and IPENZ Fellowship and Awards.

It's heartening to see all 15 participating organisations offer their employees the opportunity to work flexible hours, to take career breaks and to use employer-paid support programmes. In addition, the vast majority (93 per cent) of participating organisations allow their employees to work part time. We recommend research into understanding take-up of this flexibility and whether there are barriers to its uptake. We've heard part time work in particular can be career limiting and can result in engineers leaving this profession.

Support for those on, and returning from, career breaks is vital to make sure these qualified, experienced engineers remained engaged and enthusiastic about their work. While many organisations report they keep in touch with employees while they are on a career break, it's unclear how well supported the employees are. We urge engineering organisations to maintain regular contact with employees and to support them to maintain their knowledge and continuing professional development where possible. This will mean engineers remain up-todate, connected and informed so they can resume work and are keen to advance.

The current gender pay gap in the engineering profession is around five per cent. We commend the 11 participating organisations that have undertaken a gender pay audit. We recommend all engineering organisations perform such an audit to limit the possibility of male and female engineers being paid differently for the same work.

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