

Identifying and bridging the
“Technicians practical skills gap”
in the New Zealand Power Distribution Industry

“A third look at the practical skills gap in the New Zealand Power Industry through the eyes
of Technicians”

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Executive Summary

The following is the final paper written as part of a trilogy looking into bridging the practical skills gap in the Power Distribution industry of New Zealand.

The methodology used is “action research”, Involving a literary review followed by interviews with technicians to discover the working environment and its skills shortage, paying particular attention to technicians.

The literary research identifies what is seen as knowledge, skills, the skills gap and what impacts this gap has on the industry. It also discusses technicians. How to become one, their roles in the industry and how organisations will help shape their future in society.

Interviews were conducted with eight technicians from various organisations, mostly conducted on-line using a pre-set of questions.

From the literary review and the interviews, gathering statistics is an issue, and it has been identified that there is a skills gap, not enough is done to promote the brand of engineering, the role of a technician is not significantly recognised, and there are several organisations that offer support and help, however they didn't know these existed.

Technicians believe that not everyone can do what they do, there is not enough support for training and development, where the knowledge is not being passed on by the older generation that is leaving, and their work life balance is not favourable.

Recommendations to help bridge the practical skills gap are firstly to act now, start categorising the engineering technician role for data to be collected easier. The industry itself needs to upskill its staff and provide the necessary training facilities to gain practical experience prior to working on the networks. Tailored apprenticeships can also be an avenue to create our technicians of the future.

The attitudes towards engineering technicians need to change and moves need to be made to allow them to have a better working environment as money is not their only motivator.

Finally, for all these things to happen sufficiently the industry needs to work better together.

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Identifying and bridging the “Technicians practical skills gap” in the New Zealand Power Distribution Industry

Introduction

This is the final paper on the trilogy of “identifying and bridging the skills gap of the Power Distribution Industry in New Zealand”. This paper is the third perspective of looking at the same problem of the practical skills gap through different lenses or perspectives. This time Identifying this skills gap through the “eyes of a technician” rather than a student or an engineer. It investigates the interpretation of what the skills gap, and a definition of a technician, if they are adequately supported, and technicians’ attitudes towards rewards and recognition.

We begin with a literary review of documents and publications investigating the skills gap in detail from 2017 to early 2024 from U.K and NZ literature and findings, followed by a summary of eight interviews held with technicians from the industry, finalised with a discussion and recommendations.

Background and Research Methodology

Using the action research methodology outlined in (Dikilitas & Griffiths, 2017) and transdisciplinary approach (Belcher, Rasmussen, & Zornes, 2015), the following section discusses the engineering skills gap specifically with technicians in New Zealand. A literature review, and interviews.

The literary review involved searching for information on, and examples from global sources of the technicians’ skills gap in industry, as very little information is available in New Zealand.

The Interviews were carried out using video conferencing and recorded using dictation software. There are a total of 8 participants from Distribution and Generation companies. Pre-set questions were asked during the interviews (Found in Appendix C) and discussed in the later section.

Literary Review

The “skills gap” can be described as a wicked problem. (Grint, 2010), and there are many moving parts. The research begins at the fundamental understanding where the definition of skills and knowledge must first be defined.

The New Zealand Distribution and Generation Industry

The energy sector in New Zealand includes electricity, petrol, diesel, coal, natural gas, and renewable energy. The New Zealand distribution industry consists of 28 distribution companies and 4 major generation companies being Contact Energy, Genesis Energy, Mercury Energy, Meridian Energy of generation companies. See appendix A to see the allocation geographically across New Zealand.

What is Knowledge?

According to the Cambridge dictionary:

“Knowledge is the understanding of, or information about a subject that you get by experience or study, either known by one person or by people generally”.

Whereas:

“Knowledge is viewed as one of the most valuable resources and strategic assets of the 21st century. This makes it important for organisations to manage their knowledge to remain competitive. In a knowledge economy, the acquisition, transfer, sharing and management of knowledge is essential for organisations to achieve competitive advantage. Within the knowledge management domain tacit knowledge (TK) is recognised as fundamental to an organization’s competitive knowledge base, yet it is difficult to capture and reproduce as it is always unknown, non-shared and discrepant due to different individual perceptions” (Jin-Fen, 2017)

This can be broken into two parts, **tacit knowledge** which is *“Highly personalised and rooted in individuals’ actions and experiences as well as in the ideals, values, or emotions he or she embraces”* and **explicit knowledge** which is *“Knowledge that can be expressed in words or numbers, and easily communicated and shared in the form of hard data, scientific formula, codified procedures or universal principles”.*

For the purposes of this research, we will be discussing the lack of knowledge, and skills are of the tacit nature.

Views and attitudes towards knowledge

Currently there is a perception that experience and knowledge gained by the elder generation is being ignored, however this is not a new view which is highlighted in (Trott, 2013) where it is cited from significant philosophers in history, where they all agree on the fashion for ridiculing or ignoring all former knowledge. “Anyone who isn’t part of the new way of doing things is a dinosaur”. This is something that we need to be aware of as this whole research may be written and carried out by one of these dinosaurs.

This may be echoed within the Power Industry of today causing the skills gap to be seen to increase as previous experience is being ignored, where people are able to retire and not be able to pass on the knowledge gained over their career.

What is a skill?

Skill according to the Cambridge dictionary is “an ability to do an activity or job well, especially because you have practised it”.

Being able to practice something you must have experienced it several times to be able to be skilful at it.

What is Competence?

“A Competent person who has through a combination of training, education and experience, acquired experience, acquired knowledge and skills enabling that person to perform a specific given task”. (IET)

A person who has through a combination of

Education + Training + Experience = The ability to do a specific task competently.

If our graduates, engineers, and technicians are not having the relevant experience and training, by default they are incompetent. Which seems harsh, however “A rose by any other name is still a rose”.

To summarise, to have skills, knowledge and competence, people must be exposed to circumstances to be able to learn and gain experience. Within the Power Distribution

industry, there must be somewhere for individuals to be able to practice and gain experience as close to the real thing as possible. Now, there is a minimal amount of practical training available or in small pockets to those in the Power industry and therefore a skills gap exists and is widening as demonstrated in the following section.

The skills gap.

A skills gap is the difference (or gap) between the skills that an employer needs and the skills that their workforce (or specific employee) currently lacks.

The skills gap in the Power Industry and its impacts

When investigating knowledge management in the energy sector it is evident that New Zealand is not alone with this skills crisis, there is a global crisis in the Power generation industry. Just as Galwey (2017) had discussed, there is also an ageing working population within the electricity industry in America and Europe, this is not unique to New Zealand, and the loss of critical knowledge puts the industry in a desperate situation.

A survey carried out in 2018 of 17,000 energy professionals in 162 countries (New Zealand coming under Australasia) 48% are concerned about the impending talent crisis and 32% said that the crisis already hit the sector with a further 28% saying that their company was directly affected by the skills shortage.

In America, the lack of practical skills has become such an issue, that there is a South Park episode “joining the Panderverse” where the professionals are unable “to do shit” and the handymen become millionaires as practical skills are in high demand. (Parker, 2023) The only solution the creators can come up with is to transfer more handymen from a parallel universe to resolve the issue. How is New Zealand going to deal with the problem?

In New Zealand to grow the Energy sector and to replace workers who leave, it will require the energy sector to attract 150, Engineers, technicians and trades people a year, and if you take the broader definition of the sector to include service provider engineers, technical and trades staff then this estimates to be 700 engineers a year” (Hayes, R., 2021)

Electrical power companies globally are struggling to balance labour shortages along with the changing skills. The power sector will not be immune to the impending skills crisis that is affecting the wider energy sector. Power companies will need to source better training to attract and retain the skills they need (Airswift, 2021).

Within the U.K, Engineering employers think applicants are lacking in technical skills and that it is specialist skills/knowledge needed for the role that is likely to be lacking, and that complex problem-solving skills specific to the situation are the concern. (Institute of Engineering and Technology, 2021)

In New Zealand, Electrical engineers especially those who work with high voltage are in continued demand. There is a distinct lack of generation engineers, power systems engineers and substation design engineers with experience in the New Zealand power industry (Hays Engineering, 2020).

The loss of knowledge is a real threat to this industry and many industry leaders have attested to the fact that the industry knowledge is valuable, and they must find a way to retain it before it is lost. An aspect to resolving the issue is Organisations have realised that intergenerational knowledge develops existing staff and the internal talent to ensure that specialist knowledge is not lost (Auckland University of Technology, 2015).

The following are examples of the different characteristics of different generations from 1946 to the present day. This demonstrates the different communications and attitudes leading to differences in ways of operating within roles which can cause conflicts and misunderstanding leading to inefficiencies, and sometimes the inability for people of different generations to work well together:

Baby Boomers are born 1946 to 1964 and are motivated by company loyalty, teamwork, and duty. Their communication style is whatever is most effective, Phone calls or face to face. They have a world View that **Achievement comes after paying one's dues**; sacrifice for success and Employers should Provide them with **specific goals and deadlines**; put them in mentor roles; offer coaching style feedback.

Generation X are born 1965 to 1980. They are motivated by diversity, Work life balance, their **personal professional interests**, not the companies. Their preferred Communication style is whatever is most effective but prefer **Phone calls or face to face**. Their world View is Favouring Diversity; **quick to move on if their employer fails to meet their needs** resistance to change if it affects personal life. Their Employers should give them immediate feedback, provide **flexible work arrangements and work life balance**, extend opportunities for **Personal development**.

Millennials are born 1981 to 2000. They are motivated by responsibility, the quality of their manager, and **unique work experiences**. They preferred communication style is to use **IMS, texts, and e-mails**. They have a world view of Seeking challenge, growth and development, fun work life and work-life balance, and are **likely to leave organisation if they do not like the change**. Employers **should get to know them personally**; manage by results; be flexible on their schedule and work assignments and provide immediate feedback.

Generation Z are born 2001 to 2020. They are motivated by Diversity, personalisation, individuality, and creativity. Their preferred Communication style is via **IMS, texts, and social media**. They self-identify as digital, value individuality. They prefer to collaborate with millennial managers, innovative co-workers, and modern technologies. Employers should offer them work on multiple projects at the same time and provide work life balance, allow them to be **self-directed and independent**.

(McKenney & Handley, 2020) also claim that the practical development of skills has somewhat been lost due to the attitudes of business.

In an IET Article interviewing James May, known for his status in the tv programme top gear.

He felt children and young adults should have more exposure to engineering. perennial issues of the skills shortages, recruitment, diversity, and visibility in engineering can in part be traced to the discipline having a problem with its own PR.

Attitudes to engineering is a very British disease, a kind of snobbery rooted in the class system, where people are sniffy about the technical trades and professions such as applied engineering.

"I suppose we need some better spokespeople. Some glamorous, charismatic people to talk about tools and tolerances in a gripping way. May thinks his television work contributes to this outreach, but "not to a significant degree". (Smith, James May:Our attitude to engineering is a very British disease', 2023)

Even attempts by the U.K government to encourage upskilling have not been met with enthusiasm **largely through the lack of demand**. The government has made progressively warmer noises about long term education for the workforce. It is seen that Employers need to focus on upskilling to **wean themselves off seeing immigration** as their way to fill staffing gaps.

Robert Moritz, global chairman of consultancy PwC. Points to sectors such as engineering, employers have been wary of spending money on training, and upskilling **for fear of losing those workers to higher paying competitors**. “An inherent lack of trust between the employer and the employee, but also “Skilling them up has a multiplier effect. Upskilling gives people more confidence and research has shown it is the people that are lacking the skills are more likely to leave, the biggest problem is **getting people to join industry in the first place**.

The Open University have reported also that the pressure on existing staff had made it **hard for them to find time to train new people**. Jilinan Hughes the director of the National Microelectronics Institute at a hearing organised by the Commons Business committee “although companies would like to take on apprentices or graduate apprentices, they are **struggling because they have to provide hands-on training** in that environment. Would they like to take on more younger people? Absolutely – But do they have the bandwidth to do it? They do not at the moment”. (Edwards, Engineering Crisis: A multi-pronged problem, 2023)

New Zealand employers are concerned that older workers leaving the workforce will leave a skill gap. However, they can also be seen as an untapped resource. 58 % of New Zealand employers believe that an ageing workforce will have an impact on their organisation (New Zealand Human Rights Commission).

Completions in the key Cable jointer, and Transmission Line Maintenance qualifications look reasonably healthy in the last couple of years and there was spike in Fault Response and Switching, and Line Mechanic completions in 2019. However, the pipelines of Electricity Supply Electrician, Distribution Faultman, Field Switcher and Electrical Fitter completions have all weakened recently. (Hayes, R., 2021)

The impacts of the skills gap

There is a lack of skilled workers, which has led to a **war for talent**. (Edwards, Engineering skills crisis: a multi-pronged problem, 2023) and one of the impacts is poaching between employers. “Master Electricians chief executive Bernie McLaughlin said that was not a sign that electricians overall were in plentiful supply. In fact, the industry was 10,000 electricians short” (Harris, 2021)

*Most employers said the shortages are also **piling pressure on staff and reducing output and profitability. This in turn creates stress for people and their wellbeing is also affected.***

New Zealand organisations have an inability to capitalise on the institutional knowledge that older workers possess and loss of knowledge as they exit the organisation. Institutional knowledge and memory are a valuable resource, failure to capitalise on these will result in the loss of that knowledge.

One consequence is seen as:

“A world of exciting targets has become one of missed deadlines” (Bently, 2019)

There also seems to be a blind spot when discussing the lack of knowledge. Managers don't know what they don't know, and therefore cannot make informed decisions without advisors which are getting shorter in supply as time goes on. How many people looked at the photo on page 54 of Engineers making a difference, where the person is holding a tool and has the necessary PPE, I wonder how many people have noticed that the danger sign is upside down. (Somara, 2023)

An example of a physical consequence that reached people's attention was the Northland power outage in June 2024 due to a Pylon falling over, causing Almost 100,000 people to be left without power.” where Transpower chief executive Alison Andrew confirmed, maintenance crews removed all the nuts at the bottom of three legs of the power pylon that collapsed, causing the widespread power outage for all of Northland.

Andrew said Transpower crews were completing “routine maintenance” on the tower in Glorit.” It is unprecedented and inconceivable that all the nuts were removed at once, our view is that the specifications and procedures [for the maintenance] were not followed”. (New Zealand Herald).

There are also many costs that managers are not aware of, either because they are not made aware, or they are simply not conscious that they are paying lots of money through the lack of knowledge and know-how of their staff.

The definition of an Engineering Technician

The Dublin accord is an international agreement establishing the required educational base for engineering technicians. The agreement established mutual recognition of the qualifications which underpin the granting of Engineering Technician titles.

The signatories are committed to development and recognition of good practice in engineering education. It is specifically focused on the mutual recognition of academic programmes/qualifications that are a base for Engineering Technicians.

It also recognises the importance of the roles engineering technicians play as part of a wider engineering team. Even though the term engineering technicians used throughout, it is mindful that these roles are often termed differently within the specific jurisdictions. It also includes roles such as certified or professional technician, which may also be called engineering associates.

Currently there are nine signatories that make up the Dublin Accord: Australia, Canada, Ireland, New Zealand, Korea, South Africa, UK, USA, Malaysia.

<https://www.internationalengineeringalliance.org/accords/dublin>

It states that: “Engineering technicians implement proven engineering techniques and procedures to solve practical engineering problems. They apply safe systems of work and contribute to the design, development, manufacture, commissioning, operation and maintenance of products processes and services”.

In New Zealand, A Registered Engineering Associate (REA) is an experienced senior engineering technician / technologist that has been acknowledged with an internationally recognised credential. (Edgar, 2018)

What does it take to be a technician?

“The current pathway to become a power technician is to complete the National Certificate in Electricity (level 5). The Electrical Workers Registration Board employers’ licence will allow diploma and degree graduates to work as technicians. However, asset owners will require them to have proof qualifications and personal electrical registration” (Johanna).

To be registered with the REA Technicians require Academic qualification equivalent to NZCE or NZ Diploma in Engineering, Time proven track record of practical engineering competency, supervisory experience and demonstrated ability to exercise sound engineering principles and judgement.

They are required to: Work ethically within the limit of their skills and competencies. Act in the public interest especially in matters of Health and Safety, the protection of life, and the well-being of the community, Recognise the need for sustainable management of resources and minimise adverse effects on the environment and develop their knowledge and competence on a continuing basis. They can have this assessed on a voluntary basis under REAcap (Edgar, 2018)

As part of the registration, the Engineering Associates Registration Board expects all REAs to commit to the responsibilities and obligations listed in the Code of Ethics, as follows:

- Promote and maintain efficiency, good management, proper conduct, high ideals of courtesy and personal integrity, with understanding and cooperation between themselves and others.
- Uphold the dignity, standing and reputation of REAs and other engineering professionals, promoting their interests, integrity, status, and welfare.
- Not be involved in illegal, dishonourable, improper, and objectionable practices.
- Commit to the ongoing development of all members of the engineering profession, and to continuous improvement in knowledge and competence.
- Apply their skills and knowledge ethically and in a spirit of fidelity and fairness to their clients or employers for whom they act, and work within their areas of competence.
- Uphold the public interest, especially in matters of health and safety and the protection of life and the well-being of the community.
- Recognise the need for sustainable management of resources and to minimize adverse effects on the environment (Edgar, 2018)

Nature of a Power Technicians role

Technicians tend to undertake work for the Generating and distribution/transmission companies, or as contractors (service providers).

Those that are working in a distribution or generation company tend to do more maintenance type of work, replacement of existing equipment, including inspection and testing and in smaller EDB's this may extend to new installations of equipment.

Contractors tend to do new installations of equipment and less maintenance work. The contracting model is affected by what Galwey (2017) says is the boom-and-bust nature of project work.

In short, there doesn't seem to be any set role for a Power distribution technician, and in New Zealand due to its size, they not only work across other roles of the industry, but they also take on responsibility of both the engineer and the electrician. An example of this happening is:

"In large power supply authorities, it is often the practice to use engineers to do tasks that could reasonably be carried out by sub-professional people at the technician level. This is both wasteful of engineering manpower and frustrating to the individual engineer.

Realisation of this has increased in recent years and courses for people at the technician level have been boosted and their stature has gained accordingly. It must be remembered, however, that there is a very definite limit to the ability of the technician, and that there is a limit at which the gains through using sub-professional people to do a particular task are more than off-set by the increase in costs of not employing a professional engineer" (Mcrae, 1968) even though the above article was written in 1968, the principle remains the same of where it is unclear what the technicians role really is, the term "Jack of all trades" springs to mind, where they do a bit of everything, but not a master of anything.

Why is there a skills gap?

There are several reasons that are believed to have caused the skills gap. One of the major contributors are changes in the education landscape over the last four decades has changed the approach to the development of engineering and the training of its people.

In the 1980's there were major sector reforms, deregulation, and privatisation and in 1986 The Electricity Corporation of New Zealand (ECNZ) was set up under the State-Owned Enterprises Act.

The 1990's the industry was plagued with a generation crises. Electricorp was established to monitor the industry. The first alternative sources of generation were initiated and NZQA made changes to the apprenticeship model.

In the 2000's Privatisation is feeding an electrical generation crisis. Wind and geothermal generation contribute 20% of all electricity provided to the national grid, and the creation of Tertiary Education Commission takes place to deal with the ongoing skills shortage.

The existing situation is still a skill gap and ageing population, there is a worldwide training shortfall, Te Pūkenga is set up in 2020 to help unify all training providers.

Another influence to the skills gap is the attitudes to work lifestyle of the general population and the working norms, where (Wolf, 2024) Exclaimed: "Although we cannot give a precise figure, we may guess that at present, in many countries, at least a quarter of the adult population is in the Precariat. This is not just a matter of having insecure employment, of being in jobs of limited duration and with minimal labour protection, although this is widespread. It is being in a status that has no sense of career, no secure occupational identity and few, if any entitlements to the state and enterprise benefits that several generations of those who saw themselves as belonging to the industrial proletariat or slarist had come to expect as their due.

In 2018, 88% of the Energy Sector workforce said it worked 40 hours or more per week compared with 62% across the whole economy. If the sector is unable to cater for more flexible work practises, this may be a barrier to attracting young people and people with families, and therefore greater workforce diversity, and over the next 10 years, the industry is going to experience an unprecedented number of workers reaching retirement age. In 2018, 25% of the workforce was aged 55 and above, compared with 23% of the total economy. (Hayes, R., 2021)

The main area of difficulty remains applicants lacking technical skills. However, more engineering employers than before report a lack of applicants for their roles. (Institute of Engineering and Technology, 2021)

James May thinks that the perennial issues of the skills shortages, recruitment, diversity and visibility in engineering can in part be traced to the discipline having a problem with its own PR. (Smith, James May:Our attitude to engineering is a very British disease', 2023) which supports the idea that the power industry is seen as dull and old-fashioned, a reputation that still remains. The young digitally skilled graduates do not see this sector as appealing.

Overseas recruitment of technicians is difficult due to language problems and potential jobseekers do not have the correct qualifications. Britain and South Africa were the countries

that were the easiest to recruit but the pay was not attractive, however, it was perceived that there was a decent quality of life in New Zealand. But New Zealand has now also been seen as a steppingstone to Australia.

In some respects, the situation in New Zealand is unique as it is a small country, where small companies involved do not have scheduled workforce training plans because of the small numbers of power technician teams.

There are many parts of the industry that are lacking in skills and it “is relying on a select few individuals many of whom will be approaching retirement age” in the next 15 years as these were pre – privatisation trained technicians. (Galwey, 2017, p. 17). Therefore, on the job training is really the only practical technical training on offer because of the contracting model. Also, the opportunities for training are diminishing because there is now more focus on profits.

Electrical Engineering support organizations and registration in New Zealand

There are several stakeholders involved in the provision of practical training for those in the electrical Power industry, the following are the main organisations that have an influence over a technician’s career.

Electrical Workers Registration Board (EWRB)

The Electrical Workers Registration Board (EWRB) is a part of the Ministry of Innovation & Employment, they register and certify the on-going competency of electrical and electronic workers in New Zealand. There appears that there is no recognition for technicians with this organisation, only that they register as electricians, and it is a requirement of becoming a technician when seeking employment.

Institute Of Engineering Technology

The Institution of Engineering and Technology (IET) is a global organisation that has more than 156,000 engineering and technology professionals in 148 countries. Providing a professional home for life for engineers and technicians.

Their strategy is to promote the general advancement of science, engineering, and technology and to facilitate the exchange of information and ideas on these subjects amongst the members of the IET and otherwise.

The member types of Student, Associate, Member (MIET or TMIET), a Fellow (FIET) and Honorary Fellow (HonFIET), and there are four categories of Professional Registration; Chartered Engineer, Incorporated Engineer, Engineering Technician, and ICT Technician where each category follows a variation of the UK Standard for Professional Engineering Competence (UK-SPEC) or ICTTech.

Engineering New Zealand

Engineering New Zealand is a multi-disciplined organisation based primarily in its home country and is made up of mostly of Civils and Structural engineers. They have a small electrical representation, and their strategy is to be:

“A non-profit membership organisation that’s driven to help engineers be the best so they can engineer better lives for New Zealanders”.

They Promote the industry, share knowledge, build connections, celebrate achievements, uphold professional standards, manage competence standards, provide advocacy and advice, support professional development, encourage global experience.

Engineering New Zealand’s strategy for 2022–2030 has four key ambitions. They strive for Engineering New Zealand and their members to be: Professional. Technically skilled, credible, trusted and valued by the communities they serve and live in.

Currently they have different levels of membership and offer CPEng only.

The Institute of Electrical & Electronic Engineering (IEEE)

The Institute of Electrical and Electronics Engineers is an American 501 professional association for electronics engineering, electrical engineering, and other related disciplines.

IEEE members are engineers, scientists, and allied professionals whose technical interests are rooted in electrical and computer sciences, engineering, and related disciplines.

Their strengths are seen in having communities and networking, conferences and events, Publications, Developing of Standards and Education.

Their Different memberships are:

Student Member, Affiliate to Member, Associate to Member, Senior Member Grade, Fellow, and life member.

The Electrical Engineers Association (eea)

“The EEA is committed to providing the New Zealand electricity supply industry with expertise, advice and information on technical, engineering and safety issues affecting the electricity industry”.

The issues they focus around are engineering, technical and health and safety and the EEA providing an '**electricity supply industry voice**' to the Government, regulators, stakeholders, professional bodies, and the media.

The EEA also provides publications for the industry and public use, including technical & safety guides and standards, safety and asset management resources, industry reports and links to relevant legislation and international information.

They also provide an independent forum to enable debate and engagement on industry, engineering, technical and safety issues. The EEA Conference, regularly hold courses and workshops, are important events for engaging with members and other industry stakeholders.

There are two membership types, corporate and individual.

The Register of Engineering Associates (REA)

The REA provides registration and standards for engineering technicians and technologists, it is a statutory mark of quality, which is seen to encourage life-long education and competency development.

Being registered with the REA provides an internationally -recognise time-tested benchmark. It Establishes a hierarchy of delegation levels for management. It matches workplace tasks against personnel competence experience, that fosters ethical standards in industry, Provides bases for career pathways, training goals and succession planning.

Other observations in the industry regarding Technicians

There are several other influencing conditions that exist that will bring into context the reasons why people may leave the industry and seek employment in other sectors:

Customers' demands Vs what's good for the network.

From experience of working in an electrical distribution company, there seems to be a balance regarding the customer paying for a service with the need to be made one of the top priorities, and the ability to future proof the network for future customers is something that needs to be gotten right. When the technician see's that the company is engineering itself into a corner because of the focus is on the customer at the time, it can make things frustrating when they are concerned about the longer-term future.

Time-sheeting and billable time

One of the trends in the industry is the billing of time for a job, there is no allowance for "thinking time" and coming up with the best solution. It also goes under scrutiny from people that don't really know engineering. This creates even more pressure on those who are already under pressure, and sometimes people are relieved when leaving that job because "A weight has been lifted off their shoulders."

The lack of management knowing what good looks like

As the skills gap is getting larger, managers are being put into positions where they don't really know what good looks like. Without previous experience they think something is good because its cheap, when it is a poor engineering decision or workmanship. Therefore, standards begin to slip, and those technicians that normally do a good job take more time and money, are put under pressure to lower their standards from their manager, which goes against the grain of good technicians.

Competitive tender: a fallacy due to the lack of skills in the industry

The existing methods of engaging service providers where they are competitively competing for a job is bad for the industry in general. As most of the works is seen to go on price, however it is known that the contractor would normally lower the price and then come back with variations during the project. Also, they are forced to price for something that they have not done yet, and if its complex works, then making an assessment of an unknown can be difficult as the experience is no longer there.

This then drives the contractor to price for a minimum number of hours which causes unnecessary pressure on the technicians causing anxiety and stress when trying to meet unrealistic timescales when carrying out the job.

The Clients wanting service providers to investing training and not willing to contribute themselves to the cause.

Clients are looking to have the contractor to pay for the training and development of its staff, but at the same time they are not encouraging the contractor to give the necessary funding and support to the contractor by screwing them down on price when they tender. This leads to no development and training for the contractor's staff.

A divided support structure. Having the different organisations competing for the technicians' subscriptions

Each of the above organisations (IET, EEA, RAE, Engineering New Zealand and the IEEE) all are reliant on subscriptions from their members. Due to the costs of each of these memberships they are competing for the technicians' limited funds. They want to join, which one do they choose? And what do they get from being a member?

Attitudes of customers towards technicians in the "age of rage"

These days we are living in a world of narcissistic tendencies where customers now feel that they can have what they want, almost unquestionably. Not being able to push back and stand our ground leads to fundamental engineering decisions being made that will have a greater impact on the network in the future. This is causing extra pressure and putting technicians in situations, where they don't create the problems, but they are left dealing with them.

Discussion on the future of the technician role

REA has never achieved the numbers that were originally estimated based on the ratio of say 3 to 4 Technicians to every Professional Engineer. That would have meant something like 12,000 to 14,000 registered technicians, instead of the 5,915 that have been achieved after 55 years.

Once the support from the State Sector disappeared, the demand for the credential never retained the growth previously experienced and it continues to decline.

Industry despite claiming that a statutory registration for Technicians (and more latterly Technologists) was desirable, has not formally adopted the credential into organisational career structures nor remuneration scales.

Without this support it will prove difficult to continue to be justified or to meet the Government criteria for statutory occupational registration.

Over recent years major disasters within NZ have all raised serious concerns over the problems with occupational registration / licensing, and to name a few examples, Cave Creek platform collapse, the Tamahere Storage Plant refrigerant explosion, Pike River Mine.

Similarly with the decline of the interest in the registration by the graduates now entering the workforce the trend in the diminishing registered numbers can be expected to continue with the retirements of the current registrants exceeding the rate of new applications. (Edgar, 2018).

What needs to be done about the skills gap?

There are several different things that contribute to the skills gap, and there is a requirement to solve the problem from multiple approaches to help minimise the gap going forward and try to not let it get any larger. As Transpower have identified that as technology changes the current workforces' skills and capabilities will also need to evolve to ensure we continue to provide quality services and overcome any challenges that arise in the future. (Transpower New Zealand, 2021)

The Energy sector needs a clear picture of how many people it employs, particularly in engineering, technical and trade occupations. And it needs a methodology for forecasting skill needs of the future.

According to (Hayes, R., 2021) The energy's sector – its contractors, consultants, and suppliers – are not well delineated in official statistics. Service providers are grouped together with other parts of the Energy Sector making it difficult to estimate the number of people employed in providing their services. The roles need to be categorised correctly to be able to gather statistics properly. Secondly, the unprecedented nature of the changes heralded by the Climate Change Commission that the sector is expected to undergo, adds to the complexity of forecasting the effect of those changes on the workforce.

The industry requires an overall “Master Plan” where vision and direction will be very important to get where we want to be. While many of the challenges faced by the Energy sector such as decarbonisation and technological change are unprecedented, the underlying principles of workforce development and recruitment plan should be established for the whole of the industry. “Working together”.

Changes to the Education or development of practical skills is required to vocational Education, with the possibility of regional skills leadership groups, centres of vocational excellence, targeted training, and apprenticeships. (Hayes, R., 2021)

Being able to retain older workers will allow knowledge transfer which is paramount to ensuring that industry critical knowledge is passed on and not lost (Galwey, 2017) This can be achieved by workers are nearing retirement they can be offered options such as flexible working hours to accommodate their lifestyle needs to prevent the loss of the valuable industry knowledge, they have accumulated. Galway (2017, page number) states that:

“It is advised that generation companies hire younger Power Technicians in order to provide timely continuity and allow for intergenerational knowledge transfer. This needs to occur before the large cohort of older Power Technicians leave the industry, to provide lead time for training of new technicians. Or alternatively, provide the resourcing for the training of these individuals if hiring is not a practical option”.

The sector must target the domestic workforce: school leavers, tertiary education graduates, and skilled workers in other sectors. There are also opportunities to tap into under-utilised labour pools such as Māori and females, also potentially create work opportunities that currently do not exist for other parts of society such as reformed offenders.

Technicians’ interviews:

The following are the questions and summarised responses from the interviews conducted between June 2022 and January 2023 investigating the views and opinions of those that are technicians in the New Zealand Power industry. The themes have been collaborated with quotations sometimes in their own words to stop any misunderstanding during the colation process.

1. What is a technician

1.1 What is your interpretation of a technician?

The first academic type answer from the group was that a technician is a subprofessional engineering occupation sitting between tradesperson and engineer (typically holding a Level 6 qualification).

Most of the interviewees believe that your average person doesn't know what a technician is, some even tell people at parties they are a "High Voltage Electrician".

They see themselves as the next step up from an electrician, that can interpret the technical language of an engineer and put it into layman's terms.

Whenever they do testing, they believe technicians have the ability to understand what the results mean. Having the ability to interrogate those results and ask the relevant questions such as: Have you compared it with the previous test? Is it worse? Is it better? Is it comparable with the other equipment that we've got on our network? and using their past experiences to be able to make an informed pragmatic decision.

They also believed that they are seen as someone who has probably come up off the tools or has come off an engineering degree, and completed all their further learning and their experiences are from being field based.

A few quotes:

"The hands and the tools of the Engineer or Designer",

"It's somebody who gets a phone call when nobody else knows what's going on and is the unknown part of the electrical industry.

"A guy that is expected and usually does anything and everything".

Their thoughts are that the technicians under 50 years of age, have not been formally trained as technicians. And they tend to be electrical trades people with Level 4 qualifications who are good at IT and have enquiring minds on protection, metering, SCADA, and communications.

1.2 What do you think are the key attributes to being a technician?

From the interviews some of the key attributes have been identified as being thorough, having good attention to detail, and logical thinkers.

Being methodical is important, where being able to take the time to sit down and read something, understanding what information is presented to them and be able to “join the dots”. Because *“a lot of manufacturers and people don't give you the complete story”*. This leads to being able to have good problem-solving abilities, good fault finding, a thirst for knowledge and an understanding of computers. Tenacity also is essential. *“You've got to be like a dog with a bone. Sometimes because some problems are really gnarly, and you have to just not let it go”*.

Discipline is very important as good technicians don't cut corners. *“As a technician, there's no way to do the job if you smash into it and to get out as quickly as possible”*. Also being pedantic is important as you must be able to repeat the same thing over, and over again.

“They must have dinosaur skin” where they need to be able to accept others challenging them and be able to maintain focus whilst those around them may be allocating blame for something going wrong. Which leads to the requirement of being good under pressure, not allowing themselves to be pressured as they can make terrible mistakes”.

“As you're looking at a design, you're working through stuff, you just got to have that integrity to see your way. Identify “this isn't right” or “I think you're wrong”. And be able to express that without getting too emotional about it. *“Just being able to stick with the facts and get on with it. Which can be difficult as most technicians that take great pride in their work and are passionate about what they do”*.

Being able to communicate across a variety of different levels in the industry, however some of the best technicians struggle with getting their point across. Finally, the rest is down to experience, *“you can't just decide to be a technician and boom, you're a technician”*.

1.3 Do you think that Professional Registration is important?

The answers to this question varied amongst the group.

Some thought that professional registration is important because it's good to set a standard and they can prove their competence.

A lot of the supply authorities would like them to be registered electricians being a technician is not really a recognized status, it's beginning to become more recognized, but it's not recognized in terms of being certified. At least if there was a license then it would help in setting this standard and everyone would be on the same wavelength.

Some of the interviewees thought professional registration is important for people who like to have letters after the name, or it was "More important to the boss". It didn't mean anything to one or two. If it was made very important by an employer, and not their experience, then they would probably not work for them because anyone can get the piece of paper but not everyone can do the practical side of being a technician.

"Some people think it's a nice to have, but if you're working within your own business, then you probably don't need it so much".

1.4 Do you think that you are adequately supported by organisations and Industry?

The general feeling is that technicians work in an environment that gives them little support. "In the companies I have come through, there wasn't that much support or guidance, technically within the industry or even within the company".

They are often managed by people with other backgrounds than their own. One interviewee state *"I have heard of technicians being reprimanded by their management for being awkward, but they are really seeking the best safety outcomes"*.

They work in fields that are highly technical and not understood by those in management leading to a lack of investment in equipment and spare parts not being held. They often must scratch together parts or procedures to make things work.

The majority of those interviewed do not know of any professional organisations in New Zealand that support them. The only support they get are from the suppliers. For example, if they have trouble, they get hold of the SEL engineers and tell them "I'm having this trouble" and it could be between an hour and a week to help resolve their issue.

They also rely heavily on other people they know. Once they find someone, they generally go back to them.

“I think I'm quite lucky here because we've got so many guys who've been here 30 years that I lean on them quite a bit. And they're always very helpful, but understand, that's probably not the case for every company in New Zealand”.

“If I hadn't had two very, very good mentors I wouldn't have been able to do the work that I was doing as a technician. And these types of people are starting to retire.”

When we try to contract resource out, and going out to other networks and companies, you realise how much knowledge is held by a small amount of people, and those are hard to find.

1.5 What do you think is important to a technician?

Most technicians want the "right outcomes" to happen safely. Using their skills in a way that enhances teamwork and community service tend to be important drivers.

Some think support and understanding is important where *“If you tell your manager/supervisor this doesn't work and it's going to take me some time to sort it out, they reply OK, that's fine. You know, just get on with it”.*

Respect for what they are doing is also important *“Not waving banners and blowing horns but, for a job well done, a thank you, which is pretty basic”.*

For some it was about the environment and culture where they work. Conducive to raising a family. *“I had a young family when I was going through my career so that was an important factor”.*

“You get something that's not working and hopefully when you leave it, it is now working which gives a sense of achievement”.

Feeling useful is also important *“I went on holiday for two weeks and nothing got done, the work just piled up and it's there for me when I got back. So, nobody wanted to step into the technician role because it is very hard to do unless you're trained to do it”.*

I'm getting involved in different stuff. Not just doing that repetitive type thing, most technicians want to have something a bit more to do than just that routine.

Humour, *“the engineers are pretty hands off now and don't just come and have a look at what you've done and have a bit of a laugh when you point out a few of the funny mistakes that they have made”.*

There are differing opinions regarding wages. *“I've seen techs that are just driven by money. They are the ones that go off to the mines or are following the jobs around the world”.*

Alternatively, *“Some of the guys I've worked with have been long term and have done long stints with companies. and if they want more money, they could just go somewhere else, so I think sometimes it's not just money”.*

Unfortunately, it seems flexible hours is not an option for technicians, and as a result can have a negative effect on their work life balance. One of the hardest things that technicians must deal with is the lack of respect for their time and what it costs for them from a work balance point of view to be at work.

“Next week is going to be the first my family have gone on holiday for five years, and that's not good”.

“We've been doing too many overtime hours at the moment. I had to come in on Sunday, just when I thought it was all over”.

2. Definition of a skills gap.

2.1 What is your definition of a skills gap?

The general themes of the interviewees of what a skills gap are as follows:

The skills gap in the power industry can be seen as the difference being expected to deliver and what can be delivered. This could be an unknown skill that a lot of people don't even know existed.

“There's kind of gaps in knowledge, the local knowledge, and the knowledge of what's happened in the past”.

Another view is that is between the basic electrician and an engineer. Whereas you get the practical to the electrician and then the theory to the engineer, it's the bridge in the middle to get the technician enough theory to understand the engineering side, and enough practical to make it work.

2.1 Do you think a skills gap exists? if yes, why?

There was an overwhelming yes from all candidates and below are some of their own understandings on why the skills gap exists.

People don't know what a technician is, "My wife doesn't know what I do". also due to school leavers not really seeing it as an option for a career.

"How are you supposed to explain to someone at a school level what a technician is and what they do? Even your coworkers, other staff members and your family don't understand what you do, everyone knows what an electrician is, however nobody knows what a protection technician is."

The Electrical Workers Registration Board (EWRB) publishes the numbers of people with different registration classes, but they don't distinguish between those in the power industry and those outside, leading to difficulty in importing resources from overseas: *"How are you supposed to hire a technician if they're not in the skill shortage list? We bring them over as a linesman and after two years, you can throw them on the network as technicians"*.

"There must be a skills gap because beyond registration, there is no common formal definition of what skills are needed to do particular tasks. I recall trying to specify commissioning requirements when I worked within a line company, but the pushback was that they are too onerous or difficult to implement".

Practical skills and experience for technicians is part of the job. They can't really be classified as a technician without those practical skills and the current situation is that there is not much practical training available for those who want to enter the industry.

"I was a second to last intake of the people that was used as a school for the NZDE and that's where they took us to a place with workshops there and they taught us how to weld, how to use hammers, how to draw, how to wire all those things. Then when you went out into industry you could do all these things. Then that all stopped. So now there's probably a 25-to-30-year period where nobody has been trained".

“These days people can do engineering qualifications where they learn the theory, however when you give them a task, they should be able to go and start it and know how to drill a hole, you would hope that they would know that. but they don't”.

Also, it is seen that the skills gap exists from the lack of training and support given to people already in the industry. “If you want to be a technician, you have to push your case and you have to self-drive anything you want”.

Another theme that arose from the interviews was the lack of a pathway and loss of people to overseas:

“The skill gap is increased because of the lack of a pathway for technicians. “Based off my experience if you get a supportive company, they'll assist you, monetary wise, but they won't put any training in place for you. I've had both worlds where my apprenticeship was the opposite. We're not training enough people. And these people are leaving to go overseas once they are trained up”.

A few of the interviewees thought there was a lack of funding as an issue as when governments are not involved, companies do not put their foot forward because the private sector are motivated by profit. So, the feeling is that the solution needs to be industry wide if the government are not going to help. Back when New Zealand was growing, the government was one of the biggest employers and they had training schemes and they also had all the big generation sites coming online, now the industry is trying to keep their overheads low.

There also seems to be a lack of enough interesting work to generate more training: *“For years, you had this well trained a bunch of people that had come out of these big projects and the country didn't need to train anyone. So, nobody trained because there was a surplus of staff. Then along comes the industry practice where the user pays and then nobody wants to pay for training. An effect of this is that the whole country just gets out of the habit of training people”.*

Finally, it is seen that companies feel it's more cost effective to poach off others, rather than train them. When you end up “poaching Peter to pay Paul”.

3. The Need for practical skills

3.1 Do you think that you have the ability to have practical experience in your role?

They all confess that they are constantly learning, and they are always being asked to do things they have never done before, and they must sit down and learn things. *“I think the only day that you stop learning is probably when they put you in a rest home or under the ground”.*

As a technician in the field, they do have facilities to do a few acceptance tests. There is not free thinking on the technician side, its more driven by the engineers, where they would tell them the scope of works and sometimes what to do.

Even though they get practical experience in the field they also believe it should be supplemented with a practical centre, where they can practice, test things, and simulate scenarios before they go out on the network.

One technician discussed being able to work on Omicron test equipment and spending a week in Australia. *“It filled a gap that I didn't even know was there, you can't put a price and experience, and five days with the experts that Omicron was more valuable to me as a technician than 18 months of going to do a Polytechnic course”.*

There is a lot of on-the-job training where the practical skills are learnt through doing, on working equipment. How people progress can be how well they have gone without destroying anything: *“We're multitasking here in a smaller Company. We've got technicians that are doing all sorts of different work, we've got a kid who's an electrician who does electrical fitting work. We've got a generation technician does substation maintenance. We like to identify someone who has potential to do technician work, so you might get them in to assist on a wiring job or to really assess how they're doing, whether they listen and if they are any good, they get more of that type of work. Thats the only way that these guys get their experience”.*

3.2 As engineering is about doing things? Do you feel that you have the facilities to try out new ideas, test and implement them, or do you have to install and hope that it works?

The general theme was It's a lot about installing and hoping that it works, and they rely on experience. They sometimes rely on suppliers, as an example they arrange for SEL to visit their offices and complete training sessions for them.

“Some stuff has a standard design you can follow and implement, other stuff you just make up as you go along really”.

“As the Power industry is not really groundbreaking, we use the tried and tested methods and rely on high probability of things working”.

They try and bench testing before they install equipment so sometimes, they need to be in a workshop testing, if possible.

4. Why is it so difficult to attract people to the industry?

4.1 Do you think that we (The Power Distribution Industry) do enough to attract people?

Most of the interviewees thought it was a good industry to work for. They thought attracting outsiders or school leavers, and the younger generation is a major challenge for the industry.

They think that there is an issue that we do not publicise what we do enough:

“I put it there's no real engagement between the public and us, you know? and the industry as such, that we are silent or don't exist”.

“I don't think there's much in the way of advertising or showing how good the role is? the energy sector generally as a whole, is pretty good at advertising how good they are being efficient and how much energy saving they are doing”.

“I think there's a few aspects that Genesis is well publicized, everybody knows who Genesis are. You may know who vector are, but the rest of the line's companies, they're not well advertised. So that was probably a part of the reason why I want to be an electrician at Genesis Energy”.

“It's definitely an exposure thing. I still don't know how to explain my trade to people when they ask me. I just call myself a high voltage electrician because people know what an electrician is, and people know what high voltage is, so they can try and associate with that”.

Some of the technicians thought it's the type of environment that the contractors are working in, turns people off from joining us:

“I don't think that contracting part of the industry is full of rosy stories or has a happy vibe”.

“On the contractor side, I think there's a lot of challenges for attracting people, and having to work hard and shouldn't put people off, but it's more than just that, it's just the sort of environment and the culture that seems to exist in that space now where it's all about cost constraint”.

Regulating the industry has also contributed to cost cutting so there's only a certain amount of money available in the industry. So, when attracting people, advertising is not top priority.

Some thought that the pay was not what it should be, where employers are struggling to employ a new protection technician at the moment because they are not in the right pay bracket.

4.2 What ideas do you have that could get people to join us?

Some thoughts were generating a video, showing the equipment that's on our networks. And what it does as people “don't understand a lot of it”.

Better representation by national bodies was a reoccurring theme where having some kind of representation that they can lobby can coordinate and help organise PR. *“I think what would help people trying to get into that space, but also help people might encourage people to stay there once they're in there”.*

Ideas of cost sharing put in place that lets the whole industry train its people. They think the network owners, the clients or the principals need to share the load of training. Having a national body for the technicians would also help them to have a pathway exposing them to practical training, enabling them to carry out their work with competence.

One idea was to Advertise and co-ordinate secondments around the country, they feel that you'd end up with a whole better-quality engineer if you could expose them to different companies in the industry.

Finally, more money for the role in which they carry out as the feel they are not recognised fully for what they do.

4.3 Do you think that engineering is only suitable for certain types of people with a certain way of thinking? Or do you think anyone can be an engineer?

Most technicians think that you must be a certain type of person for the following reasons:

“You gotta be quite methodical and be able to think outside the box. To be able to reason things and never be afraid to listen to anyone else because half the time you find someone that stands in the background, can contribute to a good solution, even the apprentices”.

They think that being humble at times can also be an attribute that the younger generation lack. *“I have seen a few technicians come through that are quite full of themselves. They don't know anything, and they make it obvious, and people end up walking away from them and do not impart important information, so they end up struggling, and eventually quit”.*

They also feel people need to have a good grasp of the English language, clear concise communication when required, an example where the poor communication skills have almost cost them their lives where *“I've had a couple of near misses where you've said something, and they replied saying yes and they totally did the opposite. Which can be very dangerous for themselves and others. One example is where we were commissioning new Voltage Transformers in a 110kV site, and it came to energising the VT. We gave the instruction to stay inside in case it goes bang. As soon as the VT was energised, he decided to walk out into the yard, and I had to grab his tool bag and drag him back.*

Some people believe there's room for different types of technicians if they are keen to learn. *“The problem is really finding someone that's keen to learn.”*

They believe there's a certain amount of ADHD required, as sometimes you have to have the ability to sit all day to try and figure something out and having a calm mannerism helps because it's one of those jobs and easily get frustrating. *“While there's a shitstorm going on, that just sort of got that calm, demeanour, where they don't, they'd start to throw their hands around and get themselves in a bit of a panic”.*

They all believe that they must also be able to use their hands, so a technician needs to be able to do both. *“You need to be an engineer but need to be an electrician at the same time, and not a lot of people can do that”.*

“You need the ability to pick up and go when you need to go, plus have that practical skill of where you are in this, situation and installation. Because you do have to be an electrician to install equipment, but you also have the ability to sit at the computer and do some programming for a week straight, which in our workplace there’s a lot of electricians that could not do that”.

“Whether you could put in the category of nerd, I guess to a point without saying non-PC with nerd, but you do have to be a bit of a nerd to be a technician”.

“Some people seeing a technician as a higher level than an electrician. They come in and do it for a couple of months, and then they're out of there. It's too much for them”.

5. Retaining people in the industry

5.1 What stops you from leaving your current job?

From this question many of the interviewees believed that the pay is relatively good to others within the industry. They say that using contractors is not good for long term situations as *“they do not have skin in the game”*, and companies are now more likely to have full time staff rather than service providers.

Having a good employer and a good group with the right culture is also important. *“My company is a good bunch to work for. It’s like having a close family and variety in the role contributes to me not leaving my current workplace’.* Having a sense of humour is important whilst being able to get the job done at the same time.

They see other perks of the job that are non-financial incentives such as Southern Cross, a good redundancy package, the ability to have an extra one or two weeks extra leave as a salary sacrifice and some get a reduction in their power bill. Also, one company rewards loyalty by allocating extra weeks leave per year for staying longer than ten years with them. These sometimes are seen more important than any cash rewards that can be given.

5.2 How do you get rewarded for doing a great job?

There has never been a great deal of recognition for what they do. The general feeling from the technicians is they don’t really work for rewards, they work for self-satisfaction where they enjoy being a part of a good team, more than working for the management.

“I don't think I've had anything. Interestingly one of the interview questions that I had at company X; was how do you feel about starting a project but not being allowed to finish it?”

“I look at it that your reward is your weekly pay. We don't traditionally get rewarded financially if we done a great job. we get paid in pizza”.

I find the better you do, the more you get given to do and more freedom to do it, and then you get loaded up with even more work.

“You don't get anything from the company or the industry because that is your job”.

“So probably the biggest reward for me is seeing a job well done, with no one getting hurt or nothing getting broken. at the end of the day, you hand it over to the owner or the operations people and it works as it's designed, so you get that that reward from just having a job well done”.

In summary, many of the technicians don't get “rewarded” for doing a great which is not what they are there for, unless its pizza.

5.3 How would you like to be rewarded for doing a great job?

Words of appreciation and feeling respected seems to be enough for the interviewees *“I don't like being rewarded for doing any kind of job. I like to just finish the job and move on. Someone acknowledging the fact that we finished the job and saying thanks is probably good enough for me”.* Which will lead to be able to be given the autonomy to keep doing a job when required.

That your extra effort is seen and rewarded financially, not a continuous payment but maybe a one off for the job. Some think that being allowed to go on an expensive holiday once in every 4-5 years was a good idea.

In New Zealand, the majority thought they did not get paid enough in terms of what they can earn in Australia or other places. *“We get job offers all the time because they're screaming out for people and the money that they're throwing around is ridiculous, however I stay here because I have a family here and I like where I live. I get the freedom of the beach, and the sun”.*

Some would like to be given the time to celebrate and recognise success, which doesn't happen because of the lack of people. Where they must move from one job straight to the next.

“You've finished your job, and you almost don't get the chance to celebrate the success of it, because you're already behind on the other two jobs you're trying to do at the same time”.

“Sometimes when somebody does well, we love to have a barbecue. Yeah. subway or something like that, and we really appreciate it.”

Summary of the research, interviews, and general discussion:

A skills gap is seen as the difference between what the industry needs and the availability of the workforce to be able to complete the required tasks sufficiently. Not only in numbers but having the right people with the correct skills to do the job.

There has been changes in legislation over the last fifty years, whereas government funding ceased in the late nineties and the industry was left to do its own training. The view was when demand is sufficient the training will take place. This is not the case, training is an expensive undertaking and when placed in a profit driven environment, cost cutting is commenced under the umbrella of “Value”. As a result, the industry itself has used the existing personnel, importing from overseas, as part of a solution. However, we are now in a situation that we have people retiring and no generation immediately following them that has the required skills necessary to fulfil the requirements of the industry.

The skills gap is a wicked problem and is difficult to quantify. There is an issue with measuring information which is reflected in the interviews where the technicians see themselves in a role between the Electrician and Engineer. Currently the statistics are hidden with other industries when surveyed, which makes it difficult to demonstrate the seriousness of the problem to management, and without these statistics available it is difficult to build a business case to justify funding for training.

The attitudes of the general population towards the conditions of work that people want to be under is not what technicians do, an example is what has been called the precariat. Project type of work does not allow for flexible hours which can easily lead to working over 40 hours a week and due to the demand, this means they do not have time to relax, sit back, reflect on their work, and spend time with their families, all highlighted in the interviews.

The impacts from having the skills gap is difficult to quantify and difficult to be able to evaluate. Quality, hidden failures, hidden costs, wasted time and a stressed-out workforce are all outcomes from having this gap, and is difficult to demonstrate with statistics.

The effects of social media such as “linked in” where recruiters are painting the picture of better jobs in the industry paying more money, enticing people away from their current employer. This may be seen as good for the individual, but its not for the industry as it creates a difficult ground of retaining staff and sometimes once they see that the “grass is not always greener” it’s too late to return to the place they left.

It is worth noting the difficulty in getting the interviews completed with the technicians, as the way that the contractor business model requires each of them to have a purchase order to account for every hour of their work, therefore the interviews were conducted by the technicians in their own time which is precious. Also, their availability is determined by the work they have on at the time, which highlights two points of the technician, and that is the way they are paid via timesheets and the type of work that they do. The work they do is job specific, and there doesn’t appear to be much strategical thinking around forward workloads, they have a challenge placed in front of them and they need to complete the job and move straight onto the next one without time to reflect.

The above situations create pressure in which they are put under, not just the technical aspects of getting it right, but the time pressures and the consequences of getting things wrong. When you have an outage, you do not want to end up turning power off for over a thousand people, or even worse create a situation where someone could suffer from you making a mistake.

Even if the industry did have the numbers, it is viewed that those that are technicians are specialists in their field and that not everyone can be a technician. They have to have the technical and practical skills to do what is required. So, if we want good technicians in the industry, we need enough practical training and facilities to ensure our industry technicians are sufficiently competent prior to, and during the time they work on our High Voltage networks.

Both the research and the technicians believe the industry is not very attractive and that we can do more to entice people to join. They agree that the brand of an engineer is vague, they are not as identifiable as a policeman, a fireman, lawyer, or a doctor. Taking that into account, as a result, the technician being a specialised role in engineering, has almost no

exposure to the public and if they don't know if these roles exist, how are they supposed to want to do those jobs through choice?.

As a result, this is creating the war for talent, and internally employers are reluctant to train their staff because they will leave for more pay or be lured away by recruiters from linked in.

The majority of the knowledge and experience lies with the older generation and because of the generational gap between Generation X and current generation has made passing on this knowledge more difficult.

Generational differences make the situation more difficult to try and narrow the skills gap, the differing attitudes towards workstyles requires different communication approaches.

Something that may work for a 50-year-old with over 30years of experience of working in industry, will not be interpreted the same as a 20-year-old straight from university.

Advances in technology has exacerbated the situation even further, as there are now a variety of online communication platforms available and choosing the best one for multiple generational comms is difficult.

There is no legal requirement for registering the position of engineering technicians, although the Dublin accord exists, most technicians are not aware of it. To be a technician, they must first be registered with the EWRB and then its dependant on the employer what other requirements are needed to fulfil their role.

There are several support organisations that influence the technician role and their registration such as the IET, Engineering NZ, the IEEE, EEA, and REA. However, most of those interviewed didn't realise they existed. A point of note is that these organisations rely on subscriptions. As the technicians have a limited amount of funding which one do they choose? Other than having their name on a ticket, they don't see much value in being members.

It is viewed by some of the technicians that managers that haven't been engineers themselves have blind spots as they don't know or have the experience to make informed decisions relying on hear-say. Depending on that source of information can result in poor decisions being made. As good resources and experience is diminishing, so are the "good decisions".

There is a lack of training in the industry (practically), the technicians all agree that there is a lack of facilities available for them to try and test equipment prior to installing it on the networks and that having a training center will be beneficial. There is training that is spread around the industry, however there isn't a practical facility for substation work and other general distribution.

Most of the Technicians viewed working for a good company was the best way of working, they don't really do the work for the money. They prefer the intrinsic rewards where they see a successful day when things work and have a sense of achievement, not what is in their bank account at the end of the week, however it can be helpful to moral.

Finally, Technicians enjoy being paid in "Pizza".

Recommendations

The Skills gap **needs addressing now**, otherwise we will be left with circumstances such as the Pylon that fell over in 2024 causing over 10,000 people to be without electricity for days.

These incidents may become more frequent as there is a lack of training and with the experience with old equipment is becoming more sparse, the likelihood of something bad happening is increasing as time goes on. Something needs to be done before any serious incidents, blackouts or accidents occur before we pay attention to the issue.

The following are a few recommendations that should be considered if anyone is serious about bridging the gap.

Firstly, changes in attitudes to working styles and business practices is required or phased out. Stop looking back and focussing on the good old days and focus on the way forward. This includes stopping to try to run our businesses in the traditional way, by embracing new technologies, methods and approaches towards work.

Organisations in the industry need to work better together. A networking group must be set up with good connections with an overall masterplan for the industry and its way forward regarding training. This is a fundamental requirement for the skills gap to be narrowed. Pooling resources and finances will be essential for any form of industry wide problem to be

tackled. Generation, Transmission, Distribution, Contractors, and Consultants must all work together.

Currently, it is difficult to gather sufficient data on Engineering employees of the Power industry, as it is grouped with other parts of the Energy sector making it challenging to identify the skills gap and make sufficient strategic decisions going forward.

To resolve this issue will be to Identify all businesses: either operating in, or providing services to the sector, then, create a full census of employment within these, to include a count of the types of employment in key roles. This will also need a sector-wide agreement on role titles and definitions. Finally, once this data has been collected identify a methodology for forecasting future skill needs. (Hayes, R., 2021)

Investment and time allocation for upskilling technicians should also be made a priority. More emphasis for continuous development needs to be allocated to employees, more importantly with the contractors as this does not appear to be an issue with the EDB's.

Engineering employers are aware that they are responsible for providing training to upskill their workforces as well as improving diversity. However, there are some barriers that must be overcome. These include a general lack of applicants as well as a shortage of applicants with the necessary technical skills required for their industry, especially in young people. (Institute of Engineering and Technology, 2021)

Attitudes of how the EDB's treat their contractors and employees need to change, technicians need to be given more respect and better understanding of their working conditions. Management like time-writing and believe it is a good way of having control over the staff. However, time-writing causes unneeded stress, and it has been witnessed where people have left companies because of the unsettling working environment they create. The recommendation is not to continue with time writing as it helps create an unwanted culture from its staff.

The EWRB should implement a registration status and recognition towards the technician grade of the electrical profession. Communication between the REA and EWRB may need to take place to discuss the future of the technician level in industry and the Dublin Accord. This registration needs to be publicised via social media and also the Government need to recognise this as a category that should be on the short list for Visa's, this will help if someone wants to get Technicians outside of New Zealand.

A better branding/ marketing strategy on what an “engineering technician” is required. This can be completed by a marketing campaign driven by the industry, whereas social media will be one of the important ways of doing this. Going into local schools has been the favoured method of introducing youngsters to engineering as you can’t do practical things online. The message needs to be sold that engineering is not just Mathematics or hitting things with a hammer, it’s much more. It’s about taking an idea and making it work.

Employers should work with educators more closely to improve the skills pipeline where Apprenticeships should be leveraged both internally and externally, having the industry provide the facilities to help with the practical training requirements. Apprenticeships remain the most common way of engaging with the education system. A scheme can also be introduced where the first year is at a Polytech, followed by industry exposure prior to them joining a sponsoring company.

The existing situation is that there are no practical training facilities to cover the Power Distribution Industry, there must be a place for the newcomers and existing members where they have the ability to try things out, test and practice installing the equipment with minimum risks to themselves and no risk to the network.

There is an opportunity to encourage more diversity in the industry, and not just the Māori and females, all kinds of people. They will bring a fresh perspective and help solve issues through the experience of working outside. We will still need to be able to keep the core values and principles of engineering without letting things get out of control.

The intrinsic value of a job lies in the pleasure of doing it and the sense of purpose and satisfaction it provides. The extrinsic value lies in the income, status, independence, marriageability and so forth that having a job provides. Both the intrinsic and the extrinsic value of jobs are important. (Wolf, 2024). As Engineering managers, we need to get the rewarding and treatment of our staff right, accounting for the variances in generations and recognising both intrinsic and extrinsic personnel, getting these balances right when giving them rewards. We as managers have an ethical responsibility to look after our staff, after all “culture eats strategy for breakfast”.

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Appendix A: Geographical locations of the Power Distribution companies in New Zealand



Appendix B: Associated Training Associations in the power Industry.

1. Electrical Engineers Association
2. Te Pukenga (and connexis)
3. Non PTE Trainers
4. Privat Training
5. Waihanga Ara Rau
6. Waihanga Ara Ru reference groups
7. Waihanga Ara Rau Strategic reference groups
8. Universities
9. EpeCentre University of Canterbury
10. Victoria University Robinson research institute
11. AUT research institute
12. Energy Centre Auckland University
13. EWRB
14. Electrical Authority
15. Engineering NZ
16. IEE
17. IET
18. Energy Academy
19. VEENZ
20. SEANZ
21. Industry representatives: Generators, Transpower, distributors, contractors, and consultants

Appendix C: Interview Questions

Firstly, can you introduce yourself and give us a bit of information on what you currently do and your background.

1. What is a technician?

- a. What is your interpretation of a technician?
- b. What do you think the key attributes to being a technician are?
- c. Do you think professional registration is important? Why/Why not?
- d. Do you think you are adequately supported as a technician via the industry/professional organisations in New Zealand??
- e. What do you think is important to a technician?
Respect/Money/Leave/Family/Sense of belonging?

2. The Definition of a Skills gap

- a. What would you describe as a skills gap?
- b. Do you think that there is a skills gap in the power Industry?
- c. If yes, why do you think the skills gap exists?

3. The need for Practical Skills?

- a. Do you think that you have the ability to have practical experience and learnings in your role.
- b. As engineering is about doing things? Do you feel that you have the facilities to try out new ideas, test and implement them, or do you have to install and hope that it works?

4. Why is it so difficult to attract people to the industry?

- a. Do you think that we do enough to attract people?
- b. If no, what ideas do you have that could get people to join us?
- c. Do you think that engineering is only suitable for certain types of people with a certain way of thinking? Or do you think anyone could be an engineer?

5. Retaining people in the industry

- a. What stops you from leaving your current job?
- b. How do you get rewarded for doing a great job?
- c. How would you like to be rewarded for doing a great job?