

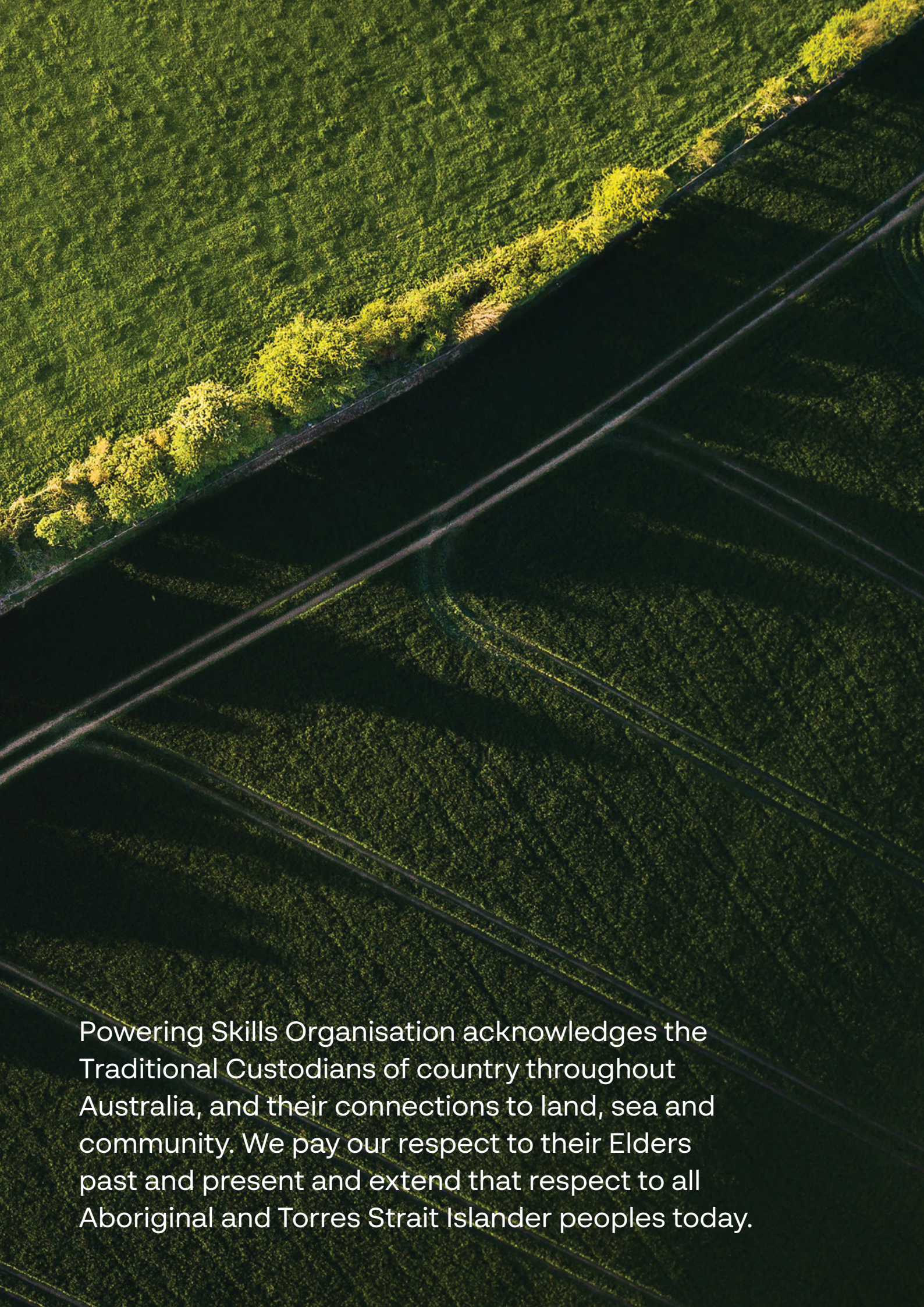
High Load, Short Supply

Bridging the gap to 2030



Follow us



An aerial photograph of a lush green landscape. A winding road or path cuts through the dense vegetation, which appears to be a mix of trees and shrubs. The lighting is bright, creating strong highlights and shadows that emphasize the texture of the foliage. The road curves from the upper left towards the lower right, with a line of trees following its path in some sections.

Powering Skills Organisation acknowledges the Traditional Custodians of country throughout Australia, and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Table of Contents

CEO foreword	I
Executive summary	VII
Introduction	1
The energy sector	6
PSO's strategic response	7
List of proposed actions	9
Critical trades workforce	15
Electricians	23
Air Conditioning and Refrigeration Mechanics	29
Electrical Distribution Trades Workers	33
Electrical Engineers	37
Electronics Trades Workers	41
Electrical Engineering Draftspersons and Technicians	45
New and emerging occupations	49
Identified issues for critical trades workforce	53
Workforce shortages are widespread	56
Energy trade apprentices	57
Gender diversity in the workforce	75
First Nations workforce	79
Cultural and linguistically diverse representation in the workforce	83
Subsector workforce	91
Solar, wind and other energy	99
Hydro-electricity generation	105
Coal and mineral energy generation	109

Transmission (includes substations)	113
Electricity distribution	117
Consumer	121
Gas supply and pipeline transport	125
Electrical services	131
Air conditioning and heating services	135
Identified issues for subsectors	139
Quantifying skills needs	141
Upskilling for post-trade workers	143
Collaboration between industry and training sector	144
Project uncertainty	145
Awareness of clean energy trades and specialisations	146
Strategic response to identified issues	147
ADAPT framework	149
Strategic response to identified issues	150
Proposed actions	151
In-progress actions	153
Appendices	155
Methodology and approach	157
Occupation matrix	163
Data methodology	165
Energy career pathways	169
Policies and initiatives that align with the Workforce Plan	175
Glossary/acronym list	183

CEO foreword



The biggest workforce development opportunity in a generation

The Net Zero transition is one of the largest changes to our global and national economy since the Industrial Revolution. Chief amongst its impacts will be a profound reshaping of the labour and training market for energy trades in this country and across the world.

The transition provides the impetus to understand how these markets operate in Australia. Additionally, it provides the impetus to proactively embrace this moment as a once-in-a-generation opportunity to strategically prepare the labour and training market for a fundamentally different energy future.

Australia is already witnessing several trends that signal we've got the workforce fundamentals in place to support the transition:

- Our energy trades workforce now sits at around 300,000 workers – a 20% increase since 2010.
- A record number of energy apprentices are in training, including unprecedented numbers of women and First Nations people.
- Additional demand for energy apprenticeships is soaring, in some cases over 100 applicants want to train for every available spot.
- Electricians rank among the top career choices for students, especially for young men.
- As part of its productivity agenda, the federal government has tasked the Productivity Commission with several new inquiries, including ones focused on workforce and skills, and the Net Zero transition.
- The landmark five-year National Skills Agreement commits \$12.6 billion from the federal government (with potential state co-investment) to strengthen the Vocational Education and Training (VET) sector. This commenced in 2024, with a key focus on supporting the Net Zero transition.



Other key institutional foundations have also been laid, and that's why Powering Skills Organisation (PSO) was born. Established in 2023, as one of ten government-backed Jobs and Skills Councils (JSC), PSO was purpose-built to harness the specific workforce opportunities in the energy, gas, and renewables sector.

This has proved a timely and bold move. Not all nations around the world have a dedicated entity like PSO – even though all are undergoing the Net Zero transition, and all need to strategically understand and reform their energy labour markets to deliver a larger and ever more complex portfolio of projects.

The foundations of the JSC model in general, and PSO in particular, are further strengthened by a strategic focus on 'workforce planning'. This is an emerging discipline in our public discourse, but one close to my heart, having worked as a workforce planning practitioner in the energy and resources sector for many years.

I understand its importance, but also its frustrations. The workforce, skills and training requirements are often among the last factors considered as any industry undergoes change. And workforce plans are often one-off or short-term documents, rather than dynamic and continually evolving like the workforces they are trying to support.

That's part of the reason why I am so excited to release PSO's 2025 Workforce Plan.

Australia has the opportunity to be heavily proactive in workforce planning and development for the energy sector between now and 2050 – and this year's plan from PSO spearheads that continuing journey.

The energy transition is not just about change, but about growth and advancement. Delivering a 'just' transition – over and above a 'just in time' transition – includes effort to understand upskilling in fields like electric vehicle infrastructure, smart home automation, renewable installations, and emerging digital and soft skills. This will help give all Australians the opportunity for stable, safe, well-paying and highly skilled careers enabling Australia, and the world, to solve climate change.

What's in the plan?

In developing the 2025 WFP we spoke to over 280 organisations across the country, and brought them together for one purpose – to help us develop a plan to grow, skill and retain the energy workforce we need. Close to two-thirds of these organisations were from industry and the training sector.

Our collective efforts have come together resulting in a strategic response of over 30 actions. Most of these actions are to be undertaken directly by PSO, which we plan to start prioritising, scoping and implementing within the remainder of 2025. Other actions are policy recommendations to our government partners.

To me, a strength of this year's plan is its systemic view of what factors enable success in the evolving energy labour market, which helps to better shape coordinated strategic action across those areas. For too long, I believe the national conversation in this area has been constrained by 'silver bullet' thinking and 'quick fix' solutions.

We've determined there are four discrete requirements or 'success factors' that, if worked towards tenaciously and holistically, would help build and secure the workforce required now and in the future – capacity, capability, culture and confidence. The first two have been central to my strategic outlook since the beginning of my tenure as CEO, while the latter two have quickly joined the repertoire as equally critical.

We then unpacked each of these success factors. This was to measure their need (where possible), determine their drivers and brakes on expansion, and, critical for workforce planning, what type of action could be taken to start unlocking real change.

Take 'capacity' as an example of the utmost importance. As outlined in the plan, the energy sector – particularly the trades – is acutely dependent on the onshore apprenticeship system for its future workforce taking four years to train a qualified professional. This reliance on the capacity of the Australian Vocational Education and Training (VET) system makes it a critical indicator of the sector's sovereign human resource potential. Ultimately, our future workforce capacity in the energy trades is determined by the size of this apprentice pipeline over the medium to long-term.

We estimate that, despite record growth recently, the energy apprentice pipeline could do with an additional 40% boost to help reach our highest Net Zero ambitions, that is, to become a clean energy superpower that realises our domestic goals and export potential. The federal government continues to signal this ambition through recent commitments, one example, the very recent expansion of the renewable energy capacity investment scheme by 25%.

But how can we encourage even more onshore growth – over and above our current record-breaking levels?

We highlight that various initiatives to unlock the latent potential in three deeply interconnected areas could be activated to drive and sustain further capacity growth: apprentices, apprentice employers and the training system. For instance, we found more apprentices available than positions offered and the potential to build additional interest in the trades. We found some employers (mainly small businesses) remain hesitant to take on apprentices and more apprentices could be training with larger

businesses. We found we could use more trainers and expand the amount of training infrastructure and space. All contribute to our current capacity ceiling, and all are within our collective power to unlock. But again, there are no silver bullets and no quick fixes.

To lift capacity, PSO offers a range of actions in the 2025 Workforce Plan.

These include:

- A national register for apprentices who want to train to connect directly with employers
- A national strategy to support career influencers and promote trades pathways
- Better understanding and defining the apprenticeship value proposition for employers
- Early year apprentice quotas on major projects – especially large businesses
- Evaluate existing initiatives to increase number of trainers
- A grants program for Registered Training Organisations (RTOs) to invest in training infrastructure

These are just some of the actions in our 2025 Workforce Plan PSO will now start implementing to unleash future capacity growth for the industry.

As you'll discover, other initiatives in the plan outline a similar network of evidence-based, integrated and implementable actions PSO can now start taking over short, medium and long-term horizons. Actions we know will boost and improve the other labour market success factors we've identified – capability, culture and confidence.

Finally, we believe that all national energy labour markets around the world are being reshaped by the Net Zero transition, and no country has a perfectly functioning labour and training system to respond. Yet Australia is at the forefront by proactively using this as a sovereign opportunity. By developing and implementing a plan like this, leveraging our strong workforce, training and institutional foundations, and working in partnership with industry and government, we are demonstrating to our global peers how to make the most of this moment.

I encourage all stakeholders to read our plan, and I thank everyone who participated in its development. Especially our industry and training sector colleagues who are already busy helping deliver their unique share of the new energy transition.

Anthea Middleton

Chief Executive Officer
Powering Skills Organisation



Executive summary



Net Zero is a top government priority – but its success risks being held back by an underprepared and undersupplied labour market. Very few workforces have faced such a sharp rise in demand for more workers, new skills and cultural change from such a low starting point in supply as the energy sector is anticipated to face.

In response, PSO has developed this Workforce Plan, informed by in-depth consultation, analysis, and modelling. Consequently, this has revealed multiple interconnected crises, spanning workforce shortages, upskilling gaps, and cultural barriers, along with their underlying causes.

To address these, PSO has proposed a strategic response made up of 31 targeted actions.

Built with industry, backed by insight

PSO developed the 2025 Workforce Plan through a structured, industry-led approach – beginning with the identification of workforce challenges, central to which was extensive industry engagement, involving 280 organisations across every state and territory. This process was supported by quantitative data analysis, stakeholder insights, and workforce modelling.

Collectively, stakeholders contributed around 3,000 comments, with nearly 60% of input coming directly from industry and the training sector, and the remainder from peak bodies, unions, and government departments. Over 100 solutions and recommendations were proposed by these stakeholders.

Engagement occurred in two key phases: first, to identify workforce challenges and their root causes; and second, to collaboratively identify solutions. All industry contributions were consolidated into a single, comprehensive research asset, ensuring the plan was built with industry and backed by evidence.

The 'dual crisis' putting Australia's clean energy ambitions at risk

During the development of the 2025 Workforce Plan, PSO uncovered some sobering truths about the future of Australia's energy workforce. The country's structural shift toward a Net Zero economy is profoundly transforming the labour market for energy workers – in ways unforeseen just a decade ago. The result isn't a standard one-dimensional labour market issue.

The Net Zero transition has quickly catalysed two urgent, simultaneous crises: a shortage of workers that is expected to worsen and a critical need for more diverse skills, underwritten by the necessity for a cultural overhaul across the industry.

The workforce challenge

The key driver of the workforce challenge is the sheer scale of demand. According to PSO analysis of data from Jobs and Skills Australia, Australia requires an additional 42,000 energy trades workers by 2030. This is expected to expand over the following decades. This growth in demand reflects the total additional workforce needed to support both renewable and non-renewable sectors – particularly under a high growth scenario when Australia becomes a major clean energy exporter.

Several factors limit the ability to scale up the workforce to meet this demand.

The energy trades have some of the lowest immigration rates, and legitimate safety regulations make it a thorough, carefully managed and longer-term prospect for migrants to fill licensed roles like electricians.

As a result, the workforce gap will largely need to be addressed through the onshore apprenticeship system – an essential but time intensive pathway (around four years) – that ensures workers are fully qualified and safety-ready. This is a notoriously hard system to scale.

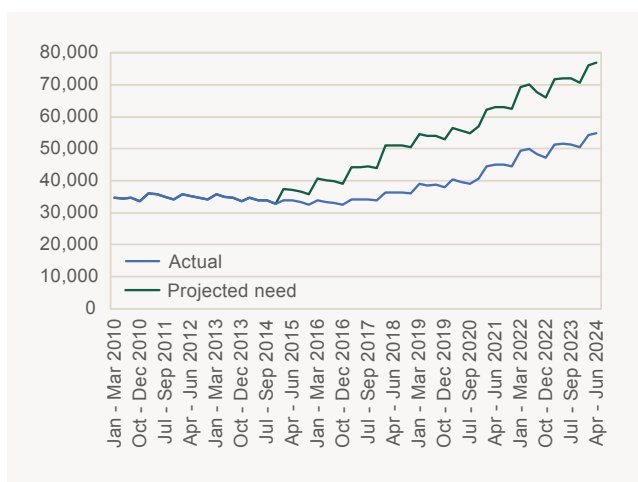
PSO's independent modelling underscores the significant challenge Australia therefore faces.



Meeting the 2030 target of 42,000 additional workers means boosting apprentices in training by 40%, or approximately 22,000 more energy apprentices. As of 2024, this would mean raising the current total from 55,000 to 77,000. Ideally, efforts to expand capacity should have begun ten years ago, given the structural and logistical challenges of scaling the training sector.

On a positive note, the number of apprentices in training is already on the rise, thanks to strong efforts by the government to grow the pipeline. However, there's still much more room and need for concerted action.

Figure 1: Energy trade apprentices, Australia, in-training



Source: National Centre for Vocational Education and Research (2025). Apprentices and trainees ('Actual'). PSO (2025). For 'Projected need' methodology – see appendices. Energy trade apprentices are Electricians, Air Conditioning and Refrigeration Mechanics, Electrical Distribution and Transmission Trades Workers, Electrical Engineering Draftspersons and Technicians, Electronics Trades Workers, Electrical Engineers.

Apprenticeship bottlenecks are limiting growth

Stakeholder feedback for the 2025 Workforce Plan highlights the reality of the crises starts right at the beginning of the workforce pipeline: apprenticeships.

Multiple factors are holding back the growth of apprentice numbers. These factors collectively affect all three groups that need to work in harmony in the training system – apprentices, employers, and training providers.

Apprentices

Two issues were identified that, while seemingly contradictory, conspire to limit the number of apprentices in training. The need to generate more interest and exposure for people to become apprentices, and the need to better meet the existing demand from those already eager to start.

The first issue is unsurprising. Most school students are steered toward university over trades. Data from *Year13* shows 78% of secondary students plan to attend university, while only 10% report an intention to pursue an apprenticeship. The second issue is more distinctive. Current demand for apprenticeships is outstripping both the number of positions offered by employers and the capacity of the training sector. This includes one report of around 6,000 applicants vying for just 150 energy apprenticeship positions at a single network distribution company.

Employers

Stakeholders highlighted that micro, small and medium-sized businesses, as of 2024, train around 75% of Australia's energy apprentices, face significant wage and supervisory pressures when hiring apprentices – often without a clear return on investment.

This challenge is worsened by frequent reports of larger companies 'poaching' third – and fourth – year apprentices, further discouraging employers from taking on apprentices. Additionally, apprentice quotas on major projects are limited in scope and often exclude early-year or mature aged apprentices, further restricting new entrant opportunities.

Training providers

A major barrier to expanding the apprentice pipeline is the shortage of VET trainers and limited training infrastructure. 79% of training organisations surveyed by PSO reported needing more educators, with low pay being the main obstacle to attracting qualified candidates. Additionally, 77% of surveyed training organisations say infrastructure must grow to meet future demand, but costs and capital investment remain the biggest hurdles. These challenges have also reportedly led to delays in commencements and long wait times for many apprentices already enrolled but have yet to begin their classroom studies.

The upskilling challenge

While the need for more energy workers is evident, an equally urgent – but less visible – challenge is the parallel skills needed for development.

The skills required within the energy trades are also undergoing profound transformation, driven by the Net Zero transition and rapid technological change. Early indications of a skills evolution is happening within existing roles, rather than through the creation of entirely new ones. The nature of tasks is shifting fast, driving urgent demand for new and updated skillsets (see Figure 2). For example, electricians are among the top five jobs projected to undergo the most technological augmentation by 2034, according to the Australian Computer Society.

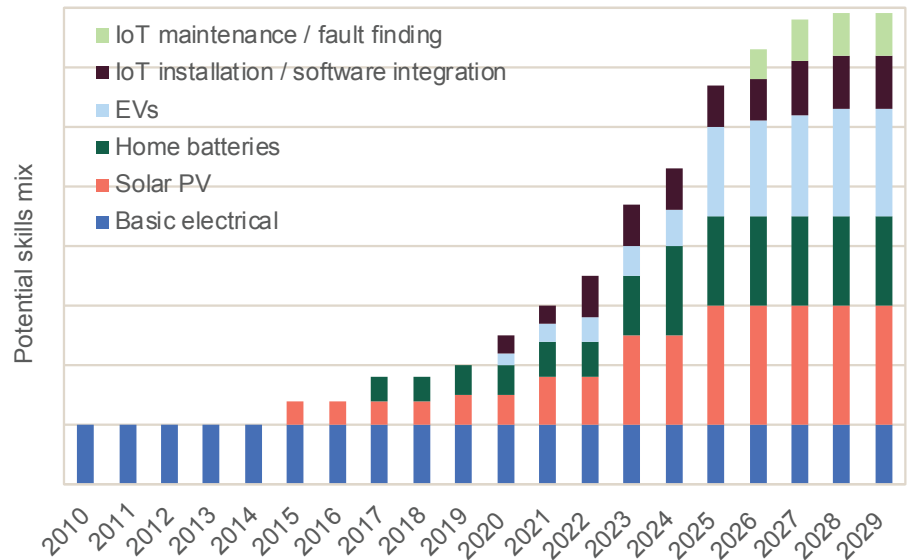
The Net Zero transition is creating new training needs at all stages of the workforce development pipeline – pre-apprenticeship, apprenticeship, and post-apprenticeship. Yet the traditional training system is struggling to keep up, with slow adaptation of new units, delivery models, and limited flexibility.

The UEE – Electrotechnology training package, which covers over 95% of energy workers has been widely reported to PSO as outdated, overly complex, and slow to keep pace with evolving industry needs. These inefficiencies have been linked to slowing graduation times for energy workers, along with skill deficiencies.

For example, a potential shortage of units of competency in clean energy technologies has been recognised as a risk to the Net Zero transition. With growing consumer adoption of these technologies there is an urgent need for nationally recognised training to ensure safe and compliant installations.

PSO has already initiated a full review and update of the UEE training package, consulting with industry to deliver a more responsive, future-focused package.



Figure 2: Electricians (residential), evolving skills needs

Source: PSO (2025). Conceptualisation of qualitative stakeholder feedback.

Some of the key challenges in upskilling is the lack of post-apprenticeship programs and Continuing Professional Development (CPD) frameworks (and incentives) for qualified energy trades workers to remain current and advance their skills.

This directly affects the rollout of Net Zero technologies across the economy, such as electric vehicle infrastructure. It also hinders the growth of digital skills needed for tasks like configuring Internet of Things (IoT) systems and home automation, as well as the rising importance of soft skills, including advising customers on energy efficiency.





What deeper factors underpin the challenges?

The current culture in the energy trades – especially where it intersects with construction – poses a significant barrier to workforce development goals, with the prevailing ‘brawn’ culture creating challenges for diversity and inclusion.

An inconsistent and worksite dependent culture, fuelled by insufficient workplace policies and training programs, continues to hinder the attraction and retention rates of a more diverse energy trades workforce.

For example, women make up only 3% of energy trades workers, with lower apprentice completion and higher post-apprenticeship dropout rates than men. Many leave the industry within five years even after graduating. While complex to untangle, this appears to be driven by various issues such as policy gaps around flexible work, a lack of support networks (including role-models, allies and women in senior leadership positions), and inadequate on-site facilities and suitable Personal Protective Equipment (PPE).

First Nations participation also remains below average in both representation and apprenticeship completion, despite strong presence in Renewable Energy Zones (REZs). Despite a threefold increase in First Nations workers over the past 15 years, these individuals make up only 2% of the energy trades, falling below the 3.4% representation seen across all occupations.

Contributing factors included the underutilisation or underdevelopment of tailored training programs for First Nations communities (e.g. the Certificate II in Remote Area Power Supply Maintenance), and engagement from the renewable energy sector being limited overall or weakened by a lack of cultural awareness.

Together, these limit the industry’s ability to both grow its workforce size and skills diversity via previously untapped demographics.

PSO's strategic response

The nature of these challenges calls for a coordinated, multifaceted response. Resolution demands a step change in workforce size and a parallel revolution in workforce capability and culture.

Simple approaches that focus solely on increasing workforce numbers without upskilling, or reskilling without growing the workforce, are insufficient. Likewise, wholesale inattention to cultural change risks missing a vital enabler of deep progress. To be effective, solutions must tackle key challenges simultaneously.

Similarly, an appropriately sized program of workforce planning is needed to match the scope and time horizon of the challenge. Both the time-critical and longer-term aspects must be considered. An approach that achieves quick wins while also addressing issues at a deep, systemic level. While further research is important in some areas, such as the potential for increased productivity gains to ease workforce demand, there is also a clear need for targeted workforce development projects, policy action and reform, and both strategic and efficiency-focused development of training products.

Without these varied elements in PSO's strategic response, the future energy workforce will not meet the profoundly complex labour demands engendered by the transition or the needs of our rapidly diversifying economy.

With these needs in focus, PSO has developed a strategic response that operates across multiple dimensions. Throughout the workforce planning process, PSO received over 100 recommendations and potential actions from stakeholders.

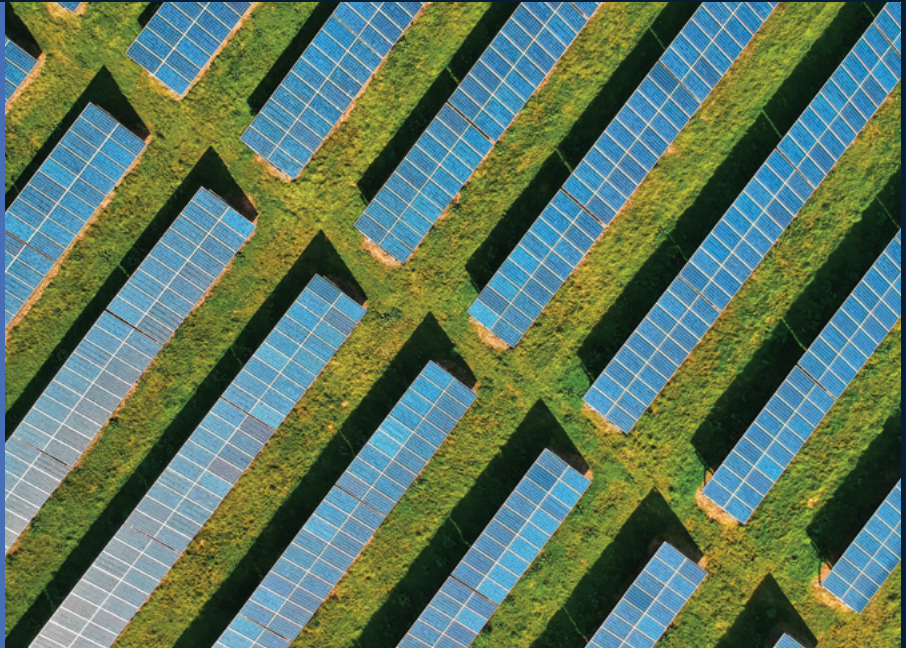
These have been workshopped and shortlisted in collaboration with various internal and external teams and partners, including PSO's Strategic Industry Advisory Body (SIAB). These working groups then assessed each recommendation against key implementation criteria such as priority, value, risk, and complexity.

A total of 31 actions form PSO's integrated and strategic responses to the constellation of labour market issues identified through the 2025 Workforce Planning process. Fifteen of these are already in progress, and 16 new actions are proposed.

The true strength of this strategic response lies not in a single action, but in its collective power for workforce planning: a deeply integrated, multi-layered approach, and a foundation built on solid evidence. It is shaped by a clear understanding of the challenges facing the sector, and the root causes behind them, ensuring that every action is targeted, meaningful, and aligned to solve a real issue.

Introduction

Powering Skills Organisation (PSO) is the Jobs and Skills Council (JSC) for the Australian energy, gas and renewables sector.



One of the missions of JSCs is to provide the voice of their respective industry and the training sector to the Federal Government.

One of the primary ways JSCs do this is through the development of an annual Workforce Plan (WFP). PSO is pleased to present this document as the full 2025 edition of the WFP for the Australian energy, gas and renewables sector.

The goal of the WFP is to clearly articulate the challenges facing the energy industry and its workforce, and to provide a strategic response to address these challenges.

PSO plays a multifaceted role in this domain: providing advice to the government on necessary actions to address these challenges, while also collaborating with government, industry, and

the training sector to tackle them through policy development, programs, workforce planning initiatives, and the development and promotion of training products.

Articulating and responding to these challenges is in turn dependent on systematically collecting stakeholder input.

This WFP plan has been strongly shaped by input from industry and training experts. Using a range of methods, PSO engaged directly with over 280 organisations nationwide to gain a comprehensive understanding of the workforce challenges and opportunities. This engagement generated a database of approximately 3,000 comments, which formed a key evidence base on which this WFP was built.

Why is a workforce plan needed?

The Australian energy, gas and renewables sector is experiencing unprecedented transformation, driven by the rapid shift to clean energy, the rise of technology, the broader shift to electrification.

This transition has resulted in numerous large-scale national infrastructure projects and spurred technological innovations in all areas of the sector. Consequently, there has been a growing demand for skilled workers across the industry and an ongoing evolution of the skills required.

As the industry experiences this period of transformation, national level workforce planning and modelling is required to ensure coordinated policies, strategies and initiatives are in place to facilitate the growth and skilling required of the energy sector workforce.

A workforce plan is a critical resource to advise government and the private sector on key opportunities, policies, risks and activities that the sector will need to undertake to ensure we have the skilled workforce required for the future and the transition to Net Zero.

Without a workforce plan, there will be no nationwide mechanism to articulate the workforce challenges facing the energy sector, or a shared, transparent and co-ordinated response to addressing them over the short and long-term.

Linked and layered documents

Given the size and scope of the 2025 WFP a number of connected but standalone documents accompany this full version of the plan. These documents, their associated links and a brief outline of their content and rationale are provided below.

PSO 2025 WFP – National Policy Paper

- Outlines PSO strategic response in detail but in isolation from workforce analysis and technical detail
- Designed for policy makers and government agencies

PSO 2025 – State and Territory supplementary reports

- Delivers tailored analysis of the specific workforce challenges and energy policy landscape in each of Australia's eight states and territories
- Designed to ensure jurisdictional stakeholders see their regional contexts accurately reflected and addressed
- Created in response to feedback on the 2024 WFP highlighting that states and territories had not been separately represented
- Excludes jurisdictional strategic responses to identified workforce issues



The energy sector workforce is a relatively small, but highly critical component of the nation's workforce. Comprising just 1.7% of national employment, the energy sector employs 60% of Australia's electricians.¹ This speaks to the criticality of this workforce and sector in delivering the nation's clean energy projects over the coming decades.

The energy sector workforce has grown substantially over the past 20 years, at a rate almost twice the national average. The current surge in demand due to energy projects and broader electrification is predicted to drive a 7.1% growth over the period 2024 to 2029, higher than the average across all industries (6.6%) and by 13.0% over the period 2024 to 2034.

Figure 3: Energy sector employment 2004-2024

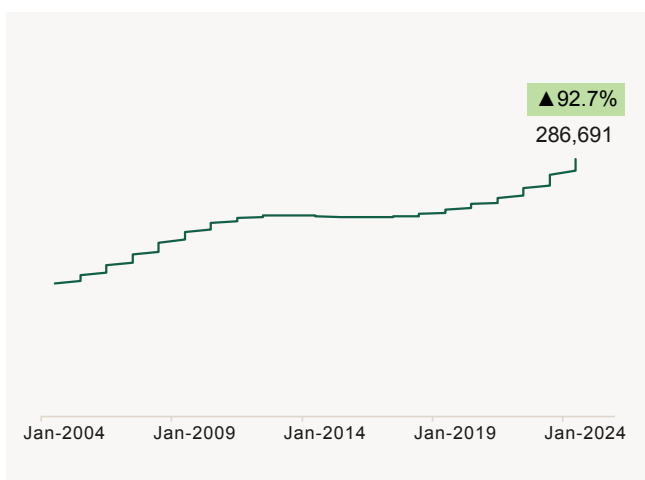
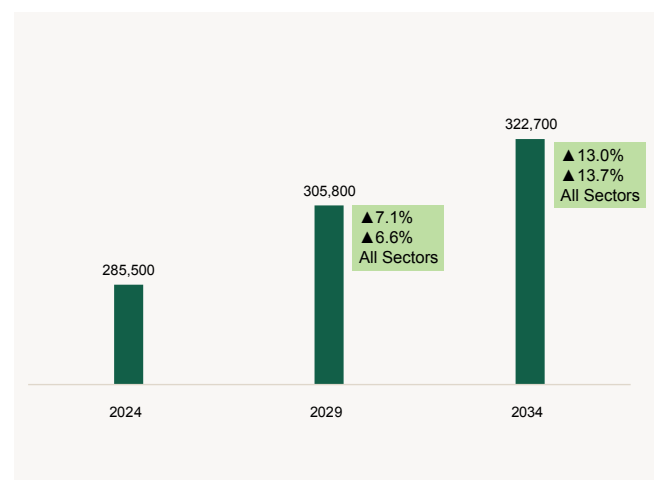


Figure 4: Energy sector workforce projections 2024-2034



Source: (3) Australian Bureau of Statistics (2024) Labour Force, November 2024 (trended by Jobs and Skills Australia), ABS
 (4) Jobs and Skills Australia (2024) Victoria University Employment Projections Produced for Jobs and Skills Australia, May 2024-2034, JSA.



However, longitudinal data analysis² and PSO's consultation with industry and the training sector reveals enduring shortages in critical trade workforces, and insufficient skilling to meet the evolving needs of industry. There have also been multiple barriers to greater growth, which will be explored further within this plan. These barriers include but are not limited to:

- Flatlining completions for apprentices
- Training packages which have grown increasingly complex, while failing to keep pace with technology
- Pipeline blockages with both industry and the training sector preventing more apprentices entering the industry
- Cultural issues which limit opportunities for women, First Nations people and culturally and linguistically diverse (CALD) individuals to enter the trade workforce.

Counter to these barriers, energy subsectors are experiencing significant workforce drivers including the expansion of transmission and distribution networks placing increased pressure on the volume of skilled technicians and engineers required for the energy sector, the ongoing important role of gas (including hydrogen and biogas), and ever-present heating, ventilation,

cooling and refrigeration needs. At the same time, growth in residential and commercial construction and technology integration continues to fuel the need for electrical installation and maintenance expertise.

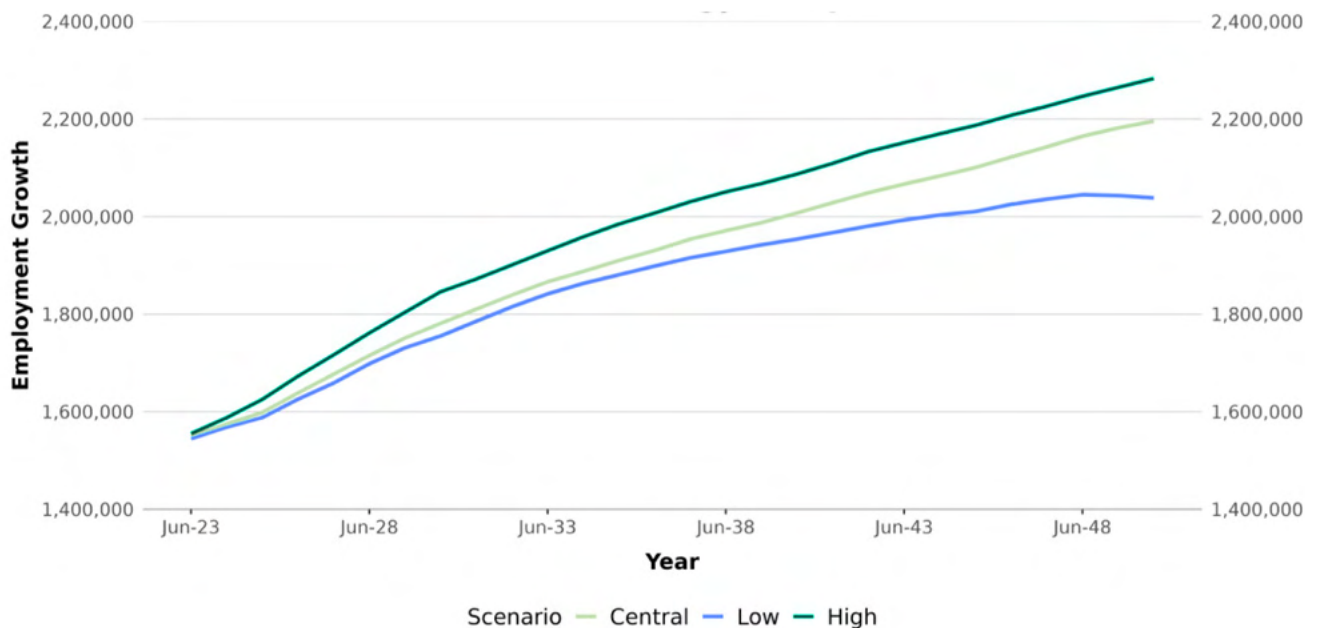
As it stands, the energy sector faces considerable challenges in meeting workforce and skilling requirements. Jobs and Skills Australia's (JSA) Clean Energy Generation report proposed three scenarios for energy sector workers required by 2030 – depending on the pace of uptake and transition from other sources of energy generation.

In that report, JSA estimated a 'central' demand scenario that would require the national electrician workforce grow by an additional 32,000 from 2023 to 2030. But, as noted in a 2024 report from per capita, the Federal Government's Future Made in Australia policy and subsidies for home battery installation, will likely push workforce requirements into a high demand scenario. Representatives from industry, unions and the VET sector have further supported the high demand scenario to be the most likely in response to PSO consultation. Notably, this high demand will require at least an additional 42,000 electricians in the labour market by 2030, as shown in Figure 5.

1 Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. By JSC ANZSIC Codes.

2 Historical List of Skill Shortages 1986-2019, National Skills Commission

Figure 5: Demand for critical clean energy occupations to 2050



Source: Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy, Australian Government, <https://www.jobsandskills.gov.au/publications/the-clean-energy-generation>

Noting the scale of this challenge, workforce growth should occur in parallel with increases in workforce productivity, which can be driven by improvements across many areas.

Greater skills attainment and development at the pre-apprentice and apprentice stages can boost productivity by making tradespersons more efficient earlier in their career, reduces time away from work for post-trade skilling and provides a more diverse skill foundation on which to build.

Of course, there have been significant efficiencies gained through new technology in recent decades, such as smart devices reducing administrative burden and making workers more interconnected. But another leap in productivity is likely on the horizon as artificial intelligence or AI becomes more integrated to business operations. How exactly this will impact energy sector trades is an ongoing conversation.

It has also been shown in modelling from the Productivity Commission "reforming occupational licensing across a range of industries could provide significant benefits, including a boost to economic output of up to \$10.3 billion."³

The federal government is currently exploring national licensing for electrical trades, another initiative which is expected to provide productivity gains, with expectations it will encourage "highly skilled electrical workers to go where they are needed most in the industry...while cutting red tape, delays and multiple fees for trades people."³

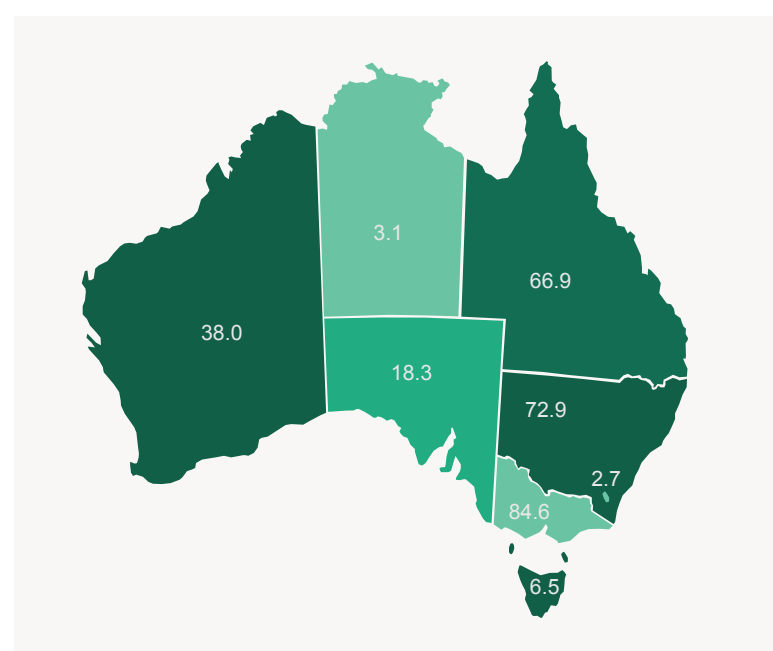
Identifying the full scope of potential productivity improvements is complex and will necessitate further research in the near future.

The energy sector

Table 1: Energy sector by ANZSIC

ANZSIC Group (3-digit) or Class (4-digit)	Subsector
2619 Other Electricity Generation	Solar, Wind, and Other Energy
2612 Hydro-Electricity Generation	Hydro-Electricity Generation
2611 Fossil Fuel Electricity Generation	Coal and Mineral Energy
262 Electricity Transmission	Transmission (Inc. Substations)
263 Electricity Distribution	Distribution
264 On Selling Electricity and Electricity Market Operation	Consumer
270 Gas Supply	Gas Supply
5021 Pipeline Transport	Pipeline Transport
3232 Electrical Services	Electrical Services (Inc. Rail Signage)
3233 Air Conditioning and Heating Services	Air Conditioning and Heating Services

Figure 6: Energy sector by Australian State and Territory ('000), November 2024



Source: Australian Bureau of Statistics (2024) Labour Force, Detailed, November 2024, EQ06 four-quarter averages [data set], ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/nov-2024>.

PSO's strategic response

The PSO 2025 WFP has been shaped by our strategic priorities, which were both reaffirmed and further unpacked during its development.

PSO's five strategic priorities are:

01 Enhance career pathways for those looking to come into renewable energy jobs

02 Develop a sustainable and agile VET system that meets the demand of industry now and into the future

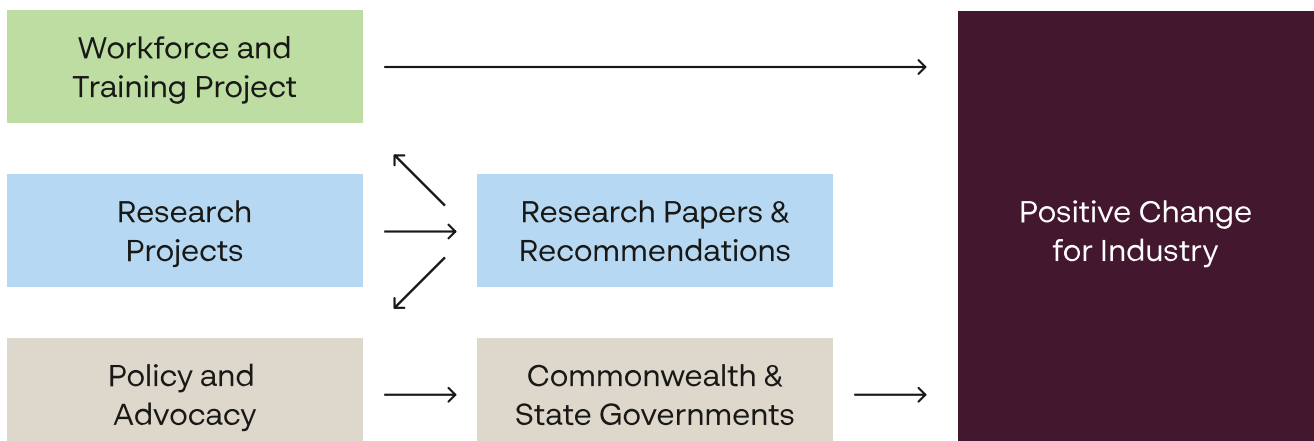
03 Ensuing PSO can accurately articulate the challenges within the energy sector for workforce planning

04 A culture of diversity and belonging in the energy sector where women and First Nations people are fairly represented. Attracting more people from these groups into the energy sector and offering them support when they come.

05 To inform and prepare industry and government for the emergence of new decarbonisation technologies in Australia

Many of the challenges identified align closely with addressing these priorities, and PSO's strategic responses have been intentionally and clearly connected to them. Moreover, the 2025 WFP process provided a valuable opportunity to explore these priorities in greater depth, engaging stakeholders to unpack their components and co-design actionable steps to effectively achieve them.

The WFP starts putting these strategic priorities into a plan of action, offering a clear and practical roadmap – all in one transparent document. With that foundation, the actions proposed by this WFP can be categorised into three workstreams:



List of proposed actions

The integrated prioritised action list details each action with its driver, intended outcomes, and implementation timeframes. We have grouped Action Focus Areas into three time Horizons:

Horizon 1

Immediate priorities carried out over the next 12 months to August 2026

Horizon 2

Short term strategic action focus areas – Two-year delivery timeframe

Horizon 3

Medium-term systematic reforms – Three-year delivery timeframe

#	Action Focus Area	Outcome Statement	Horizon
01	Apprenticeship Incentives	Improved visibility and recommendations for effective incentives	1
02	Apprenticeship Value Proposition for Employers	Clearer business case, increased apprenticeship uptake	1
03	Training Wait Times and Barriers	Reduced delays, more efficient workforce development	1
04	Apprentice Poaching	Data-driven policy and systemic solutions to reduce poaching and support retention	1
05	Safety Awareness	Immediate safety awareness for new entrants	1
06	Post-Trade Upskilling	Consistent, quality-assured upskilling pathways	1
07	Training/Workforce Locations and Future Demand	Strategic investment in training and regional workforce readiness	1
08	Mature-Aged Apprentices	Increased mature-aged participation and workforce diversity	2

The proposed actions listed are not yet prioritised or sequenced for delivery. The time horizons provided reflect the estimated duration of each action, not their relative importance to the sector or intended completion date.

Measures of success and intended impact will also be added to these actions as they progress to a detailed scoping phase through PSO's project governance framework. PSO recognises the importance of outcome evaluation, and developing meaningful success measures will be given due time and careful consideration.

#	Action Focus Area	Outcome Statement	Horizon
09	Pathways for Energy Trades	Position energy trades as a supported and valued pathway from school to skilled career	2
10	Workforce Modelling	Reliable data for planning and investment	2
11	Training Delivery Costs	Evidence-based funding and expanded training capacity	2
12	Open-Source Energy Training Resources*	Reduce duplication, increase consistency and expand training capacity	2
13	National Centre for Educator Innovation & Workforce Futures*	Increase innovation, trial new approaches, share learning, and shape system-wide improvement	2
14	Industry Partnerships and Accountability in VET*	Increase workforce development and educator capability. Align training to real-world energy sector needs	2
15	National Career Progression Framework for VET Educators*	Elevate the status of VET educators, improve retention, & position teaching as a viable & attractive long-term career	2
16	National Apprenticeship Register	Improved jobseeker-employer matching and sector participation	3

* Proposed in PSO's VET Workforce Blueprint

List of proposed actions

1. Map Apprenticeship Incentives Across Jurisdictions

Timeline	Horizon 1
Driver	PSO have identified that, while there are a range of national and jurisdictional apprenticeship incentives, there is inconsistent visibility and effectiveness in addressing the specific challenges faced by the energy sector. This includes both employer and apprentice incentives.
Action	PSO will map and review the effectiveness of incentives for employers and apprentices.
Outcomes	This action will deliver better visibility to industry and career seekers of the range of incentives that are applicable to their circumstances, with recommendations to government for more effective support specific to the energy sector. Critically, this will include the types of support for employers and apprentices.

2. Define the Apprenticeship Value Proposition for Employers

Timeline	Horizon 1
Driver	The energy sector requires significant workforce growth to meet future demand, which current data suggests will be delivered almost wholly via the apprenticeship system. The current volume and growth trend of apprentices employed by industry is not on track to meet these demands.
Action	PSO will research and articulate the business case for taking on an apprentice tailored by business size, energy subsector and jurisdiction. The role and value proposition of Group Training Organisations (GTOs) will also be considered.
Outcomes	PSO will leverage the results from this project to inform government and industry on how to effectively and more efficiently grow the volume of apprenticeship opportunities through a stronger understanding of the value proposition.

3. Identify and Reduce Apprentice Training Wait Times and Barriers

Timeline	Horizon 1
Driver	PSO have received ongoing and consistent reports about delays in commencement of apprentice training. These delays have resulted in concerns about safety, rate of professional development and ability to complete in the nominated timeframe for apprentices.
Action	PSO will investigate and address RTO capacity constraints to validate these reports, defining the scale, contributing factors and opportunities to mitigate this issue.
Outcomes	This will provide actionable evidence and recommendations to reduce training delays enabling more timely and efficient workforce development.

4. Quantify Apprentice 'Poaching' Through Data and Insights

Timeline	Horizon 1
Driver	The transfer or cancellation and recommencement of apprentices to new employers in late apprenticeship year levels (third and fourth year) can negatively impact the original employer who has invested in training of an early year apprentice. This issue disincentivises employers from engaging with the apprenticeship system and employing new apprentices.
Action	PSO will research the prevalence and impact of late-stage apprentice 'poaching' and develop mitigation strategies.
Outcomes	This action will result in data-driven insights and solutions to reduce apprentice 'poaching', supporting employer retention and system stability.

5. Develop an Industry-Relevant Apprentice/New Worker Safety Education Program (Open Source)

Timeline	Horizon 1
Driver	Related to Action Focus Area 3, delays to commencement create a safety risk for new apprentices, their colleagues, and the public, particularly in the early stages of employment when formal training has not yet occurred.
Action	PSO will lead the creation and distribution of sector-specific safety materials for new apprentices and workers.
Outcomes	These materials will lead to immediate improvement in safety awareness for new entrants, reducing early-stage workplace risks before formal training is completed.

6. Clarify Post-Trade Training for Energy Workers

Timeline	Horizon 1
Driver	Upskilling through micro-credentials, skill sets, manufacturer and non-accredited training plays a key role in upskilling existing workers, especially in adapting to new technologies. However, there are inconsistent practices and governance across these forms of training, along with both missed opportunities and emerging risks.
Action	PSO will analyse and provide guidance on the use and governance of skill sets, micro-credentials and other post-trade courses for upskilling.
Outcomes	This action will provide a consistent, quality-assured approach to short duration training, supporting rapid upskilling and adaptability in the workforce.

7. Map Training and Workforce Locations to Future Industry Needs

Timeline	Horizon 1
Driver	Future energy projects, particularly in REZ, will require a workforce that is regionally and geographically distributed in new ways. Stakeholders have raised concerns about a disconnect between the locations of current apprentices, existing training infrastructure, and future project locations.
Action	PSO will conduct geospatial analysis to align apprentice and training locations with future project demand, especially in REZs.
Outcomes	The resulting data-driven insights will guide strategic investment in training infrastructure and workforce mobility, ensuring regional workforce readiness.

8. Improve Support for Mature Aged Apprentices Through Policy and Incentives

Timeline	Horizon 2
Driver	Mature aged apprentices contribute to increased workforce diversity, but face significant barriers to entry, particularly due to a limited number of apprenticeship opportunities offered by industry.
Action	Review and enhance policy and incentives to address barriers to entry and increase mature-aged apprentice participation. PSO also acknowledges the outsized impact that action in this area could produce (e.g. increasing diversity <i>while</i> growing the workforce) and will factor this into future prioritisation of all actions outlined in this workforce plan.
Outcomes	This project will investigate the policy environment and support systems for mature aged apprentices, with a focus on identifying improvements and supporting inclusive growth. This will contribute to workforce diversity and address workforce gaps.

List of proposed actions

9. Build Clear Pathways for Energy Trades	
Timeline	Horizon 2
Driver	There is a perception among secondary students that an apprenticeship pathway is less prestigious or valuable career option compared to university pathways. This limits the pool of high-quality candidates and contributes to ongoing skills shortages in the energy sector.
Action	PSO will explore, mature and reframe the perception of energy sector career pathways. This includes raising the profile of energy sector trades, aligning messaging with student motivations, and improving how pre-apprenticeship and VET in schools training is positioned within the education system.
Outcomes	This will establish a clearly defined and communicated pathway into energy trades, enabling students, schools, and families to confidently navigate and pursue skilled career options with full visibility of the steps, supports, and opportunities available.
10. Energy Sector Workforce Supply and Demand Modelling	
Timeline	Horizon 2
Driver	A lack of consistent, robust modelling to define the supply and demand dynamics of the energy sector workforce limits the sector's ability to plan and respond to future skills needs.
Action	PSO will develop robust, scenario-based workforce modelling for critical energy occupations.
Outcomes	This project will produce reliable forecasts to inform workforce planning, policy, and investment decisions across the sector.
11. Quantify Delivery Costs for Energy Training Qualifications	
Timeline	Horizon 2
Driver	A critical barrier to expanding training delivery is the lack of clarity around the cost to establish and deliver high-volume, resource-intensive energy qualifications.
Action	PSO will analyse and report on the true cost of delivery for key energy sector qualifications.
Outcomes	This analysis will support evidence-based funding and investment strategies to expand training capacity and address resource constraints.
12. Create an Open-Source Repository of Energy Training Resources (Proposed in VET Workforce Blueprint)	
Timeline	Horizon 2
Driver	RTOs and TAFEs across Australia face challenges in delivering high-quality training due to duplicated effort, high development costs, and inconsistent resource quality.
Action	A national, open-source repository of quality-assured training resources can streamline delivery, reduce duplication, and elevate consistency across the VET sector. These resources would be unit-aligned, adaptable for local contexts, and centrally maintained.
Outcomes	Improved access to shared training materials will reduce administrative burden on providers, enable faster course rollout, and improve training quality. This supports national capability-building and cost-effective growth in energy sector training delivery.

13. Establish a National Centre for Educator Innovation and Workforce Futures (Proposed in PSO's VET Workforce Blueprint)

Timeline	Horizon 2
Driver	The VET sector faces a need for scalable, innovative approaches to educator development and training delivery reform, particularly in response to rapid workforce shifts and digital disruption.
Action	A virtual national centre can facilitate collaboration, co-design, and experimentation to develop and test new tools, practices, and professional development models across the VET educator workforce.
Outcomes	Educators gain access to a structured platform for innovation, enabling them to trial new approaches, share learning, and shape system-wide improvement in teaching, credentialing, and digital pedagogy.

14. Strengthen Industry Partnerships and Accountability in VET Delivery (Proposed in PSO's VET Workforce Blueprint)

Timeline	Horizon 2
Driver	There is a lack of consistent and structured collaboration between industry and the VET sector, limiting training relevance and access to industry expertise.
Action	Creating co-investment models and national forums for joint planning can embed stronger partnerships and empower industry to support educator development, content relevance, and infrastructure access.
Outcomes	Enhanced industry engagement will drive shared responsibility for workforce development, increase educator capability, and ensure training is better aligned to real-world energy sector needs.

15. Develop a National Career Progression Framework for VET Educators (Proposed in PSO's VET Workforce Blueprint)

Timeline	Horizon 2
Driver	A lack of clear career pathways contributes to low retention, limited professional recognition, and inconsistent development opportunities within the VET educator workforce.
Action	Designing a structured, national framework can outline clear progression routes from entry-level to leadership roles and support ongoing professional development.
Outcomes	The framework will elevate the status of VET educators, improve retention, and position teaching as a viable and attractive long-term career.

16. Establish a National Register for Connecting Apprentices to Employers

Timeline	Horizon 3
Driver	There is a large volume of unsuccessful applicants to some apprenticeship recruitment opportunities who are not being further engaged by industry.
Action	PSO will lead the creation of a platform to connect unsuccessful apprenticeship applicants and jobseekers with employers across the energy sector.
Outcomes	This platform will improve matching of jobseekers to opportunities, reducing administrative burden and increasing workforce participation in the sector.

*This Workforce Plan includes a further 15 projects already initiated.
These are listed in Strategic response to identified issues.*

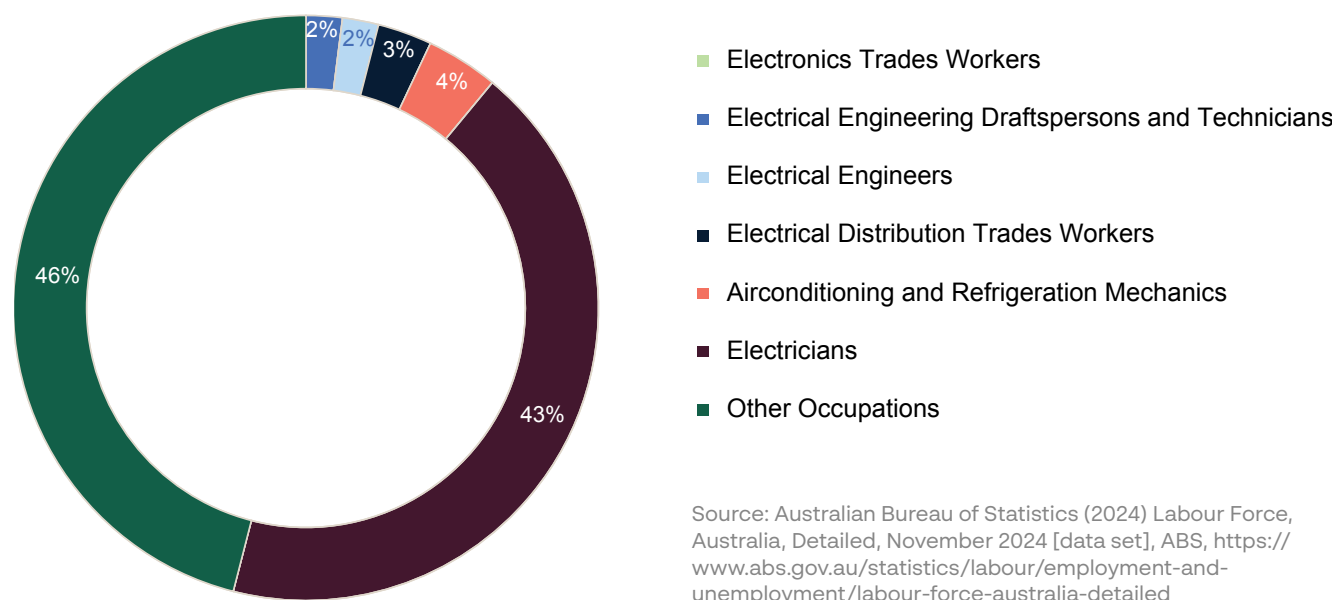
Critical trades workforce



PSO defines the critical trades workforce as a cluster of six ANZSCO* occupations. Collectively, these six occupations account for 54% of the energy sector's workforce:

 Electricians	 Air Conditioning and Refrigeration Mechanics
 Electrical Distribution and Transmission Trades Workers	 Electrical Engineering Draftspersons and Technicians
 Electronics Trades Workers	 Electrical Engineers ⁴

Figure 7: Proportion of energy sector workforce as at November 2024



The remaining 46% of the energy workforce is made up of smaller and mostly non-trade occupations, including operational support, project management, facilities management, building and surveying technicians, scientists and chemical, process and production engineers. PSO also notes the criticality of trade occupations in the Gas Supply and Pipeline Transport, such as Gasfitters, and their alignment to UEG – Gas Industry Training Package, however these represent a comparatively low volume. These occupations are highlighted in the relevant subsector sections of this Plan, and represented in broader workforce numbers.

The six occupations of focus in this Workforce Plan have also been targeted due to their criticality to the Net Zero transition⁵ and the majority of their training being delivered through the four VET training packages in PSO's remit:

Any person enrolled in an apprenticeship in these four training packages within PSO's remit is considered an energy trade apprentice in this Workforce Plan.

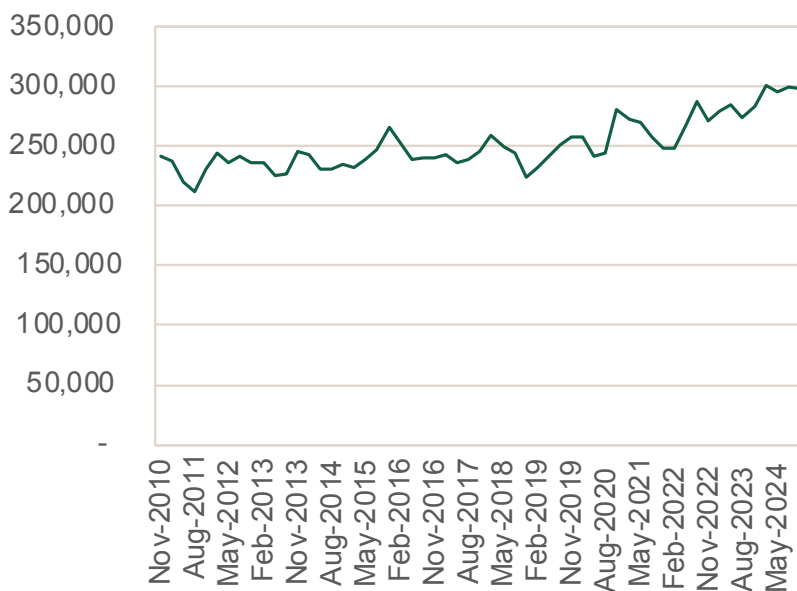
UEE Electrotechnology

UET Transmission, Distribution and Rail Sector

UEG Gas Industry Training Package

UEP Electricity Supply Industry – Generation Sector

Figure 8: Critical trades employment, Australia



Economy-wide, this workforce has grown by around 20% since 2010, however shortages still plague most of these trades due to consistent high demand and shortage of skilled labour.

Source: Australian Bureau of Statistics (2024) Labour Force Survey [data set], ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia> Note: Energy trades = Electricians, Air Conditioning and Refrigeration Mechanics, Electrical Distribution and Transmission Trades Workers, Electrical Engineers, Electrical Engineering Draftspersons and Technicians, Electronics Trades Workers

* ANZSCO has now become Occupation Standard Classification for Australia (OSCA)

4 PSO acknowledges that Electrical Engineers are normally included in the professional occupations workforce rather than being considered a trade career. However, for the ease of analysis, they have been included as part of energy trades workforce in this Workforce Plan.

5 Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy, Australian Government, <https://www.jobsandskills.gov.au/publications/the-clean-energy-generation>

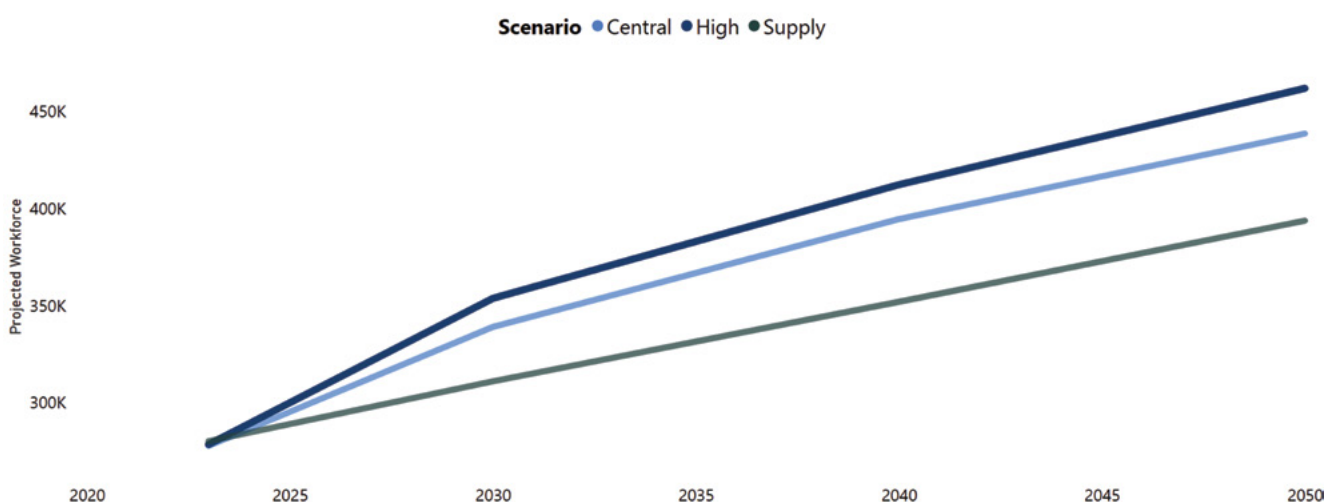


Comparing workforce projections from Jobs and Skills Australia to the predicted workforce growth from JSA's Clean Energy Generation report – which already showed workforce figures lagging – the gap in workforce demand and supply continues to widen.

Across all critical trades, the Clean Energy Generation report's high demand scenario required an average growth of more than 10,000 workers per year from 2023 to 2030. Supply projections from that same report estimated an average growth of 4,400 per year to 2030. Although current JSA data shows the critical trades workforce at a higher volume for 2024, projected growth will see this fall short of even the Clean Energy Generation report's supply projection by the middle of the next decade.

In its forecasting of the workforce required to deliver Australia's clean energy needs, the Clean Energy council, predicted that the number of Electricians alone would need to grow by approximately 24% from 2023 to 2030. JSA forecasts the electrician workforce to grow by just 7% from 2024-2029.

Figure 9: Projected supply and demand for critical trades workers



Source: Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy, JSA, <https://www.jobsandskills.gov.au/publications/the-clean-energy-generation>



The primary pipeline to grow this workforce is electrotechnology apprentices. In the last quarter of 2024, National Centre for Vocational Education Research (NCVER) recorded an estimated 55,000 energy apprentices in training nationally – over 50% more than the same period five years prior. A similar growth is observed in each state and territory. While a record number of women and First Nations people were engaged in energy apprenticeships (Figure 11), these cohorts still account for a smaller share of energy trade apprentices than other apprenticeships offered across Australia.

Figure 10: Energy trade apprentices, in-training, Australia

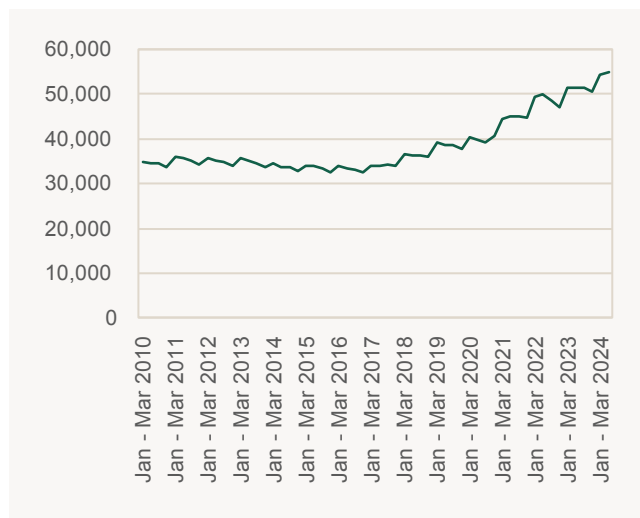
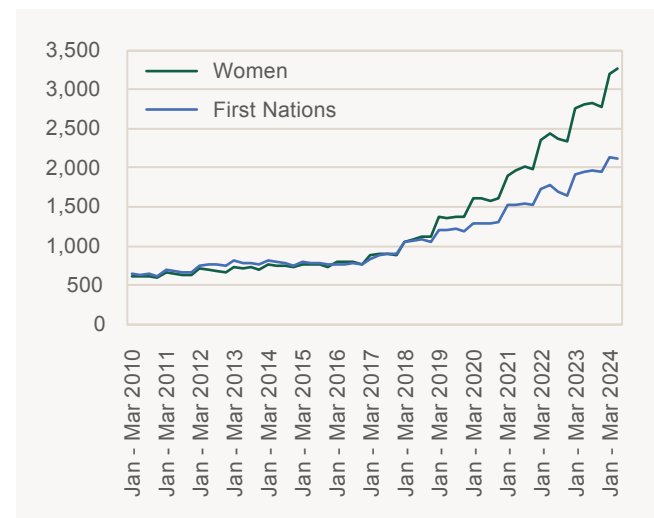


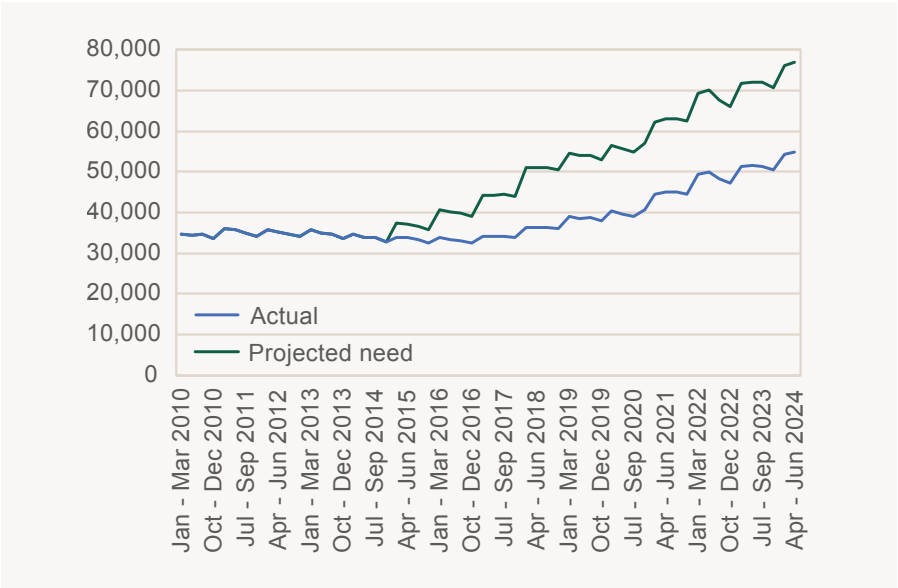
Figure 11: Energy trade apprentices, in-training, Australia, women and First Nations people



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Energy apprentices includes UEE, UET, UEP, UEG.

PSO conducted internal modelling to estimate the volume of energy apprentices required in training to reach workforce demand targets set out in JSA's (2023) Clean Energy Generation report. According to PSO analysis, Australia needed to increase the number of apprentices in training by approximately 40% above historical levels beginning in 2015 to better align the training system with the workforce requirements needed under a High scenario by 2030. While there has been significant growth in apprentice numbers, an estimated 22,000 additional apprentices were required in training in 2024 to meet the nation's ambitious goals. In other words, the nation is still not on track to meet the projected need for apprentices. Australia cannot afford to be complacent – there remains a shortage of energy apprentices across Australia at present.

Figure 12: Energy trade apprentices, Australia, in-training



Source: NCVER (2024) Apprentices and Trainees. Projected need is PSO analysis based on customised workforce data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy.

Over the past decade, many of these trades have faced annual shortages across the country, impacting both metropolitan and regional areas. As shown, only one occupation – Electrical Engineering Draftspersons and Technicians – is not experiencing shortages.

It's also important to note that the trades facing shortages across Australia mean that these occupations are in shortage in virtually all states and territories. The majority of PSO stakeholders across the nation report corroborate significant shortages, with expectations that these will worsen in the future.

Table 2: Energy trades in shortage, 2024

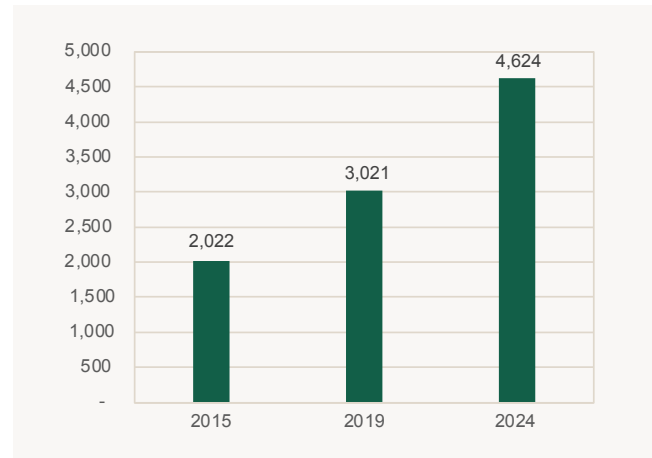
Energy Trade	Australia
Electrician	Shortage
Air Conditioning & Refrigeration Mechanic	Shortage
Electrical Distribution & Transmission Trades Workers	Shortage
Electrical Engineers	Shortage
Electrical Engineering Draftspersons & Technicians	No Shortage
Electronics Trades Workers	Shortage

Source: Jobs and Skills Australia (2024) Occupation Shortage List, JSA, <https://www.jobsandskills.gov.au/data/occupation-shortages-analysis/occupation-shortage-list>

**Figure 13: Online advertisements,
Energy trades, Australia**

Due to these shortages, combined with rising demand, the number of online job listings for energy trade roles in Australia is reaching unprecedented levels. Figure 13 illustrates the number of online jobs advertisements for the critical trades workforce at intervals between 2015 and 2024.

Collectively, online job advertisements for these trade roles hit their highest level in 2024 – having more than doubled from the number recorded in 2015. This trend is evident across all states and territories, as the demand for energy workers intensifies. This serves as a clear indication of the increasing pressure to increase the energy trades workforce, as well as the strain on the existing workforce to deliver projects and manage growing work pipelines.



Source: Jobs and Skills Australia (2024) Internet Vacancy Index, August 2024 [data set], JSA, <https://www.jobsandskills.gov.au/data/internet-vacancy-index> Note: Average per month. Energy Trades Workers = Electricians, Air Conditioning and Refrigeration Mechanics, Electrical Distribution and Transmission Trades Workers, Electrical Engineers, Electrical Engineering Draftspersons and Technicians, Electronics Trades Workers

While not explored in detail in this Workforce Plan, PSO notes these long-term shortages are likely to have resulted in significant, but difficult to quantify, impacts on other occupations critical to the delivery of renewables and infrastructure projects. Experienced tradespeople can diversify into a range of other specialised, leadership or support roles, such as engineers, project managers, apprentice supervisors, or TAFE and RTO educators. Shortages at the beginning of the career pipeline – and challenges to gaining additional skills – then naturally create shortages further along. PSO's VET Workforce Blueprint further explores the impact on training roles and proposed solutions.

The following sections detail these critical occupations, the pressures on the current workforce pipeline and the challenges to increased workforce growth.

Electricians

183,500
Across Australia

▲ 53,400
Increase since 2014

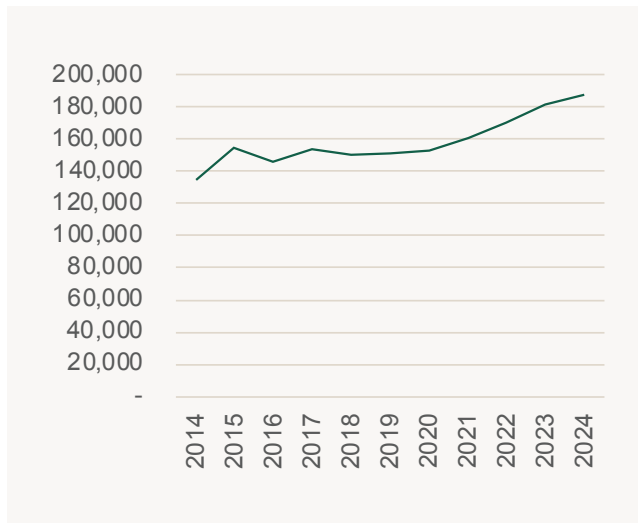
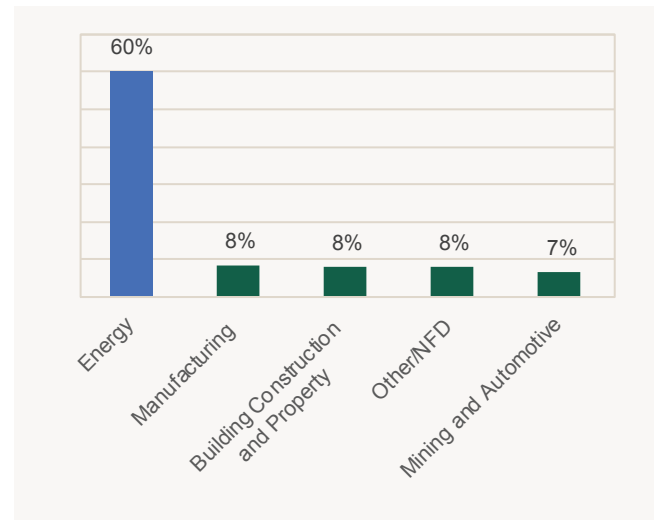
Overview

Electricians install, maintain, and troubleshoot electrical systems in various settings, including construction sites, homes, and industrial plants. Also known as Electrical Fitters or Electrical Contractors, this category includes Lift Mechanics (who account for around 0.02% of employment within this occupation) but excludes Automotive Electricians.

Around 183,500 Electricians were employed in Australia in November 2024, according to ABS Labour Force data, an increase from 130,000 since 2010. Electricians work across various sectors of economy, with most (60%) working in the energy sector.

While other trades workforce detailed in this report are critical to the transformation, due to licensing requirements the base qualification for a broad range of pathways in the energy supply industry is that of electrician, therefore it is crucial that this foundational occupation (and the training products which underpin it) is both accessible for new entrants and reflective of the evolving technological needs of the sector.

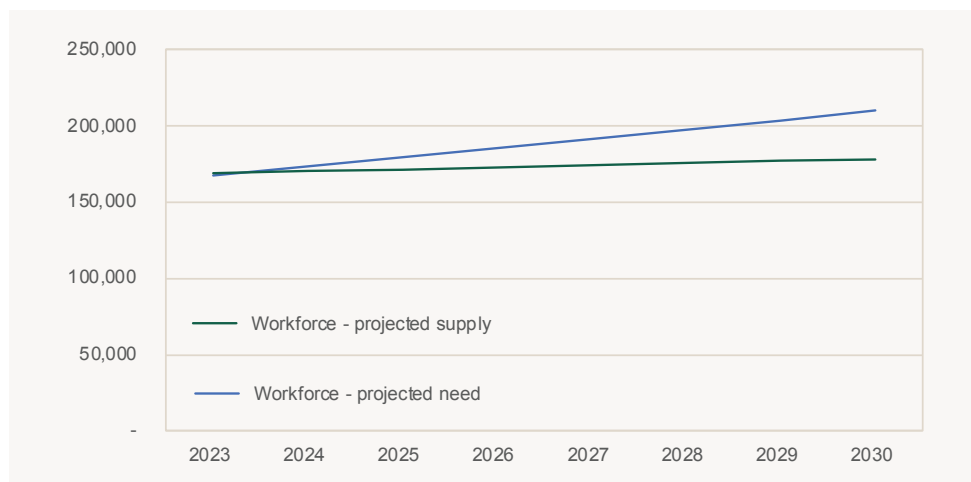


Figure 14: Electricians, Australia**Figure 15: Electricians, by sector of employment, Australia**

Source: (14) Australian Bureau of Statistics (2024) Labour Force Survey [data set] averaged, ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed>. (15) Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. By JSC ANZSIC Codes.

Occupation projections

Under a high scenario Australia is forecast to require more than 42,000 additional electricians between 2023 and 2030. Based on 2023 data this could take the total number of electricians required to 209,700 by 2030. However, without intervention, this same modelling suggests a supply of electricians of only 189,700 by 2030. This is according to PSO analysis of JSA (2023) Clean Energy Generation projections, as in Figure 16.

Figure 16: Electricians, Australia

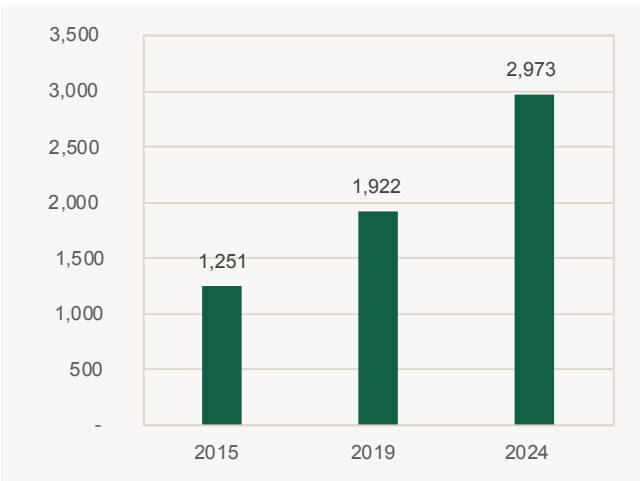
Source: PSO (2025). PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy.

Note: High scenario.

Table 3: Electrician shortages, Australia, 2024

Jurisdiction	Shortage Status
Australia	Shortage
New South Wales	Shortage
Victoria	Shortage
Queensland	Shortage
South Australia	Shortage
Western Australia	Shortage
Tasmania	Shortage
Northern Territory	Shortage
Australian Capital Territory	Shortage

Figure 17: Online advertisement, Electricians, Australia



Source: (3) Jobs and Skills Australia (2024) Occupation Shortage List, JSA, <https://www.jobsandskills.gov.au/data/occupation-shortages-analysis/occupation-shortage-list> (17) Jobs and Skills Australia (2024) Internet Vacancy Index, August 2024 [data set], JSA, <https://www.jobsandskills.gov.au/data/internet-vacancy-index>. Note: Average per month.

Occupation shortages

Electrician shortages have been reported in every jurisdiction across Australia (see Table 3) for many years. Research undertaken by JSA shows that there has been a national shortage of electricians every year from 2021 to 2024. Demand appears to be growing, with online job listings reaching unprecedented levels in 2024 – over 50% higher than five years prior and well over 100% higher than in 2015 (Figure 17).

One of the most consistent themes in stakeholder responses to PSO consultation is that Australia is facing a critical shortage of skilled electricians, particularly in emerging fields like renewable energy. This problem has persisted for over a decade and is expected to worsen given projected demand.

Furthermore, there is a shortage of qualified electrical educators, as electricians can earn significantly more in the field than in teaching roles. This shortage includes both the volume of people available in the occupation, and the skills of people already within the occupation. Potential consequences of these shortages include compromised safety, increasing consumer costs, constrained business growth and delays to the achievement of net-zero goals.

A consistent response in stakeholder feedback has also been the lack of suitably qualified candidates. A variety of skill gaps in both the current and emerging workforce are reported. These gaps are mainly driven by the growth of renewables and emerging technologies, compounded by the slow pace at which training packages are adapting to these advancements. This highlights that as well as shortages, the skills in demand are also in short supply amongst the current workforce and new entrants.



The suitability conundrum

This is based on some compelling data from JSA's in their Survey of Employers Who Recently Advertised (SERA) (2024). According to this data, for every three electricians who apply for a job, two are not hired due to suitability issues, even though they hold a prerequisite electrical licence and the right to work in Australia. Anecdotally, these suitability issues predominantly relate to applicants lacking the specialisation or contextualised experience on diverse technologies and projects.

The suitability conundrum is: given current skills shortages, why are two-thirds of qualified electrician applicants not hired? What is the nature of the suitability gap? How could PSO help fill that gap to ease skills shortages?

By comparison, this isn't the case for Electrical Transmission and Distribution applicants – if they're qualified, they typically get the job, with a much higher success rate.

Figure 18: Qualified Electricians, Job Application Success Rate



Source: Jobs and Skills Australia (2024). Survey of Employers who have Recently Advertised, JSA. Customised Data Request.

Electrician Apprentices

In 2024, the number of electrician apprentices in training reached the highest level in over a decade – approximately 44,000. While the number of apprentices in training was relatively flat prior to 2017, shifting policy focus to Net Zero targets and investment in renewable energy in the preceding years spurred greater demand for electricians. Despite this, workforce and skills shortages have endured.

Only 6% of electrician apprentices are women compared to 27% of all apprentices. Similarly, a lower share are First Nations (3.8%) compared to First Nations representation across all apprenticeships (6.6%).



Figure 19: Electrician apprentices, in-training, Australia

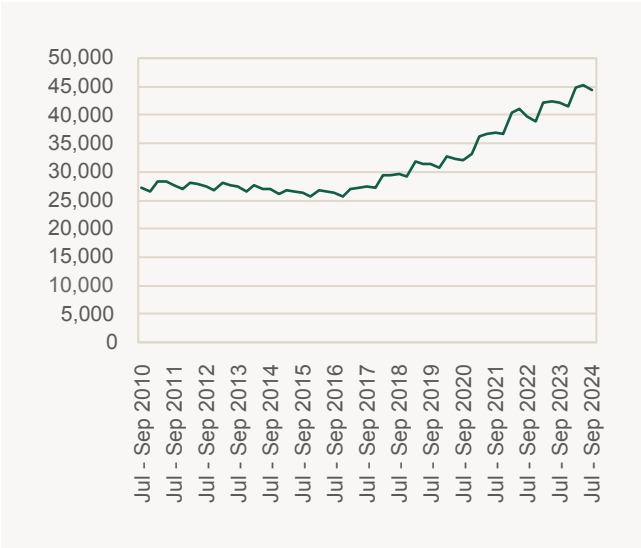
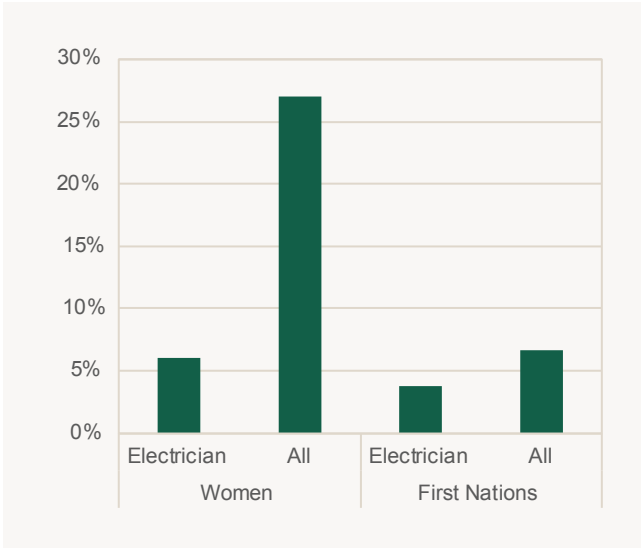


Figure 20: Women and First Nation representation, Electrician apprentices, in-training, Australia



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Apprentices in-training.

Air Conditioning and Refrigeration Mechanics

Overview

29,000
Across Australia

▲7,000
Increase since 2014

Air Conditioning and Refrigeration Mechanics install, maintain, and repair heating, cooling, and refrigeration systems, from residential ducted units to large commercial refrigeration. They work indoors and outdoors at homes, factories, and construction sites.

Air Conditioning and Refrigeration Mechanics work across various sectors of the economy, with the highest concentration (41%) working in the energy sector. Approximately 29,000 people were working in this trade as of November 2024, up from 22,000 around 10 years ago.



Figure 21: Air Conditioning and Refrigeration Mechanics, Australia

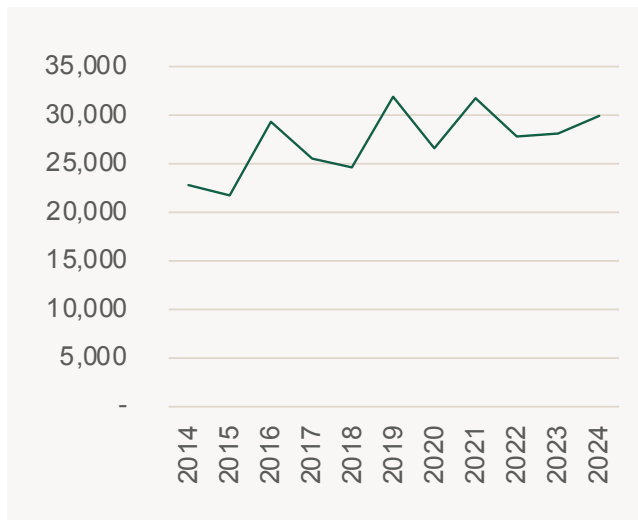
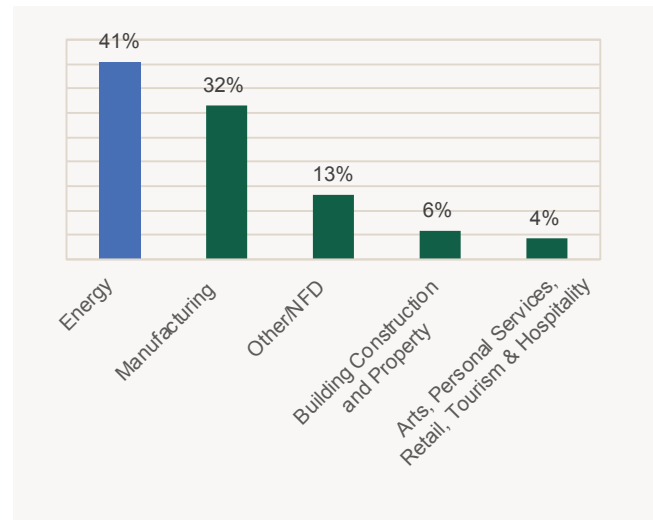


Figure 22: Air Conditioning and Refrigeration Mechanics, by sector of employment, Australia

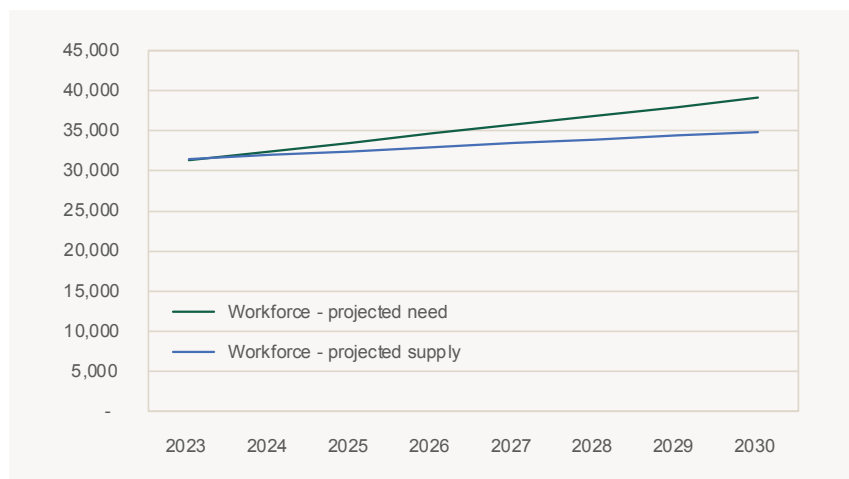


Source: (21) Australian Bureau of Statistics (2024) Labour Force Survey [data set] averaged, ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed>. (22) Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. By JSC ANZSIC Codes.

Occupation projections

Under a high scenario Australia is forecast to require at least 7,800 additional Air Conditioning and Refrigeration Mechanics between 2023 and 2030. Based on 2023 data this could take the total number of workers required to 39,100 by 2030. However, without intervention, this same modelling suggests a supply of only 34,900 by 2030. This is according to PSO analysis of JSA (2023) Clean Energy Generation projections.

Figure 23: Air Conditioning and Refrigeration Mechanics, Australia



Source: Powering Skills Organisation (2025). PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy.

Note: High scenario.

Occupation shortages

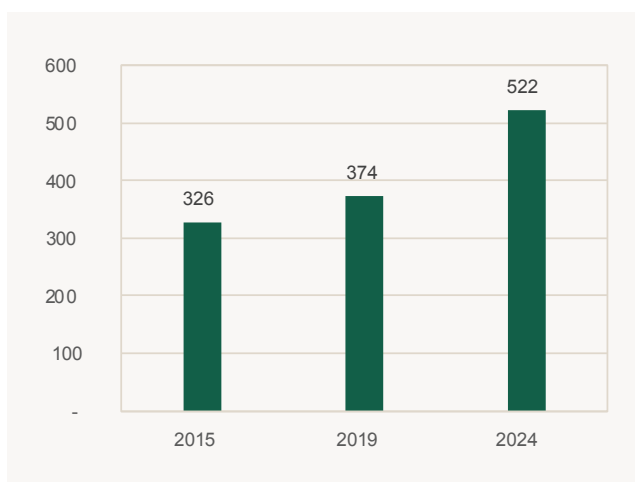
Air Conditioning and Refrigeration Mechanics shortages have been reported in every jurisdiction across Australia (see Table 4) for many years. Research undertaken by JSA shows that there has been a national shortage of this trade every year from 2021 to 2024.

Demand appears to be growing, with online job listings reaching unprecedented levels in 2024 – around 40% higher than in 2019 and 60% higher than in 2015 (Figure 24).

Table 4: Air Conditioning and Refrigeration Mechanics shortages, Australia, 2024

Jurisdiction	Shortage Status
Australia	Shortage
New South Wales	Shortage
Victoria	Shortage
Queensland	Shortage
South Australia	Shortage
Western Australia	Shortage
Tasmania	Shortage
Northern Territory	Shortage
Australian Capital Territory	Shortage

Figure 24: Online advertisements, Air Conditioning and Refrigeration Mechanics, Australia



Source: (4) Jobs and Skills Australia (2024) Occupation Shortage List, JSA, <https://www.jobsandskills.gov.au/data/occupation-shortages-analysis/occupation-shortage-list> (24) Jobs and Skills Australia (2024) Internet Vacancy Index, August 2024 [data set], JSA, <https://www.jobsandskills.gov.au/data/internet-vacancy-index>. Note: Average per month.

Air Conditioning and Refrigeration Mechanic Apprentices

Around 6,400 Air Conditioning and Refrigeration Mechanics apprentices were recorded as in training at the end of 2024, the highest level in over a decade. This is around a third higher than five years prior, and more than double the number recorded a decade prior. However, this is still not enough to reach required projections. Stakeholders report limited awareness among school leavers about career opportunities in Heating, Ventilation, Air Conditioning, and Refrigeration, impacting the number of new entrants. School engagement and targeted campaigns are essential to inspire young people and promote VET pathways.

Figure 25: Air Conditioning and Refrigeration Mechanics apprentices, in-training, Australia

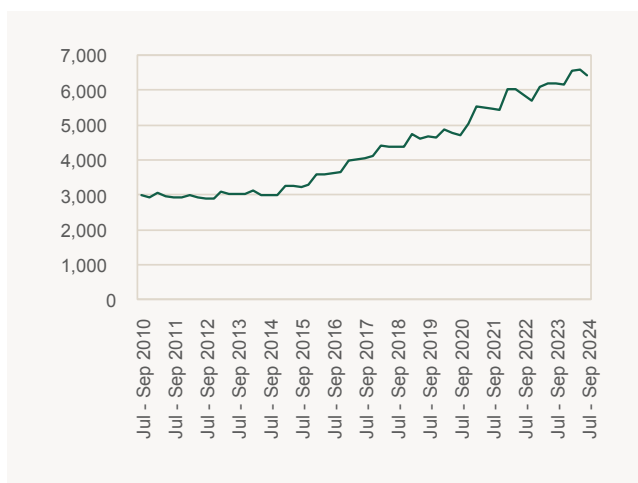
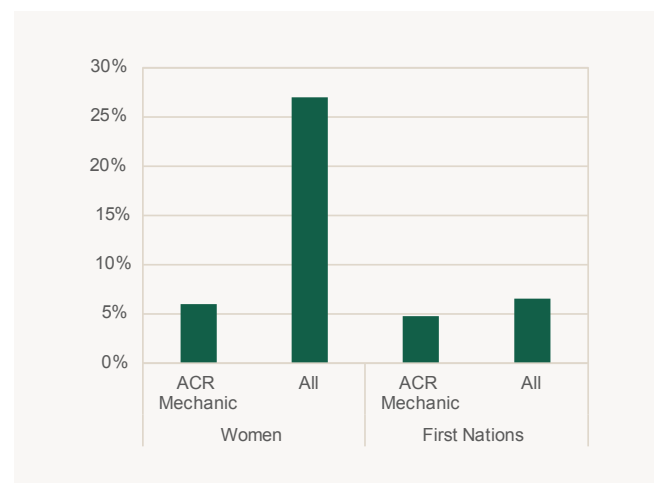


Figure 26: Women and First Nation representation, Air Conditioning and Refrigeration Mechanics apprentices, in-training, Australia



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Apprentices in-training.

Electrical Distribution Trades Workers

12,000

Across Australia

▲1,300

Increase since 2014

Overview

Electrical Distribution Trades Workers install, maintain, and repair electrical transmission and distribution systems, including power poles, streetlights, transformers, and circuit breakers. This category covers Electrical Lines workers (Distribution and Transmission) and Technical Cable Jointers.

Australian Bureau of Statistics (ABS) Labour Force data from November 2024 recorded 12,200 people working in this trade across Australia. Employment figures have varied significantly according to ABS Labour Force data, however 2024's figures are only slightly higher than previous peaks in 2018 and 2014. This may indicate the overall workforce size has not significantly grown over this period, notable given rapidly rising demand has been projected into the future.

Electrical Distribution Trades Workers work across various sectors of the economy, with most (70%) working in the energy sector.

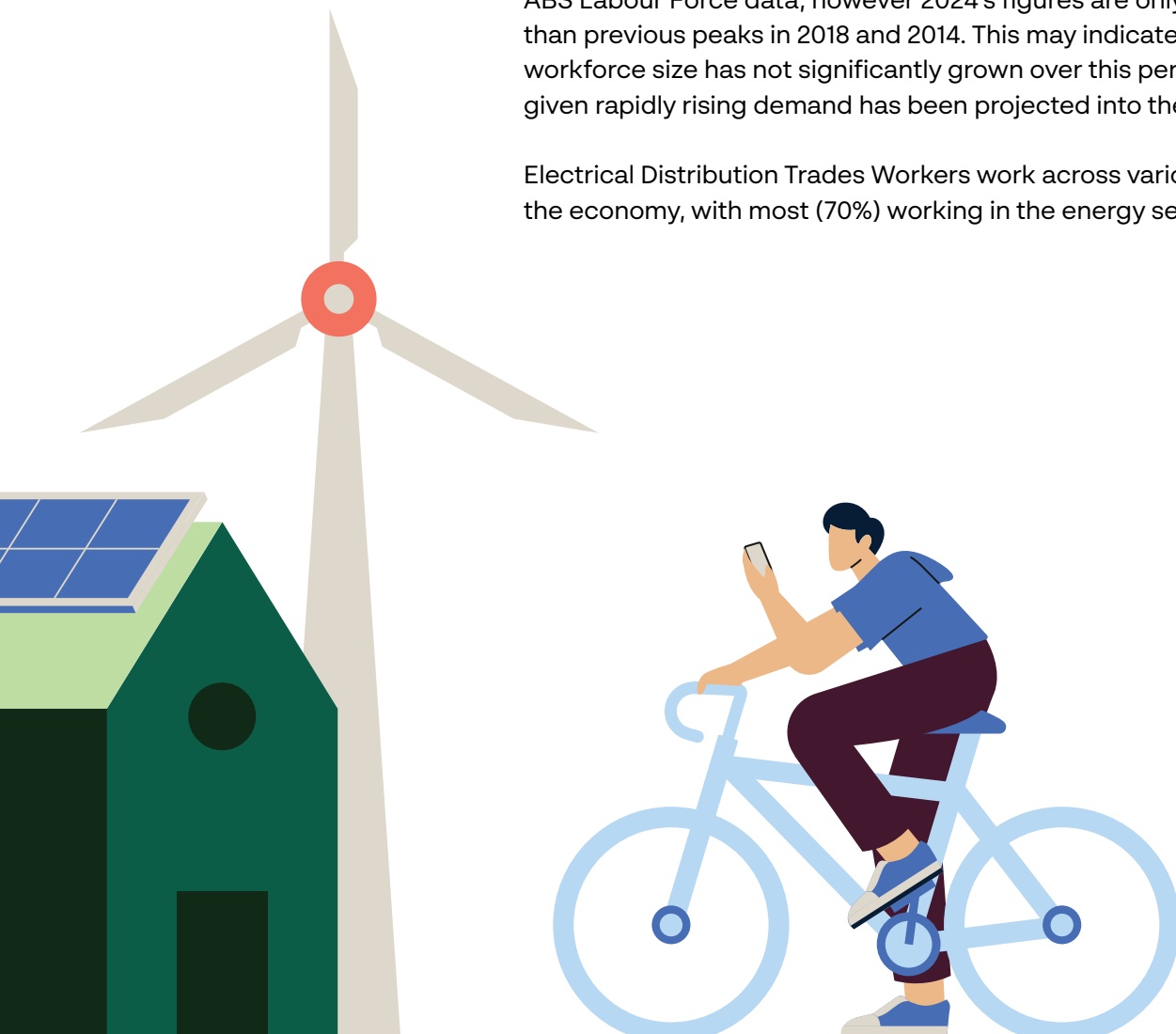


Figure 27: Electrical Distribution Trades Workers, Australia

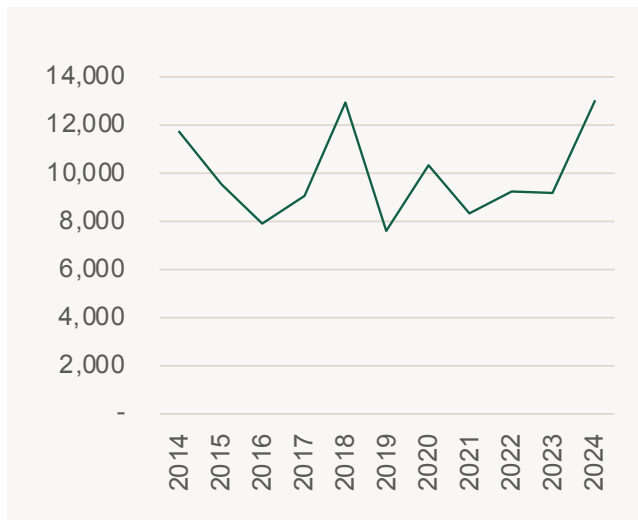
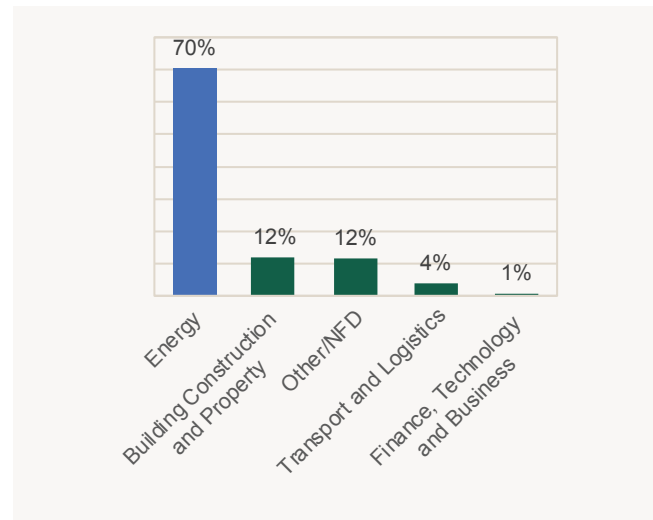


Figure 28: Electrical Distribution Trades Workers, by sector of employment, Australia

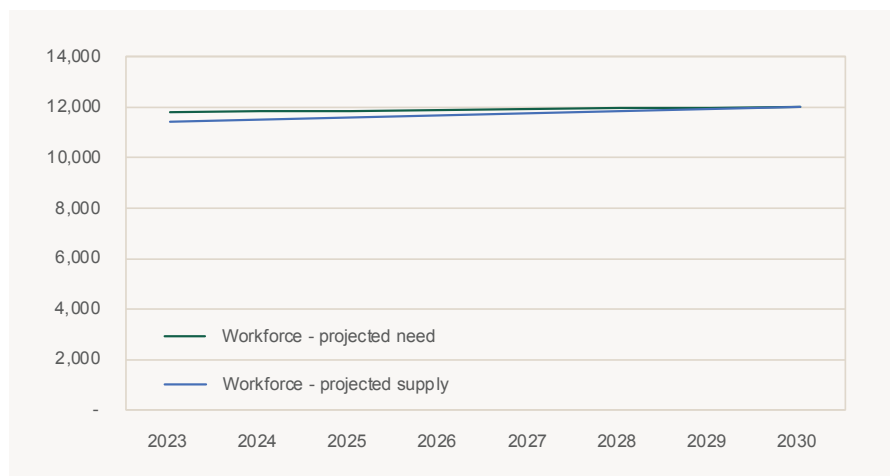


Source: (27) Australian Bureau of Statistics (2024) Labour Force Survey [data set] averaged, ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed>. (28) Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. By JSC ANZSIC Codes.

Occupation projections

Occupation projections for Electrical Distribution Trades Workers may indicate sufficient supply to meet projections, however actual employment figures pre-2023 show a high degree of volatility, with the workforce size wavering by 2,000 – 4,000 individuals from year to year, indicating insecure work or a highly transient workforce. Therefore it should not be assumed that a future workforce will be reliably available when and where required.

Figure 29: Electrical Distribution Trades Workers, Australia



Source: Powering Skills Organisation (2025). PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy.

Note: High scenario.

Occupation shortages

Electrical Distribution Trades Workers shortages have been reported in every jurisdiction across Australia (see Table 5) for many years. Research undertaken by Jobs and Skills Australia shows there has been a national shortage of this trade every year from 2021 to 2024.

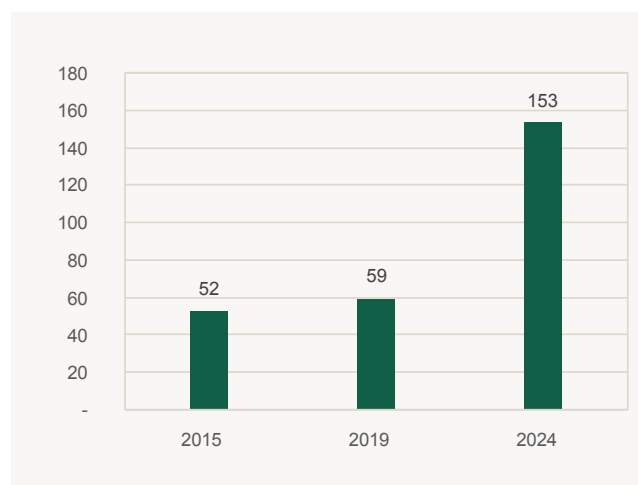
Demand appears to be growing, with online job listings reaching unprecedented levels in 2024 – nearly tripling the rate reported in 2015 (Figure 30).

Large-scale transmission builds and significant increases in maintenance demands across Australian networks are intensifying the need for skilled workers, which is a concern due to the current national skills shortage. Rural and remote areas are reportedly experiencing high demand due to infrastructure projects and transition.

Table 5: Electrical Distribution Trades Workers shortages, Australia, 2024

Jurisdiction	Shortage Status
Australia	Shortage
New South Wales	Shortage
Victoria	Shortage
Queensland	Shortage
South Australia	Shortage
Western Australia	Shortage
Tasmania	Shortage
Northern Territory	Shortage
Australian Capital Territory	Shortage

Figure 30: Online advertisements, Electrical Distribution Trades Workers, Australia



Source: (5) Jobs and Skills Australia (2024) Occupation Shortage List, JSA, <https://www.jobsandskills.gov.au/data/occupation-shortages-analysis/occupation-shortage-list> (30) Jobs and Skills Australia (2024) Internet Vacancy Index, August 2024 [data set], JSA, <https://www.jobsandskills.gov.au/data/internet-vacancy-index>. Note: Average per month.

Electrical Distribution Trades Workers Apprentices

After a stark decline during the 2010’s, which saw the number of Electrical Transmission and Distribution Trades Worker apprentices in training reduce by 70%, apprentices rebounded to around 1,900 by the end of 2024. Despite this recent improvement, the effects of such a decline in the previous decade would likely be felt today as a shortage of experienced workers. Stakeholders also report the transmission and distribution subsectors have an over-reliance on contractors and outsourcing, which has reduced internal training investment.

Figure 31: Electrical Distribution Trades Workers apprentices, in-training, Australia

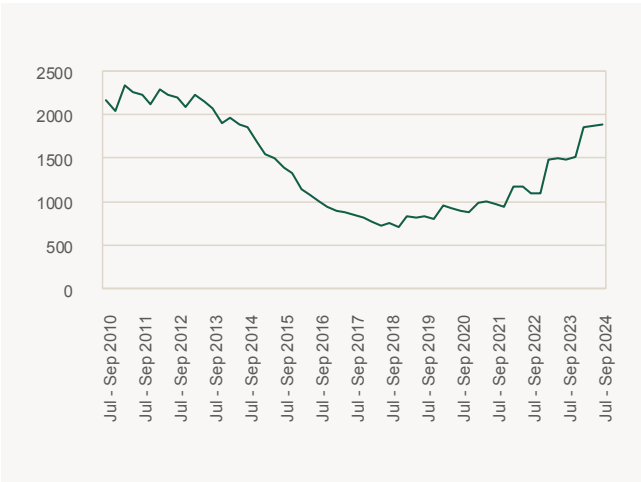
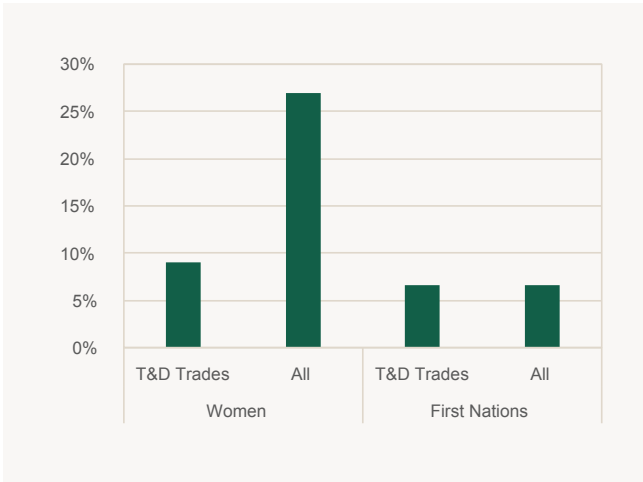


Figure 32: Women and First Nation representation, Electrical Distribution Trades Workers apprentices, in-training, Australia



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVET, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Apprentices in-training.



Electrical Engineers

28,800
Across Australia

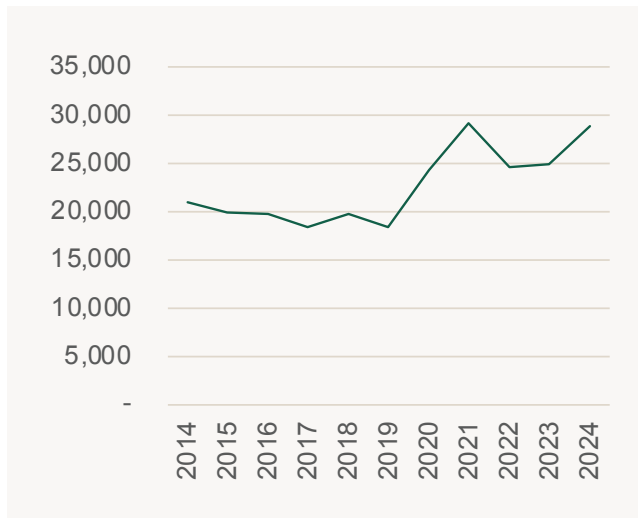
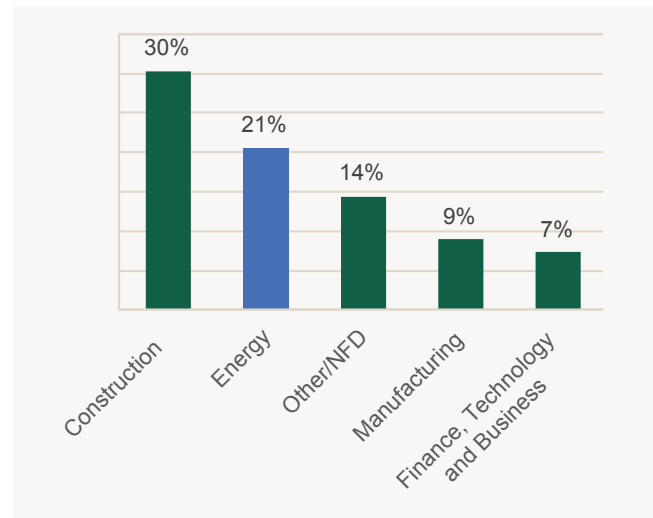
▲7,800
Increase since 2014

Overview

Electrical Engineers design and develop equipment for generating, distributing, and using electricity, including renewables. They oversee maintenance, installation, and operation, typically working in offices but also in labs, workshops, or on-site at power facilities and construction projects. Specialisations include electrical design, rail signalling, and signalling and communications engineer.

ABS Labour Force data reported 28,800 people working in this profession across Australia as of November 2024, up from 19,800 in 2014. Electrical Engineers work across various sectors of economy, with around 21% (one in five) working in the energy sector.



Figure 33: Electrical Engineers, Australia**Figure 34: Electrical Engineers, by sector of employment, Australia**

Source: (33) Australian Bureau of Statistics (2024) Labour Force Survey [data set] averaged, ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed>. (34) Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. By JSC ANZSIC Codes.



Key distinctions between Electrical Engineers and other critical energy trades:

- Electrical Engineers are not required to hold an electrical licence to work in their field.
- Over 80% of Electrical Engineers enter the profession through university pathways, unlike most energy trades which follow VET or apprenticeship routes (ABS Census 2021).
- Electrical Engineering has a higher proportion of migrants, with 52% born overseas compared to 25% in other key energy trades.
- The profession is more gender-diverse, with women making up 10% of Electrical Engineers versus just 3% in other energy trades.



Occupation shortages

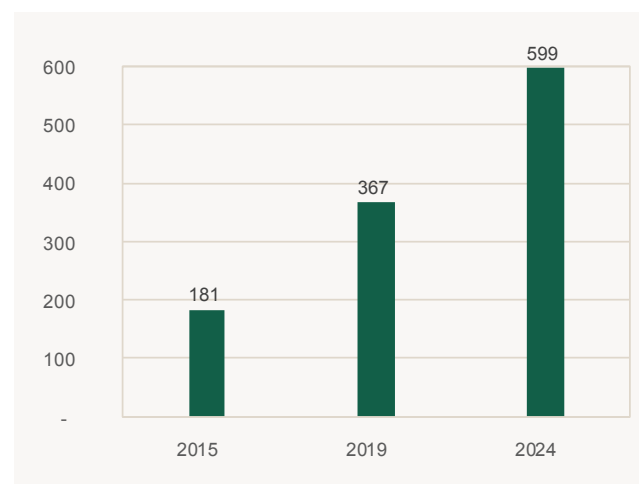
Electrical Engineers were recorded as in shortage in every jurisdiction across Australia in 2024 (see Table 6), affecting a wide range of industries. Longitudinal analysis shows Electrical Engineers have experienced recurring national shortages over the past two decades. Research undertaken by Jobs and Skills Australia shows that there has been a national shortage of Electrical Engineers every year from 2021 to 2024. While Electrical Engineering has a higher proportion of women and people from CALD backgrounds than trade roles, engineering professions have their own barriers to attraction and retention for those groups. Demand appears to be growing, with online job listings reaching unprecedented levels last year – over 60% higher than five years ago and well over 200% higher than a decade ago (Figure 35).

As noted in PSO's consultation with industry, shortages in such a critical role, particularly in design and early build phases, may delay progress in infrastructure projects. Furthermore, regulatory uncertainty around the role of electrical engineers in complex technologies, such as microgrids, may also cause project delays.

Table 6: Electrical Engineer shortages, Australia, 2024

Jurisdiction	Shortage Status
Australia	Shortage
New South Wales	Shortage
Victoria	Shortage
Queensland	Shortage
South Australia	Shortage
Western Australia	Shortage
Tasmania	Shortage
Northern Territory	Shortage
Australian Capital Territory	Shortage

Figure 35: Online advertisements, Electrical Engineers, Australia



Source: (6) Jobs and Skills Australia (2024) Occupation Shortage List, JSA, <https://www.jobsandskills.gov.au/data/occupation-shortages-analysis/occupation-shortage-list> (35) Jobs and Skills Australia (2024) Internet Vacancy Index, August 2024 [data set], JSA, <https://www.jobsandskills.gov.au/data/internet-vacancy-index>. Note: Average per month.

Electrical Engineer pathways

Unlike other occupations in this Workforce Plan, electrical engineers gain qualifications through tertiary education. Specific time series data on electrical engineering student enrolment in Australia is provided by the Australian Government Department of Education at the broad field of education called 'Engineering & Related Tech'. Further research indicates that electrical engineering enrolments have reduced in recent years.

"Historically, there were relatively large numbers of graduates in electrical and electronic engineering, but numbers in this field have dwindled over the years and there were few completions in the main engineering streams of mechanical, civil and electrical engineering."

(Australia's Next Generation of Engineers, 2020, p.20).

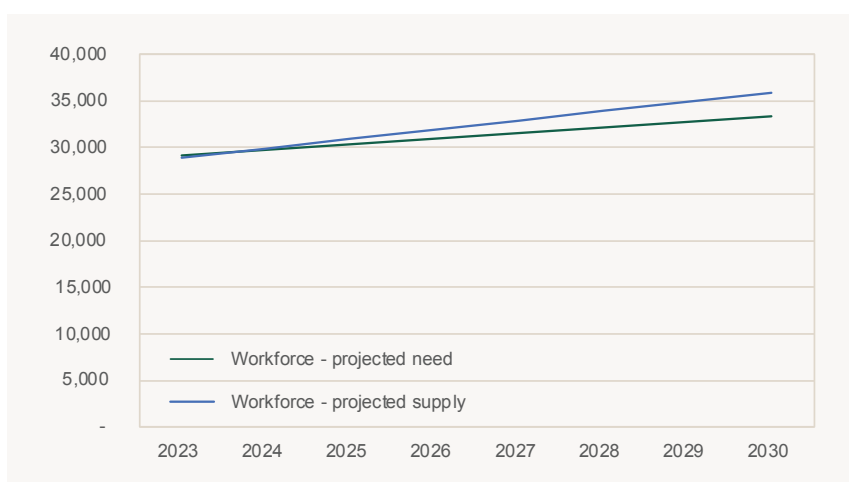
The Australian Council of Engineering Deans and Engineers Australia report that completions for domestic electrical and electronic engineering students fell 20% from 2020 to 2022 and around 10% for international students in the same period.

(Australian Engineering Higher Education Statistics 2012-2022, p.9).

While core offerings and student electives differ depending on the institution and the student, consultation feedback indicates that students who specialise in renewable energy during their studies are particularly sought after. Even more attractive to employers are graduates who have also completed a trade apprenticeship; combining technical and engineering knowledge.

Occupation projections

Figure 36: Electrical Engineers workers, Australia



Even under a high scenario, existing modelling indicates Australia is forecast to have a surplus of Electrical Engineers by 2030. PSO acknowledges this may not fit expectations of demand and the current shortfalls in Electrical Engineer in the labour market or education system. PSO offers an action to update this modelling to interrogate this area.

Source: Powering Skills Organisation (2025). PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy. Note: High scenario.

Electronics Trades Workers

28,800
Across Australia

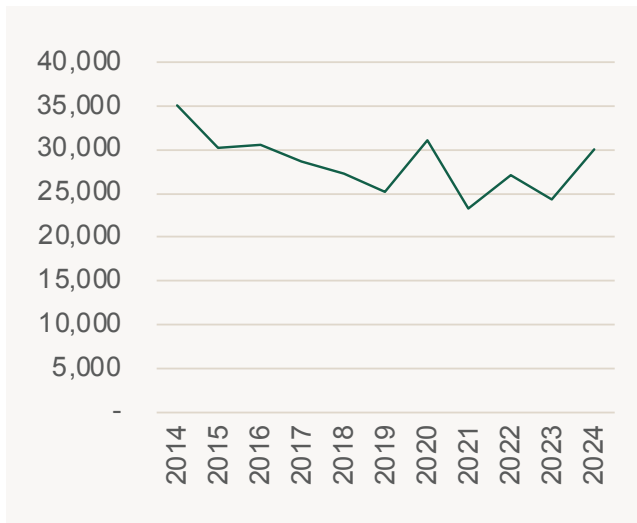
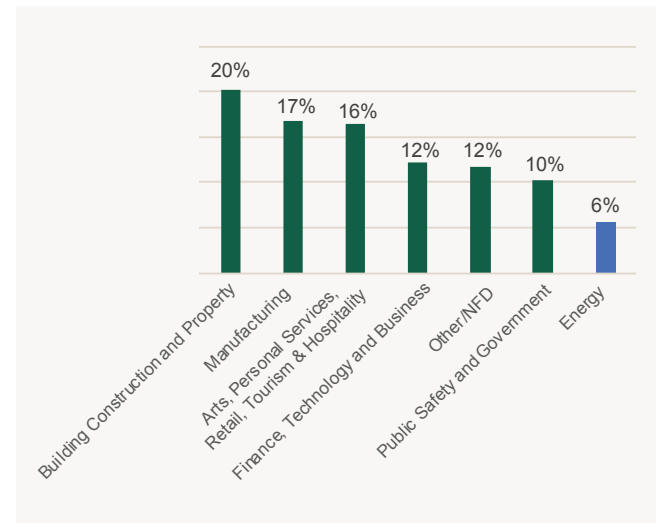
▼5,100
Decrease since 2014

Overview

Electronics Trades Workers maintain, adjust and repair electronic equipment such as business machines, video and audio equipment, and electronic instruments and control systems, and transmit and receive radio messages.

Labour Force data estimated 28,800 people were working in this trade across Australia as of November 2024, down from 35,100 in 2014 – this is a notable decrease given future demand is predicted to grow. The reasons for this decline are unclear, with multiple factors likely contributing, including an ageing workforce, diversification into other occupations (such as ICT Support Technician), a decline in Australian manufacturing and the disposable nature of modern electronics. Electronics Trades Workers operate across various sectors of economy, with only around 6% working directly in the energy sector.

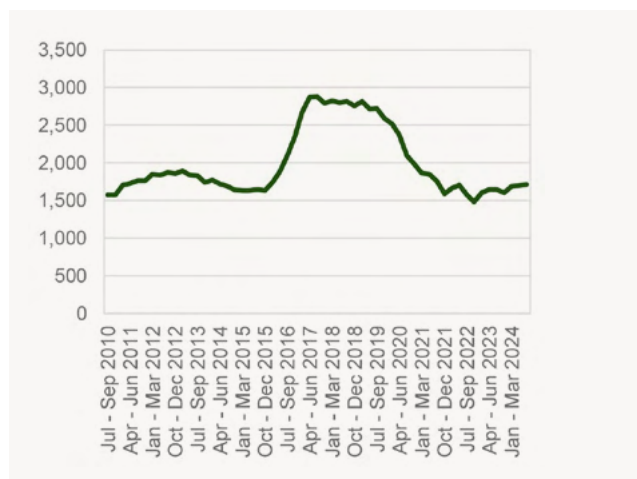


Figure 37: Electronics Trades Workers, Australia**Figure 38: Electronics Trades Workers, by sector of employment, Australia**

Source: (37) Australian Bureau of Statistics (2024) Labour Force Survey [data set] averaged, ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed>. (38) Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. By JSC ANZSIC Codes.

Occupation projections

Under a high scenario Australia is forecast to require at least 14,800 additional Electronics Trades Workers between 2023 and 2030. Based on 2023 data this could take the total number of workers required to 41,300 by 2030. However, without intervention, this same modelling suggests a supply of only 34,300 by 2030. This is according to PSO analysis of JSA (2023) Clean Energy Generation projections, as shown in Figure 39.

Figure 39: Electronics Trades Workers, Australia

Source: Powering Skills Organisation (2025). PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy.

Note: High scenario.

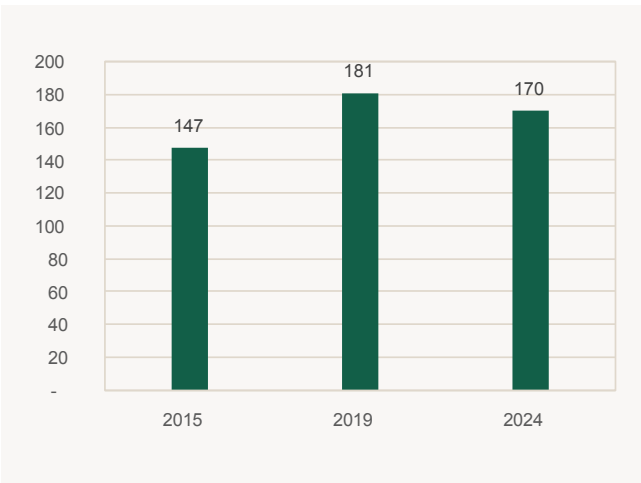
Occupation shortages

Electronics Trades Workers shortages have been reported in every jurisdiction across Australia (see Table 7) in 2024, with long-term trends showing sustained periods of shortage in the latter half of the 2000s into the 2010s. Research undertaken by Jobs and Skills Australia shows that there has been a national shortage of this trade every year from 2021 to 2024. Online job advertisements have also remained at relatively consistent levels in recent years (Figure 40). However, unlike other energy trades, job advertisements for this occupation did not hit new highs in 2024.

Table 7: Electronics Trades Worker shortages, Australia, 2024

Jurisdiction	Shortage Status
Australia	Shortage
New South Wales	No Shortage
Victoria	Regional Shortage
Queensland	Shortage
South Australia	Shortage
Western Australia	Shortage
Tasmania	Shortage
Northern Territory	Shortage
Australian Capital Territory	Shortage

Figure 40: Online advertisements, Electronics Trades Workers, Australia



Source: (7) Jobs and Skills Australia (2024) Occupation Shortage List, JSA, <https://www.jobsandskills.gov.au/data/occupation-shortages-analysis/occupation-shortage-list> (40) Jobs and Skills Australia (2024) Internet Vacancy Index, August 2024 [data set], JSA, <https://www.jobsandskills.gov.au/data/internet-vacancy-index>. Note: Average per month.

Electronics Trades Worker Apprentices

Around 1,700 Electronics Trade Worker apprentices were recorded in training at the end of 2024 – significantly less than five years prior. This is unlike most other energy trade apprenticeships which grew over the preceding five years. Only 8% of these apprentices are women compared to 27% of all apprentices. Similarly, a lower share are First Nations people (3.9%) compared to First Nations representation across all apprenticeships (6.6%).

Figure 41: Electronics Trades Worker apprentices, in-training, Australia

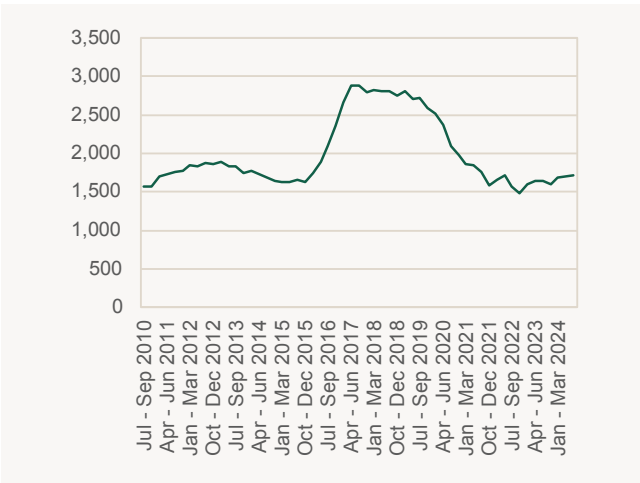
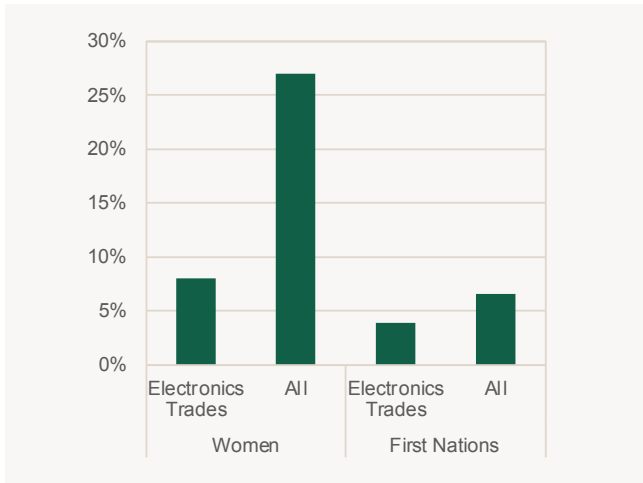


Figure 42: Women and First Nation representation, Electronics Trades Workers apprentices, in-training, Australia



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Apprentices in-training.



Electrical Engineering Draftspersons and Technicians

10,000
Across Australia

▼300
Decrease since 2014

Overview

Electrical Engineering Draftspersons and Technicians assist in electrical engineering research, design, manufacture, assembly, construction, operation and maintenance of equipment, facilities and distribution systems.

An estimated 10,000 people were recorded working in this trade as of November 2024, similar to the workforce 10 years prior. This is a notable lack of growth given strong future demand. This trade operates across various sectors of economy, with the highest share (34%) working in the energy sector (Figure 44).

While limited commentary had been provided in Phase 1, PSO sought greater detail throughout Phase 2 consultation with stakeholders. Responses noted challenges in increasing the size of the workforce due to long training times, low early-career wages and unclear school-to-trade pathways. Concurrently, retirement and attraction into other sectors and roles have reportedly reduced workforce numbers. Upskilling will likely be required due to rapid changes in power generation, storage, transmission, AI, automation/augmentation, and advancements in robotics.



Figure 43: Electrical Engineering Draftspersons and Technicians, Australia

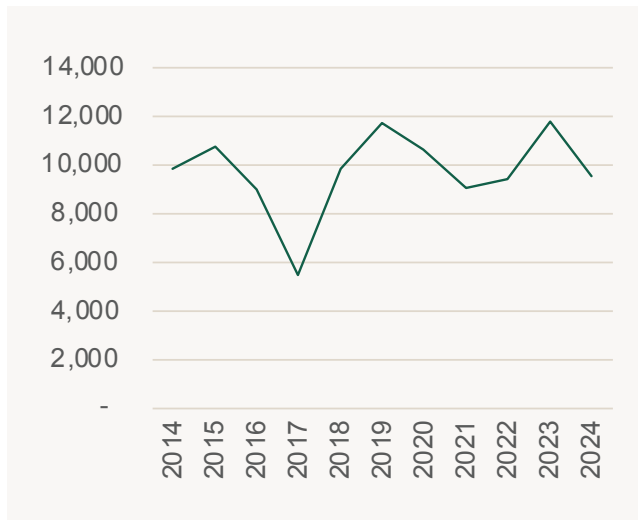
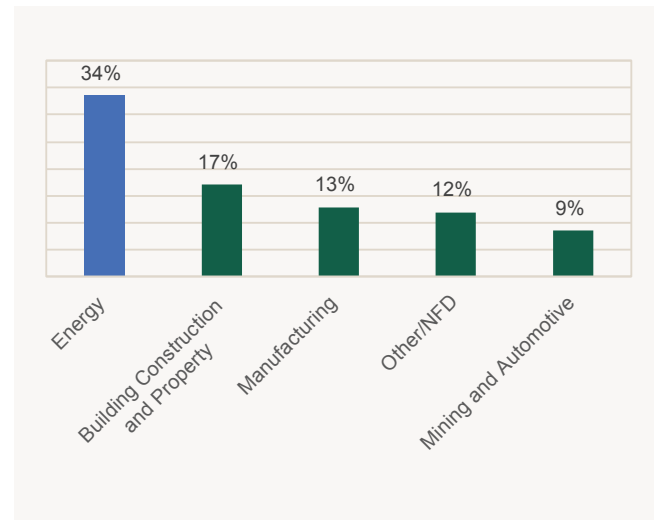


Figure 44: Electrical Engineering Draftspersons and Technicians, by sector, Australia

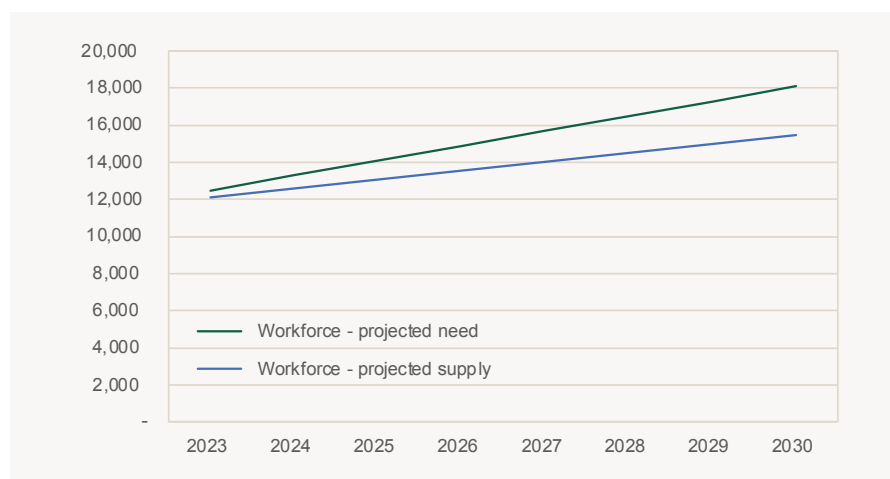


Source: (43) Australian Bureau of Statistics (2024) Labour Force Survey [data set] averaged, ABS, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed>. (44) Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. By JSC ANZSIC Codes.

Occupation projections

Under a high scenario Australia is forecast to require at least 5,600 additional Electrical Engineering Draftspersons and Technicians between 2023 and 2030. Based on 2023 data this could take the total number of workers required to 18,100 by 2030. However, without intervention, this same modelling suggests a supply of only 15,500 by 2030. This is according to PSO analysis of JSA (2023) Clean Energy Generation projections, as shown in Figure 45.

Figure 45: Electrical Engineering Draftspersons and Technicians, Australia



Source: Powering Skills Organisation (2025). PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy.

Note: High scenario.

Occupation shortages

Unlike other energy trades, shortages were only reported in Western Australian and the Northern Territory (see Table 8) in 2024, and infrequent reports of national shortages in prior years. This latest shortage is potentially due to increased demand from the Mining sector, which is drawing skilled workers from other sectors.

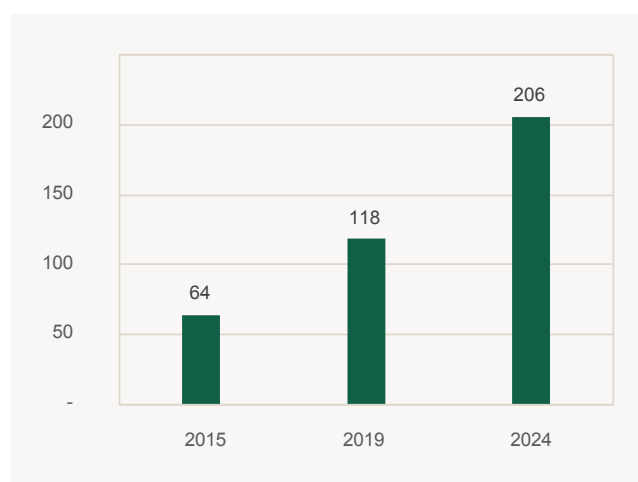
The high level of technical expertise and skill required for the role provides a challenge in upskilling existing workers in other occupations. One subject matter expert noted to PSO it could require up to 5 years to appropriately transition from a tradesperson to a technician.

Demand for this trade is still rising with online job listings reaching unprecedented levels in 2024 – over 70% higher than five years prior and well over 200% higher than in 2015 (Figure 46).

Table 8: Electrical Engineering Draftspersons and Technician shortages, Australia, 2024

Jurisdiction	Shortage Status
Australia	No Shortage
New South Wales	No Shortage
Victoria	No Shortage
Queensland	No Shortage
South Australia	No Shortage
Western Australia	Shortage
Tasmania	No Shortage
Northern Territory	Shortage
Australian Capital Territory	No Shortage

Figure 46: Online advertisements, Electrical Engineering Draftspersons and Technicians, Australia



Source: (8) Jobs and Skills Australia (2024) Occupation Shortage List, JSA, <https://www.jobsandskills.gov.au/data/occupation-shortages-analysis/occupation-shortage-list> (46) Jobs and Skills Australia (2024) Internet Vacancy Index, August 2024 [data set], JSA, <https://www.jobsandskills.gov.au/data/internet-vacancy-index>. Note: Average per month.

Training Pathways

Unlike other trades roles highlighted in this Workforce Plan, electrical engineering draftspersons and technicians do not gain their qualifications through a Certificate III or apprenticeship. Two post-trade training packages have been identified as pathways to this occupation: the Advanced Diploma of Engineering Technology and Certificate IV in Engineering Drafting. Both qualifications show low or declining rates of commencements from 2019 to 2024.

With stakeholder feedback indicating strong demand for these skills, the lack of clarity for training pathways and the low commencement rates, this occupation may be at risk of greater shortages in the future. PSO will continue to investigate these issues for electrical engineering draftspersons and technicians.



New and emerging occupations

New and emerging occupations are unlikely to be reflected in quantitative data due to their recent entry into the labour market. Accordingly, PSO has developed the following based on stakeholder consultation, resulting in a primarily qualitative approach to identification and analysis of these occupations and skills.

Stakeholders highlight that rather than the emergence of entirely new occupations within the energy sector, the energy trades are constantly evolving to respond to changing technologies.

Consequently, while the foundational skills and principles remain stable, the industry is increasingly seeking a workforce with more diverse skill sets, or with deeper, specialised expertise and digital literacy.

Key drivers of this skills evolution within the energy trades include:

- The renewables transition
- New and changing technologies
- Changes to refrigerants (specific to the HVAC sector)

The one exception is that some consultation has revealed a possible need for a technician-level between Electrical Distribution Trades Workers and Electrical Engineers. PSO will investigate this further.

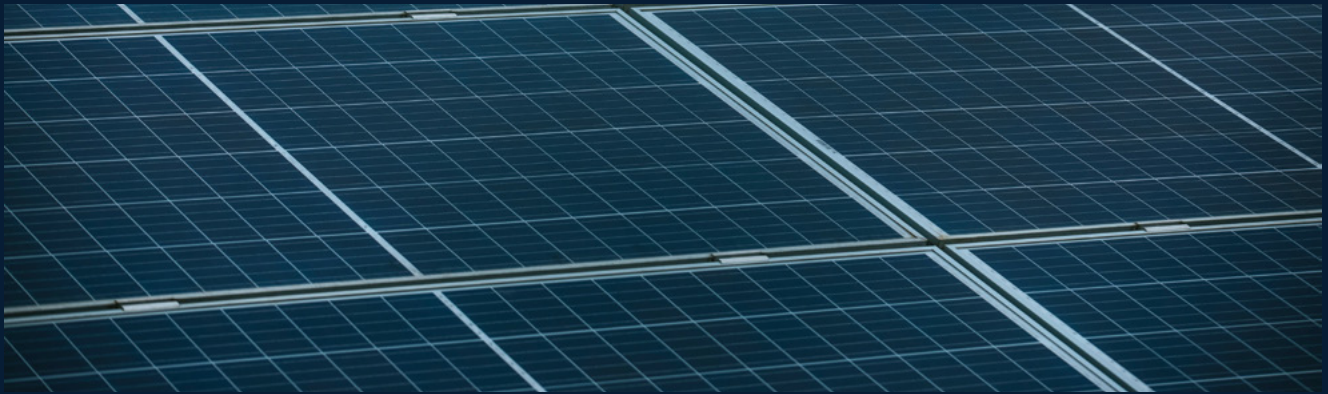


The renewables transition

Stakeholders indicate there is growing demand for electricians with broader knowledge of various clean energy technologies, their installation, and maintenance. This includes small-scale solar and battery systems, operating large scale batteries, wind energy, Electric Vehicle (EV) charging station, solar grid connection, remote system management, hydrogen and Virtual Power Plants.

Moreover, a strategy is required to develop training in these areas to ensure the workforce is suitably skilled to safely and efficiently undertake renewables work and that the training supports mobility across renewable projects. Two examples of changing skills needs for the energy trades are provided in the text box below.





New and changing technologies

As technology advances, digital literacy and Information Technology (IT) skills are becoming increasingly important for the energy trades and apprentices, especially electricians. Trades skill sets will need to evolve towards digitisation and electronics as technology continues to improve, enabling lower power consumption and greater control over equipment.

This shift is particularly evident in the smaller (domestic and commercial) sectors of the electricity market, wherein the rise of advanced systems, such as the Internet of Things (IoT) and smart technology in homes and businesses, demands new skills that combine electrical work with software and communications, requiring installers to adapt their traditional expertise. For instance, fault-finding in interconnected systems (e.g. heating, cooling, solar) in homes is becoming more complex. Issues may not only stem from a unit itself, but from system configuration problems. There is also reportedly a gap in service models for home energy systems, with larger contractors able to address maintenance needs through OEM training, while smaller ones struggle to keep up.

Changes to refrigerants (specific to the HVAC sector)

Stakeholders indicate that shortages in available workforce are compounded by a reported lack of experience with the right equipment and refrigerants in the labour market. Ozone-friendly refrigerant training is crucial, as businesses transition from synthetic refrigerants to natural alternatives, yet there is a reported shortage of available training.

How the renewables transition is changing the skills needs of the energy trades

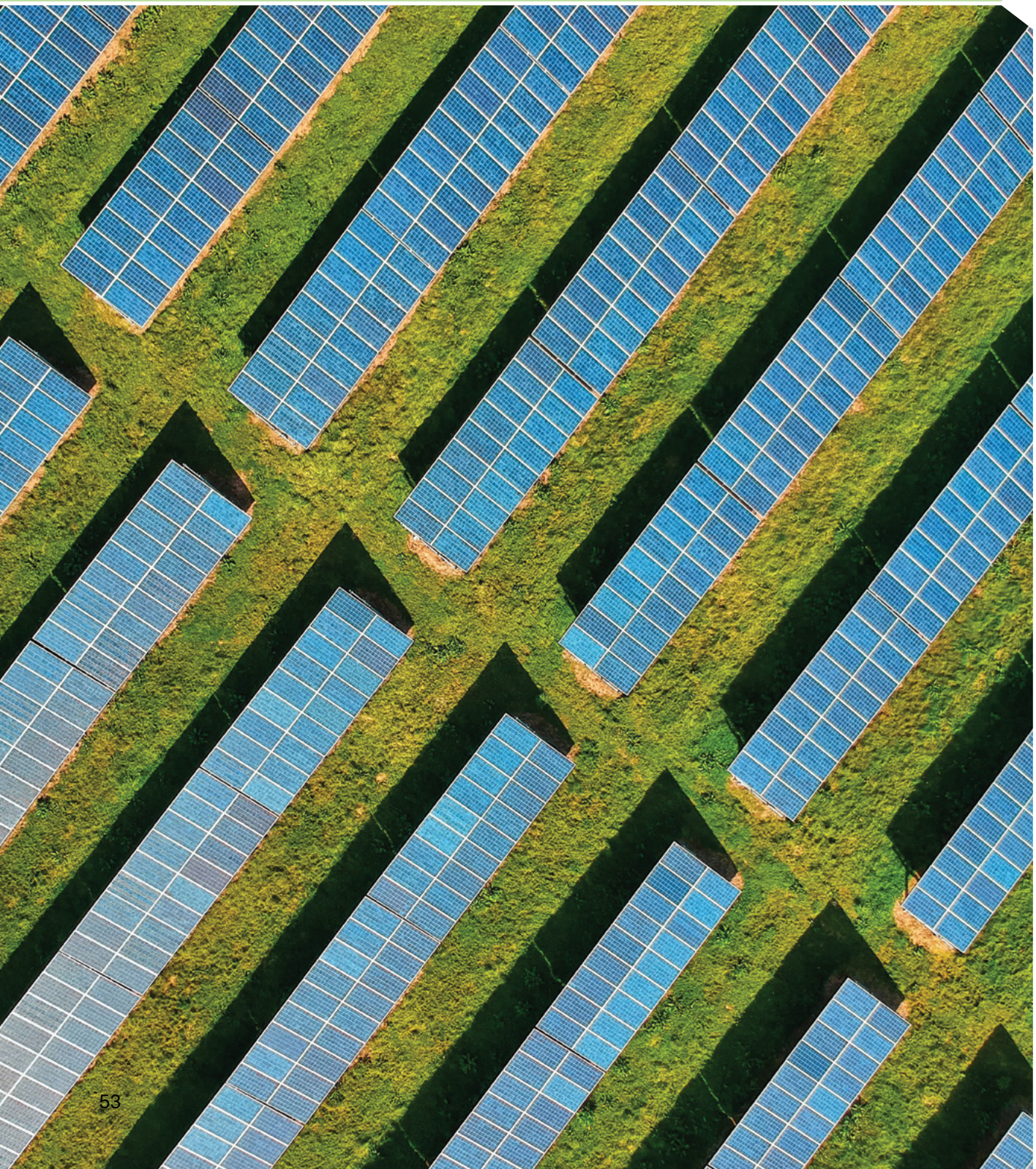
Skills Challenges of EV Infrastructure

- Residential EVs primarily use low-voltage AC charging, but heavy vehicles like trucks and buses require high-voltage DC charging. This demands specialised skills and infrastructure.
- Heavy vehicle infrastructure often involves large electrical systems, including high-voltage switchgear and DC components (which means different skills needs), compared to the simpler residential setups.
- In regions like Europe, discussions are underway about the need for industrial-level infrastructure to support large truck fleets, which may require connections to the transmission grid (and hence transmission trade skills).
- Victoria's regulation requiring bus fleets to electrify by 2026 highlights the growing need for specialised knowledge and workforce development in the large-scale EV sector.
- These trends are driving skills differentiation between small scale and large scale EVs and potentially specialised post-trade skills

Skills Differentiation Between Large and Small-Scale Renewable Projects

- Large projects like solar farms or wind farms replacing coal power often allow for specialisations in tasks such as commissioning, where experts handle specific components for short periods.
- In contrast, smaller-scale installations (like rooftop solar) require workers to have a broader skill set, handling a wide range of tasks such as installation, testing, communication, and network integration.
- Renewable projects in rural areas often use temporary workers from outside the region (like a 'FIFO' model), while local installations may face skill gaps as the local workforce may not have the specialised knowledge needed for more complex systems.
- These differences in scale and complexity create distinct challenges in workforce training and recruitment when looking at small scale / domestic vs large scale / industrial projects.

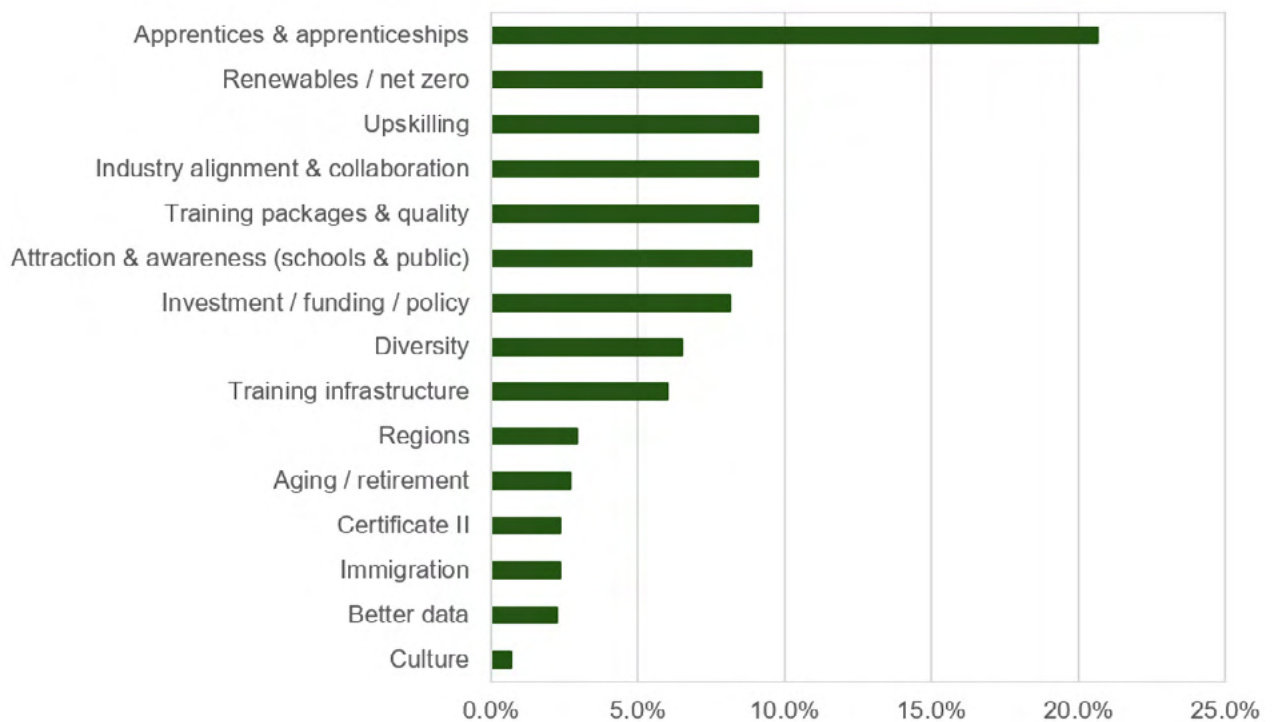
Identified issues for critical trades workforce



Throughout consultation for this Workforce Plan, PSO categorised responses from stakeholders according to common themes. The number of mentions serve as a proxy for their importance to industry partners. PSO also independently assess risks to the industry through data analysis and research, investigating issues which may not be as frequently reported by stakeholders, but still represent a threat to workforce targets.

As shown in Figure 47 below, the industry faces various issues. Responses regarding apprentices and apprenticeships were more than double the next most common issues. However, most prominently the industry has noted concerns regarding renewables, upskilling, industry alignment, training packages and attraction to industry.

Figure 47: Workforce issues confronting the energy sector, as identified by stakeholders



Source: PSO (2025). Quantitative categorisation of qualitative stakeholder commentary.



Workforce shortages are widespread

As noted for almost all critical trades, workforce shortages have been persistent for over a decade in a range of electrotechnology trades, despite growing demand and increasing investment in energy infrastructure projects.

The factors leading to these workforce shortages are numerous and complex – stemming from long-standing issues in the volume of apprentices, the suitability and delivery of training packages, capacity of training providers across the country, rapidly advancing technology, and the record volume of infrastructure projects and electrification trends related to the Net Zero transition.

And although critical trades, such as electricians, have seen modest growth, as reported in the Clean Energy Generation report, supply projections from that organisation indicate Australia will not have the required workforce to meet the high demand scenario.

In most cases, the majority of the critical trades workforce is also highly concentrated in the energy sector, limiting opportunities to attract from other industries. This, however, makes the workforce in the energy sector a target for attraction by adjacent industries, such as mining, construction, manufacturing and defence industry, as demand for trades skills increases in those areas.

Energy trade apprentices

The apprenticeship system is the primary source of workforce growth for the energy trades workforce in Australia. Issues experienced at this critical end of the talent pipeline have significant and compounding impacts on the ability to grow and skill the energy trades workforce.



Capacity to train and employ apprentices

Industry representatives and training providers have provided consistent and repeated concerns that there is not a lack of demand for apprenticeship positions, rather a lack of capacity to train and employ. PSO has heard from these stakeholders that significant numbers of potential apprentices are being turned away as a result – notably mature age students (many of which are reportedly return-to-work parents, primarily women) – and that extension of a four-year apprenticeship is becoming more common.

PSO has gathered several anecdotal reports of extremely high demand for energy apprenticeships relative to the availability of positions including:

- 900 applicants for less than five apprenticeship openings
- 200-250 applicants for 30 apprenticeship places
- 900 applications for just 60 places in a pre-apprenticeship program in electrotechnology
- 7,000 applicants for 150 apprenticeship places

This demonstrates a mismatch in the availability of training seats and employment opportunities available for electrotechnology apprentices compared with demand from the labour market – requiring a significant uplift from both training providers and employers. Further investigation is required to quantify the scale and full impact of these capacity bottlenecks.

Case Study – Apprentice wait times and delays

"I started off in Victoria in the public training service. I was told I'd have to wait three months to start, but after three months there wasn't any news."

By the time Ro Lyon finishes her four-year apprenticeship as a Certificate III in Electrotechnology it could have spanned five years. Ro has met with countless delays in booking spaces in the classroom to get her assessment side of the apprenticeship done.

"One phone call I was transferred to seven people. They all said they'd get back to me soon and explained there was a shortage of teachers so they couldn't start a new class. I was getting nowhere so after another two months I asked to transfer to a different company. It was a lot of paperwork but eventually I was ready to start work."

Ro was doing well and enjoying her apprenticeship until May 2024 when she decided to relocate to Brisbane.

"This time I thought, there shouldn't be any problems – I was wrong," she explains.

"While in Victoria you go to college one day a week and the other four you are on the job site – up here you book in blocks of learning. The problem is there isn't any availability when you call to book them in."

Instead Ro is left stuck at the same progression stage in her apprenticeship for longer than she should be.

"By the time I finish it could have spanned five years in total to get my apprenticeship. That has a knock-on effect for me financially. There's also not the guarantee of a job once I finish my contract so I just hope my host employer will keep me on until I can do my capstone. It is a worry."

Ro Lyon

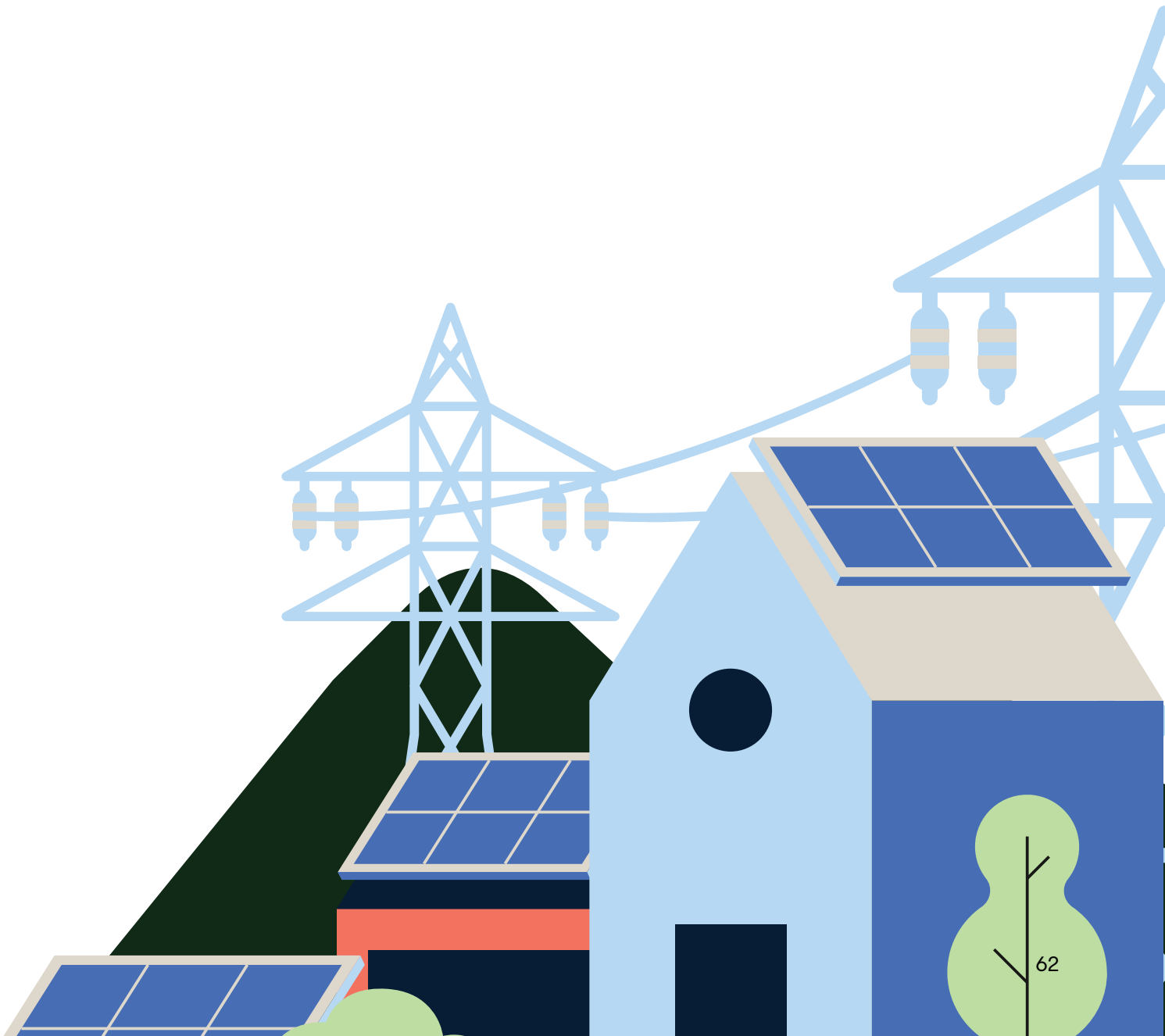
Electrotechnology Apprentice



Proposed action

1. Map Apprenticeship Incentives Across Jurisdictions	
Timeline	Horizon 1
Driver	PSO have identified that, while there are a range of national and jurisdictional apprenticeship incentives, there is inconsistent visibility and effectiveness in addressing the specific challenges faced by the energy sector. This includes both employer and apprentice incentives.
Action	PSO will map and review the effectiveness of incentives for employers and apprentices.
Outcomes	This action will deliver better visibility to industry and career seekers of the range of incentives that are applicable to their circumstances, with recommendations to government for more effective support specific to the energy sector. Critically, this will include the types of support for employers and apprentices.
2. Define the Apprenticeship Value Proposition for Employers	
Timeline	Horizon 1
Driver	The energy sector requires significant workforce growth to meet future demand, which current data suggests will be delivered almost wholly via the apprenticeship system. The current volume and growth trend of apprentices employed by industry is not on track to meet these demands.
Action	PSO will research and articulate the business case for taking on an apprentice tailored by business size, energy subsector and jurisdiction. The role and value proposition of Group Training Organisations (GTOs) will also be considered.
Outcomes	PSO will leverage the results from this project to inform government and industry on how to effectively and more efficiently grow the volume of apprenticeship opportunities through a stronger understanding of the value proposition.
3. Identify and Reduce Apprentice Training Wait Times and Barriers	
Timeline	Horizon 1
Driver	PSO have received ongoing and consistent reports about delays in commencement of apprentice training. These delays have resulted in concerns about safety, rate of professional development and ability to complete in the nominated timeframe for apprentices.
Action	PSO will investigate and address RTO capacity constraints to validate these reports, defining the scale, contributing factors and opportunities to mitigate this issue.
Outcomes	This will provide actionable evidence and recommendations to reduce training delays enabling more timely and efficient workforce development.
5. Develop an Industry-Relevant Apprentice/New Worker Safety Education Program (Open Source)	
Timeline	Horizon 1
Driver	Related to Action Focus Area 3, delays to commencement create a safety risk for new apprentices, their colleagues, and the public, particularly in the early stages of employment when formal training has not yet occurred.
Action	PSO will lead the creation and distribution of sector-specific safety materials for new apprentices and workers.
Outcomes	These materials will lead to immediate improvements in safety awareness for new entrants, reducing early-stage workplace risks before formal training is completed.

16. Establish a National Register for Connecting Apprentices to Employers	
Timeline	Horizon 3
Driver	There is a large volume of unsuccessful applicants to some apprenticeship recruitment opportunities who are not being further engaged by industry.
Action	PSO will lead the creation of a platform to connect unsuccessful apprenticeship applicants and jobseekers with employers across the energy sector.
Outcomes	This platform will improve matching of jobseekers to opportunities, reducing administrative burden and increasing workforce participation in the sector.





Reports of apprentice 'poaching'

Another dynamic witnessed in the apprenticeship system is changes of employer during an apprenticeship. An average 28% of critical energy trades apprentices change employer at least once during their training period.⁶ Most movements occur in the 3rd and 4th year, which PSO consultation has indicated primarily flows in the direction of medium to large businesses from small businesses. This has frequently been characterised by stakeholders as 'poaching' of apprentices.

Apprentices have the right to voluntary movement between employers – seeking better working conditions, greater wages, broader experience, or any other reason – it should be noted the above trend disproportionately impacts small businesses who have shouldered the financial and productivity cost in employing an unskilled apprentice during the first half of their study. Employers have reported this makes them reluctant to hire apprentices due to financial pressures and by larger companies

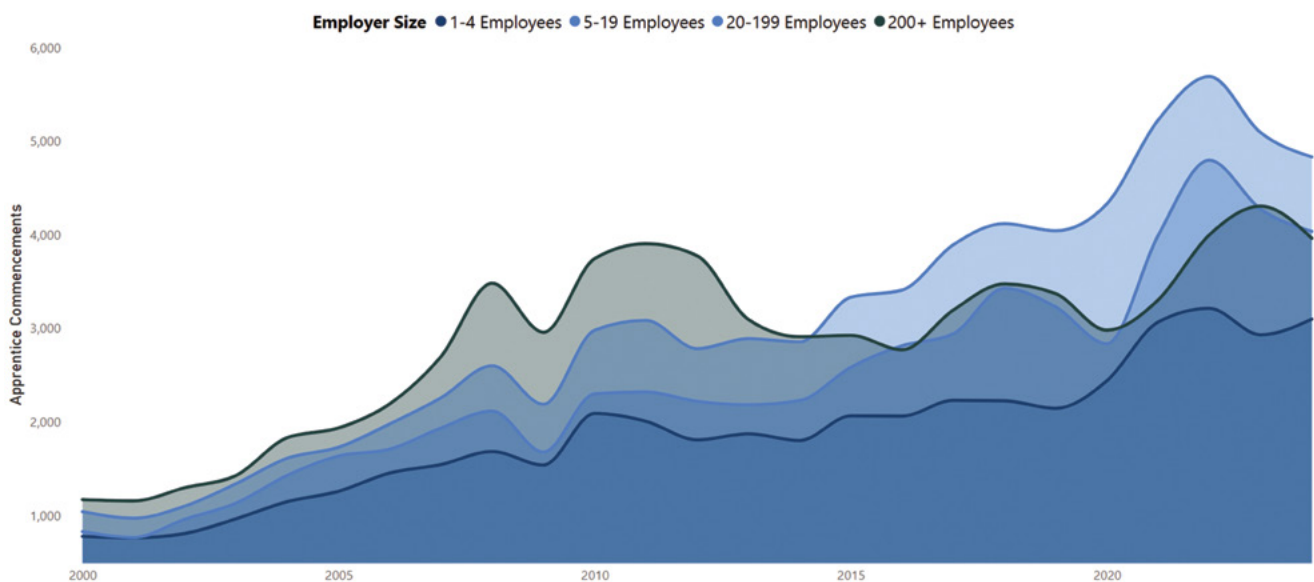
offering better wages – compounded by increased competition for limited skills and workforce. The cost of employing an apprentice varies based on the age of that apprentice, however taking on an apprentice also requires significant administrative time. For example, it can take employers and apprentices a combined total of 11.8 hours to prepare and attend a sign-up.⁷

On average, three quarters of critical energy trade apprentices in 2024 were employed by businesses with fewer than 200 employees and nearly half of energy trade apprentices were employed by businesses with fewer than 20 employees. In terms of the volume of apprentice commencements, even as recently as 2014 larger employers were the largest employers of apprentices, as shown in Figure 48. This places enormous pressure on small to medium employers to train the future workforce or, if poaching is occurring as reported, places undue financial and opportunity burden to train 1st and 2nd year apprentices.

⁶ NCVER, custom data extract. Counts apprentices who have recorded a change of contract.

⁷ <https://www.dewr.gov.au/download/14760/australian-apprenticeship-services-and-supports-discussion-paper/31053/australian-apprenticeship-services-and-supports-discussion-paper/pdf>

Figure 48: Time series of critical trades apprentice commencements by employer size, 2000 - 2024



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVET, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Apprentices in-training.

Proposed action

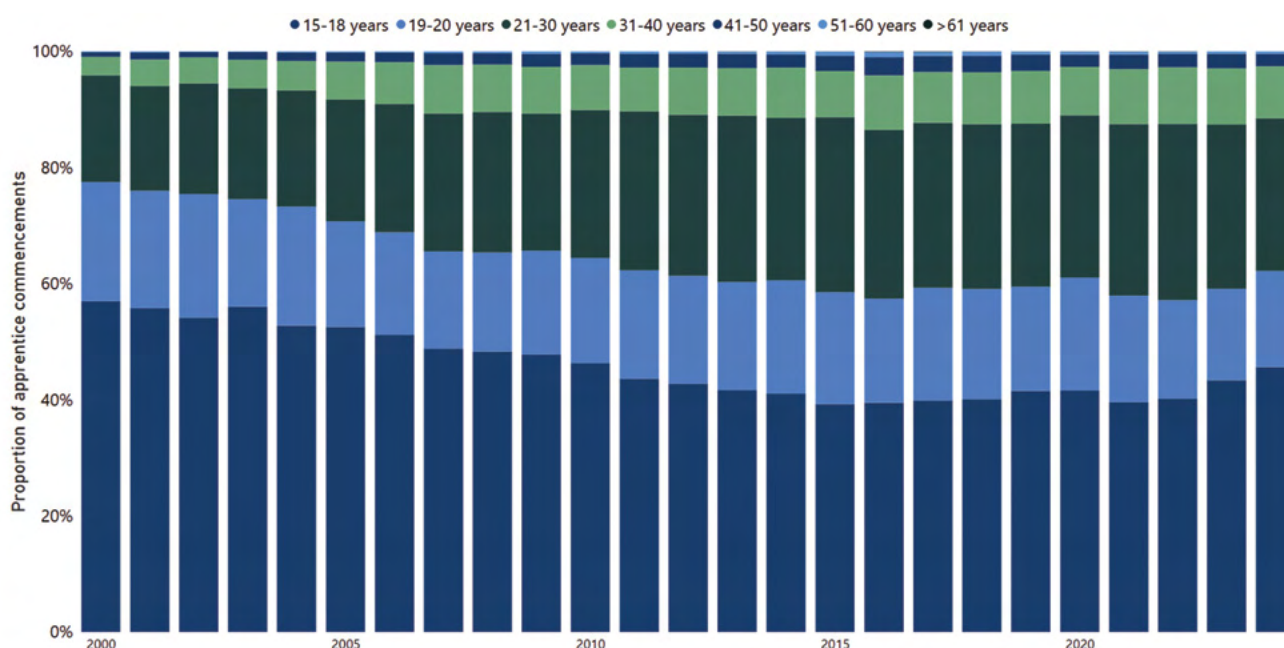
4. Quantify Apprentice 'Poaching' Through Data and Insights

Timeline	Horizon 1
Driver	The transfer or cancellation and recommencement of apprentices to new employers in late apprenticeship year levels (third and fourth year) can negatively impact the original employer who has invested in training of an early year apprentice. This issue disincentivise employers from engaging with the apprenticeship system and employing new apprentices.
Action	PSO will research the prevalence and impact of late-stage apprentice 'poaching' and develop mitigation strategies.
Outcomes	This action will result in data-driven insights and solutions to reduce apprentice 'poaching', supporting employer retention and system stability.

Support for mature age apprentices

Data from NCVER shows the typical electrotechnology apprentice commences their training between 15 to 18 years old. However, the long-term trend shows the proportion of commencements in this age band has fallen, while mature age (21+ years old) electrical apprentices has increased from 22% of commencements in 2000 to 37% in 2024.

Figure 49: Critical trades apprentice commencements by age band



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Apprentice commencements

Yet, while mature age apprentices have become a greater proportion of the workforce pipeline, support for mature age apprentices and their employers has not kept pace. For a mature age apprentice, the minimum annual salary is around \$42,000 in their first year,⁸ increasing to \$45,000 in their final year – well below the median income of approximately \$72,000.⁹

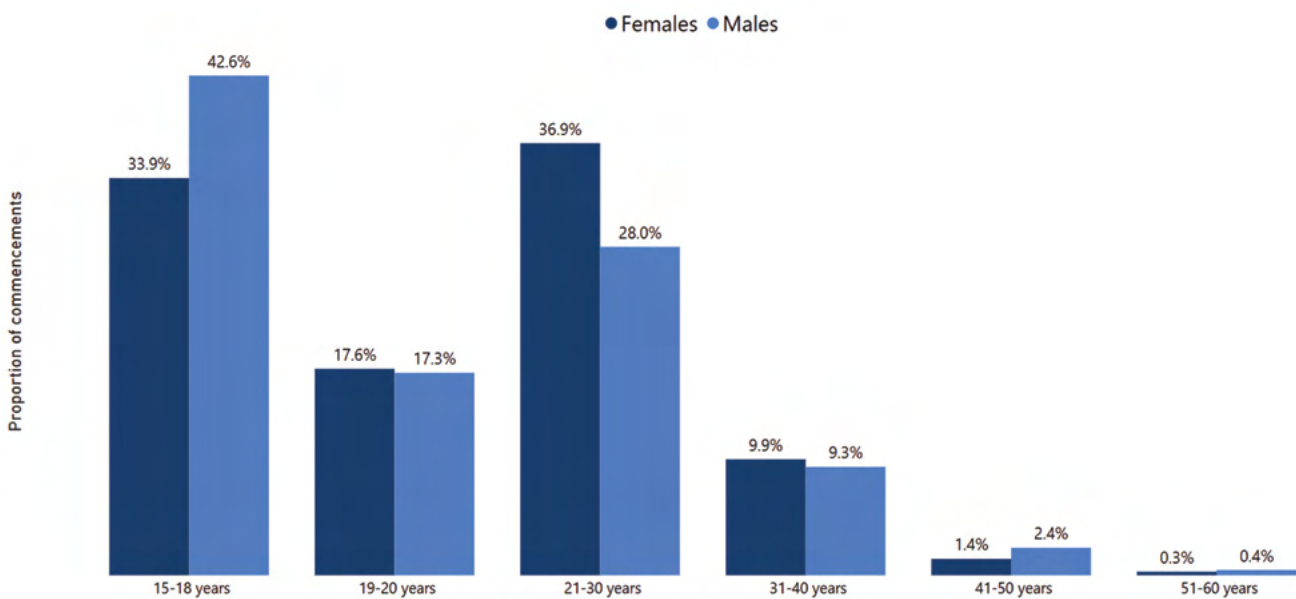
Mature electrical apprentices are around 45% more expensive than juniors, which equates to a estimated \$40k - \$50k more over the span

of an apprenticeship for a mature age person, excluding superannuation and oncosts. Many businesses, particularly small businesses, can struggle to afford the higher wages required for mature apprentices. PSO consultation also revealed concerns about insufficient government support and incentives to make mature apprentices financially viable for businesses. This has potentially had a concurrently negative impact on diversity in the workforce, as women are more likely to commence an apprenticeship as a mature age student than men.

⁸ https://library.fairwork.gov.au/award/?krm=MA000025#_Toc184736615

⁹ <https://www.abs.gov.au/statistics/labour/earnings-and-working-conditions/employee-earnings/latest-release>

Figure 50: Proportion of critical trades apprentice commencements 2000 - 2024 by gender by age



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVET, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Apprentice commencements

Proposed action

8. Improve Support for Mature Aged Apprentices Through Policy and Incentives	
Timeline	Horizon 2
Driver	Mature aged apprentices contribute to increased workforce diversity, but face significant barriers to entry, particularly due to a limited number of apprenticeship opportunities offered by industry.
Action	Review and enhance policy and incentives to address barriers to entry and increase mature-aged apprentice participation. PSO also acknowledges the outsized impact that action in this area could produce (e.g. increasing diversity <i>while</i> growing the workforce) and will factor this into future prioritisation of all actions outlined in this workforce plan.
Outcomes	This project will investigate the policy environment and support systems for mature aged apprentices, with a focus on identifying improvements and supporting inclusive growth. This will contribute to workforce diversity and address workforce gaps.

Scaling up the training sector

Industry and VET sector stakeholders have reported there is insufficient training infrastructure to meet the demand for energy trade apprenticeships. TAFE programs have significant backlogs and training packages are inconsistently delivered across states and territories; some training packages are only delivered online, requiring students to travel significant distances to complete practical aspects of their training. A lack of qualified educators has also been a persistent issue raised in PSO's consultation. The drivers and impacts of this shortage are explored in greater detail in PSO's VET Workforce Blueprint.

Stakeholders have reported concerns that greater capital investment in training infrastructure may be required to expand and modernise, ensuring it meets the simultaneous need of growing demand for apprenticeships and post-trade training, and advancements in energy technology.

Training infrastructure expansion:

- Stakeholders report that current infrastructure is insufficient to accommodate rising training volumes, especially in electrotechnology.
- This has reportedly resulted in overcrowded classes and a lack of resources, and also apprentices being turned away from apprenticeships.
- TAFEs and RTOs will be required to expand teaching spaces, such as labs and workshops, to increase the capacity to offer training.
- Delays and difficulty engaging a training provider due to lack of capacity and training infrastructure continues to further dissuade employers from engaging apprentices and upskilling their staff.

Training modernisation:

- Training in renewable energy technologies, like solar and battery installation, requires expensive, specialised equipment. This challenge is further exacerbated by the high cost of consumables and maintenance.
- The slow adoption of new technologies, due to significant and long-term funding limitations and commercial IP challenges are a major barrier to improving training quality and aligning it with industry needs.
- Addressing this issue would increase the capability to provide more industry-aligned pre-apprenticeship, apprentice programs and post-trade upskilling.

Detailed research would be required into the cost of delivery and investment opportunities available to determine if more financial support is required.

Proposed action

11. Quantify Delivery Costs for Energy Training Qualifications

Timeline	Horizon 2
Driver	A critical barrier to expanding training delivery is the lack of clarity around the cost to establish and deliver high-volume, resource-intensive energy qualifications.
Action	PSO will analyse and report on the true cost of delivery for key energy sector qualifications.
Outcomes	This analysis will support evidence-based funding and investment strategies to expand training capacity and address resource constraints.

13. Establish a National Centre for Educator Innovation and Workforce Futures (Proposed in PSO's VET Workforce Blueprint)

Timeline	Horizon 2
Driver	The VET sector faces a need for scalable, innovative approaches to educator development and training delivery reform, particularly in response to rapid workforce shifts and digital disruption.
Action	A virtual national centre can facilitate collaboration, co-design, and experimentation to develop and test new tools, practices, and professional development models across the VET educator workforce.
Outcomes	Educators gain access to a structured platform for innovation, enabling them to trial new approaches, share learning, and shape system-wide improvement in teaching, credentialing, and digital pedagogy.

15. Develop a National Career Progression Framework for VET Educators (Proposed in PSO's VET Workforce Blueprint)

Timeline	Horizon 2
Driver	A lack of clear career pathways contributes to low retention, limited professional recognition, and inconsistent development opportunities within the VET educator workforce.
Action	Designing a structured, national framework can outline clear progression routes from entry-level to leadership roles and support ongoing professional development.
Outcomes	The framework will elevate the status of VET educators, improve retention, and position teaching as a viable and attractive long-term career.

Training package delivery and content

In a survey of employers and educators, conducted by PSO, 30% of respondents said training packages were mostly or highly suitable. However, 66% of respondents said training packages were only suitable or not very suitable. Respondents from the training sector commonly noted training packages are outdated, overly complicated, and too focused on theory.

Key issues raised included:

- Training packages are too complex, with confusing language and complicated compliance rules. These processes need to be simplified to better match local industry needs.
- Units need updating to reflect current practices and modern technology, particularly renewables.
- Training is reportedly too focused on theory over practical experience.
- More attention is needed on basic skills like numeracy, compliance and their relationship to the broader occupation.
- Training packages should include other critical skills, such as digital literacy and soft skills, which are essential for success in a more customer focused industry.
- Training products need to be more flexible to keep up with industry changes, offering easier-to-update units, more electives, and updated qualifications like Certificate IV to include new technologies.
- The current system is rigid, with few opportunities for apprentices to transition between levels or specialised training in emerging areas, like renewable energy and home automation.

Respondents also commonly raised concerns about the quality and consistency of training across RTOs and TAFEs. At the same time, it's essential that any changes maintain the high safety standards in energy sector trades training.

Stakeholders report greater collaboration between industry and the training sector would help to resolve some of these issues, however previously engagement between industry and the training sector to date (especially TAFEs), has been inconsistent. For instance, many industry representatives have reported a lack of understanding of training products, hindering meaningful contributions.

Proposed action

12. Create an Open-Source Repository of Energy Training Resources (Proposed in PSO's VET Workforce Blueprint)	
Timeline	Horizon 2
Driver	RTOs and TAFEs across Australia face challenges in delivering high-quality training due to duplicated effort, high development costs, and inconsistent resource quality.
Action	A national, open-source repository of quality-assured training resources can streamline delivery, reduce duplication, and elevate consistency across the VET sector. These resources would be unit-aligned, adaptable for local contexts, and centrally maintained.
Outcomes	Improved access to shared training materials will reduce administrative burden on providers, enable faster course rollout, and improve training quality. This supports national capability-building and cost-effective growth in energy sector training delivery.





Energy trade apprentice completion rates

A key factor in the flow of energy apprenticeships is completion rates. Naturally, the greater the completion rate, the better the industry will be able to meet its skill needs.

As shown in Figure 51 to the right, the apprenticeship completion rate for the critical energy trades averages 68% - electrician apprenticeship completion rates are slightly higher at 69%. While notably higher than the overall trades completion average of 54%, this still leaves room for improvement.

Contributing factors include inadequate literacy and numeracy skills, lack of job support, and competing career opportunities or higher wages offered elsewhere. Financial and logistical barriers, like delays in getting apprentices to training and lack of training spaces, also hinder retention.

Increasing the number of apprentices while also improving their completion rates are critical challenges the sector must address to ensure a sufficient supply of qualified tradespeople in the future.



Figure 51: Apprentices, completion rates, Australia

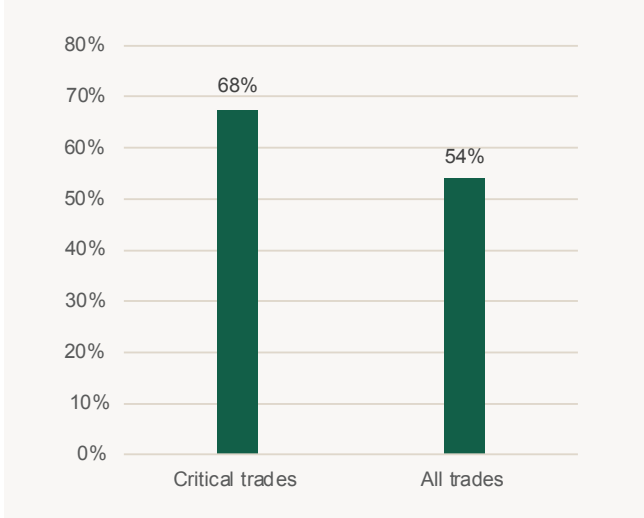
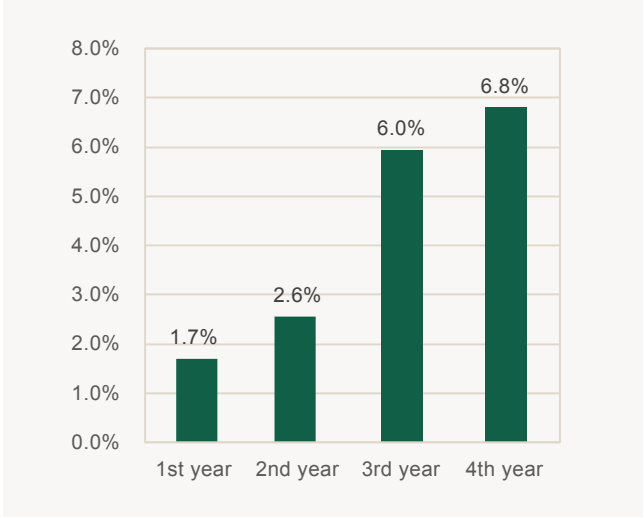


Figure 52: Apprentice changes of employer, by year of apprenticeship (estimated)

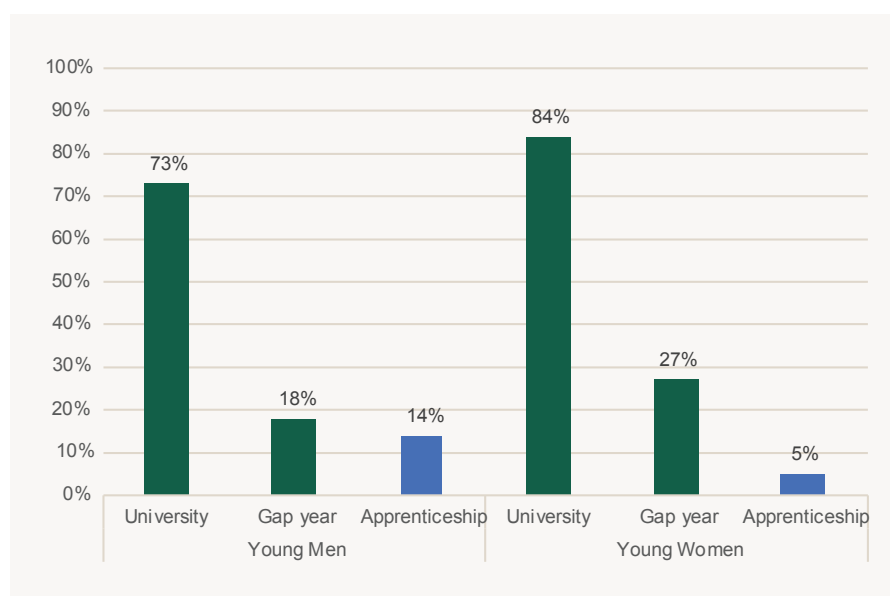


Sources: (51) National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>. Note: Energy apprentices in-training; Includes UEE, UET, UEP, UEG. (52) PSO estimates based on Department of Employment and Workplace Relations (2022). Australian Apprenticeship Services and Supports – Discussion Paper

Attraction to VET and trade careers

Longitudinal analysis of student pathways shows declining interest in trade careers among young people, with significantly more opting for university or a gap year. This is driven by widespread societal perceptions surrounding VET in Australia as “less intellectually demanding and inferior to university, and as leading to lower-paid, more physically demanding, and less stimulating employment.”¹⁰

Figure 53: Post-school preferences, Australian high school students



Source: Year13 (2024) After the ATAR, Year13, <https://year13.com.au/>

Note: Percentages may total more than 100% due to multiple selections from respondents

These perceptions are deeply entrenched and shaped by cultural, institutional, and systemic factors. For example, in many schools, success is often measured by Australian Tertiary Admission Rank (ATAR) scores and university entry rates, with VET pathways positioned as a secondary option for those who may not be ready or consider university as a pathway. This framing is reinforced through school marketing materials, which frequently highlight academic achievement while VET outcomes are underrepresented.

Stakeholders highlight the need to enhance awareness and promote energy trades to schools and the broader public to boost participation. This remains essential despite the current shortfall in apprenticeship positions, as future demand is projected to grow substantially.

¹⁰ House of Representatives Standing Committee on Employment, Education and Training 2023, Shared vision, equal pathways: report into the status of the vocational education and training sector, Parliament of Australia, Canberra, viewed 25 June 2025, https://parlinfo.aph.gov.au/parlInfo/download/committees/reportrep/RB000170/toc_pdf/Sharedvision,equalpathways.pdf.

Proposed action

9. Build Clear Pathways for Energy Trades	
Timeline	Horizon 2
Driver	There is a perception among secondary students that an apprenticeship pathway is less prestigious or valuable career option compared to university pathways. This limits the pool of high-quality candidates and contributes to ongoing skills shortages in the energy sector.
Action	PSO will explore, mature and reframe the perception of energy sector career pathways. This includes raising the profile of energy sector trades, aligning messaging with student motivations, and improving how pre-apprenticeship and VET in schools training is positioned within the education system.
Outcomes	This will establish a clearly defined and communicated pathway into energy trades, enabling students, schools, and families to confidently navigate and pursue skilled career options with full visibility of the steps, support, and opportunities available.

The role of Group Training Organisations

By recruiting apprentices and matching them with host employers, Group Training Organisations (GTOs) enable businesses, particularly those unable to commit to a full apprenticeship term, to take on apprentices for a shorter amount of time.

Stakeholders indicate the unique role that GTOs can play in developing the next generation of energy trades workers.

GTOs can, in theory, help alleviate the effects of project and pipeline unpredictability on energy businesses' willingness to commit to apprentices for a full term. They achieve this by placing apprentices only when these businesses have sufficient work available. In principle, this approach may support the overall growth of apprentices in training during uncertain periods while reducing the risk for businesses taking on apprentices. GTOs may be particularly valuable in

project-driven sectors like energy, which also face wider uncertainty as pipelines of work emerge related to clean energy and new technology.

GTOs could also potentially place apprentices in clean energy projects, giving them valuable exposure to the sector and helping to broaden the skill base of the industry in high demand areas.

Around one in 10 energy apprentices currently in training (10.7%) use GTOs according to data from NCVER. This is above the average across all apprentices in the VET system (6.9%), which shows the role that GTOs already play.

Currently, PSO is starting to investigate the role of GTOs in energy trades training, and at this stage we recognise they may form a unique part of the training system that must be considered in future workforce planning and skill development.

Gender diversity in the workforce

Diversity and inclusion aren't just about boosting workforce numbers – they also make strong business sense. Inclusive workplaces consistently deliver better outcomes at the organisational, team, and individual levels. Research from Diversity Council Australia¹¹ shows that diverse and inclusive teams are:

- 10 times more likely to be innovative than non-inclusive teams
- Eight times more likely to work effectively together
- Four times more likely to provide excellent customer service
- 2.5 times more likely to have members willing to work extra hard to help their team succeed

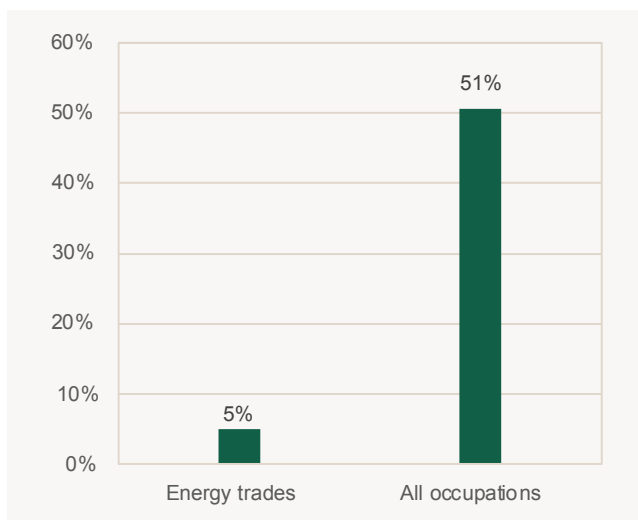


The energy sector has the lowest women's participation rate compared to all other sectors - that includes other low participation sectors like mining and automotive, transport and logistics, and building, construction and property. As shown in Figure 54, women make up just 5% of the energy trades workforce in Australia, compared to 51% of the overall workforce across all occupations.

While there are pockets of success in the industry, and individual programs implemented at all levels to improve participation (federal, state/territory, industry programs, VET programs, subsidies) these have barely moved the needle on overall participation – equating to an average 0.1% increase per year in women's participation for the last 15 years.

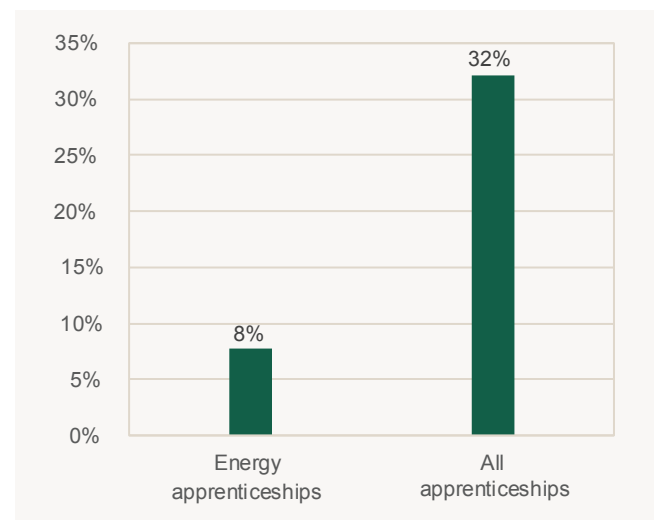
Jobs and Skills Australia reports that occupations dominated by one gender are more likely to face worker shortages – perhaps unsurprisingly, as industries miss the opportunity to tap into 50% of the potential workforce. These metrics show similar underrepresentation at the national level as well.

Figure 54: Women in the workforce, Australia



Source: Australian Bureau of Statistics (2021). Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>
Energy trades = Electricians, Air Conditioning and Refrigeration Mechanics, Electrical Distribution and Transmission Trades Workers, Electrical Engineers, Electrical Engineering Draftspersons and Technicians, Electronics Trades Workers

Figure 55: Women in apprenticeships, Australia



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>

Note: Energy apprentices in-training; Includes UEE, UET, UEP, UEG.

Culture plays a critical role in attracting and retaining talent, especially during times of skills shortages, both at the company and industry level.

Unfortunately, the energy sector is undermined by reports of bullying and sexism, particularly in sectors exposed to construction, contributing to a negative public image – often associated with a “rough” or “brawn” image. These issues particularly affect women and school students (both men and women), deterring them from considering a career in the industry or staying in the industry.

These disparities are apparent at the apprenticeship stage, as illustrated by the figures above, which show the same diversity metrics for energy apprentices. Figure 55 indicates that approximately 8% of energy apprentices across Australia are women, compared to 32% across all apprentices in the country.

It is noteworthy that the proportion of women in energy apprenticeships is higher than in the workforce, indicating that progress is being made in diversifying the energy trades (since apprentices often serve as leading indicators of workforce trends), but it will take time for these changes to fully take effect, and there is still significant potential for further progress.

The industry's culture requires significant improvement. Companies that have focused on cultivating a positive culture are finding it to be a key differentiator in successfully attracting and retaining talent.

However, barriers to women's participation and retention are both broad and deeply entrenched in the industry, including:

- Policy settings which do not support women to stay or return to industry through significant life events
- Societal and gender norms which discourage women from entering or considering trades as a career
- A lack of access to appropriate Personal Protective Equipment (PPE) and sanitary facilities.

While some issues – such as industry, cultural or societal expectations – can take decades to transform, action can be taken now to reduce practical barriers which both deter women or put their health at risk, such as providing appropriate PPE.



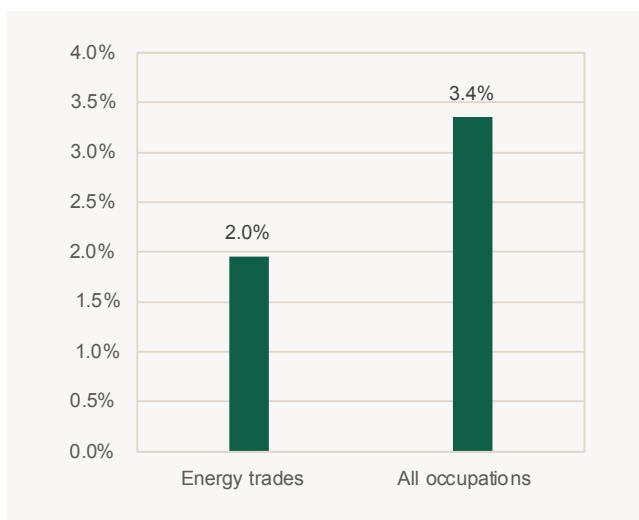
First Nations workforce

The role of First Nations in delivering clean energy projects can be substantial – but cultural, institutional and accessibility barriers are limiting opportunities. First Nations participation in the energy sector has tripled over the past 15 years – with an estimated 3,300 now working in the sector.

Three-quarters of First Nations people in the energy sector are in technician and trade roles, with 50% being qualified Electricians. Yet, Figure 56 shows that 2.0% of people in the Australia energy trades are First Nations individuals, which is below the national average of 3.4% across all occupations.

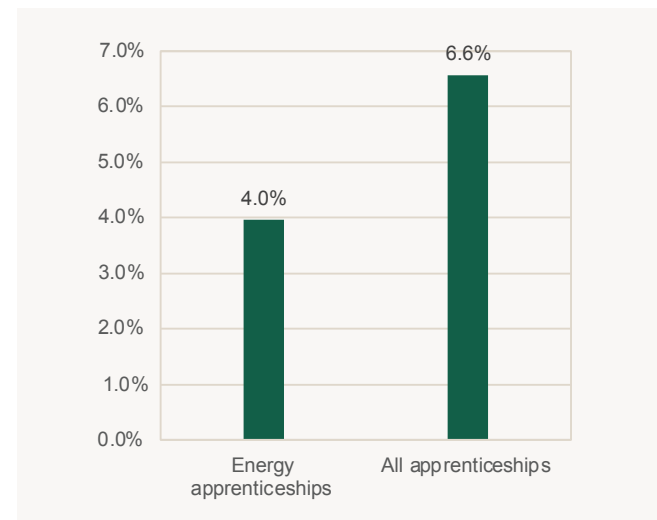
Similarly, around 4.0% of energy apprentices across Australia are First Nations people, while 6.6% of all apprentices across the nation identify as First Nations (Figure 57). This shows progress towards greater representation in the industry, however - as with gender diversity - there is still significant potential for further progress.

Figure 56: First Nations people in the workforce, Australia



Source: Australian Bureau of Statistics (2021). Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>
Energy trades = Electricians, Air Conditioning and Refrigeration Mechanics, Electrical Distribution and Transmission Trades Workers, Electrical Engineers, Electrical Engineering Draftspersons and Technicians, Electronics Trades Workers

Figure 57: First Nations people in apprenticeships, Australia



Source: National Centre for Vocational Education Research (2024) Apprentices and Trainees [data set], NCVER, <https://www.ncver.edu.au/research-and-statistics/collections/apprentices-and-trainees-collection>

Note: Energy apprentices in-training;
Includes UEE, UET, UEP, UEG.

This discrepancy can partly be attributed to geographic factors. Almost 60% of First Nations people live in regional and remote parts of Australia, compared to only 26% of non-First Nations people.¹² Therefore, First Nations people are more likely to face difficulties in accessing training and employment. Colonisation and subsequent policies of dispossession and discrimination have impacted First Nations peoples' access to quality education to develop foundational skills in language, literacy and numeracy. Foundational issues in language, literacy and numeracy, which have also been raised as contributing to low representation.

The investment in local communities spurred by REZs has the potential to positively impact both training and employment opportunities for First Nations individuals. On average, the share of population that identifies as First Nations in REZs is 6% which is significantly higher than the national population share (at 3.8%) – this is even higher in certain REZs located in New South Wales, Queensland, South Australia and Tasmania.¹³

However, delivering training in remote areas is also hindered by high costs and insufficient funding. Meanwhile systemic issues, such as lack of transport to and from training places or employment, hinders opportunities for those First Nations people seeking training or employment in the energy sector.

Further, existing energy qualifications designed for remote and First Nations communities are not being fully utilised, such as Certificate II in Remote Area Power Supply Maintenance (UEE21420). Concurrently, industry engagement with First Nations on clean energy projects is still in its infancy, with industry reportedly struggling with cultural awareness. This highlights the need for training within the industry to foster respectful and inclusive workplace environments and attitudes.

PSO is already engaged in the following projects intended to improve education and employment outcomes for First Nations people:

- First Nations Power Security
- First Nations Bespoke Qualification
- Foundation for Energy: Literacy and Numeracy for Energy Jobs
- Remote and Very Remote Community Training Package Updates

12 Australian Bureau of Statistics (2021). Census of Population and Housing

13 First Nations Clean Energy Network, Powering First Nations Jobs in Clean Energy



Cultural and linguistically diverse representation in the workforce

Persistent workforce shortages, challenges in the apprentice pipeline and complex upskilling requirements mean that meeting future demand will require an additional boost from skilled migration. According to the Clean Energy Generation report (2023), the relevant critical trades have some of the lowest rates of overseas born workers among the 38 occupations listed in that report – with Electricians, Electrical Distribution Trades Workers, and Air Conditioning and Refrigeration Mechanics among the bottom five occupations.

This may indicate a need to review current processes for recognising qualifications and skills acquired overseas, ensuring it is fit for purpose: delivering a stable pipeline of migrant workers without compromising safety standards. Whilst priority should be given to growing the nation's energy workforce through the VET pipeline, improvements should be made to address barriers to skills recognition for migrants.

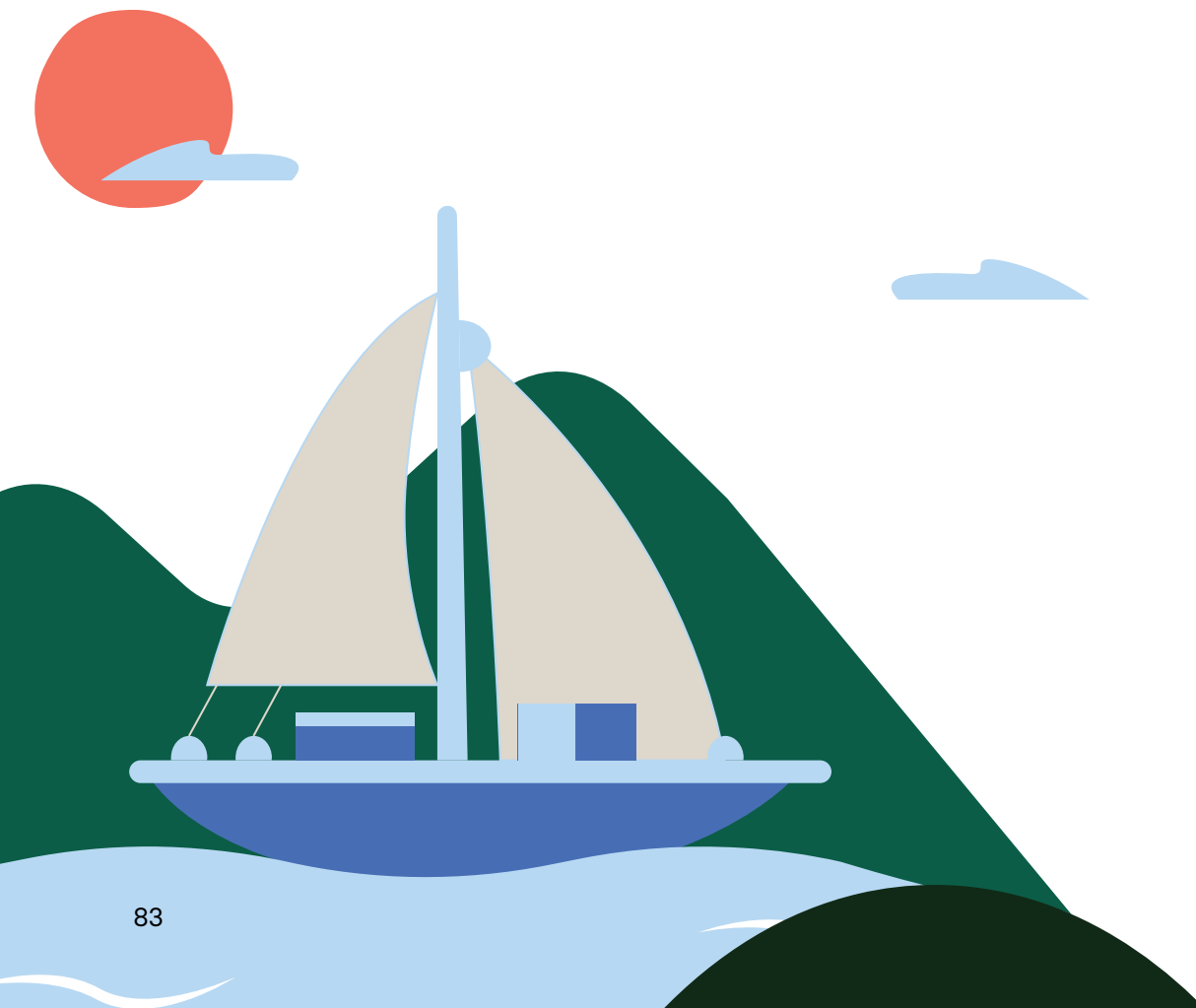
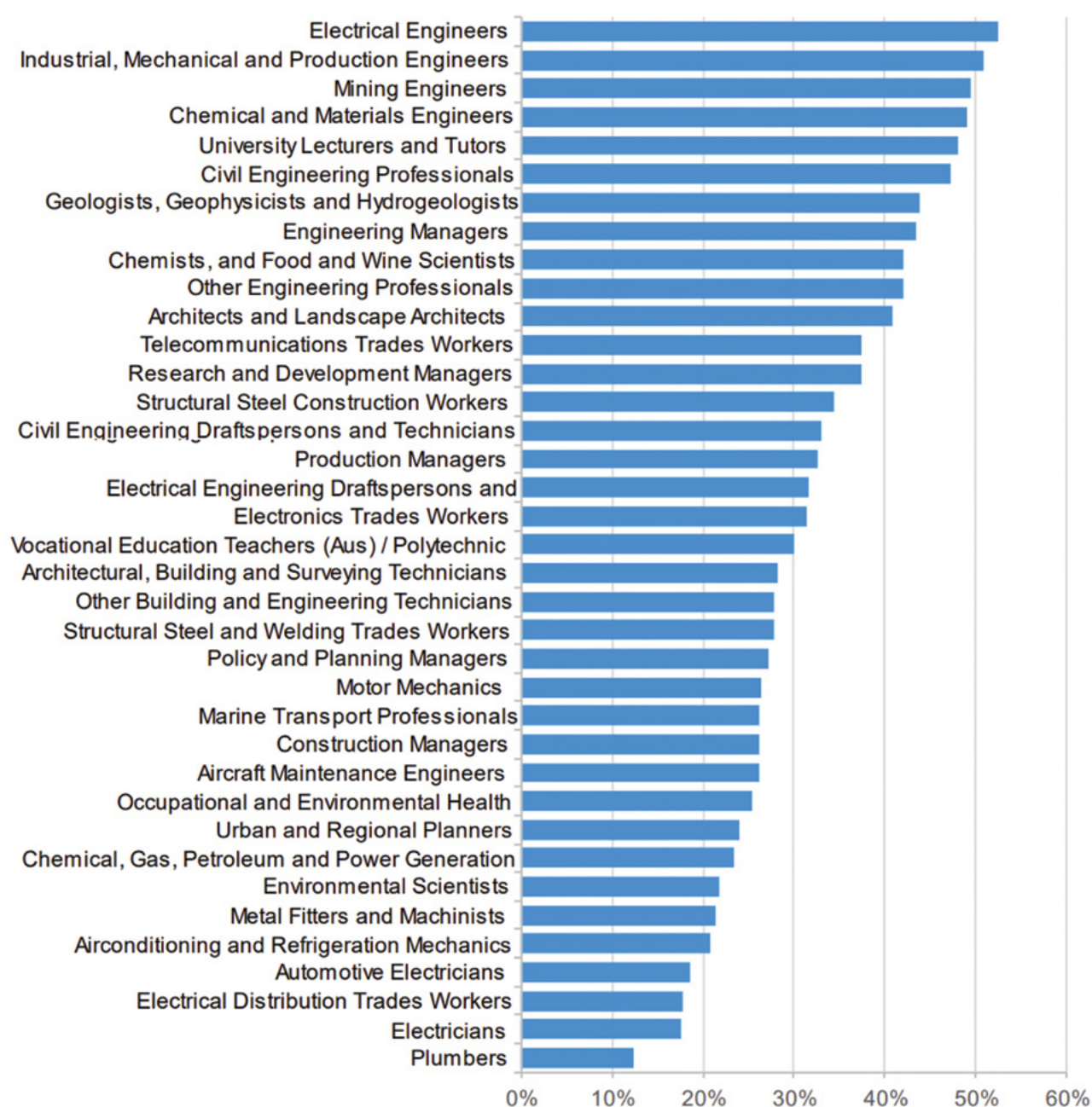


Figure 58: Workers born overseas by critical occupation



Source: Jobs and Skills Australia (2023), The Clean Energy Generation: Workforce needs for a Net Zero economy, JSA, <https://www.jobsandskills.gov.au/publications/the-clean-energy-generation>

Stakeholders have consistently reported that skilled migration is an attractive solution for the industry as a stop-gap solution to long-term workforce shortage. However, the critical energy sector trades remain largely culturally homogeneous – most reported over 80% Oceanian (including Australian-born) or European ancestry. This further points to a need to ensure the industry is providing a welcoming and safe working environment for skilled workers from a culturally or linguistically diverse background.

Table 9: Ancestry of critical trades workforce across industries as of 2021 Census of Population & Housing

Ancestry	Electrical Engineers	Electricians	Air Conditioning and Refrigeration Mechanics	Electrical Distribution Trades Workers	Electronics Trades Workers	Telecommunications Trades Workers
Oceanian	13%	26%	27%	30%	20%	25%
North-West European	36%	55%	53%	58%	50%	56%
Southern and Eastern European	8%	9%	8%	5%	10%	11%
North African and Middle Eastern	5%	2%	2%	0%	2%	4%
South-East Asian	4%	2%	2%	4%	4%	6%
North-East Asian	12%	2%	2%	0%	5%	7%
Southern and Central Asian	17%	2%	3%	1%	5%	13%
Peoples of the Americas	1%	0%	1%	0%	1%	1%
Sub-Saharan African	2%	1%	1%	1%	1%	1%
Supplementary codes	1%	0%	0%	0%	0%	1%
Not stated	1%	1%	1%	1%	1%	1%

Source: Australian Bureau of Statistics (2021) Census of Population and Housing [Tablebuilder], ABS, <https://www.abs.gov.au/statistics/microdata-tablebuilder/tablebuilder>. 1-digit level ANCI1P Ancestry 1st Response



Case study – Growing diversity in trades at Energy Queensland

Advancing Workforce Inclusion through Structural Reform and Cultural Change

Energy Queensland (EQL), one of Australia's largest electricity distributors, is driving systemic workforce diversity reforms, particularly in technical and operational roles. EQL's commitment to growing workforce diversity through intentional design has led to industry-leading results.

As of June 2025, women made up over 22% of their almost 10,000 workers and over 30% of their apprentices. This was complemented by significant growth in First Nations peoples within their workforce, reflecting EQL's strategic shift toward a more diverse, inclusive and future-ready organisation.

EQL's approach to growing diversity across their workforce focused on three primary streams.





1. Building the Pipeline

EQL identified that building a stronger pipeline of diverse applicants was integral to growing the diversity within their workforce. Initiatives including the 'Girl Power' program (running since 2021 in high schools) were designed to inspire girls to pursue trade careers by connecting them with women tradies and apprentices. Partnerships with organisations like the Clontarf Foundation and rural cadetships helped to grow interest among First Nations peoples.

These strategies, coupled with work experience opportunities and deliberate focus on diversity within advertising, school engagement and careers fairs, led to significantly increased interest in EQL careers by diverse applicants. By 2025, over 1,200 women and 600 First Nations peoples applied for EQL apprenticeships.

2. Recruitment Reform

EQL re-examined their apprentice recruitment process to determine how to improve diversity, while maintaining the highest standards for candidate selection. EQL revamped its recruitment to focus on candidate potential, not just past performance. A gender target (40% women, 40% men, 20% open) was introduced and embedded through leadership briefings and organisational performance tracking. Meanwhile, diversity and inclusion training, including within the apprenticeship, and support for First Nations employees, ensured a broader positive culture shift.



3. Retention through Inclusive Practices

EQL focused not just on increasing the diversity of the incoming workforce, but also in retaining and supporting their needs. In 2017, EQL established a Women in Technical and Operational Roles (WINTOR) working party to better understand the experiences of their employees and address barriers to equity and inclusion. WINTOR has driven employee-informed solutions and workplace improvements, ranging from uniform and tooling suitability to parental leave support, buddy systems, Women in Trades forums and safe and inclusive workplace practices.

In addition to WINTOR, EQL matured a culture of inclusivity through cultural safety and behavioural training and commitment to growing a supported diverse workforce - from the Board and senior leadership right through to the apprentices and new hires.

These employee-informed solutions promote dignity, autonomy, and long-term retention.

Outcomes and Lessons

With a >95% apprentice completion rate and a fast-growing number of women and First Nations peoples in apprentice and technical roles, EQL is seeing real change.

Success has hinged on intentional design, visible representation of diversity, clear targets and internal messaging, and employee-led innovation—demonstrating that lasting inclusion requires systemic action and organisational commitment.

Subsector workforce

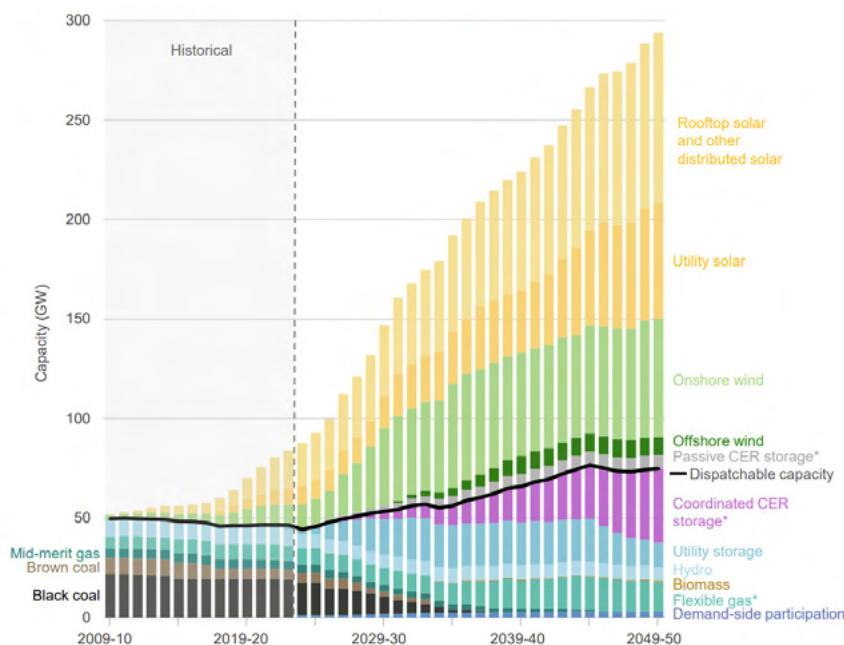


In 2024, renewable energy was projected to contribute over 40% of Australia's total electricity supply. By 2030, the Australian Energy Market Operator (AEMO) predicts solar and wind capacity will triple, rooftop solar capacity will double, and storage capacity will increase sixfold.¹⁴ At the same time battery storage, electrical vehicles and home energy management systems will continue to grow. Meanwhile, onshore and offshore wind, hydro-electricity, hydrogen and biogas will all likely increase to form a far more diversified mix of energy generation than previously seen in Australia.

As the mix of energy generation sources in the market becomes more diversified, this places additional pressure on the workforce to diversify their skills or develop specialised skillsets. Strong demand for workforce is not the sole challenge.

The AEMO's 2024 Integrated System Plan (ISP) optimal development path gives an indication of the skills and workforce required for building and maintenance of renewable and other alternative energy sources in the future.

Figure 59: AEMO ISP projection of gigawatt capacity to 2050



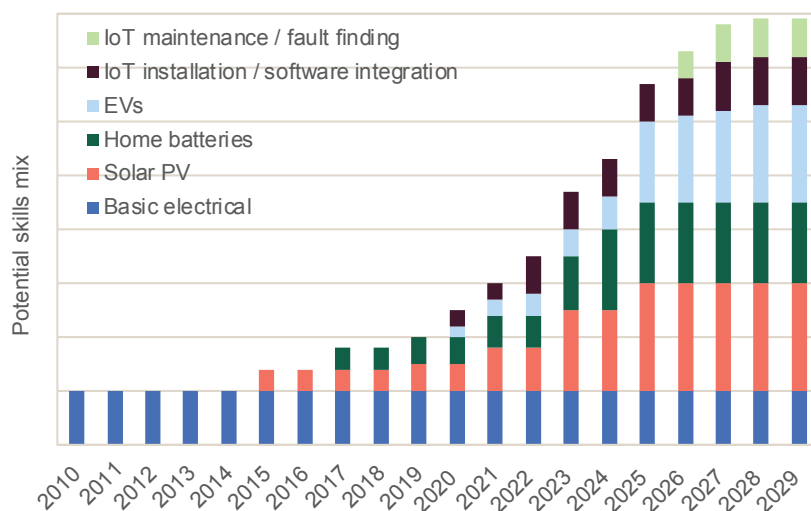
This transition to renewables at both domestic and large-scale capacities, requires that the workforce be able – and willing – to acquire new skills and adopt new technologies. PSO consultation has yielded a potential mix of skills requirements for the average electrical trades worker as integration of new technologies gathers pace, shown in Figure 60. As noted above, any possible productivity gains from attainment of these skills is as yet unquantified.

Source: Australian Energy Market Operator (2024) Integrated System Plan, AEMO.

¹⁴ Australian Energy Market Operator (AEMO) 2022, Integrated System Plan, AEMO, Melbourne, viewed 25 June 2025, <https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp>.



Figure 60: Potential skills mix for trades workforce in energy sector



Source: PSO (2025). Conceptualisation of qualitative stakeholder commentary.
IoT = Internet of Things. PV = Photovoltaics.

Shortages and skills requirements are felt differently across the different subsectors depending on the workforce size, the demand for workforce and whether the relevant skills are widely available. There is a significant increase in house construction and distribution network maintenance, driving demand for contractors in the energy services sub sector. Some energy markets are still maturing, such as hydrogen, where training may be site specific or delivered by the original equipment manufacturer. This means acquisitions of relevant skills can be highly targeted, with a specialised but small workforce.

PSO is closely tracking several emerging technology areas that stakeholders have flagged as priorities, including:

- Offshore wind energy
- Data centres
- Hydrogen
- Cybersecurity and Artificial Intelligence
- Pumped Hydro Energy Storage

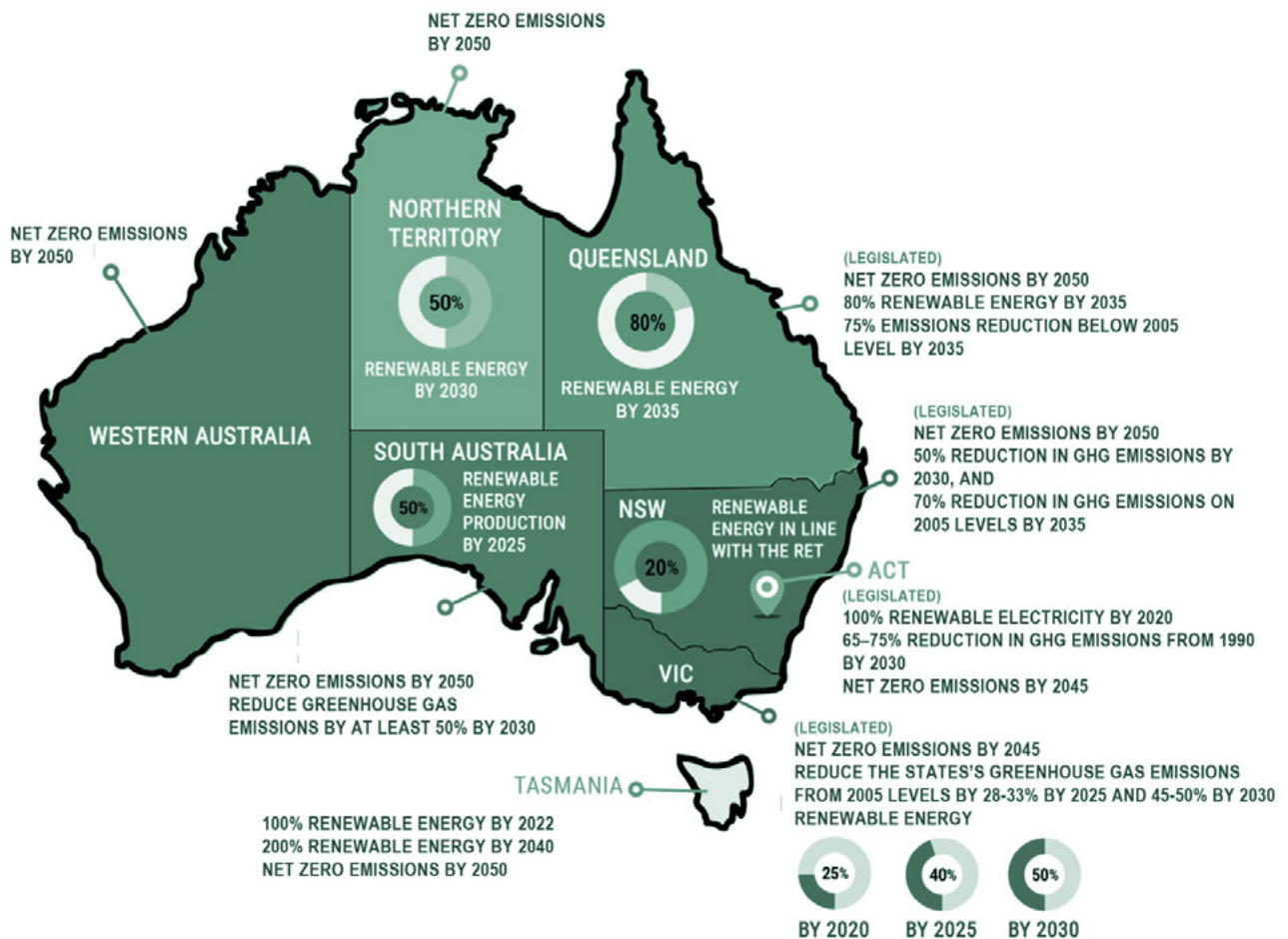
These sectors are complex, have distinct workforce requirements, and will require long lead times for skills development and training. While future demand will be shaped by market conditions and policy decisions, these areas are firmly on PSO's radar and are being factored into long-term workforce planning.

The energy project pipeline

Over the past decade, a surge in infrastructure spending has occurred, encompassing both major energy and other critical infrastructure.

Australian federal and state governments have allocated substantial funding to support the energy transition and achieve their net-zero targets. The Australian Government is actively driving the development of the nation's future energy system through several key initiatives focused on job creation, reducing electricity costs, and meeting emissions reduction targets (Figure 61).

Figure 61: Net Zero commitments by State and Territory as of September 2024



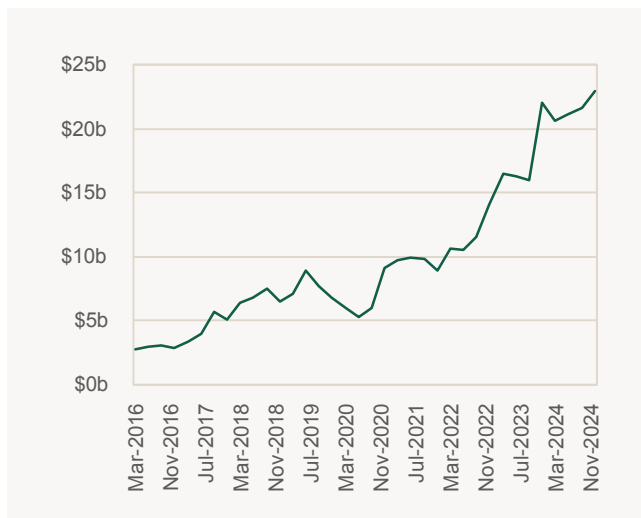
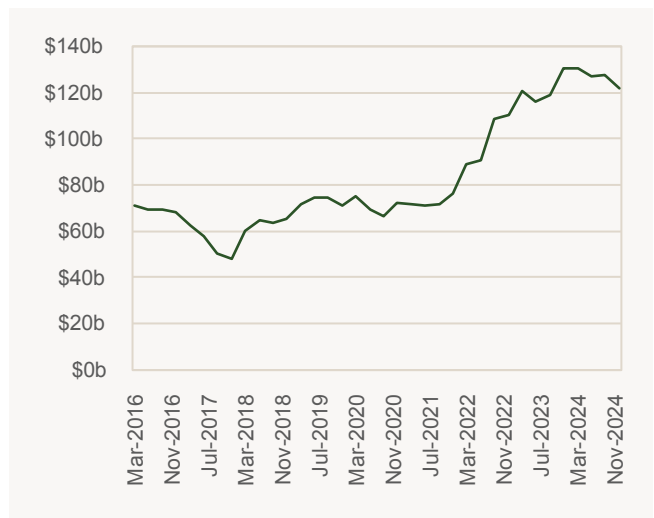
Source: <https://100percentrenewables.com.au/net-zero-commitments-by-states-local-governments-and-communities-sept-2024/>



As shown in Figure 62, the energy project pipeline has grown from \$2.7 billion to almost \$23 billion over the past ten years – representing a more than eight-fold increase and nearly one-sixth of all major infrastructure projects (Figure 63). Australia’s transition to a low-carbon economy is being driven by a suite of emerging energy technologies, each playing a critical role in ensuring energy security, sustainability, and economic resilience.

Shifting from a centralised to a decentralised energy system allows for building a more resilient, flexible, and inclusive energy future, one where power generation is closer to the point of use, enabling communities to play an active role in managing energy, reducing transmission losses, and enhancing reliability, especially in regional and remote areas.

From decentralised systems like Microgrids (small, local energy networks that can operate independently) and Virtual Power Plants (digital platforms that coordinate distributed energy resources) to clean energy sources such as hydrogen, wind, and geothermal, these technologies are rapidly shaping the future of the energy sector. Utility-scale renewable energy projects expanded significantly in the decade 2014-2023, and consequently, the workforce continued its expansion at a relatively fast rate of 2.7% per annum, reaching 241,600 by the end of 2023. As of June 2023, there were 56,402 energy sector businesses operating across Australia. This reflects a mix of large utilities and a wide base of small and medium-sized enterprises.

Figure 62: Major energy projects, Australia**Figure 63: All major infrastructure projects, Australia**

Source: Australian Bureau of Statistics (2024) Engineering Construction Activity, Australia [data set], ABS, <https://www.abs.gov.au/statistics/industry/building-and-construction/engineering-construction-activity-australia/latest-release> Note: Value of work yet to be done. Energy projects = Generation, transmission and distribution projects

At the same time, consumer demand has pushed residential solar to one of the largest generators in the energy market¹⁵ - a trend that the Australian Energy Market Operator predicts will see rooftop solar capacity triple by 2030. A raft of subsidies across every state and territory, including a national scheme, will likely see home batteries proliferate.¹⁶ Rising power costs have also seen more Australians turn to home energy management systems to control their energy use. As well, electric vehicles have grown to a record 9.6% of new car sales in 2024,¹⁷ requiring significant future charging infrastructure both domestic and commercial.

The implementation, monitoring and maintenance of this increasingly electrified future requires a highly skilled and qualified energy workforce to ensure safe and successful delivery.

The following sections detail industry subsectors, the trends in the workforce and challenges each subsector faces in acquiring a sufficient workforce with the necessary skills.

15 https://cleanenergycouncil.org.au/getmedia/581fc1f9-5ffc-40e6-8e2c-b92298017f33/rooftop-solar-and-storage-biannual-report_final.pdf
 16 Ibid
 17 <https://electricvehiclecouncil.com.au/uncategorized/2024-sets-new-record-for-ev-sales-in-australia/>

Solar, wind and other energy

26,850

Employed (2018–2019)

Coverage (ANZSIC industry classifications)

ANZSIC 2619 Other Electricity Generation (partial)

Workforce description

This workforce is involved in the generation of electricity using onshore and offshore wind, utility and rooftop solar, tidal, and other methods of electricity generation not elsewhere classified.

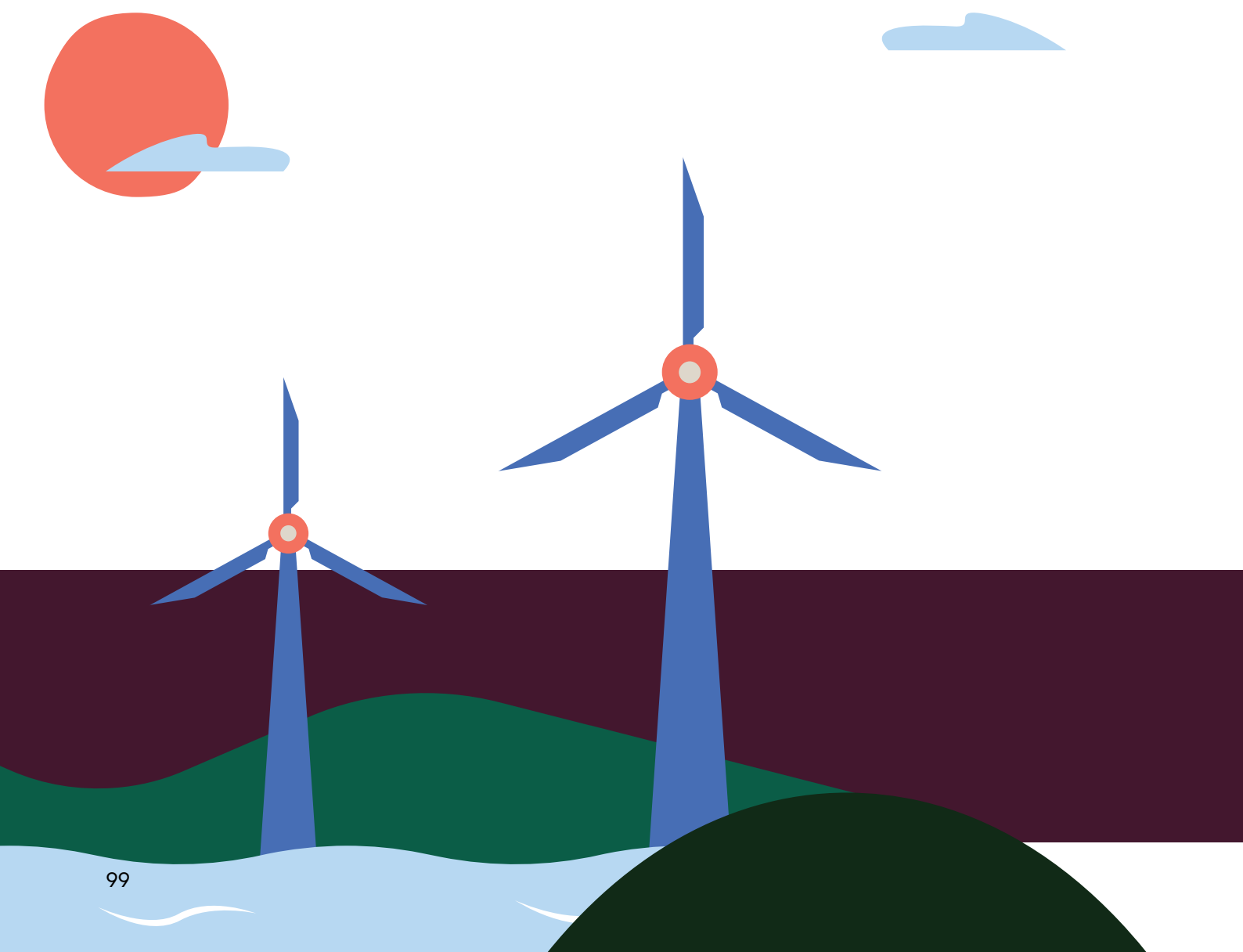


Table 10: Key demographic characteristics

Demographics	Other Electric	All Sectors
Women	22%	48%
Part-Time	14%	31%
First Nations	1%	2%
People who live outside capital cities	32%	31%
Median age	36	38

Figure 64: Counts of businesses, June 2023

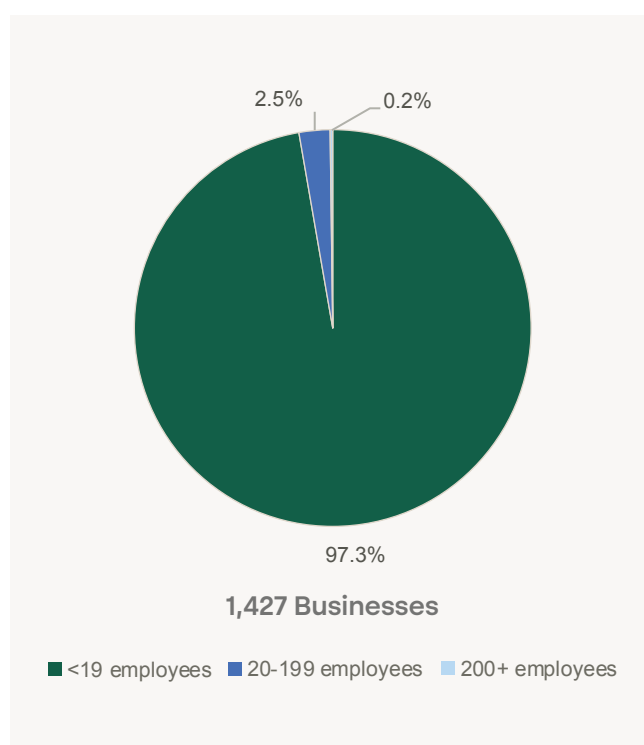


Table 11: Examples of key occupations

Occupations
Electricians
Metal Fitters and Machinists
Electrical Engineers
Construction Managers
Industrial, Mechanical and Production Engineers
Engineering Managers
Labourers
Chemical, Gas, Petroleum & Power Gen. Plant Operators
Engineering Professionals
Electrical Engineering Draftspersons and Technicians

Sources: ABS, Employment in Renewable Energy Activities, Australia (2018-19), released 2020 (employment figures). (10) ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age, Female, Part-time); (64) ABS Counts of Businesses, June 2023 (11) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Net Zero
Transition
(By 2050)



National
Hydrogen
Strategy

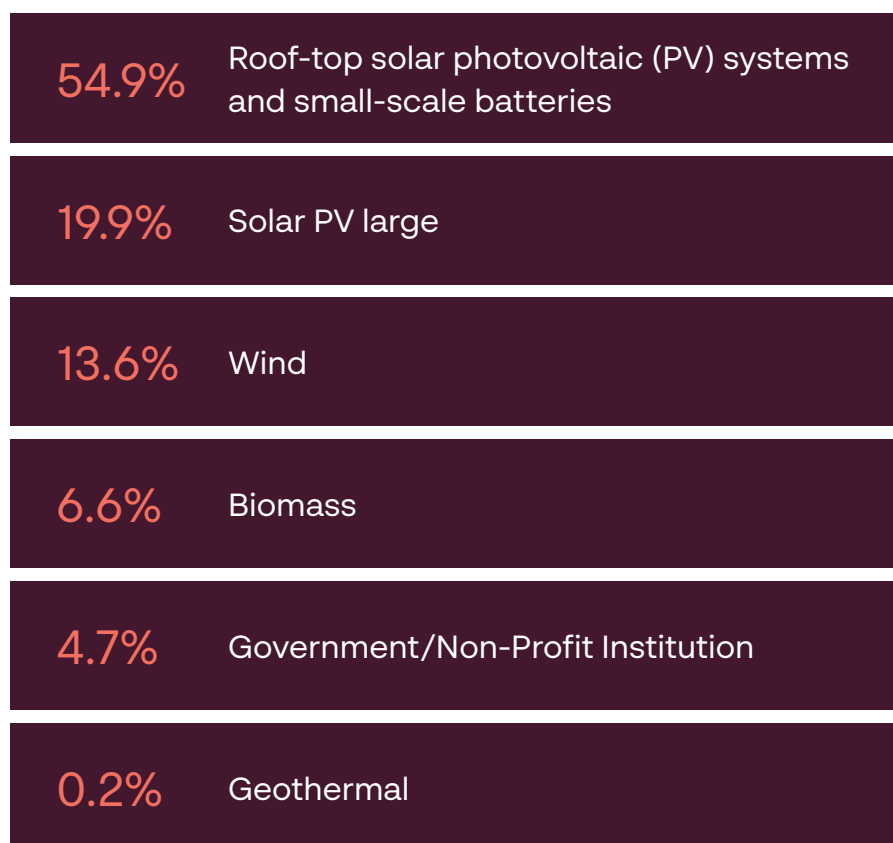


Powering
Australia
Plan

Overview

This subsector features a diverse mix of energy sources – solar, wind, tidal, and battery storage, among other sources – at both utility and smaller scale. While wind and solar are expanding, other renewable energy sources like biomass, tidal, and geothermal are less prominent.¹⁸

Employment estimates for the subsector by generation source were provided in Jobs and Skills Australia's Clean Energy Generation report.¹⁹ ABS's Employment in Renewable Energy Activities 2020 publication provided experimental modelling which produced the following estimate of workforce distribution for the period 2018-2019:²⁰



18 IBISWorld (2023), D2169a Wind and Other Electricity Generation in Australia - Market Research Report (2013-2028), IBISWorld.

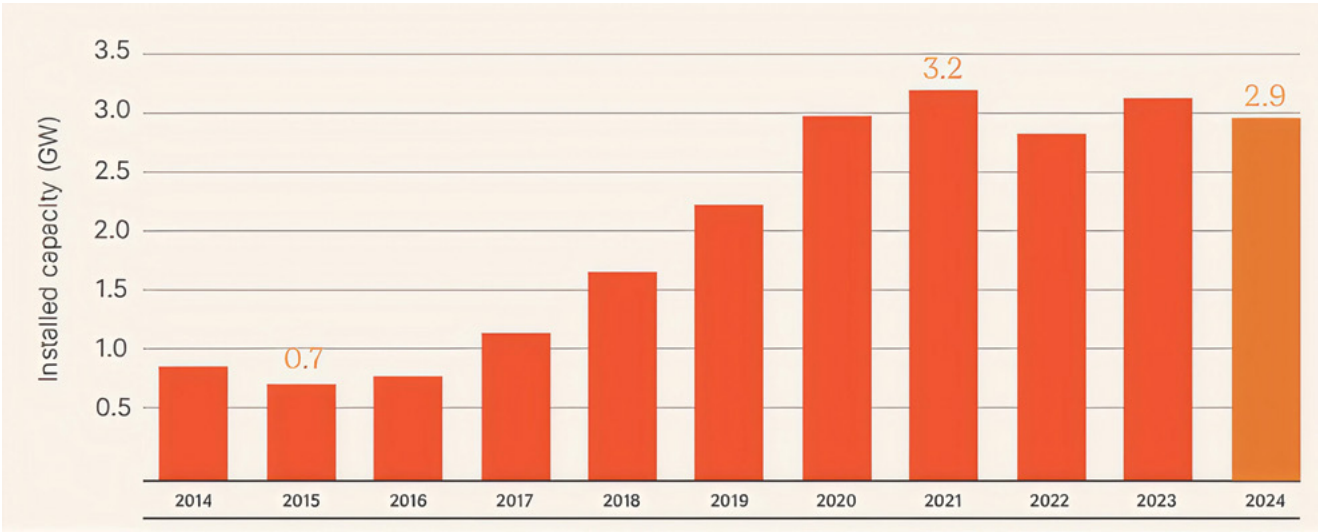
19 Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy, JSA, <https://www.jobsandskills.gov.au/publications/the-clean-energy-generation>

20 Australian Bureau of Statistics (2020) Employment in Renewable Energy Activities, Australia (2018-19), ABS, available at <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/employment-renewable-energy-activities-australia/latest-release>



Large-scale solar is set for more capacity investment over the next decade to meet the needs of consumers and businesses. Small-scale solar is widely adopted, with solar panels covering a growing proportion of Australian homes; more than half of the houses in Queensland and South Australia are estimated to have solar systems installed, while across the entire country, this figure sits at just below 40% in 2024-25.²¹ In November 2024, rooftop PV surpassed four million installations and a cumulative total capacity of 25.5 GW. Australia continues to be a leading nation in per capita electricity generation from solar.²²

Figure 65: National installed rooftop PV capacity (GW), by year



Source: Clean Energy Council (2024) Rooftop solar and storage report: July—December 2024 (figure 2), Clean Energy Council.

21 IBISWorld Industry Report (2025), OD4042 Solar Panel Installation in Australia, IBISWorld.
22 Clean Energy Council (2024) Rooftop solar and storage report: July—December 2024, Clean Energy Council.



There is high demand for electricians, engineers, and technicians in solar installation projects, with each role being pivotal.²³

The Australian battery market has experienced significant growth due to its role in integrating renewable energy sources like solar and wind. This trend is helping to reduce dependence on centralised power and promote energy independence.²⁴ Due to the technology's versatility and falling costs, the use of batteries for renewable energy is expected to increase over the coming years.²⁵ There are growing calls for government to improve battery storage, with the Australian Institute of Energy reporting that battery storage isn't keeping up with the increase in solar and wind farms leading to periods of energy oversupply.²⁶ There are numerous large-scale battery projects in the pipeline, particularly in Queensland, New South Wales, and Victoria.

Wind energy generation in Australia is currently dispersed, with the three largest generators accounting for about a third of the output. While onshore wind is more established, the number of offshore wind projects with greater capacity are expected to increase.

While hydrogen production is not new in Australia, the scale of new projects and production and usage cases are quickly emerging and evolving. Hydrogen is seen as a key solution for replacing fossil fuels in hard-to-abate sectors, storing excess energy, and transporting renewable energy over long distances. When hydrogen innovations and a skilled and ready workforce are aligned, Australia will have an opportunity to become a world leader in the global hydrogen economy. It is estimated that in 2030, the hydrogen industry will need about 4,000 to 28,000 skilled workers and that many occupations will require more contextualised training to bridge skills gaps in the transition to hydrogen work.²⁷

The domestic hydrogen sector will require a large construction and fabrication workforce to initially establish new facilities and electrolyzers, followed by the need for workers to operate and maintain the sites. In addition, there will also be demand for workers to build pipelines and refuelling stations, which can be leveraged from Australia's gas workforce.

23 Clean Energy Council, Renewable energy: powering jobs and regional communities, <https://cleanenergycouncil.org.au/for-consumers/fact-sheets/recycling-get-the-facts/recycling-wind-turbines-solar-panels-batteries/renewable-energy-jobs-regional-communities>, accessed 18/6/2025.

24 Expert Market Research, Australia Battery Market Size, Share Analysis and Forecast Report (2025-2034), Expert Market Research, <https://www.expertmarketresearch.com.au/reports/australia-battery-market>

25 Australian Renewable Energy Agency, Battery Storage, accessed 15/01/2024, <https://arena.gov.au/renewable-energy/battery-storage/>

26 Radio National Breakfast (2024), Growing call for government to improve battery storage for solar households, ABC, <https://www.abc.net.au/listen/programs/radionational-breakfast/growing-calls-for-government-to-improve-battery-storage/104530238>

27 PwC (2022) National Hydrogen Skills and Training Analysis, PwC, accessed 22/02/2023, <https://www.skillsforaustralia.com/hydrogen-2/> and The Victorian Hydrogen Hub (2022) Hydrogen Skills Roadmap, accessed 22/02/2023 Swinburne University of Technology, <https://www.swinburne.edu.au/news/2021/09/new-report-highlights-alarming-lack-of-hydrogen-training/>

Challenges

With utility and domestic scale renewables becoming a significant and critical part of the energy generation mix, it is important that energy sector tradespeople are sufficiently trained to safely install, operate and maintain the relevant technology.

However, delivery of training in renewables is costly and highly specialised. PSO has heard from training providers that lack of investment in renewable energy training equipment has created capacity gaps nationwide. Solar panel and battery installation training requires costly equipment, like panels, batteries, and inverters, pushing the capital cost into the thousands of dollars. This also impacts delivery of post-trade pathways in renewable energy. Training providers have also noted to PSO a lack of suitably experienced educators to deliver the training. Non-accredited Original Equipment Manufacturer (OEM) training is one alternative that has filled this gap.

Apprentices increasingly work with solar, batteries, split systems, wind or EV's but there is little emphasis in the apprenticeship training packages to formalise learning. Some stakeholders identify the need for a specialised apprenticeship model for

renewables – particularly wind technicians. Both employers and training provider feedback to PSO has called for greater collaboration between the two sides of the sector on training development, skilling and resourcing.

Noting these challenges in acquiring the necessary skills, competition for skilled workers has increased in this subsector. In utility scale projects, employment is characterised by a 'boom/bust' pattern, with more workers required during construction phases and fewer long-term opportunities which can be a deterrent for prospective workers. Therefore, it is equally important workers are acquiring the skills to secure employment opportunities beyond build and installation, such as diagnostic and maintenance skills.

Most renewable energy projects are being undertaken in regional and remote areas at Renewable Energy Zones, providing local job opportunities via training pathways. However, it has been reported to PSO that regional projects and complex installations are already using temporary workers from outside local regions because local talent strategies either don't exist or local workers don't have the skills required.

Hydro-electricity generation

4,200

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 2612 Hydro-Electricity Generation

Workforce description

This workforce is involved in the generation of electricity using hydro-electric generation processes, as well as pumped hydro storage generation processes. Hydropower leverages natural water resources to produce electricity in large-scale facilities.

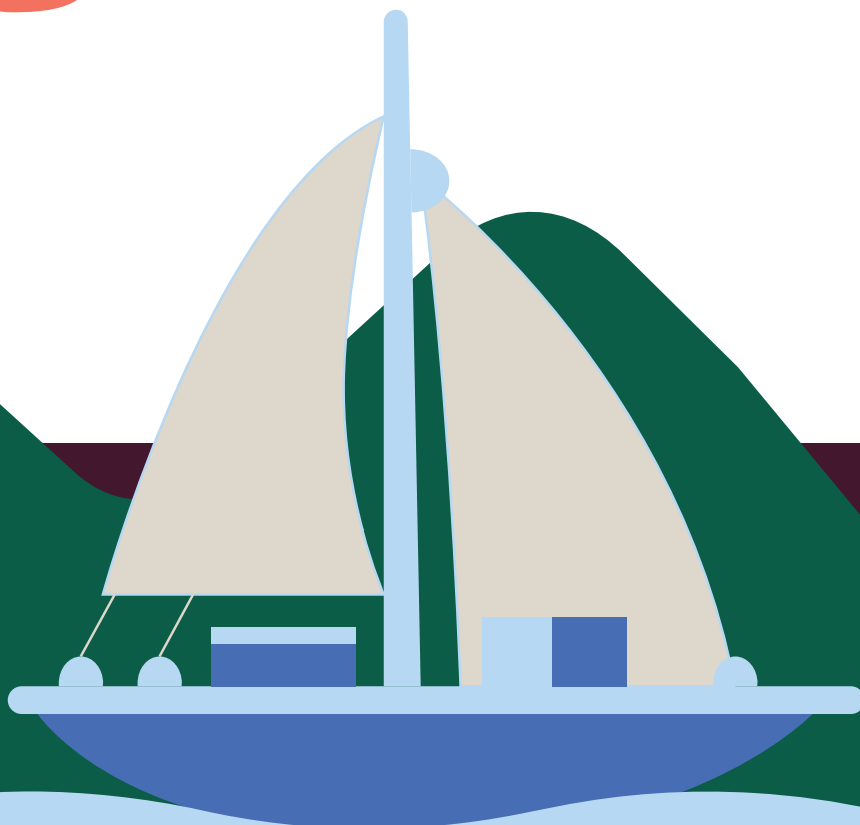
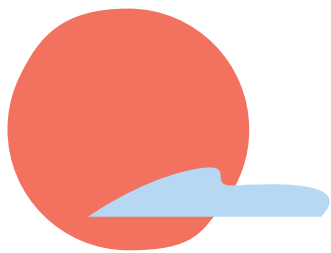


Table 12: Key Demographic Characteristics

Demographics	Hydro-Electric	All Sectors
Women	28%	48%
Part-Time	10%	31%
First Nations	1%	2%
People who live outside capital cities	44%	31%
Median age	42	38

Figure 66: Counts of businesses, June 2023

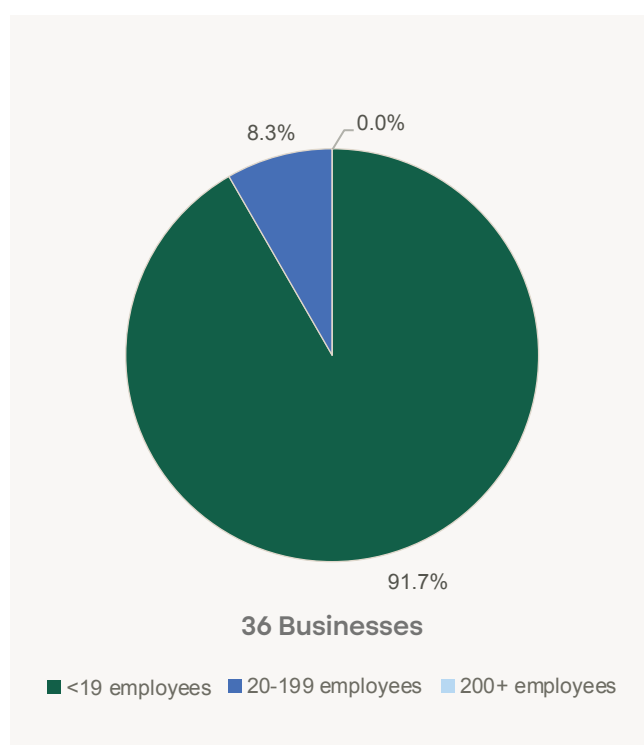


Table 13: Examples of Key Occupations

Occupations
Electricians
Electrical Engineers
Metal Fitters and Machinists
Chemical, Gas, Petroleum & Power Gen. Plant Operators
Industrial, Mechanical and Production Engineers
Civil Engineering Professionals
Electrical Engineering Draftspersons and Technicians
Engineering Managers
Construction Managers
Environmental Scientists

Sources: (12) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age, Female, Part-time); (66) ABS Counts of Businesses, June 2023 (13) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Many Pumped Hydro Energy Storage (PHES) projects in development. One of Australia's largest PHES projects, Snowy 2.0 (NSW), is on track to be delivered by 2029



Several PHES projects propose repurposing existing mine sites

Overview

Hydroelectric power is being increasingly integrated with other renewable energy sources such as wind and solar to enhance grid reliability and support sustainable development goals. Hydro generators in Australia are navigating volatile energy markets, prompting intervention by regulators and governments to stabilise the National Electricity Market (NEM) and ensure a reliable electricity supply. From 2021 to 2023, rising coal and gas prices drove up wholesale market prices, benefiting hydro generators since they don't incur fossil fuel costs. Both private and public sectors are investing in pumped hydro projects to support renewable energy. However, large-scale hydro generation is limited by geographic realities, the distribution of viable hydro sites, and high capital costs for new facilities.²⁸

Challenges

Stakeholders report a significant shortage of skilled workers and express serious concerns about the ability to access skilled labour in the future, particularly in electrical and mechanical roles.

An ageing workforce poses a significant skills risk to the subsector. The workforce is highly trained and multi-skilled, making it difficult to replace (with long lead times). Therefore shortages in the hydro-electricity generation subsector is not driven by a shift from fossil fuels or technological changes, but rather a simple need for more workers skilled in the existing technologies. Younger generations are moving away from trade careers, and the traditional notion of "jobs for life" is losing its appeal, limiting the attractiveness of careers in this field.

There are only a few large hydropower operators in Australia, and consequently, a limited number of RTOs serving the sector. This creates challenges, such as the lack of training providers for generation and operations in Tasmania, requiring workers to be sent to the mainland.

Business operations and competitiveness with other sectors is already being affected, including difficulties in finding enough qualified supervisors for apprentices.

Chronic shortages are particularly evident in regional and remote areas, where most hydropower assets are located. The shortage of electrical workers is compounded by gaps in other key roles within the subsector, including asset maintenance, planning, mechanical trades, and cybersecurity.

Staffing levels fluctuate throughout project life cycles, making career paths unpredictable. For example, the ongoing operations workforce can be as low as 5% of the peak workforce during construction.

If contractors continue to struggle to access a skilled workforce, it could hinder the development of new hydropower assets, ultimately affecting Australia's energy transition. In the worst-case scenario, workforce shortages could jeopardise energy security, given the critical role these large assets play in the nation's infrastructure.



Coal and mineral energy generation

16,600

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 2611 Fossil Fuel Electricity Generation

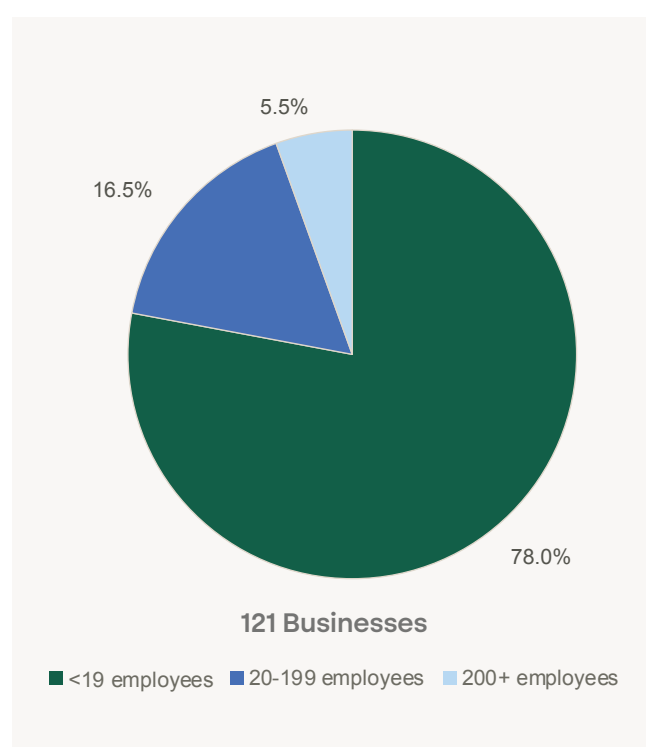
Workforce description

This workforce is involved in the generation of electricity using mineral or fossil fuels (e.g. coal or coal derived products, mineral gases, mineral oil or mineral oil derived products) in internal combustion or combustion-turbine conventional steam processes.



Table 14: Key Demographic Characteristics

Demographics	Coal / Minerals	All Sectors
Women	19%	48%
Part-Time	9%	31%
First Nations	2%	2%
People who live outside capital cities	53%	31%
Median age	45	38

Figure 67: Counts of businesses, June 2023**Table 15: Examples of Key Occupations**

Occupations
Chemical, Gas, Petroleum & Power Gen. Plant Operators
Electricians
Metal Fitters and Machinists
Electrical Engineers
Industrial, Mechanical and Production Engineers
Structural Steel and Welding Trades Workers
Structural Steel Construction Workers
Electrical Engineering Draftspersons and Technicians
Engineering Managers
Electrical Distribution Trades Workers

Sources: (14) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age, Female, Part-time); (67) ABS Counts of Businesses, June 2023 (15) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Coal power plants to close / transition to renewable energy



Energy Industry Jobs Plan: provides a framework for supporting workers at eligible closing coal and gas-fired power stations to transition to new employment.

Overview

Fossil fuel generators have historically supplied most of Australia's electricity. However, with the Net Zero transformation being the main driver for the future demand for energy trades workers, employment will inevitably decline in carbon-intensive sectors such as fossil fuel generation and coal mining. Australia's coal power stations are all forecast to close by 2038, which represents an additional 14 years of operation.²⁹ Mature-aged workers within these businesses are critical in ensuring their continued operation and closure.

Challenges

Respondents highlighted the need for gap training as the industry transitions from fossil fuels to renewables. Suggestions include incorporating AI in training, operations, and maintenance, and developing new training products and targeted skill sets.

The Australian Government has implemented the Energy Industry Jobs Plan (EIJP) to support workers affected by the closure of coal plants. The EIJP provides support to workers at eligible closing coal and gas-fired power stations to transition to new employment. This includes access to training, career planning,

financial advice, and paid leave or flexible work arrangements to access these supports. These measures aim to reduce the impact of closures on communities and help workers find new employment quickly.³⁰

Common mechanisms businesses use to support the skills shift from fossil fuels to renewables include development pathways for employees through expression of interest programs to gain exposure working in renewables projects (such as windfarms), skills mapping followed by gap training through a combination of both accredited and non-accredited training.

²⁹ Australian Energy Market Operator (2024) Integrated System Plan For the National Energy Market, AEMO.

³⁰ Net Zero Economy Authority (2024), Support for workers in the Net Zero transformation, Australian Government, <https://www.netzero.gov.au/support-workers-net-zero-transformation>



Transmission (includes substations)

5,600

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 262 Electricity Transmission

Workforce description

This workforce is involved in the operation of high voltage electricity transmission systems including lines and transformer stations; transmit or facilitate the transmission of electricity from the generating source to the low voltage electricity distribution system. This includes electricity substation operation.



Table 16: Key Demographic Characteristics

Demographics	Transmission	All Sectors
Women	12%	48%
Part-Time	0%	31%
First Nations	1%	2%
People who live outside capital cities	14%	31%
Median age	43	38

Figure 68: Counts of businesses, June 2023

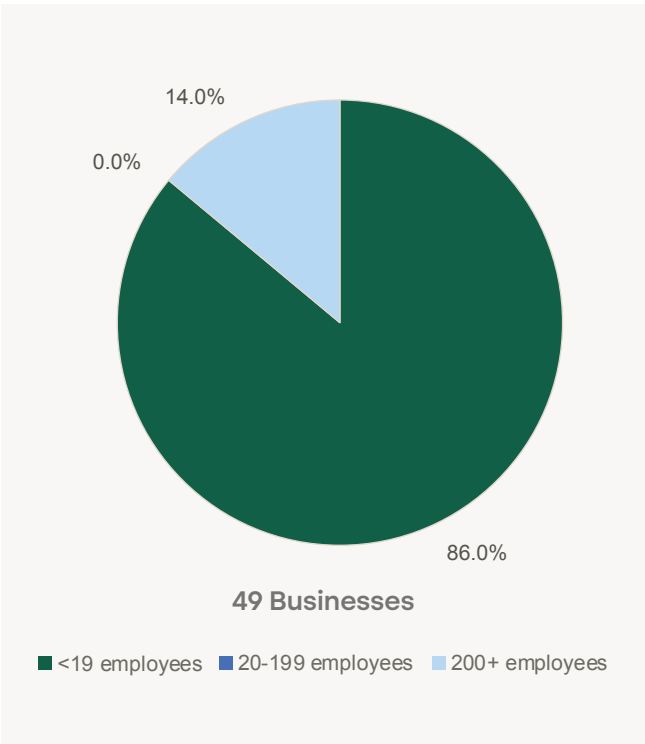


Table 17: Examples of Key Occupations

Occupations
Electrical Engineers
Electricians
Electrical Engineering Draftspersons and Technicians
Electrical Distribution Trades Workers
Engineering Managers
Construction Managers
Architectural, Building and Surveying Technicians
Engineering Professionals
Policy and Planning Managers
Supply, Distribution and Procurement Managers

Sources: (16) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed, Female, Part-time); ABS Census 2021 (First Nations, Outside of Greater Capital Cities) (68) ABS Counts of Businesses, June 2023 (17) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Substation
upgrades to
connect w/ REZs



NSW-VIC-SA
The EnergyConnect
Project

Overview

Transmission providers function as regional monopolies, with the Australian Energy Regulator (AER) determining their revenue and capital returns. Largely driven by increases in interest rates and inflation, a recent decision by the AER was made that will see the amount charged by six distributors – Ausgrid (NSW), Endeavour Energy (NSW), Essential Energy (NSW), Avoenergy (ACT), Power and Water Corporation (NT) and TasNetworks (TAS) – rise over the next five years, taking effect from July 2024.³¹ Innes Willox from the Australian Industry (AI) Group says the wholesale electricity market is up and down which is causing pain for businesses nationwide.

“Australia used to be historically very cheap when it came to energy. That was one of our great competitive advantages, and we've lost that advantage.”

Innes Willox
Chief Executive, AI Group

It is estimated that there are more than 574,000 utility-owned transformers in Australia with a capacity of at least 79,000 megavolt-amperes. Substations will remain critical in both facilitating and maintaining this transition, which will demand both flexibility and resilience in the transmission network. The transmission network will have a critical role to play, connecting identified Renewable Energy Zones in rural parts of the country with the capital cities where vast amounts of electricity is used.³²

Challenges

Stakeholders report a mix of adequate workforce numbers alongside significant shortages, with a universal concern about accessing skilled workers in the future, particularly line workers, cable jointers, and technicians.

The unprecedented demand for workers to integrate renewable energy assets across Australia, especially new transmission lines to interconnect Renewable Energy Zones.

A large portion of the workforce is nearing retirement, increasing the need for new skilled workers.

While there is high demand for apprenticeships (with reports the number of applicants is commonly ten times larger than the number of positions), there are challenges in training capacity, availability, and infrastructure.

Contributing factors include:

- A shortage of educators.
- A shortage of specialised training infrastructure (such as poles and conductors).
- The shortage of RTOs delivering training (including TAFEs).
- The need for course updates for new regulations and technologies (like battery storage and high voltage switching).

Limited access to training in regional areas, for example in regional Victoria, makes it difficult to attract and retain talent in rural areas.

The consequences of failing to meet these skills needs were mentioned and include the ability to deliver critical Net Zero infrastructure and safety concerns.

31 Langenberg A (2024), Electricity bills set to rise as Australian Energy Regulator sets new network transmission costs, ABCNews, <https://www.abc.net.au/news/2024-04-30/electricity-bills-rising-as-energy-regulator-increases-costs/103784950>

32 Energy Journalist (2023) What is a substation? Behind the technology driving transmission and distribution networks, Energy Magazine, <https://www.energymagazine.com.au/what-is-a-substation-behind-the-technology-driving-transmission-and-distribution-networks/>



Electricity distribution

33,000

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 263 Electricity Distribution

Workforce description

This workforce is involved in the operation of low voltage electricity distribution systems, including lines, poles, meters and wiring, that deliver electricity to final consumers.

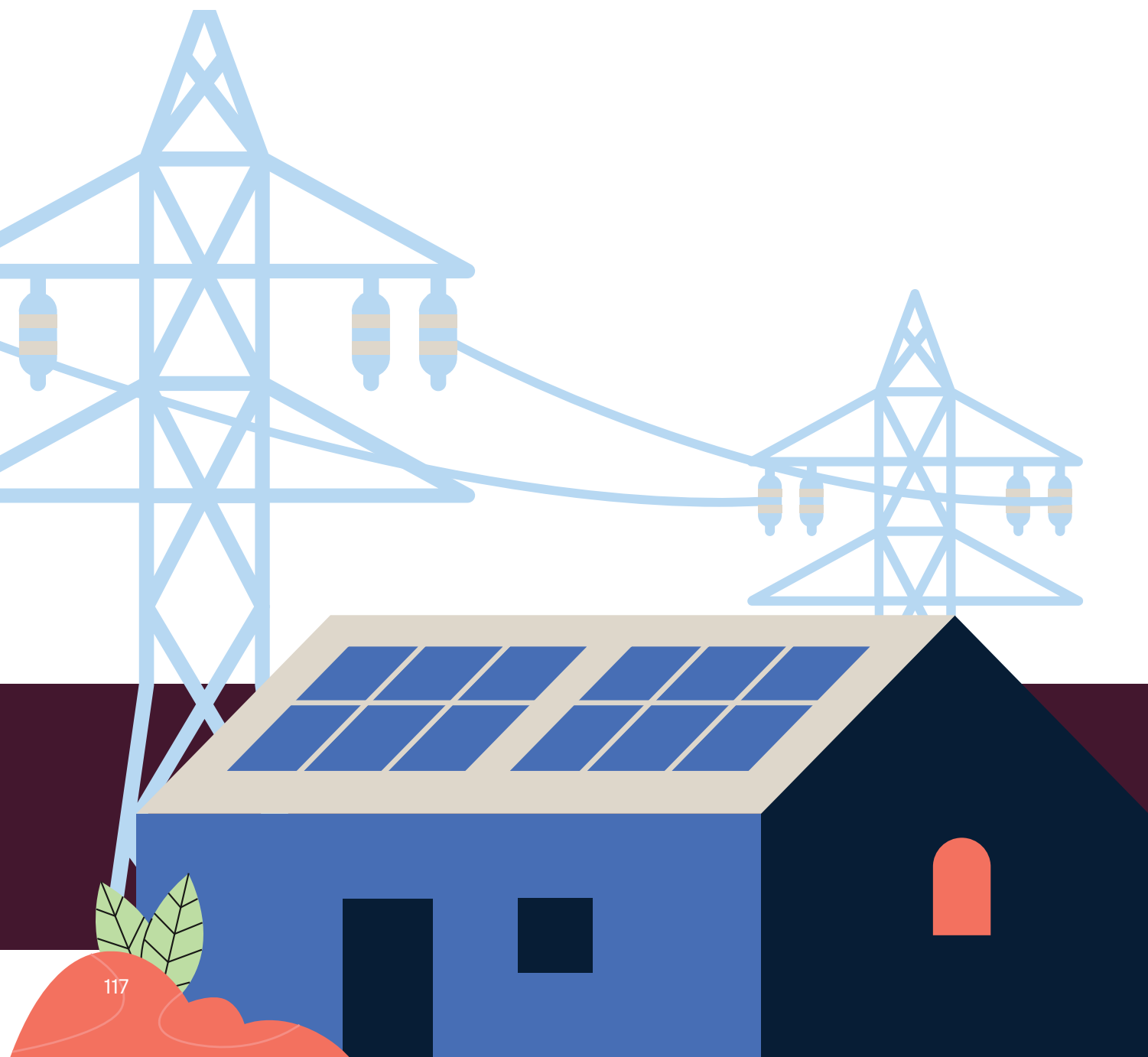


Table 18: Key Demographic Characteristics

Demographics	Distribution	All Sectors
Women	31%	48%
Part-Time	5%	31%
First Nations	2%	2%
People who live outside capital cities	41%	31%
Median age	43	38

Figure 69: Counts of businesses, June 2023

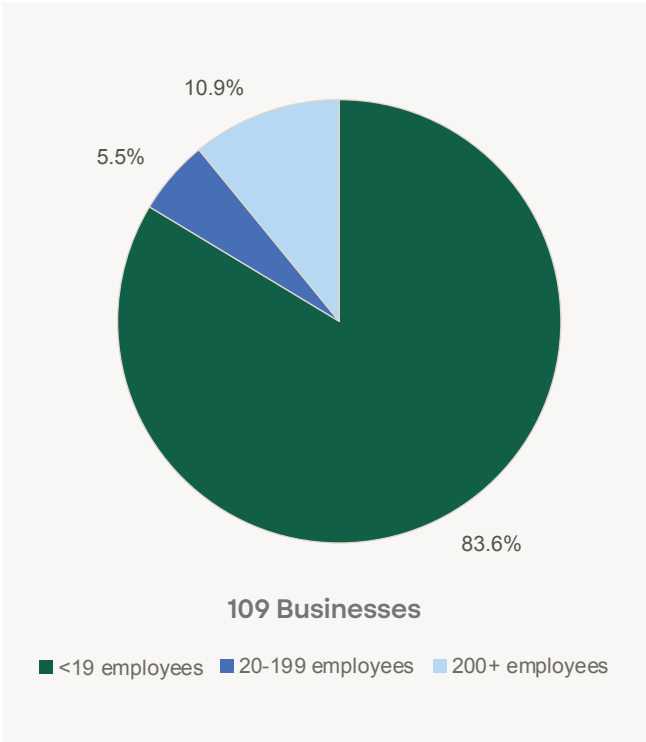


Table 19: Examples of Key Occupations

Occupations
Electrical Distribution Trades Workers
Electricians
Electrical Engineers
Electrical Engineering Draftspersons and Technicians
Software and Applications Programmers
Chemical, Gas, Petroleum & Power Gen. Plant Operators
Construction Managers
Engineering Managers
Inspectors and Regulatory Officers
Electrotechnology and Telecommunications Trades Workers

Sources: (18) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed Female, Part-time); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age); (69) ABS Counts of Businesses, June 2023 (19) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Smart
Meter
Rollout

Overview

Electricity distribution networks, which deliver power to homes and businesses, are regulated by the Australian Energy Regulator (AER) to determine their revenue, investment returns, and capital expenditure. Since December 2022, a new Rate of Return Instrument has been in place. Regulators have scaled back expansions, focusing on asset replacement and maintenance. The rollout of smart meters has accelerated to improve data accuracy.³³

Challenges

Stakeholders report a mix of adequate workforce numbers alongside significant shortages, with a universal concern about accessing skilled workers in the future, particularly line workers, cable jointers, and technicians. A large portion of the workforce is nearing retirement, increasing the need for new skilled workers.

There is a significant increase in distribution maintenance across all Australian networks. The consequences of failing to meet these skills needs were mentioned by stakeholders and include the ability to deliver critical Net Zero infrastructure and safety concerns.

Stakeholders have also report critical skills gaps in the current workforce and training, including:

- Insufficient training in energy storage and its integration with the grid.
- Lack of construction and commissioning training for field crews in the distribution sector.
- New technologies such as rubber cable are not yet imbedded within the accredited training packages.
- Highly specialised training required for extremely high voltage projects (particularly offshore wind)

While there is high demand for apprenticeships (with the number of applicants commonly ten times larger than the number of advertised positions), there are challenges in training capacity, availability, and infrastructure. Contributing factors include:

- A shortage of educators.
- A shortage of specialised training infrastructure (such as poles and conductors).
- The shortage of RTOs delivering training (including TAFEs).
- The need for course updates for new regulations and technologies.

Limited access to training in regional areas, for example in regional Victoria, makes it difficult to attract and retain talent in rural areas.

33 IBISWorld (2023) D2630 Electricity Distribution in Australia - Market Research Report (2013-2028) industry report, IBISWorld



Consumer

7,300

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 264 On Selling Electricity and Electricity Market Operation

Workforce description

Consumer electricity (on selling electricity via power distribution systems operated by others) includes provision of services to the electricity market which facilitate the matching of supply and demand for electricity. Primary activities include electricity market operation, retailing and wholesaling.



Table 20: Key Demographic Characteristics

Demographics	Consumer	All Sectors
Women	26%	48%
Part-Time	10%	31%
First Nations	1%	2%
People who live outside capital cities	24%	31%
Median age	39	38

Figure 70: Counts of businesses, June 2023

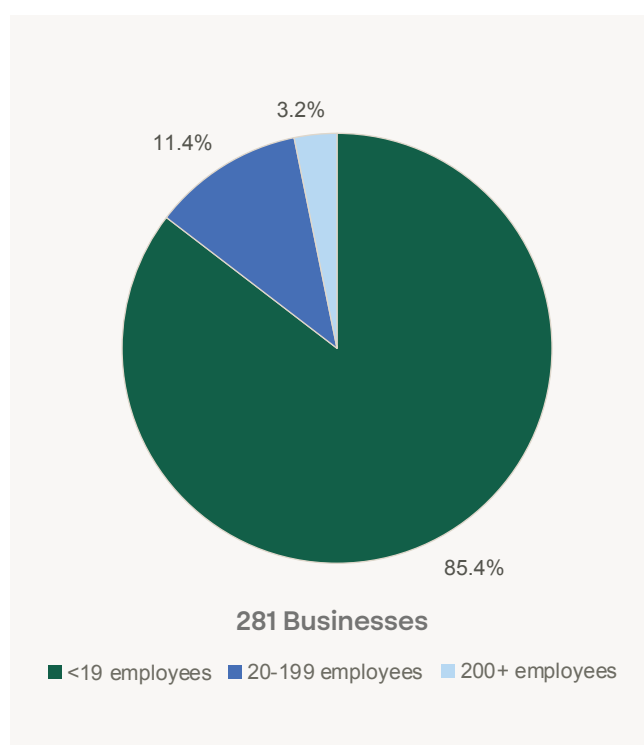


Table 21: Examples of Key Occupations

Occupations
Chemical, Gas, Petroleum & Power Gen. Plant Operators
Call or Contact Centre Workers
Information Officers
Electricians
Sales Assistants (General)
Metal Fitters and Machinists
Electrical Engineers
Industrial, Mechanical and Production Engineers
Policy and Planning Managers
Electrical Engineering Draftspersons and Technicians

Sources: (20) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed Female, Part-time); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age); (70) ABS Counts of Businesses, June 2023 (21) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Rising
electricity
prices



Shift to
renewable
energy



Electrification of households
+ increased energy
efficiency awareness



Overview

In 2022, commodity price shocks caused a surge in wholesale prices, leading the Australian Energy Market Operator (AEMO) to temporarily suspend the National Electricity Market in June 2022, capping rates to protect consumers. The Federal Government later imposed price caps on domestic coal and gas to reduce upstream costs. The coal price cap expired in 2023-24, but the gas price cap was extended.³⁴ Recently, energy retailers have distanced themselves from dynamic pricing, which typically charges more during peak times. This has resulted in complex prices and high energy bills for consumers. The Australian Energy Council criticised poles-and-wires companies and the regulator, calling for a halt to tariffs. The lobby representing these companies defended the price structures, blaming retailers for inadequate customer communication.³⁵

There is also a reported a gap in ongoing service models for home energy systems, with larger contractors addressing maintenance needs (via OEM training) while smaller ones struggle. Many consumers are unaware of the importance of regular maintenance.

Challenges

Through a range of consultation mechanisms, stakeholders have highlighted key challenges and opportunities experienced within the subsector. Many organisations reported experiencing a minor shortage of skilled workers although there is a high level of concern about accessing suitably skilled workers in the future, with fears that the current apprenticeship system may not produce the required number of electricians without compromising on quality and safety.

The biggest barriers to accessing a skilled workforce include the availability of educators, the evolving nature of accredited training programs, and the lack of diversity within the industry. There is also concern about the retention of apprentices, with many dropping out due to inadequate support and the challenges of online learning.

Post-trade training and employing apprentices and trainees are common initiatives used to build the skilled workforce, but there are challenges related to the cost and productivity loss during training. Furthermore, energy tradespeople must engage in lifelong learning to stay relevant, as technological advancements continue to change home energy systems and requirements. For example, fault-finding in homes with interconnected systems (e.g. heating, cooling, solar) is becoming more complex, as it may not be a straightforward issue with a unit itself but a problem in system configuration.

The current training products are generally seen as mostly suitable for meeting industry and student needs, but there are concerns about the adequacy of training in new technologies and renewable energy sectors.

Diversity programs aimed at increasing the participation of women, First Nations people, and neuro-diverse individuals are seen as important but have reportedly experienced low uptake.

Regulatory and licensing complexities and inconsistent training outcomes across states are also significant concerns. Mapping and clearer visibility of electrical licensing across states has been highlighted as a potential solution to reduce administrative burdens and improve workforce mobility.

Stakeholders highlight the critical need for a coordinated approach to address the skills shortage in the energy sector. This includes improving training programs, supporting diversity initiatives, and implementing policies that facilitate workforce development and mobility. The feedback from respondents underscores the importance of industry collaboration and government support in overcoming these challenges.

34 IBISWorld (2024), D2640 Electricity Retailing in Australia - Market Research Report (2014-2029), IBISWorld
 35 Mercer D (2024) Electricity retailers label complex power prices 'perverse' as industry goes to war with itself, ABCNews, <https://www.abc.net.au/news/2024-10-01/smart-meters-pricing-changes-broadside-industry-rift/104395532>

Gas supply

11,900

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 270 Gas Supply

Workforce description

This workforce is involved in the distribution of gas such as natural gas or liquefied petroleum gas through mains systems.



Table 22: Key Demographic Characteristics

Demographics	Gas	All Sectors
Women	25%	48%
Part-Time	7%	31%
First Nations	1%	2%
People who live outside capital cities	27%	31%
Median age	43	38

Figure 71: Counts of businesses, June 2023

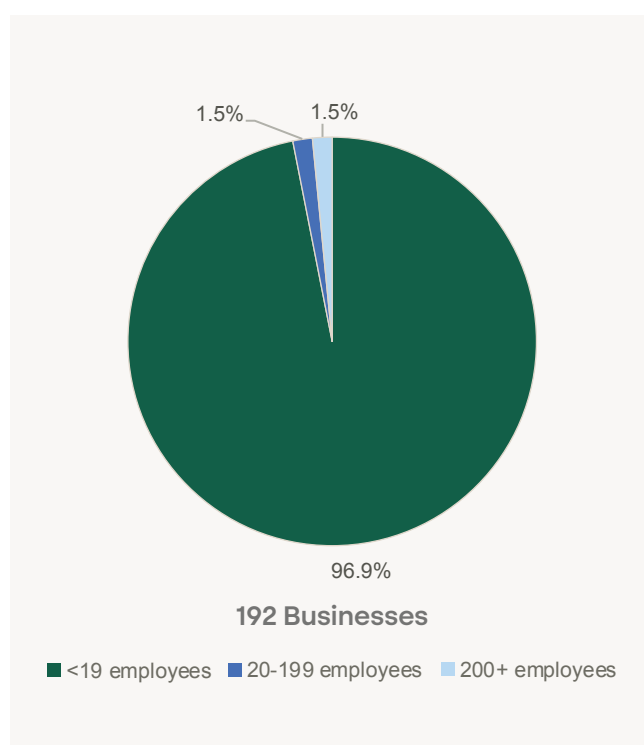


Table 23: Examples of Key Occupations

Occupations
Plumbers
Chemical, Gas, Petroleum and Power Gen. Plant Operators
Metal Fitters and Machinists
Industrial, Mechanical and Production Engineers
Electricians
Technicians and Trades Workers
Engineering Professionals
Safety Inspectors
Supply, Distribution and Procurement Managers
Architectural, Building and Surveying Technicians

Sources: (22) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed, Female, Part-time); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age); (71) ABS Counts of Businesses, June 2023 (23) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Reduced gas usage domestically by 2050 in line with Australia's Net Zero goals



Future Gas Strategy

Pipeline transport

900

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 5021 Pipeline Transport

Workforce description

This workforce is involved in the transportation of natural gas, oil or other materials via pipelines. Transmission pipelines carry commodities from the region they are extracted or processed to the next stage in their supply chain, be it further transport, export or use. It excludes piping sewage through sewer systems; constructing, repairing or maintaining gas mains; and water reticulation by mains.



Table 24: Key Demographic Characteristics

Demographics	Pipeline	All Sectors
Women	28%	48%
Part-Time	8%	31%
First Nations	1%	2%
People who live outside capital cities	17%	31%
Median age	44	38

Figure 72: Counts of businesses, June 2023

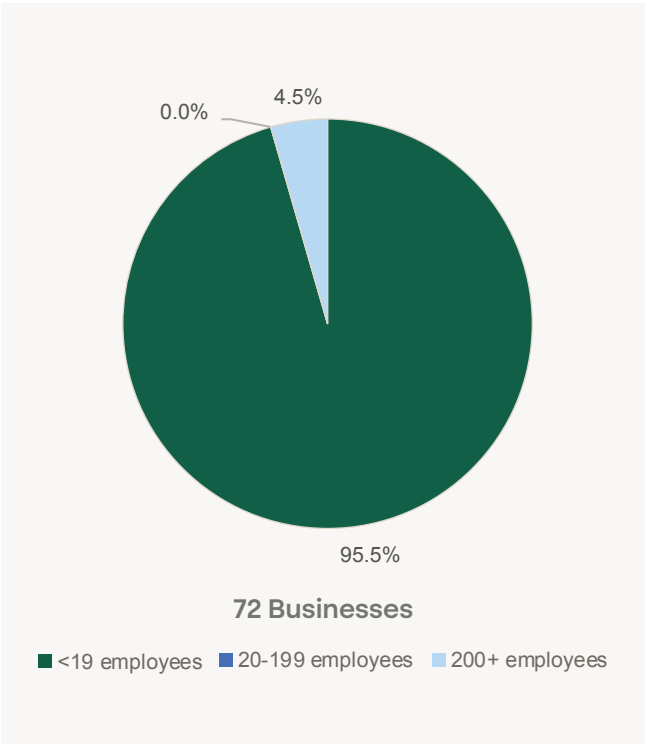


Table 25: Examples of Key Occupations

Occupations
Plumbers
Industrial, Mechanical and Production Engineers
Chemical, Gas, Petroleum and Power Gen. Plant Operators
Electrical Engineers
Engineering Professionals
Electrical Engineering Draftspersons and Technicians
Engineering Managers
Surveyors and Spatial Scientists
Architectural, Building and Surveying Technicians
Electricians

Sources: (24) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age, Female, Part-time); (72) ABS Counts of Businesses, June 2023 (25) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Australia's liquefied national gas (LNG) exports are booming globally

Gas supply and pipeline transport

Overview

The gas supply sector is expected to decline by 2050 to meet Net Zero targets, although gas-fired electricity generation will continue. Firms such as AGL are diversifying into renewable power generation. Changes in gas supply and pipeline transport depend on the viability of hydrogen and other biogas as a replacement for natural gas.³⁶

Gas is crucial for firming renewable power and is essential for hard-to-abate sectors like manufacturing until viable alternatives are available. Despite changes in gas use, it will remain a significant energy source in Australia through 2050 and beyond. Ensuring access to reasonably priced gas and avoiding supply shortfalls, projected by Australian Energy Market Operator to occur by 2028, is a key priority for Australia.³⁷

Since 2022, the Australian Government has implemented the mandatory Gas Code of Conduct, renewed Heads of Agreement with Liquefied Natural Gas (LNG) exporters, and strengthened the Australian Domestic Gas Security Mechanism (ADGSM) to secure affordable gas supplies for households and businesses.

There has been a significant increase in domestic gas consumption and demand for LNG in global markets. Australia has become one of the world's largest exporters of LNG. Western Australia is a major player, hosting over half of the country's gas production. Driven by demand, Pipeline Transport's market size is projected to grow over the next five years but there are challenges due to environmental opposition to fossil fuel projects.³⁸

Challenges

Many organisations reported a shortage of skilled workers, impacting business operations such as inhibiting growth. There is concern about accessing suitably skilled workers in the future, with many respondents highlighting the need for better succession planning and retention strategies.

Biogas and hydrogen as an energy source are not as mature in the Australian energy market as solar and wind but still has potential to play an important role in the clean energy mix. Training products have been developed but stakeholders report this is underutilised while the industry matures in Australia. Due to the shortage of skilled workers, risks include loss of quality assurance, quality control, and compliance with standards.

Victoria's shift from gas to full electrification in homes and businesses is set to create significant demand for electrification skills. With over two million customers still using gas and all new

buildings planned as all-electric, metropolitan areas like Greater Melbourne will see a heightened need for electrical workers.³⁹ This also raised concerns about how the removal of gas from new builds removes the ability to install hydrogen or biogas in the future. Yet, consultation also highlighted that minimal training is needed for gas workers to shift into hydrogen and biogas.

Respondents highlighted the following initiatives were effective in upskilling their workforce: increasing investment in skills and training, providing institutional subsidies for certifications, diversity programs, and post-trade training.

Remote locations of businesses are a recruitment barrier for employers. Successful projects like Energy Skills Queensland's rollout of gas workers in central Queensland were highlighted as examples of effective collaboration between government and industry.

36 Jobs and Skills Australia (2023) Clean Energy Generation: Workforce needs for a Net Zero economy, Jobs and Skills Australia, <https://www.jobsandskills.gov.au/publications/the-clean-energy-generation>

37 Mercer D (2024) Once unthinkable, gas giant Australia is set to import supplies for the first time, ABCNews, <https://www.abc.net.au/news/2024-09-05/gas-giant-australia-prepares-to-import-gas-as-shortage-looms/104303824>

38 IBISWorld (2023) 15021 Pipeline Transport in Australia - Market Research Report (2013-2028), IBISWorld.

39 Victoria State Government: Department of Energy, Environment and Climate Action (2024). Victoria's Gas Substitution Roadmap <https://www.energy.vic.gov.au/renewable-energy/victorias-gas-substitution-roadmap>

Electrical services

153,900

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 3232 Electrical Services

Workforce description

This workforce is involved in the installation of electrical wiring or fittings in buildings or other construction projects; includes electrical work arising from the installation of appliances. Primary activities include: Electric light installation, Electric wiring installation, Electrical installation work (e.g. switchboards, circuit breakers, etc), Installation of television antennae or cable, Installation of television satellite dish, Repair or maintenance of electrical wiring (except of electricity transmission or distribution lines), Telecommunication cable or wire installation (except transmission lines) and Traffic and rail signal installation and maintenance.

Table 26: Key Demographic Characteristics

Demographics	Electrical Services	All Sectors
Women	12%	48%
Part-Time	19%	31%
First Nations	2%	2%
People who live outside capital cities	32%	31%
Median age	34	38

Figure 73: Counts of businesses, June 2023

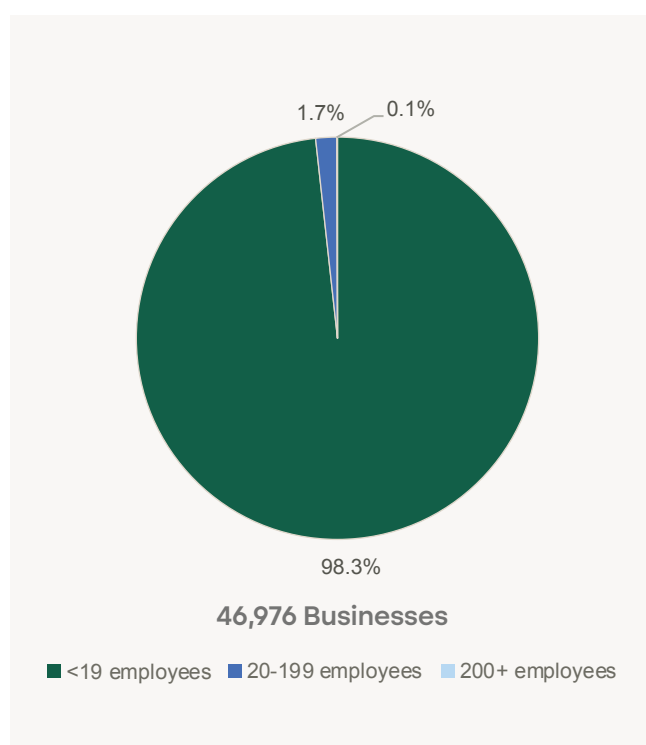


Table 27: Examples of Key Occupations

Occupations
Electricians
Electrotechnology and Telecommunications Trades Workers
Electrical Engineering Draftspersons and Technicians
Construction Managers
Telecommunications Trades Workers
Electronics Trades Workers
Electrical Engineers
Air conditioning and Refrigeration Mechanics
Electrical Distribution Trades Workers
Architectural, Building and Surveying Technicians

Sources: (26) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age, Female, Part-time); (73) ABS Counts of Businesses, June 2023 (27) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Increase in smart home integration + green tech (e.g. solar)



New tech (automation + augmentation) streamlining work processes



Modernisation of Australia's rail signalling network

Overview

The Electrical Services sector is influenced by construction trends, household spending on electrical installations and repairs, and technological advancements. Despite a decline in installation work for housing construction, the industry remains strong due to household emergency repairs and upgrade services. Electrical contractors stay competitive by maintaining quality, timeliness, cleanliness, and friendliness. Most contractors operate locally, and quote jobs based on industry-standard hourly rates.⁴⁰

There are also several notable trends in electrical services in Australia related to data cabling and rail signalling, focused on the rail industry:

- The Australian rail industry is moving towards national standards to improve efficiency, safety, and productivity for rail signalling and operations. The Harmonisation of Rail Standards Research Report highlights the need for consistent standards across the rail network, recommending the establishment of a National Rail Standards Harmonisation Strategy, overseen by a dedicated national body, to streamline standards, technologies, and processes. This harmonisation aims to increase operational interoperability, support new technologies, and facilitate the industry's transition to Net Zero.⁴¹
- There's a significant focus on modernising and expanding the rail network. Projects like the Regional Rail Revival in Victoria, Byford Rail Extension, Perth Metronet, and Moreton Bay Rail Link are driving this trend.

Challenges

Around half of PSO stakeholders operating in the Electrical Services subsector indicate a shortage of skilled workers at present.

The pace and number of new technologies being integrated into the traditional electrical servicing sector is immense (and is set to continue to increase), due to a surge in projects and investment across overlapping sectors – including housing, public infrastructure, renewables and defence industries. This demand is driving the need for new skills, including Electric vehicles (EVs) and EV chargers, solar PV and home battery installations, and smart automation systems.

The rise of these advanced systems necessitates new skills that blend electrical work with software and communications, requiring installers to adapt their traditional skill sets, for example. Stakeholders have reported to PSO that fault-finding in homes with Internet of Things (IoT) systems is becoming more complex, as it may not be a straightforward issue with a unit itself but a problem in system configuration, like Wi-Fi or battery settings.

There are also discrepancies in gaining maintenance skills for home energy systems, with larger contractors addressing maintenance needs via Original Equipment Manufacturer (OEM) training while smaller contractors may struggle.

Securing and delivering a consistent, profitable pipeline of work is a constant focus for small to medium businesses in this subsector. The pipeline of new projects, however, is erratic and uncoordinated, so does not provide the certainty and timelines required for businesses to invest in specific training or employ apprentices.

Stakeholders also reported significant challenges in opportunities for apprentices. These are purported to result from many overlapping forces, identified above in the summary of identified issues for critical trades.

40 IBISWorld (2024) E3232 Electrical Services in Australia - Market Research Report (2014-2029), IBISWorld
41 Australasian Railway Association (2024)Media Release: Australian rail industry moves towards national standards, ARA,
<https://ara.net.au/media-release/australian-rail-industry-moves-towards-national-standards/>

Air conditioning and heating services

25,100

Employed (Nov. 2024)

Coverage (ANZSIC industry classifications)

ANZSIC 3233 Air Conditioning and Heating Services

Workforce description

This workforce is involved in the installation of heating equipment, refrigeration equipment, air conditioning equipment, or in the installation of air conditioning duct work.



Table 28: Key Demographic Characteristics

Demographics	AC&HS	All Sectors
Women	16%	48%
Part-Time	18%	31%
First Nations	2%	2%
People who live outside capital cities	29%	31%
Median age	37	38

Figure 74: Counts of businesses, June 2023

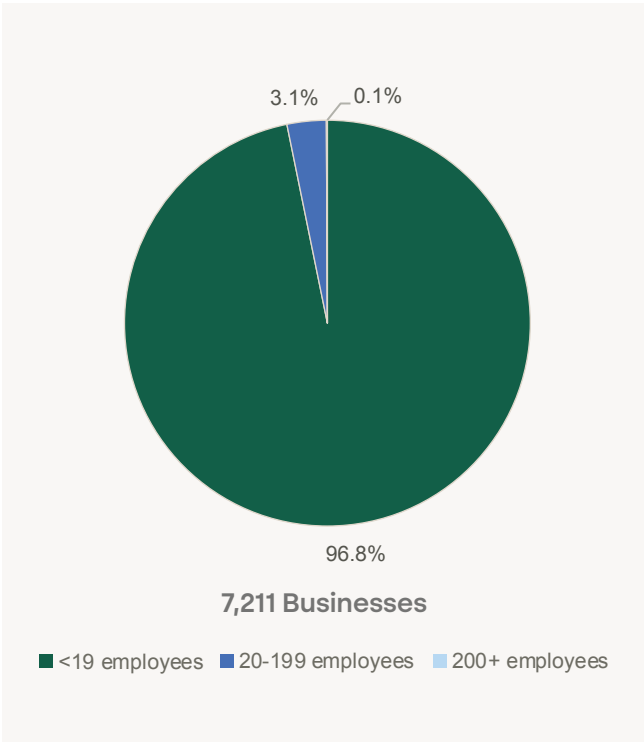


Table 29: Examples of Key Occupations

Occupations
Air Conditioning and Refrigeration Mechanics
Plumbers
Electricians
Engineering Production Workers
Industrial, Mechanical and Production Engineers
Architectural, Building and Surveying Technicians
Electrotechnology and Telecommunications Trades workers
Building and Plumbing Labourers
Mechanical Engineering Draftspersons and Technicians
Engineering Managers

Sources: (28) ABS Labour Force, Detailed, November 2024, EQ06 four-quarter averages (Employed); ABS Census 2021 (First Nations, Outside of Greater Capital Cities, Age, Female, Part-time); (74) ABS Counts of Businesses, June 2023 (29) ABS Census 2021 - Key ANZSCO occupations by employment in ANZSIC classification(s)

Key Trends



Refrigerant
Phase Out /
Transition

Overview

The performance of the Air Conditioning and Heating Services sector is driven by the installation and maintenance of Heating, Ventilation, and Air Conditioning (HVAC) systems in new buildings and structures. Most revenue comes from complex climate control and refrigeration systems in commercial buildings. Sophisticated technology is required for residential high-rise apartments, and specialist contractors install systems in structures like refineries and tunnels.⁴² Electrical contractors maintain relationships with leading HVAC equipment manufacturers and distributors, such as Daikin, Carrier, Samsung, Trane, and Mitsubishi Electric. Rising mortgage interest rates and increased living costs have reduced installations in new homes and dampened household spending on retrofitting and maintenance.⁴³

Most HVAC systems in commercial buildings use refrigerants with high global warming potential. Chlorofluorocarbons and hydrochlorofluorocarbons (HFCs) have already been phased out due to their harmful effects on the ozone layer, and now HFCs are being gradually reduced. While there are no immediate requirements to replace existing equipment, phased-out refrigerants will become more expensive to maintain. Natural refrigerants offer environmental benefits, are more energy efficient, reduce operational costs, and require less frequent maintenance. New rules for charging refrigeration and air conditioning equipment were introduced on January 1, 2020, to support the HFC phase-down and reduce emissions.⁴⁴

Challenges

Many respondents highlighted a significant shortage of skilled workers, impacting business operations and growth. Variations in licensing across states and territories are a significant barrier to workforce mobility. While holding a national ARCTick licence is mandatory to work with refrigeration and air conditioning equipment, each state and territory offers its own additional licence types. Queensland, for example, offers five licence types, administered across three state departments, for five different areas of work. New South Wales offers a single licence.

As with other critical trades, consultation revealed concerns regarding the volume of suitably skilled workers in the future. Some stakeholders noted that the current training and education systems are not keeping pace with subsector needs. Training packages require more flexible, hands-on gap training and updated products, such as new units of competency, that reflects modern technologies and practices such as ozone-friendly refrigerants and natural refrigerants. However, there are reportedly a limited number of educators with the applicable skillset to provide training in these areas.

Attracting new talent to the subsector is challenging, particularly in regional areas. There is a need for more initiatives to promote the sector to young people and underrepresented groups – with claims that other energy trades like electricians are more well known.

42 IBISWorld (2024) E3233 Air Conditioning and Heating Services in Australia - Market Research Report (2014-2029), IBISWorld

43 Ibid

44 Department of Climate Change, Energy, the Environment and Water, Rules on charging refrigeration and air conditioning equipment, Australian Government, <https://www.dcceew.gov.au/environment/protection/ozone/rac/rules-charging-rac-equipment>



Identified issues for subsectors



The rapid pace of technological change, combined with the scale and scope of required projects, is driving both demand for more workers and industry or project specific skill requirements. For example, larger projects require role specialisation (such as commissioning and protection testing), while smaller installations need broader technical and soft skill sets (such as domestic / commercial renewable systems integration). These changes are outpacing the training system, leading to emerging training needs across pre-apprenticeship, apprenticeship, and post-trade levels. And while the disparities in requirements vary between sectors and business sizes, all have reported challenges in meeting workforce demand and skilling needs.

Note that all issues detailed below are typically exacerbated in regional and remote areas, due to geographic isolation, lack of transport, lack of educators and training infrastructure, lower rates of literacy and numeracy and systemic disadvantages, such as for First Nations individuals.

Quantifying skills needs

Fundamental to understanding the workforce requirements for detailed subsectors is quantifying the skill needs to deliver on the transition to renewables and Net Zero targets. However, there are widely accessible and comprehensive analyses of the skills required across subsectors and the varying methods generation, storage, transmission or distribution to enable the transformation of Australia's energy sector. This would be required to subsequently support modelling on the scale of renewables training delivery and infrastructure required to support the pre and post-trade workforce. PSO will continue to work with industry and training sector stakeholders and investigate opportunities to support the development of such modelling.





Proposed action

10. Energy Sector Workforce Supply and Demand Modelling	
Timeline	Horizon 2
Driver	A lack of consistent, robust modelling to define the supply and demand dynamics of the energy sector workforce limits the sector’s ability to plan and respond to future skills needs.
Action	PSO will develop robust, scenario-based workforce modelling for critical energy occupations.
Outcomes	This project will produce reliable forecasts to inform workforce planning, policy, and investment decisions across the sector.



Upskilling for post-trade workers

Stakeholders highlight the critical need for post-apprenticeship programs and professional development options to keep energy trades workers updated with rapidly evolving technologies – particularly at the post-trade level. Post-trade workers face growing pressure to update skills due to rapid changes in standards, technology, and customer expectations.

This includes areas like:

- Emerging renewable technologies such as solar, batteries, EVs, and ozone-friendly refrigerants.
- Digital literacy to help workers adapt to increasingly complex systems like interconnected IoT devices and energy systems, which may involve more fault-finding.
- Soft skills development, such as providing advice and guidance to customers on consumer energy resources, solar and battery integration and performance in the home.

However, multiple barriers exist to upskilling, both structural and cultural. Employers, many of which are small businesses with fewer than 20 employees, struggle to release workers for training due to profitability concerns. Many energy trades workers have traditionally not needed continuous upskilling, and trades workers themselves also lack incentives to upgrade their skills impacted by time and cost challenges.

Inconsistent course availability is also a key factor, as many post-trade and specialist courses are reportedly only delivered when minimum student numbers are met, resulting in delays, cancellations, or infrequent offerings.

Proposed action

6. Clarify Post-Trade Training for Energy Workers	
Timeline	Horizon 1
Driver	Upskilling through micro-credentials, skill sets, manufacturer and non-accredited training plays a key role in upskilling existing workers, especially in adapting to new technologies. However, there are inconsistent practices and governance across these forms of training, along with both missed opportunities and emerging risks.
Action	PSO will analyse and provide guidance on the use and governance of skill sets, micro-credentials and other post-trade courses for upskilling.
Outcomes	This action will provide a consistent, quality-assured approach to short duration training, supporting rapid upskilling and adaptability in the workforce.

Collaboration between industry and training sector

Stakeholders report a vast disconnect between industry needs and accredited training packages, underpinned by a general lack of collaboration between these two parts of the energy sector.

Training packages are reportedly slow to update in response to technological advancements and industry changes. This leads to issues like outdated content in training packages and the need for more on-the-job training.

For example, a lack of training for new technologies like smart appliances, solar, batteries, and renewable energy systems may be driven by poor collaboration between industry and training bodies.

Increased / improved industry engagement and feedback are called for as necessary to ensure training remains relevant and effective in addressing workforce demands. This includes:

- Engagement to provide more flexible and modernised training product is needed to meet evolving industry standards.
- Establishing specialist trade streams in partnership with industry to address small but critical technical roles.

- Creating industry-led internship or mentorship programs aligned with major transmission and renewable energy projects to provide on-the-job learning.
- Many RTOs lack the specialised facilities and equipment needed to deliver advanced, hands-on training (e.g. for instrumentation, automation, hydrogen, or battery storage systems).

Stakeholders also emphasised the growing importance of intergovernmental collaboration in driving systemic change across the energy workforce and training sector. They stressed the need to involve key decision-makers and secure agreement to implement reforms, noting that this aspect of policymaking is often underestimated.

Although coordination across jurisdictions, such as through National Cabinet-style mechanisms, can be difficult in practice, it remains vital. Securing support at the state and territory level is crucial, along with achieving alignment between state and federal governments on both the evidence base and the path forward.

Proposed action

14. Strengthen Industry Partnerships and Accountability in VET Delivery (Proposed in PSO's VET Workforce Blueprint)	
Timeline	Horizon 2
Driver	There is a lack of consistent and structured collaboration between industry and the VET sector, limiting training relevance and access to industry expertise.
Action	Creating co-investment models and national forums for joint planning can embed stronger partnerships and empower industry to support educator development, content relevance, and infrastructure access.
Outcomes	Enhanced industry engagement will drive shared responsibility for workforce development, increase educator capability, and ensure training is better aligned to real-world energy sector needs.

Project uncertainty

The boom-and-bust cycle of energy sector projects has previously been identified as barrier to greater workforce growth and retention.⁴⁵ However, this is worsened by current long approval timelines for projects, particularly renewables and transmission infrastructure.

Compounding instability is a key barrier to broad, sustained investment in training and workforce development. It undermines employer confidence to commit to actions like hiring apprentices or supporting post-trade upskilling and negatively impacts on the perception of the stability and sustainability of renewable energy career pathways.

Pipeline uncertainty is another critical issue; without a clear, long-term pipeline of projects – especially in emerging sectors like renewables – employers are hesitant to invest in training. Several stakeholders have noted one of the biggest obstacles to growing apprenticeship numbers is the lack of confidence in future work beyond near-term, isolated projects. Boosting market confidence in a reliable flow of future projects is essential to support workforce growth.

Political uncertainty, as noted earlier, can significantly weaken long-term business confidence. It increases the perceived risk of investing in training across the energy sector and may hinder the development of a strong training culture and commitment to lifelong learning, both of which are essential as the sector supports the broader economic transition.

A strategy of ‘over-training’, which could help rebalance the labour market by building capacity in advance, is difficult to implement when political and macroeconomic instability make future demand unclear. Coordination of renewable energy projects and other infrastructure pipelines could also provide a more diversified pipeline of employment opportunities for workers and the capability to develop broader, transferable skills.

These overlapping layers of uncertainty have emerged as a critical concern for PSO stakeholders.

Promisingly, the Federal Government’s recent productivity agenda identifies speeding up energy project approvals as a priority within its broader Net Zero transition inquiry.⁴⁶ PSO will be monitoring closely the reform options that emerge from this inquiry and its linkage to productivity.

Proposed action

7. Map Training and Workforce Locations to Future Industry Needs	
Timeline	Horizon 1
Driver	Future energy projects, particularly in REZ, will require a workforce that is regionally and geographically distributed in new ways. Stakeholders have raised concerns about a disconnect between the locations of current apprentices, existing training infrastructure, and future project locations.
Action	PSO will conduct geospatial analysis to align apprentice and training locations with future project demand, especially in REZs.
Outcomes	The resulting data-driven insights will guide strategic investment in training infrastructure and workforce mobility, ensuring regional workforce readiness.

⁴⁵ Briggs et al (2022). Building a ‘Fair and Fast’ energy transition? Renewable energy employment, skill shortages and social licence in regional areas. Renewable and Sustainable Energy Transition.

⁴⁶ <https://engage.pc.gov.au/projects/energy-transformation/page/energy-infrastructure>

Awareness of clean energy trades and specialisations

A common insight throughout consultation is a perceived lack of awareness of clean energy trades careers amongst school students and new entrants to the workforce. Similarly, there is a perceived lack of awareness of the role energy subsectors play in transitioning to a Net Zero economy. There may also be a lack of clarity regarding the training pathway to enter a specialised occupation or skills gaps to upskill from a related trade. This highlights a need to accurately map skills and training pathways for critical trades, and increase awareness of these pathways to pre-apprentices, apprentices and post-trade workers.



Strategic response to identified issues



ADAPT framework

ADAPT (Alignment, Diversity, Access, Performance, Transition pathways) was intended as a framework to categorise planned activities and provide easier identification on the specific issues each activity sought to address. While ADAPT has been closely aligned with PSO's strategic themes, the latter will more deeply influence our work in future and become more prominent in our messaging. Maintaining two parallel frameworks risks creating confusion. While the intention and underlying themes remain the same, phasing out the ADAPT framework in favour of PSO's strategic themes will streamline our approach, reinforce a single, coherent narrative, and support clearer communication both internally and externally.

PSO's strategic themes are:

- Enhance career pathways for those looking to come into renewable energy jobs.
- Develop a sustainable and agile VET system that meets the demands of industry now and into the future.
- Ensuring PSO can accurately articulate the challenges within the energy sector for workforce planning.
- A culture of diversity and belonging in the energy sector where women and First Nations people are fairly represented. Attracting more people from these groups into the energy sector and offering them support when they come.
- To inform and prepare Industry and Government for the emergence and implementation of new decarbonisation technologies in Australia.

Strategic response to identified issues

PSO's development of solutions is an ongoing and responsive process, shaped by continual engagement with stakeholders and active investigation into workforce challenges. PSO adopts an agile approach – implementing practical, evidence-informed initiatives as they become viable to maintain momentum and deliver value to industry.

The following in-progress and proposed strategic responses are being pursued across a range of strategic levers, including industry stewardship, training package development and reform, workforce planning, and targeted research. These efforts aim to address systemic issues and enable a more resilient, skilled, and adaptable workforce.

Timeframes for development and implementation of proposed strategies have been broadly framed using indicative horizons – ranging from Horizon 1 (approximately 12 months) to Horizon 2 (up to

24 months) and Horizon 3 (up to 36 months). However, for some initiatives – particularly those centred on policy and advocacy – the path forward remains more open-ended. These efforts rely on sustained engagement with relevant stakeholders, and their success depends on flexibility and responsiveness as the broader policy landscape evolves.

However, successful implementation of these strategies also relies on cultural change across the industry. A stronger culture of professional development, inclusive practices, and support for diversity – particularly increasing female participation – is essential to ensure these initiatives take root and deliver long-term impact. These 'motherhood' goals are not secondary considerations; they provide the foundation for a sustainable and equitable workforce transformation.

Proposed actions

Table 30: Proposed Actions

#	Project Type	Issue Alignment	Proposed Actions
1	Research Project	Apprentices and apprenticeships	Map Apprenticeship Incentives Across Jurisdictions
2	Research Project	Apprentices and apprenticeships	Define the Apprenticeship Value Proposition for Employers
3	Research Project	Apprentices and apprenticeships	Identify and Reduce Apprentice Training Wait Times and Barriers
4	Research Project	Apprentices and apprenticeships	Quantify Apprentice 'Poaching' Through Data and Insights
5	Workforce Project	Apprentices and apprenticeships	Develop an Industry-Relevant Apprentice/ New Worker Safety Education Program (Open Source)
6	Policy & Advocacy	Renewables and new technologies	Clarify the Role of Short Duration Post-Trade Training for Energy Workers
7	Workforce Project	Training workforce, infrastructure and products	Map Training and Workforce Locations to Future Industry Needs
8	Research Project	Diversity	Improve Support for Mature Aged Apprentices Through Policy and Incentives
9	Research Project	Pathway attraction and awareness	Build Clear Pathways for Energy Trades
10	Research Project	Renewables and new technologies	Energy Sector Workforce Supply and Demand Modelling
11	Research Project	Training workforce, infrastructure and products	Quantify Delivery Costs for Energy Training Qualifications
12	Workforce Project	Training workforce, infrastructure and products	Create an Open-Source Repository of Energy Training Resources (Proposed in PSO's VET Workforce Blueprint)
13	Workforce Project	Training workforce, infrastructure and products	Establish a National Centre for Educator Innovation and Workforce Futures (Proposed in PSO's VET Workforce Blueprint)
14	Workforce Project	Training workforce, infrastructure and products	Strengthen Industry Partnerships and Accountability in VET Delivery (Proposed in PSO's VET Workforce Blueprint)
15	Workforce Project	Training workforce, infrastructure and products	Develop a National Career Progression Framework for VET Educators (Proposed in PSO's VET Workforce Blueprint)
16	Workforce Project	Apprentices and Apprenticeships	Establish a National Register for Connecting Apprentices to Employers

- Enhance career pathways for those looking to come into renewable energy jobs
- Develop a sustainable and agile VET system
- Accurately articulate the challenges within the energy sector for workforce planning
- A culture of diversity and belonging in the energy sector
- To inform and prepare Industry and Government

Outcomes	Horizon
Improved visibility and recommendations for effective incentives. Critically, this will include the types of support for employers and apprentices.	Horizon 1
Clearer business case, increased apprenticeship uptake	Horizon 1
Reduced delays, more efficient workforce development	Horizon 1
Data-driven policy and systemic solutions to reduce 'poaching' and support retention	Horizon 1
Immediate safety awareness for new entrants	Horizon 1
Consistent, quality-assured upskilling pathways	Horizon 1
Strategic investment in training and regional workforce readiness	Horizon 1
Increased mature-aged participation and workforce diversity	Horizon 2
Position energy trades as a supported and valued pathway from school to skilled career	Horizon 2
Reliable data for planning and investment	Horizon 2
Evidence-based funding and expanded training capacity	Horizon 2
Reduce duplication, increase consistency and expand training capacity	Horizon 2
Increase innovation, trial new approaches, share learning, and shape system-wide improvement	Horizon 2
Increase workforce development and educator capability. Align training to real-world energy sector needs	Horizon 2
Elevate the status of VET educators, improve retention, and position teaching as a viable and attractive long-term career	Horizon 2
Improved jobseeker-employer matching and sector participation	Horizon 3

In-progress actions

Table 31: In Progress Actions

Strategic Priority	Issue Alignment	Actions
Workforce Project	Diversity	Foundation for Literacy and Numeracy for Energy Job
Workforce Project	Diversity	First Nations Power Security
Training Product Project	Diversity	First Nations Bespoke Qualifications
Training Product Project	Diversity	Remote and very remote community Training package review
Training Product Project	Pathway attraction and awareness	Creating an Energy Sector Gateway
Training Product Project	Renewables and new technologies	Clean Energy Required Training State and Territory Expansion Project
Training Product Project	Renewables and new technologies	V2X Accreditation – Vehicle to Everything
Training Product Project	Renewables and new technologies	UET HV Rubber Cables Elective Unit development
Training Product Project	Training workforce, infrastructure and products	Mapping State and Territory Licensing and Regulations to Training Products
Training Product Project	Training workforce, infrastructure and products	ERAC Essential Performance Capabilities Review
Training Product Project	Training workforce, infrastructure and products	Consolidation of Competency Development Units
Training Product Project	Training workforce, infrastructure and products	UET Rescue and Refresher Units
Training Product Project	Training workforce, infrastructure and products	UEE Full training product review
Training Product Project	Training workforce, infrastructure and products	Low and no enrolments review
Workforce Project	Training workforce, infrastructure and products	VET Workforce Blueprint

- Enhance career pathways for those looking to come into renewable energy jobs
- Develop a sustainable and agile VET system
- Accurately articulate the challenges within the energy sector for workforce planning
- A culture of diversity and belonging in the energy sector
- To inform and prepare Industry and Government

Outcomes	Expected Completion
Mapping school curriculum competencies against vocational requirements to support clearer, more accessible pathways into energy jobs and accurate career guidance.	Q1 2026
Address the under-representation of First Nations peoples in the energy sector workforce in regional and remote areas and in renewable energy zones (REZ)	Q3 2026
Make recommendations on the suitability of current qualifications and whether bespoke qualifications are needed for First Nations peoples.	Q3 2025
Review and update UEE21420 and UET30921 to ensure their ongoing relevance, accessibility, and effectiveness in supporting workforce development in remote and very remote communities	Q4 2026
Carry out essential fixes to existing Cert II quals and ongoing review of Electrotechnology Cert II Pathways quals.	Q4 2025
Align training standards and qualifications with emerging industry needs and create harmonised skills matrices and a digital worker passport system.	Q2 2026
Develop a new UoC to address the skills required to install, test, and commission Vehicle to Everything	Q4 2026
Develop a new UoC – Joint, Terminate and Maintain High Voltage Rubber Insulated Cable	Q4 2025
Map licensing and regulatory requirements, align with training products, and evaluate the delivery of the Capstone Assessment within UEE30820	Q4 2025
Analysis of the 2024 EPC changes against the relevant Training Package, including liaison with other impacted Training Packages and Jobs and Skills Councils	Q2 2025
Reduce the number of units of competency designed to utilise a competency development plan	Q1 2025
Streamline a number of UoC across training packages	Q2 2025
Comprehensively review, streamline and modernise the UEE Electrotechnology Training Package	Q4 2026
Identify and assess quals within the UEE, UEG, UEP, and UET training packages that have experienced consistently low or no enrolments over the past 5 years	Q3 2025
Placeholder for VWFBP Recommendations	Q3 2025

Appendices



Methodology and approach



PSO adopted a structured, step-by-step approach to developing the 2025 WFP, beginning with the identification of workforce challenges and leading to the formulation of a targeted strategic response.

This process is underpinned by a methodology that integrates quantitative data analysis, qualitative stakeholder insights, and comprehensive desktop research.

The step-by-step process for developing PSO's 2025 WFP is outlined in Table 32 below.

Table 32: Timeline of activities for PSO's 2025 WFP

Timeline	Activity
October 2024	Project initiation
October - December 2024	Review industry feedback on PSO's 2024 WFP
October - February 2024 - 2025	Data collection and quantitative analysis
January - March 2025	Stakeholder engagement period
January - March 2025	Identification / validation of workforce challenges
March 2025	Development of 2025 Consultation Paper and drafting of WFP
April - May 2025	Stakeholder consultation period and consultation paper released
May - June 2025	Formulation of strategic response
May - August 2025	Design and development of final 2025 WFP
August 2025	Release of final 2025 WFP

Stakeholder input and analysis

PSO was established to amplify the voice of industry and the training sector to the Federal Government – and with the WFP acting as a key vehicle for that voice – a transparent and comprehensive approach to national stakeholder participation is vital to the plan’s development.

More than 600 individuals from 280 organisations contributed around 3,000 comments to inform the 2025 WFP (see Table 33). Approximately 58% of the feedback came directly from industry (30%) and the training sector (28%), with the remainder provided by industry representatives, peak bodies, unions, and government departments.

Stakeholder engagement was carried out in two phases: the first aimed to identify workforce challenges and their underlying causes, while the second focused on collaboratively developing solutions. Input was gathered through a mix of steering committee roundtables, online surveys, in-person workshops across all states and territories, public presentations, and written submissions. Meetings were recorded and transcribed for analysis.

Following phase one, approximately 1,700 stakeholder comments were consolidated into a PSO research asset. These were thematically analysed and grouped into key challenges, sub-challenges, and their drivers. The number of mentions for a challenge served as a proxy for their importance to industry partners and the sustainability / risk to the energy sectors workforce over the long-term.

The most frequently raised issues were compiled into a consultation paper to validate findings, address gaps, and canvass potential solutions – setting the stage for phase two.

By the end of phase two, around 1,300 additional comments had been submitted. These included proposed strategies and further insights into root causes. All input was merged into a single research asset of about 3,000 stakeholder comments.

Table 33: PSO stakeholder participation for the 2025 WFP

Phase	Mechanism	Details	Responses
Phase 1 – Stakeholder engagement (challenges focused)	Engagement - survey	2025 Energy Workforce and Skills Survey - Hosted on the PSO website - Distribution partners included: Electrical Trades Union, Master Electricians Australia, and Engineers Australia	215 responses
	Workforce Plan Steering Committee	- Comprised of PSO Strategic Industry Advisory Body (SIAB) members - Topics: new and emerging occupations, infrastructure projects, employment data	3 roundtables (20+ attendees)
	Workshops	10+ workshops held across all states and territories - Participants included training and industry stakeholders	180 attendees
	1:1 Meetings	- Voluntary booking platform - Topics dependent on requester	15 meetings
	PSO Summit and 'Insights' meetings	- Presentation on preliminary findings for PSO 2025 WFP - Two PSO 'Insights' meetings on PSO WFP 2025 preliminary findings (with Question-and-Answer session)	330+ attendees
Phase 2 – Stakeholder consultation (solutions focused)	Consultation survey	- Based on Consultation paper developed on Phase 1 findings - Hosted on the PSO website 20 Questions - all free text	63 responses
	SIAB solutions roundtable	- In-person event hosted by PSO 60+ WFP solutions canvassed	20 attendees
	PSO post-SIAB solutions workshop	- Internal PSO workshop - SIAB WFP solutions further prioritised	10+ attendees
	Consultation - jurisdictions	- Draft state and territory sections of WFP developed - Draft sections sent to industry skills bodies and associated departments in each jurisdiction	30+ comments
	Consultation submissions	Extended responses provided directly to PSO	5 submissions (170+ comments)
Phase 1 & Phase 2	Total	- Two online surveys 15+ workshops 20+ meetings / roundtables - Two phases: challenges then solutions	~3,000 comments (280+ organisations; 600+ people)

Developing a strategic response

Through the stakeholder process, PSO gathered over 100 solutions, recommendations, and potential actions to address the primary workforce challenges identified in the energy sector. These were integrated into the development a coordinated strategic response.

A central step in developing this response was a workshop with PSO's Strategic Industry Advisory Body (SIAB), where industry and training experts reviewed each workforce challenge, proposed solutions, and evaluated them based on priority, value, and feasibility. Around 60+ possible actions were generated during this workshop.

PSO then held an internal workshop to refine, shortlist and integrate these proposals into a

standardised framework. Viable actions were aligned with PSO's five strategic priorities and categorised by intervention type – such as policy and advocacy, research, workforce projects, or training product development. Existing actions / projects already underway within PSO to help solve identified workforce issues were also incorporated.

Each action was itemised for further feasibility assessment and scoping. Actions were organised into a horizon timeline, distinguishing near, medium, and longer-term delivery. This structured strategy will shape PSO's upcoming work program, advice/recommendations to government and inform funding decisions, including those in the November round.

Engagement

Table 34: Number of stakeholders engaged by type

Stakeholder type	Number engaged
Consultant	5
Education (Secondary, university or community)	13
Employer	83
Government Department - State	12
Government Department - Commonwealth	3
Group Training Organisation	7
Industry Association or Peak Body	19
ITAB/ Industry Skills Council	6
Jobs and Skills Council	2
Regulatory or licensing body	8
Research or Advisory Body	17
RTO - Enterprise	2
RTO - Independent	40
RTO - Public (TAFE)	30
Skills Advisory or Employment Service Provider	29
Union	5
Total	281

List of stakeholder organisations engaged

Acciona	Customised Workforce Training Solutions
AGL Energy	Deakin University
Air Conditioning Mechanical Contractors Association Australia	Deloitte
ALH Engineering Services	Department Education, Small Business and Training (Qld)
Alinta Energy	Department for State Development (SA)
Allens Training	Department of Climate Change, Energy, The Environment And Water
Alliance Automation	Department of Education
AMP Control Group	Department of Education (NSW)
APA Energy Infrastructure Partner	Department of Education (NT)
APA Group	Department of Education (Vic)
Apeiro Technology	Department of Employment And Workplace Relations
APM Apprenticeships	Department of Jobs, Skills, Industry And Regions - Sec Centre of Training Excellence (Vic)
APM Employment Services	Department of Jobs, Skills, Industry and Regions (Vic)
Apprenticeship Support Australia	Department of Trade, Employment and Training (Qld)
Apprenticeships NT	Department of Training and Workforce Development (WA)
Arc Infrastructure	Downer Utilities Pty Ltd
Arctick	Electrical Group Training
Ashley Services Group	Electrical Safety Office
ATEC	Electrical Trades Union
Aurecon Australasia Pty Ltd (rto 90921)	Electrical Trades Union (Victoria)
Ausgrid	Electrical Training Academy RTO
AUSINET	Electro Group Training
AusNET	Electrogroup Industry Training
Australian Energy Council	Electrotechnology Energy Advisory Board (EEAB)
Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH)	Electrotechnology Training Institute
Australian Manufacturing Workers' Union	Endeavour Energy
Australian National University	Energex
Australian Refrigeration Council	Energy Efficiency Council
Australian Trade Training College	Energy Queensland
Australian Ultimate Training College, College of Climate Change	Energy Safe Victoria
Avixa	Energy Skills Australia
Axial Training	Energy Skills Queensland
Bendigo Kangan Institute	Engineers Australia
Bendigo TAFE	EPW Consulting Group
Box Hill TAFE	EREA Flexible Schools Ltd
Brett Thiedeke Electrician Pty Ltd	ERGT
Business Hunter	Essential Energy
Business NSW	Evoenergy
BUSY At Work	Exemplar Learning
Busy Group	Fairwind
Canberra Institute Of Technology	Federation University Australia (Federation TAFE)
CEDIA	Fifth Quadrant
Cengage	Fire Industry Training
Central Queensland University	First Nations Clean Energy Network
Central Regional TAFE	Flexible Schools
Chamber of Commerce and Industry WA (CCIWA)	Fredon ACT
Charles Darwin University	Fredon Industries
Chisholm Institute of TAFE	Fredon QLD Pty Ltd
Churchill Trust/highlands Llen	Frontline HR
Circulareco Pty Ltd	Future Energy Skills
CIT Trade Skills	Future Skills Organisation
CitiPower/Powercor	Get Skilled Training
CITT	Global Sustainable Energy Solutions
Clean Energy Council	Globe Consultants
Cold Logic Pty Ltd	Good Energy Minds
Coldrae	Goulburn Ovens Institute of TAFE
College of Electrical Training	Green Energy Technologies
Community Education Australia	Greg Palmer
Competency Training	Grosvenor Engineering Group
Computer Science Teachers Association (CSTA)	Health & Safety Advisory Service
Conceicao Consulting	Highlands LLEN
Construction Industry Training Board	Holmesglen Institute of TAFE
Contact Electrics and Air Conditioning	Horizon Power
CSIRO	

Hunternet Career Connections-GTO
Hydro Tasmania
Industry Consultant
Industry Skills Advisory Council NT (ISACNT)
Infinispark PTY LTD
Integracom
Intuitive Training
James Electrical
Jemena
Jier Art Development
Jobs and Skills Australia
Jobs Bank
Joint Technical Trades Training System (JTTS)
Kangan Institute
Komatsu Australia
Local Jobs Network
Manildra Group
Master Electricians Australia
Master Plumbers' Association of Queensland
MEGT
Melbourne Polytechnic
Mining and Automotive Industry Training Council
Murtec Services
National Apprentice Employment Network
National Australian Apprenticeships Association
National Fire Industry Association
National Technical Education Network
NECA
NECA Education & Careers
NECA SA/NT Branch
NECA Training and Apprenticeships
NEOEN
Net Zero Economy Authority
New Energy Training Pty Ltd
North Metropolitan TAFE
North Regional TAFE
Northern College of the Arts and Technology
NSW Utilities And Electrotechnology ITAB
NT Generation
Office of Industrial Relations
Office of the Industry Regulator
Origin Energy
Pacific Energy Australia
Palmerston Youth Skills Centre
PEER Training
Phillip Riley
Plumbing and Pipe Trades Employees Union
PMV Training
Power Safety Training RTO 45198
Power and Water Corporation (PowerWater)
Powercor
Powering Australia
Powerlink Qld
Qld Business Chamber
Queensland Health
Queensland Hydro
Queensland Renewable Energy Jobs Advocate
Race For 2030
Relevant NZ
RelyOn Australia
RMIT University
SA Power Networks
SABE Services Group
Safe Wired Electrical And Solar Pty Ltd
Save Energy Solutions

Self Employed ACT
Service And Creative Skills Australia
Skills Lab
Skills Recognition International
Skills Tasmania
SkillsTech TAFE Queensland
Snowy Hydro
Snowy Technical Services, contracting for IDC/EIT Perth
South Australian Government
South Australian Skills Commission
South Metropolitan TAFE
South Regional TAFE
Southern Cross Electrical Engineering (Electrical)
Southwest TAFE
St Johns
Standards Australia
Sturdie Trade Services
Suncable
SuniTAFE
Superior Training Centre
Swinburne Institute
Sydney Trains
TAFE Directors Australia
TAFE Gippsland
TAFE NSW
Tafe NSW - Sydney Campus
TAFE Queensland
TAFE SA
TasNetworks
TasTAFE
Territory Generation
Thales Australia
The Chamber of Minerals & Energy WA
The Gordon TAFE
The McGinn Partnership
Trades Recognition Australia
Transgrid
Transgrid Training
Tyrone Electrical Services
UGL
United Energy
University of New South Wales
University Of Newcastle
Upwind Overdrive Consulting
V. Mauri, Training and Safety Consulting
Van Wyk Electrical
VCM Training
Ventia
Veritas
VES Electrical Solutions
VETASSESS
Victoria University
Victoria University - Sunshine Campus
Victorian Catholic Education Authority
Voldedge
Western Australian Electrical, Manufacturing and Utilities
Industry Training Council (EMUTC)
WHISE
Wodonga TAFE
Woolworths
Workinitiatives
Zinfra

Occupation matrix

Table 35: Employment figures for critical trades workforce

Critical energy occupation	ANZSCO v1.3	OSCA v1	Data type
Electrical Engineers	2333 Electrical Engineers	2433 Electrical Engineering Professional	Total employed, 2024 average Female (%) First Nations (%) Shortage rating, 2024 VET graduates, 2023
Electrical Engineering Draftspersons and Technicians	3123 Electrical Engineering Draftspersons & Technicians	3123 Electrical Engineering Draftspersons and Technicians	Total employed, 2024 average Female (%) First Nations (%) Shortage rating, 2024 VET graduates, 2023
Electricians	3411 Electricians	3812 Electricians	Total employed, 2024 average Female (%) First Nations (%) Shortage rating, 2024 VET graduates, 2023
Air Conditioning and Refrigerations Mechanics	3421 Air Conditioning & Refrigerations Mechanics	3821 Air Conditioning and Refrigeration Technicians	Total employed, 2024 average Female (%) First Nations (%) Shortage rating, 2024 VET graduates, 2023
Electrical Transmission and Distribution Trades Workers	3422 Electrical Distribution Trades Workers	3811 Electrical Distribution Trades Workers	Total employed, 2024 average Female (%) First Nations (%) Shortage rating, 2024 VET graduates, 2023
Electronics Trades Workers	3423 Electronics Trades Workers	3822 Electronics Trades Workers	Total employed, 2024 average Female (%) First Nations (%) Shortage rating, 2024 VET graduates, 2023

Note: Occupation employment figures reflect those across all sectors, not just employment within the energy sector. Counts of students in the total column includes those located offshore and those who did not list their location (i.e. "not known").

S = Shortage

NS = No Shortage

R = Regional Shortage

ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
347	7,943	109	6,417	1,879	525	8,217	4,044	29,480
13.3%	10.3%	0.0%	16.8%	14.2%	0.0%	11.4%	8.1%	11.8%
0.0%	0.8%	0.0%	0.6%	0.5%	1.3%	0.1%	0.4%	0.5%
S	S	S	S	S	S	S	S	S
0	5	5	0	0	0	15	5	350
55	1,537	54	1,761	854	242	3,888	1,444	9,836
0.0%	0.0%	46.7%	0.2%	0.1%	0.0%	0.0%	0.5%	0.4%
0.0%	2.0%	3.4%	2.3%	0.7%	1.9%	0.5%	1.1%	1.5%
NS	NS	S	NS	NS	NS	NS	S	NS
0	10	0	10	0	0	40	35	195
1,542	49,328	1,878	41,296	11,325	4,067	48,277	27,493	185,208
0.0%	4.9%	2.7%	3.7%	1.4%	1.8%	2.1%	5.7%	3.6%
1.8%	2.7%	8.2%	2.6%	1.0%	3.7%	0.8%	1.9%	2.1%
S	S	S	S	S	S	S	S	S
265	2,555	110	1,745	740	145	1,995	1,880	9,575
95	10,780	443	5,140	3,165	384	6,558	2,912	29,477
0.0%	6.9%	0.4%	0.0%	0.0%	0.0%	16.8%	0.1%	1.6%
2.4%	3.4%	10.0%	3.0%	1.1%	4.4%	0.5%	1.6%	2.5%
S	S	S	S	S	S	S	S	S
20	415	30	285	55	10	95	110	1,100
1	2,526	5	3,856	1,148	470	2,641	1,696	12,344
0.0%	0.0%	0.0%	3.8%	24.7%	0.2%	0.0%	41.8%	3.2%
0.0%	6.4%	19.6%	4.7%	4.1%	8.2%	0.9%	3.5%	4.2%
S	S	NS	S	S	S	S	S	S
5	75	0	135	20	10	40	55	345
928	9,548	309	7,056	1,702	462	6,886	4,449	31,340
11.1%	6.6%	12.7%	0.2%	0.2%	59.5%	13.5%	7.3%	6.7%
2.0%	1.7%	1.4%	1.7%	0.8%	1.3%	0.7%	1.1%	1.3%
S	NS	S	S	S	S	R	S	S
0	215	30	195	85	20	110	65	820

Sources: ABS, Labour Force Detailed, Table EQ08, November 2024 (12-month average) (Total employed, and Female (%)); ABS Census of Population and Housing 2021 (First Nations %); JSA Occupation Shortage List 2024 (Shortage rating); NCVER Total VET Activity – Program completions by 4-digit ANZSCO 2023 (VET graduates)

Data methodology – Critical trades workforce

Data items	Source
- Energy apprentices in-training, actual and projected need » National » Women » First Nations » Business size of employer Note: Any person enrolled in an apprenticeship in the following four training packages is considered an energy trade apprentice by PSO - UEE – Electrotechnology Training Package - UET – Transmission, Distribution and Rail Sector Training Package - UEP – Electricity Supply Industry - Generation Sector Training Package - UEG – Gas Industry Training Package	NCVER, Apprentices and Trainees, 2024. Contract status: in-training. Note: - The NCVER Apprentices and Trainees dataset is released quarterly; as such, the presented time series data reflects the cyclical nature of the training activity. - Projected need is PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy. The analysis shows that apprenticeship numbers needed to increase by 40% annually over the past decade to meet workforce needs for the Net Zero economy.
Occupation employment 2010-2024 (by ANZSCO)	ABS, Labour Force Survey, 2024.
Occupation employment by sector (ANZSCO by ANZSIC) Note: Sectors are defined by the remit of each Jobs and Skills Council, which are based on ANZSIC codes.	ABS, Census of Population and Housing, 2021.
- Energy trades shortages » National » State/territory » Regional	Jobs and Skills Australia, Occupation Shortage List, 2024.
Online advertisements by occupation 2015-2024	Jobs and Skills Australia, Internet Vacancy Index, 2024. Monthly average.
- Suitability conundrum » Qualified but not suitable (unsuccessful) » Qualified and suitable (successful)	Jobs and Skills Australia, Survey of Employers who have Recently Advertised (SERA), 2024, customised report.

Data items	Source
- Occupation-specific apprentices in-training (ANZSCO) » National, time series 2010-2024 » Women » First Nations » Projected need	NCVER, Apprentices and Trainees, 2024. Contract status: in-training. Note: - The NCVER Apprentices and Trainees dataset is released quarterly; as such, the presented time series data reflects the cyclical nature of the training activity. - Projected need is PSO analysis of customised data produced by Deloitte Access Economics for Jobs and Skills Australia (2023) The Clean Energy Generation: Workforce needs for a Net Zero economy. The analysis shows that apprenticeship numbers needed to increase by 40% annually over the past decade to meet workforce needs for the Net Zero economy.
Apprentice modelling methodology	NCVER, Apprentices and Trainees, 2024. Contract status: in-training. JSA, Clean Energy Generation Report, 2023 Note: - Analysed JSA clean energy generation projections to determine a workforce shortfall of 42,900 in six key energy trades by 2030 under the high demand scenario. - Used this figure as the target for net additional apprenticeship completions required by 2030 to meet workforce needs. - Since it takes four years to complete an energy apprenticeship, these apprentices must be in training by the end of 2026 at the latest. - Built a model using historical in-training data (with a four-year lag) to estimate normal completions from in-training numbers, identifying a conversion rate of approximately 6%. - Applied this model to estimate how many completions current apprenticeship in-training figures would yield by 2030. - Tested various increases in in-training numbers (from 2015 onward) to determine how to reach the target of 42,900 additional completions by 2030. - Found that a 40% increase in apprentices in-training (over and above actual numbers) starting from 2015 would be needed to achieve around the 42,900 additional completions by 2030.

Note: Workforce data based on 3 or 4-digit ANZSIC classifications in PSO's remit.

Data methodology – Subsector workforce

Data items	Source
- State/Territory employment - Female employment % - Part-time employment %	ABS, Labour Force, Detailed, November 2024, EQ06 four-quarter averages. Note: ANZSIC-JSC employment proportions: <i>Due to industry crossovers, two 3-digit ANZSIC codes in PSO's remit are shared with other Jobs and Skills Councils:</i> 323 Building Installation Services: 57.3% 502 Pipeline and Other Transport: 74.7% <i>These proportions have been determined by Jobs and Skills Australia. Powering Skills' proportions have been applied to calculate employment statistics where 3-digit ANZSIC codes have been used.</i> <i>Solar, Wind and Other Energy; Coal and Mineral Energy Generation; and Hydro-Electricity Generation apportioning via Census 2021:</i> <i>Estimated employment for these subsectors are based on workers listed under 3-digit ANZSIC 261 as detailed in ABS, Labour Force Detailed, Table EQ06, apportioned to employment proportions for relevant 4-digit ANZSIC codes in the ABS Census 2021. For example, during the 2021 Census, for ANZSIC 261, 63% were employed in 2611 Fossil Fuel, 16% in 2612 Hydro-Electric and 18% in 2619 Other Electricity. The following calculation was applied to estimate employment in November 2024:</i> <i>[ANZSIC 261] employment Nov 2024 X 0.18 = [ANZSIC 2619] estimated employment Nov 2024</i> <i>Electrical Services & AirCon Heating Services apportioning via Census 2021:</i> <i>Similar to the above, apportioning for these two subsectors is based on the 2021 Census employment breakdown for ANZSIC 323 Building Installation Services of which 57.3% of employment is within PSO's remit. Of that 57.3%, 86% represent 3232 Electrical Services and 14% represent 3233 Air Conditioning and Heating Services.</i>

Data items	Source
• Employment 20-year time series	ABS, Labour Force, November 2024, trended by Jobs and Skills Australia
• First Nations status • Greater capital city • Median age	ABS, Census of Population and Housing, 2021.
• Highest educational attainment	ABS, Characteristics of Employment Survey (CoE), August 2024, Customised Report
• Employment projections (May 2024 to May 2034)	Victoria University, produced for Jobs and Skills Australia, 2024.
• Number of businesses at June 2023	ABS, Counts of Businesses, June 2023
• Renewable energy activities	ABS, Employment in Renewable Energy Activities, Australia (2018-19), released 2020. Note: • <i>This data is experimental and therefore indicative in nature.</i> • <i>Hydro has been excluded from these figures as hydro-electricity is covered in a separate section of the report</i> • <i>National estimates of employment in renewable energy jobs, both official and unofficial, typically provide only limited detail on those activities deemed to be 'renewable energy' activities. This publication systematically identifies, for each renewable energy type, the main activities considered to be in scope of employment in renewable energy activities. These activities typically range from manufacturing of equipment specific to renewable energy; installation of renewable energy infrastructure; and the operation and maintenance of this infrastructure. This publication includes employment in government agencies and non-profit institutions (NPIs) where this employment is predominantly motivated by support for renewable energy. The estimates contained in this publication represent the outcome of development work requiring the use of assumptions and synthetic estimates for some data components, and are considered experimental.</i>

Note: Workforce data based on 3 or 4-digit ANZSIC classifications in PSO's remit.

Energy career pathways

Understanding career pathways is essential when choosing a profession because it ensures you invest time and effort into something that suits your skills and aspirations, helps you plan for job security, and ensure financial stability amid rising living costs.

Electrical Engineers

\$115,752
Median annual earnings

Career Pathway		
01	Education & Training	Most begin with a Bachelor of Engineering (Electrical) or a related degree. Some pursue postgraduate studies for specialisation or leadership roles.
02	Graduate Engineer	Entry-level engineers work under supervision, gaining experience in power systems, automation, telecommunications, or electronics.
03	Experienced Engineer	With time, engineers take on more complex projects, such as designing electrical systems, managing infrastructure, or working in renewable energy.
04	Specialisation & Advancement	Engineers may specialise in control systems, embedded systems, or high-voltage networks.
05	Senior & Leadership Roles	Experienced professionals move into management, consulting, or research.

Possible future upskilling requirements in line with augmentation:

- AI-based software
- Predictive maintenance and smart systems/grids
- Automation technologies

Cost of Living Impact – High expenses push people toward careers with strong earning potential and stable job prospects, which are achievable through energy careers.

Job security (automation/augmentation) – Jobs are shifting due to AI, automation and augmentation. While some routine roles are being replaced, energy careers are generally much less vulnerable compared to other highly repetitive or routine-based jobs. Rather, energy careers will be more impacted by augmentation and will require upskilling to stay relevant in future.

Exciting new careers in renewable energy – career opportunities in technologies such as electric vehicles, bioenergy, offshore wind and hydrogen will continue to emerge.

Long-Term Planning – Knowing how your career progresses, the skills needed, and future industry trends helps ensure job satisfaction and financial security.

Note: Median salaries derived from ABS Survey of Employee Earnings and Hours, May 2023, customised report.

Electrical Engineering Draftspersons and Technicians

\$134,160

Median annual earnings

Career Pathway		
01	Education & Training	Most start with an Advanced Diploma of Engineering Technology – Electrical or a related qualification.
02	Entry-Level Role	Graduates often begin as junior draftspersons or technicians, assisting with electrical designs, testing, and installations.
03	Experienced Technician/Draftsperson	With experience, they take on more complex tasks, such as designing electrical circuits, preparing technical drawings, and conducting system inspections.
04	Specialisation & Advancement	Some professionals specialise in substation design, automation systems, or high-voltage networks.
05	Senior & Leadership Roles	Experienced individuals may move into supervisory positions, consulting, or engineering support roles.

Possible future upskilling requirements in line with augmentation:

- AI-based software
- Predictive maintenance and smart systems/grids
- Automation technologies



Electricians

\$114,608

Median annual earnings

Career Pathway		
01	Education & Apprenticeship	Most electricians start with a Certificate III in Electrotechnology Electrician, which includes an apprenticeship lasting around four years.
02	Licensing & Registration	After completing training, electricians must obtain an electrical licence to work independently.
03	Qualified Electrician	Licensed electricians work in residential, commercial, or industrial settings, installing and maintaining electrical systems.
04	Specialisation & Advancement	With experience, electricians can specialise in automation, renewable energy, high-voltage systems, or instrumentation.
05	Senior & Leadership Roles	Experienced professionals may move into supervisory positions, business ownership, or electrical engineering.

Possible future upskilling requirements in line with augmentation:

- AI-based software and diagnostics
- Predictive maintenance
- Smart home systems and internet of things integration
- Robotics in hazardous work
- Automation technologies



Air Conditioning and Refrigeration Mechanics

\$104,988

Median annual earnings

Career Pathway		
01	Education & Apprenticeship	Most begin with a Certificate III in Air Conditioning and Refrigeration, which includes an apprenticeship lasting around four years.
02	Entry-Level Role	After completing training, workers start as junior mechanics, installing and maintaining air conditioning and refrigeration systems.
03	Experienced Mechanic	With time, they take on more complex tasks, such as diagnosing faults, repairing refrigerant leaks, and calibrating system controls.
04	Specialisation & Advancement	Some mechanics specialise in commercial HVAC systems, industrial refrigeration, or energy-efficient technologies.
05	Senior & Leadership Roles	Experienced professionals may move into supervisory positions, consulting, or technical training.

Possible future upskilling requirements in line with augmentation:

- AI-based software and diagnostics
- Predictive maintenance
- Smart home systems and internet of things integration
- Robotics in hazardous work



Electrical Transmission and Distribution Trades Workers

\$145,444

Median annual earnings

Career Pathway		
01	Education & Apprenticeship	Most start with a Certificate III in ESI through an apprenticeship, which usually takes around four years to complete.
02	Entry-Level Role	After completing training, workers begin as junior linesworkers or cable jointers, installing and maintaining power lines and electrical infrastructure.
03	Experienced Tradesperson	With time, they take on more complex tasks, such as high-voltage maintenance, emergency repairs, and underground cable work.
04	Specialisation & Advancement	Some workers specialise in transmission networks, substation maintenance, or network control.
05	Senior & Leadership Roles	Experienced professionals may move into supervisory positions, technical training, or engineering roles.

Possible future upskilling requirements in line with augmentation:

- AI-based predictive maintenance
- Smart grid technologies
- Robotics and automation in field work
- Cybersecurity for electrical networks
- Renewable energy systems
- High Voltage (HV) systems



Electronics Trades Workers

\$79,300
Median annual earnings

Career Pathway		
01	Education & Training	Most start with a Certificate III in Electronics and Communications or related qualification, often through an apprenticeship or vocational training.
02	Entry-Level Role	Graduates begin as junior technicians, assisting with electronic repairs, installations, and maintenance.
03	Experienced Technician	With time, they take on more complex tasks, such as diagnosing faults, repairing electronic circuits, and maintaining control systems.
04	Specialisation & Advancement	Some professionals specialise in industrial automation, telecommunications, or medical electronics.
05	Senior & Leadership Roles	Experienced individuals may move into supervisory positions, consulting, or engineering support roles.

Possible future upskilling requirements in line with augmentation:

- AI-based predictive maintenance
- Smart grid technologies
- Robotics and automation in field work
- Cybersecurity for electrical networks

Policies and initiatives that align with the Workforce Plan

There is a tremendous amount of information and reports being written on Australia's energy sector. Stakeholder feedback sourced through the development of this Workforce Plan indicated that, while this data is extremely useful, there is considerable scope for the information and analysis contained with these reports to be shared, built upon and linked. PSO recognises that potentially offering a coordination role or equivalent could improve both the harmonisation and focus of researchers on addressing data gaps within the energy sector.

Initiative	Focus	Agency Lead
Net Zero Plan Net Zero sectoral decarbonisation plans	The Net Zero Plan will articulate Australia's transition to Net Zero. Skills and workforce will be important considerations. Six sectoral emissions reduction plans will support the Net Zero Plan.	Department of Climate Change, Energy, the Environment and Water
National Energy Workforce Strategy	Improve coordination across governments Identify solutions to workforce challenges Address energy skills gaps and training sector challenges Focus on priority cohorts in the energy workforce	Department of Climate Change, Energy, the Environment and Water
National Skills Agreement Key Apprenticeship Program TAFE Centres of Excellence Jobs and Skills Councils National Skills Plan	National, State and Territory Agreement New energy skills and training Skills for critical and emerging industries Workforce challenges VET completions, Closing the Gap initiatives, National TAFE network, VET data and evidence	Department of Employment and Workplace Relations
New Energy Skills Program – Phase 1 Training pathways • Mentors to guide new energy apprentices • Clean energy workforce capacity study	• Training resources for EV and renewable training • Workforce challenges • New energy skills	Department of Employment and Workplace Relations

Initiative	Focus	Agency Lead
Jobs and Skills Australia Clean Energy Capacity Study: The Clean Energy Generation Report - Foundational Skills Study - Skills Priority List - First Nations Workforce Analysis - Food chain Supply Capacity Study	Workforce and skills needs First Nations education and employment data	Jobs and Skills Australia
National Energy Performance Strategy	Strategy for improving energy performance e.g. energy efficiency, demand flexibility, electrification Looks at workforce needs through NEWS and JSCs Talks about developing Energy Management Fundamentals training	Department of Climate Change, Energy, the Environment and Water
National Energy Transformation Partnership Capacity Investment Scheme Rewiring the Nation First Nations Clean Energy Strategy National Energy Workforce Strategy (NEWS) Also related: First Nation Community microgrids program Community Batteries for Household Solar program Community Solar Banks program	Commonwealth, State and Territory Partnership Energy generation and storage Investment in renewable energy First Nations participation in Energy Policy and Programs NEWS to forecast workforce capability and needs Infrastructure projects	Department of Climate Change, Energy, the Environment and Water
Indigenous Skills and Employment Program The Community Development Program	Indigenous skills and employment Building skills in remote Australia	National Indigenous Australians Agency

Initiative	Focus	Agency Lead
Rewiring the Nation Tasmania's Battery of the Nation Victoria: Renewable Energy Zones and Offshore wind Marinus Link between Tasmania and Victoria Transmission projects and Renewable Energy Zones in NSW Transmission projects in Western Australia	Centrepiece of Powering Australia Plan Energy transmission projects Supports AEMOs Integrated System Plan for energy transmission	Department of Climate Change, Energy, the Environment and Water
Powering the Regions Fund Safeguard Transformation Stream Critical Inputs to Clean Energy Industries Stream Industrial Transformation Stream Program Grant funding Primary steel production sector and cement, lime, alumina and aluminium sectors	Regional support Emission reduction Sovereign manufacturing capability Support and foster new clean energy industries	Department of Climate Change, Energy, the Environment and Water
Hydrogen Headstart program	Investment in emerging industry Hydrogen production projects	Department of Climate Change, Energy, the Environment and Water
Offshore Renewables Growth Strategy	Emerging industry Current consultation process	Department of Climate Change, Energy, the Environment and Water
National Electric Vehicle Strategy Electric Car Discount Bill	Uptake of EVs	Department of Climate Change, Energy, the Environment and Water

Initiative	Focus	Agency Lead
Driving the Nation Fund	Uptake of EVs	Department of Climate Change, Energy, the Environment and Water
National EV charging network	Transport infrastructure	
ARENA grants – EV charging infrastructure		
Snowy Hydro 2.0	Energy generation and storage	Snowy Hydro
National Reconstruction Fund	Growing industrial capability Investment in priority areas Decarbonisation and secure jobs and skilled workforce	Department of Industry Science and Resources/ National Reconstruction Fund
Australian Made Battery Plan	Sovereign manufacturing	Department of Industry Science and Resources
Powering Australia Industry Growth Centre	New renewable tech investment	
National Battery Strategy	Supporting New Energy Apprenticeships	
Battery Manufacturing Precinct QLD		
Cooperative Research Centres	Various focuses – some may be relevant to link into	Department of Industry Science and Resources
Developing Australia's Hydrogen Workforce – October 2022	Mapping exercise by PWC Large list of stakeholders consulted with	Department of Employment and Workplace Relations
Net Zero Economy Agency (NZEA)-precursor to the establishment of a legislated Net Zero Authority	Transition to Net Zero and climate targets including sector plans	Department of the Prime Minister & Cabinet
Net Zero Economy Authority - Net Zero Economy Taskforce	Worker transition strategy	
2035 Emissions Reduction Targets	Emissions reduction	Climate Change Authority

Initiative	Focus	Agency Lead
Women in energy Equality in Energy Transitions Initiative Equal by 30 Gender Equality in the Energy Sector Report	Gender equality in the energy sector	Department of Climate Change, Energy, the Environment and Water
National Microcredentials Framework	Supporting skills and training in the tertiary sector	Department of Education
Future Gas Strategy	Gas industry projection	Department of Industry Science and Resources
Industry Growth Program	Sovereign manufacturing supporting SMEs	Department of Industry Science and Resources
National Climate Risk Assessment and National Adaptation Plan (NAP)	Climate adaptation	Department of Climate Change, Energy, the Environment and Water
Towards Net Zero - CSIRO	Building capability in hard to abate sectors	CSIRO
Hydrogen Industry Mission - CSIRO	Hydrogen research and development	CSIRO
Critical Minerals Critical Minerals Office Critical Minerals Facility Critical Minerals Strategy	Resource investment Sovereign processing and manufacturing	Department of Industry Science and Resources
Guarantee of Origin	Emission certification	Department of Climate Change, Energy, the Environment and Water

Initiative	Focus	Agency Lead
Safeguard Mechanism	Emission reduction policy – administered by Clean Energy Regulator	Department of Climate Change, Energy, the Environment and Water
Gas Market Code	Energy and affordability	Department of Climate Change, Energy, the Environment and Water
National Rail Manufacturing Plan National Rail Action Plan Emerging Aviation Technology Partnerships Program	Transport - rail and aviation focus Includes Net Zero focus	Department of Industry Science and Resources/ National Transport Commission
Aviation White Paper Australian Jet Zero Council	Includes skilled and sustainable workforce focus	
Emerging Aviation Technologies Policy Forum		Department of Infrastructure, Transport, Regional Development, Communications and the Arts
Climate-Smart Agriculture Program Drought resilience - CSIRO	Agriculture and land focus Includes Net Zero focus	Department of Agriculture, Forestry and Fishes/CSIRO
Forestry Workforce Training Program	Includes skilled and sustainable workforce focus	
Energy Savings Package includes: Household Energy Upgrades Fund Nationwide House Energy Rating Scheme Greenhouse and Energy Minimum Standards Small Business Energy Incentive Energy Efficiency Grants for Small and Medium Enterprises	Energy Performance and Electrification	Department of Climate Change, Energy, the Environment and Water/ Clean Energy Finance Corporation/ Treasury

Initiative	Focus	Agency Lead
Future Made in Australia	Foster and encourage the significant private sector investment Net Zero industries.	Treasury
International	New energy and industry	Various
Climate and infrastructure partnership with Indonesia		
Pacific Climate Infrastructure Financing Partnership		
Australia-Germany Hydrogen Accord		
Quad Clean Energy Supply Chain Diversification Program		
Australia-United States Climate, Critical Minerals and Clean Energy		
Transformation compact Australian's international clean energy partnerships		
Sustainable Finance and Governance	Supporting climate change and Net Zero goals	Various
Sovereign green bonds Sustainable finance agenda		
Mandatory climate-related financial disclosure requirements		
Environment Protection Australia		
Australian Carbon Credits Units		
Annual Climate Change Statement		
Climate Change Authority		
Treasury's climate modelling capability		
National Hydrogen Strategy	The strategy provides the framework to guide Australia's production, use and export of hydrogen with aims to position Australia to become a global hydrogen leader.	Department of Climate Change, Energy, the Environment and Water

Initiative	Focus	Agency Lead
Building Women's Careers Program	The Program aims to drive structural and cultural changes in training and work environments, and improve women's access to flexible, safe and inclusive training and work opportunities across key male-dominated industries of clean energy, construction, advanced manufacturing and digital and technology. This flagship Program is being delivered through 20 collaborative project partnerships across TAFEs, GTOs, employer groups, peak bodies, unions and community groups to create safer, more respectful workplaces for all Australians."	
NSW: - Electricity Infrastructure Roadmap - Electricity Strategy	Supports sustainable and reliable electricity systems.	NSW Climate and Energy Action
VIC: - Victoria's Electricity Future Plan - Gas Substitution Roadmap - Victorian Renewable Hydrogen Industry Development Plan - The Victorian Transmission Plan	Supports transition to a renewable energy future	Victoria State Government – Energy, Environment and Climate Action
SA: - Hydrogen Action Plan - Green Iron and Steel Strategy - Hydrogen Jobs Plan - Hydrogen and Renewable Energy Act	Supports hydrogen industry	Various
WA: - Energy Transformation Strategy - PoweringWA	Supports reliable, sustainable and affordable electricity.	Western Australia Government

Glossary/acronym list

Acronym	Full name	Descriptor	More Information
ABS	Australian Bureau of Statistics	An Australian Government agency that collects and analyses statistics on economic, population, environmental, and social issues to advise the Australian Government	https://www.abs.gov.au/about
ACR	Air Conditioning and Refrigeration	Air Conditioning and Refrigeration (ACR) refers to systems used for cooling and heating spaces	
ANZSCO	Australia and New Zealand Standard Classification of Occupations	ANZSCO is the Australian and New Zealand Standard Classification of Occupations (ANZSCO). It groups jobs together into occupations that have similar tasks and responsibilities.	https://www.qgso.qld.gov.au/about-statistics/statistical-standards-classifications/australian-new-zealand-standard-classification-occupations
ANZSIC	Australian and New Zealand Standard Industrial Classification	The ANZSIC is used to collect, analyse and publish industry statistics in Australia and New Zealand. It also helps to compare industry statistics between the two countries and with the rest of the world.	https://www.abs.gov.au/statistics/classifications/australian-and-new-zealand-standard-industrial-classification-anzsic/latest-release
AQF	Australian Qualifications Framework	The Australian Qualifications Framework (AQF) is the national policy for regulated qualifications in Australian education and training. It incorporates the qualifications from each education and training sector into a single comprehensive national qualifications framework.	https://www.aqf.edu.au/about/what-aqf
ARENA	Australian Renewable Energy Agency	Supports improvements in the competitiveness and supply of renewable energy and the uptake of energy efficiency and electrification by providing financial assistance and sharing knowledge, to accelerate innovation that benefits all Australians, and facilitates the achievement of Australia's greenhouse gas emissions targets.	https://arena.gov.au/
ASQA	Australian Skills Quality Authority (VET regulator)	The Australian Skills Quality Authority (ASQA) is the national regulator for vocational education and training (VET) in Australia	https://www.asqa.gov.au
AVETMISS	Australian Vocational Education and Training Management Information Statistical Standard	It is a national data standard that ensures consistent and accurate capture and reporting of Vocational Education and Training (VET) information about students.	https://www.ncver.edu.au/rto-hub/what-is-avetmiss
ATAR	Australian Tertiary Admission Rank	A student's position relative to all students in their age group. It's the primary criterion for entry into most undergraduate-entry university programs in Australia. From 2020 the ATAR will replace the OP as the standard pathway to tertiary study for Queensland Year 12s.	https://www.uac.edu.au/future-applicants/atar
CALD	Culturally and Linguistically Diverse	The term 'culturally and linguistically diverse' (CALD), refers to people from a range of countries and ethnic and cultural groups. It includes people of non-English speaking background as well as people born outside Australia but whose first language is English and encompasses a wide range of experiences and needs.	

Acronym	Full name	Descriptor	More Information
CoE	Characteristics of Employment (CoE)	CoE provides insights into employment conditions, earnings, and workforce trends.	https://www.abs.gov.au/statistics/labour/earnings-and-working-conditions/characteristics-employment-australia/latest-release
CPD	Continuing Professional Development	CPD refers to ongoing learning and training for professionals to maintain and enhance their skills.	https://www.ahpra.gov.au/Registration/Registration-Standards/CPD.aspx
CSSI	Critical State Significant Infrastructure	CSSI refers to essential infrastructure projects deemed critical for economic, social, and environmental reasons.	https://www.planning.nsw.gov.au/assess-and-regulate/development-assessment/planning-approval-pathways/state-significant-infrastructure
DCEEW	Dept. Climate Change, Energy, the Environment and Water (Federal)	The Department of Climate Change, Energy, the Environment and Water (DCEEW) is an Australian Government department that: - Protects Australia's environment, water resources, and heritage - Leads the country's response to climate change and sustainable energy use - Delivers on the government's climate change and energy agenda	https://www.dcceew.gov.au/
DEI	Diversity Equity and Inclusion	Diversity, Equity, and Inclusion (DEI) is a conceptual framework that promotes the fair treatment and full participation of all people.	
DEWR	Dept. Employment, Workplace Relations (Federal)	Is a government agency in Australia that helps Australians find employment and supports fair and productive relationships between employers and employees	www.dewr.gov.au
ELV	Extra low voltage	Is a term used to describe electrical equipment or systems that operate at a voltage level that is low enough to not pose a high risk of electrical shock. (A voltage of 50 volts alternating current (AC) or less, or 120 volts direct current (DC) or less)	
EPC	Essential Performance Capabilities	The Essential Performance Capabilities (EPCs) are a list of capabilities that electricians applying for an unrestricted electrical licence in an Australian state or territory are expected to have. As such, the EPCs inform the knowledge and skills in the qualification/s that are required under legislation for eligibility to apply for this licence.	https://www.erac.gov.au/licensing/essential-performance-capabilities-for-electricians/
ERAC	Electrical Regulatory Authorities Council	Is the peak body of electrical safety regulators in Australia and New Zealand	https://www.erac.gov.au/
HVAC R	Heating Ventilation and Air Conditioning, Refrigeration		
HFC	Hydrofluorocarbon	Hydrofluorocarbon (HFC) is a synthetic compound used in refrigeration and air conditioning.	
IE	Integrated Energy	IE refers to systems that combine multiple energy sources for efficiency and sustainability.	

Acronym	Full name	Descriptor	More Information
ITAB	Industry Training Advisory Body	Is an independent, autonomous body that provides advice on training and skills needs for a specific industry sector. ITABs are funded and recognised by state governments and are a key source of information for governments on industry training matter.	https://www.nsw.gov.au/education-and-training/vocational/vet-programs/itabs
JSA	Jobs and Skills Australia	Is to engage, advise and assist the Australian Government and other stakeholders in decision-making on the current, emerging and future skills and workforce needs of the Australian economy.	https://www.jobsandskills.gov.au/
JSC	Jobs and Skills Council	Jobs and Skills Council (JSC) is an industry-led body addressing workforce challenges and skills development.	https://www.dewr.gov.au/skills-reform/jobs-and-skills-councils
NCVER	National Centre for Vocational Education Research	The National Centre for Vocational Education Research (NCVER) is the national professional body responsible for collecting, managing, analysing and communicating research and statistics on the Australian vocational education and training (VET) sector.	https://www.ncver.edu.au/
NECA	National Electrical and Communications Association	The National Electrical and Communications Association (NECA) is an organisation of employers connected to the electrotechnology industry. NECA is the peak industry body representing the interests of the electrical and communications contracting industry across Australia.	https://www.neca.asn.au/
NERO	Nowcast of Employment by Region and Occupation	The Nowcast of Employment by Region and Occupation (NERO) provides monthly employment estimates across occupations and regions.	https://www.jobsandskills.gov.au/data/nero
NSA	National Skills Agreement	The National Skills Agreement (the Agreement) is a 5-year joint agreement between the Commonwealth, states and territories to strengthen the vocational education and training (VET) sector that commenced on 1 January 2024. The Agreement will: • Deliver a national VET system that provides high quality, responsive and accessible education and training to boost productivity. • Support Australians to obtain the skills and capabilities they need to obtain well-paid, secure jobs. • Ensure Australia has the skilled workforce it needs now and into the future, with TAFE at the heart of the VET sector.	https://www.dewr.gov.au/skills-reform/national-skills-agreement
NSC	National Skills Commission	Former iteration of Jobs and Skills Australia	https://www.dewr.gov.au/nsc
NTR	National Training Register	Training.gov.au is the official national register of information on vocational education and training (VET) in Australia. The national register has the details of all nationally recognised training products, including accredited courses, endorsed training package qualifications, units of competency and skill sets.	https://training.gov.au/
NPI	Non-Profit Institution	NPI refers to organisations that operate for social or public benefit rather than profit.	
OSCA	Occupation Standard Classification for Australia.	Is a new framework for classifying different occupations according to the current and future needs of the Australian labour market. OSCA aims to offer a more comprehensive, updated, and flexible classification of occupations.	https://www.abs.gov.au/about/consultation-and-conferences/updating-anzsco/about-osca
OSL	Occupation Shortage List	The Occupation Shortage List (OSL) is an annual assessment of which occupations are in shortage in Australia's labour market. The OSL is created by Jobs and Skills Australia, which uses a variety of data sources and methods to determine the shortage status of occupations.	https://www.jobsandskills.gov.au/data/occupation-shortages-analysis

Acronym	Full name	Descriptor	More Information
OEM	Original Equipment Manufacturer	OEM refers to companies that produce parts used in another company's products.	
PPE	Personal Protective Equipment	PPE includes safety gear such as helmets, gloves, and masks used to protect workers	
REZ	Renewable Energy Zone	Are the equivalent of modern-day power stations. They combine new renewable energy infrastructure, including generators (such as solar and wind farms) storage (such as batteries and pumped hydro) high-voltage transmission infrastructure.	https://www.climatecouncil.org.au/resources/what-is-renewable-energy-zone/
RTO	Registered Training Organisation	Registered training organisations (RTOs) deliver nationally recognised training in the VET sector. To deliver this training, needs to be approved by ASQA.	https://www.asqa.gov.au/rtos/what-is-an-rto
OSL	Occupation Shortage List	The Occupation Shortage List (OSL) (and previously Skills Priority List) are lists that identify occupations that are in shortage or have high demand in Australia	https://www.jobsandskills.gov.au/data/occupation-shortages-analysis
STL	Subsidised Training List	A Subsidised Training List (STL) is a list of courses that are funded through a government department and are available for subsidised training. The STL is regularly updated to reflect the needs of the industry and the workforce.	https://desbt.qld.gov.au/training/training-careers/incentives
TGA	Training Gov	Training.gov.au is Australia's national training register. Information held on the register includes: - Nationally recognised training (NRT): training packages, qualifications, units of competency, skill sets and accredited courses. - Registered training organisations (RTOs) that are approved to deliver nationally recognised training.	www.training.gov.au
UEE	Electrotechnology Training Package	Electrotechnology covers the installation, commissioning, testing, fault finding, servicing, repair and maintenance, and design of electrical, electronic and data systems, networks and equipment for industrial, commercial and residential purposes.	https://training.gov.au/Training/Details/UEE
UEG	Gas transmission and distribution Training Package	A gas transmission training package is a training package that specifies the knowledge and skills required to work in the gas transmission industry. The gas transmission system carries large volumes of natural gas at high pressures. Key components of the system include: Pipes, Compressors, Valves, Overpressure protection, Monitoring equipment, and Metering equipment.	https://training.gov.au/Training/Details/UEG
UEP	Energy Generation Training Package	An energy generation training package is a program that provides the knowledge and skills required to work in the energy generation industry.	https://training.gov.au/Training/Details/UEP
UET	Energy Transmission and Distribution training package	An Energy Transmission and Distribution training package is a program that teaches the skills and knowledge needed to work in the electrical power transmission and distribution industry.	https://training.gov.au/training/details/UET/qualifications
UOC	Unit of Competency	A Unit of Competency is the smallest component of a Training Package that can be assessed and recognised. It gives a description of the skills and knowledge required to perform effectively to a specific standard in a particular workplace role or function.	https://www.asqa.gov.au/course-accreditation/users-guide-standards-vet-accredited-courses/standards/standard-102-and-103-enterprise-units-competency
WFP	Workforce Planning	Workforce Planning is the process of analysing, forecasting, and planning workforce supply and demand, assessing gaps relating to the Energy Sector.	



2025 Workforce Plan

