Australian Government | Infrastructure Australia

Delivering Net Zero Infrastructure:
Workforce Report

asbec
AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

July 2025

Acknowledgement of Country

Infrastructure Australia proudly acknowledges the Traditional Owners and Custodians of Australia, and their continuing connections to the land, waters, and communities. We pay our respects to them and to their Elders past and present. In preparing for the future of our infrastructure, we acknowledge the importance of looking beyond the immediate past to learn from Aboriginal and Torres Strait Islander peoples' unique history of land management and settlement, art, culture, and society that began over 65,000 years ago.

As part of Infrastructure Australia's commitment to reconciliation, we will continue to develop strong, mutually beneficial relationships with Aboriginal and Torres Strait Islander partners who can help us to innovate and deliver better outcomes for Aboriginal and Torres Strait Islander communities, recognising their expertise in improving quality of life in their communities.

A note from the artist:

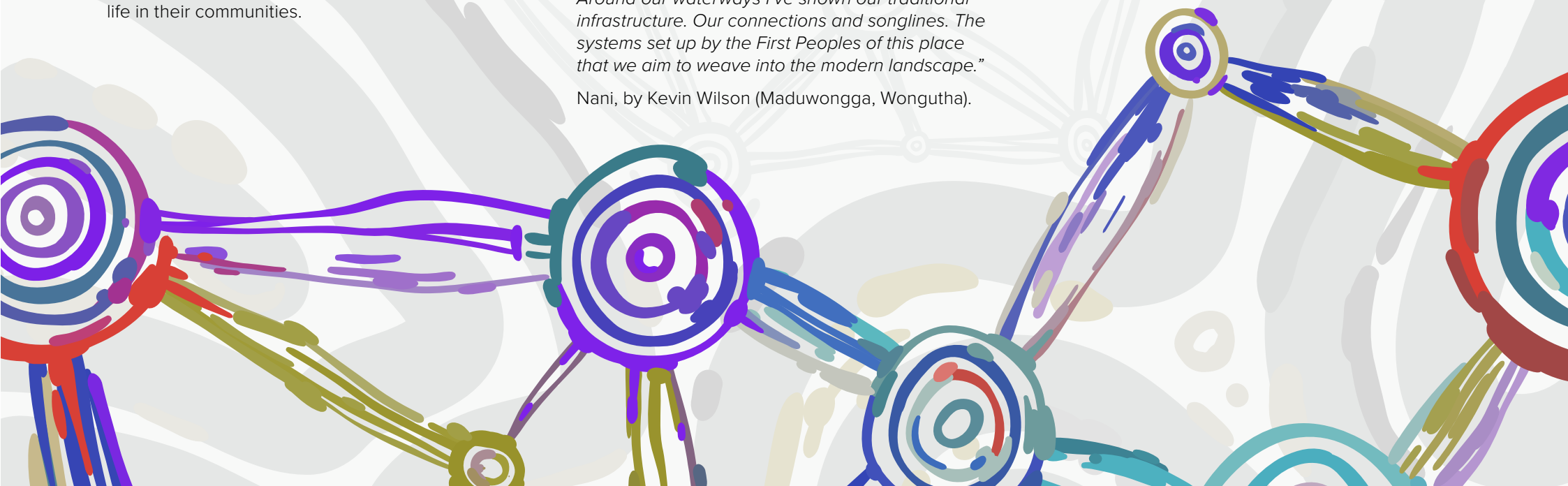
"Through sharing culture, we can create a sense of belonging, by connecting to the land we stand on. This connection of people and our communities is shown through connecting campfires. These being places we sit, yarn, and share knowledge.

The Infrastructure Australia values - expressed by the colours blue, green, orange, purple and teal - weave through the artwork to represent the opportunities and benefits for our communities. Under this sits our rivers, lakes, oceans, and waterways.

Water being the giver and supporter of life and flows through us all. I see the reconciliation journey as the water along the path to benefiting our people.

Around our waterways I've shown our traditional infrastructure. Our connections and songlines. The systems set up by the First Peoples of this place that we aim to weave into the modern landscape."

Nani, by Kevin Wilson (Maduwongga, Wongutha).



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Acknowledgements

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The Australian Sustainable Built Environment Council (ASBEC) hosts the Infrastructure Net Zero initiative. ASBEC is a collaborative national forum of peak bodies in the Australian built environment, focused on achieving sustainable, productive, and resilient buildings, infrastructure, communities, and cities. Its members consist of industry associations, professional bodies, academia, non- government organisations and government observers who are involved in the planning, design, delivery, and operation of our built environment.

Infrastructure Net Zero is a collaborative effort aimed at coordinating and reporting on Australia's infrastructure journey to net zero emissions. This initiative acknowledges the collective responsibility for decarbonisation and aims to efficiently use shared time, resources, and expertise to advance key initiatives for sustainable policy change and industry innovation.

Funding provided by

The Australasian Railway Association is the peak body for the rail sector in Australia and New Zealand, and advocate for more than 230 member organisations across the rail industry. Its membership includes all sectors of the rail industry, including passenger and freight operators, track owners, managers and contractors, suppliers and manufacturers and consultants.

Engineers Australia is Australia's national body for the engineering profession, serving as the voice and champion of its 130,000 plus members. A mission-based not-for-profit organisation, it is constituted by a Royal Charter to advance the science and practice of engineering for the benefit of the community.

Infrastructure Australia was established by the *Infrastructure Australia Act 2008* as the Australian Government's independent advisor on infrastructure investment planning and prioritisation. Its role is to provide the Australian Government with independent and expert advice on Australia's current and future needs and priorities for nationally significant infrastructure across transport, energy, water, telecommunications and social infrastructure.

Infrastructure Canberra (iCBR) builds infrastructure across the Australian Capital Territory to meet the growing needs of Canberra. iCBR's vision is to enrich and connect communities through sustainable and transformative infrastructure, places and spaces. iCBR is the Territory's expert on capital infrastructure. Its purpose is to efficiently develop, deliver and maintain infrastructure, places and spaces with partners, for the community.

Funding provided by

Infrastructure WA provides expert advice and assistance to the Western Australian Government on a range of infrastructure matters, particularly regarding the state's infrastructure needs and priorities, to assist in enhancing the efficiency and effectiveness of infrastructure planning and coordination, and to promote the adoption and use of policies, practices, information and analysis to support sound decision making in relation to infrastructure.

Infrastructure South Australia is an independent agency of the South Australian Government which provides expert advice to the government on coordination, planning, prioritisation, delivery and operation of infrastructure. It was established and operates under the *Infrastructure SA Act 2018*, to serve as an independent advisory and assurance body in relation to major infrastructure projects in South Australia.

The Department of State Development, Infrastructure and Planning is delivering a better lifestyle through a stronger economy and planning for Queensland's future by coordinating the right infrastructure at the right time. We're delivering historic levels of infrastructure investment to provide safe communities, establish health, transport and other services where they're needed, and for the 2032 Olympic and Paralympic Games.

Infrastructure Victoria is Victoria's independent advisory body, that conducts research on infrastructure issues and provides advice to the government. As an independent statutory authority, its core functions include publishing original research on infrastructure related issues, preparing a 30-year infrastructure strategy for Victoria and advising the Victorian Government on specific infrastructure matters.

Authors

Australian Government | Infrastructure Australia

Australasian Railway Association

With extensive support provided by

BuildSkills Australia is the national Jobs and Skills Council for the built environment sector – established by the Australian Government to work with industry to find solutions to the workforce challenges facing construction, property and water industries.

Consult Australia is the leading industry association representing consulting businesses in design, advisory and engineering across Australia. It plays a key role in advancing the interests and success of consulting professions, by advocating for better commercial conditions, providing professional development, resources, networking opportunities and promoting industry excellence.

Australian Government | Jobs and Skills Australia

Jobs and Skills Australia (JSA) is an independent Australian government body providing advice on current, emerging and future workforce, skills and training needs. Its primary function is to assist the Australian Government and other stakeholders in decision-making regarding the Australian economy's skills and workforce needs.

Infrastructure NSW

Infrastructure New South Wales provides independent advice to the New South Wales Government on the identification and prioritisation of critical public infrastructure. Its primary functions include providing expert advice, priority project delivery, oversight of the state's infrastructure pipeline and precinct delivery.

The Australian Government's Department of Infrastructure, Transport, Regional Development, Communication and the Arts established the **Net Zero Unit** to identify how the infrastructure portfolio can work across government and with industry to help achieve net zero and improve the resilience of our transport networks and supply chains in the face of increasing extreme events.

Executive Summary

The infrastructure workforce of today needs to be capable of delivering impactful decarbonisation activities to achieve net zero ambitions

Australia has committed to reaching net zero by 2050. Infrastructure will be a critical enabler of the energy transition, with investment in energy infrastructure projected to increase six-fold over the next five years.[1] The sector is also a significant emitter in its own right —currently, infrastructure and buildings are directly responsible for almost one third of Australia's total carbon emissions, and indirectly responsible for over half of all emissions.[2]

As Jobs and Skills Australia (JSA) pointed out in its seminal *Clean Energy Generation* report, ambitious workforce and skills policies are needed to achieve our net zero targets. JSA's report provided the first definition of Australia's clean energy workforce, with infrastructure acknowledged as an enabling sector supporting the national energy transition. It also identified a range of broad policy settings and structural changes needed to reach net zero by 2050.

Building on the scene set by JSA, it is important to consider the role of the infrastructure sector and what it means to achieve net zero in infrastructure (referred as Net Zero Infrastructure hereafter). This subject has been explored in the March 2025 report by the Australian Sustainable Built Environment Council (ASBEC), *A solid foundation: A common definition for net zero infrastructure and how to get there*.

However, there is currently no consistent and agreed definition of the workforce and skills needed to decarbonise infrastructure projects. To address this gap, the Infrastructure Net Zero initiative with ASBEC commissioned this report to:

- Identify and quantify the 'Net Zero Infrastructure workforce' – that is, the workers who currently have responsibilities that contribute to reducing infrastructure project emissions.
- Assess emissions reduction potential across the infrastructure asset lifecycle by project stages (design, plan, construct, and operations and maintenance).
- Prioritise occupations based on their impact on reducing project emissions and identify related skilling challenges.

This report identifies the subset of roles, occupations and skills that currently contribute to reducing emissions across the asset lifecycle (across planning, design, construction, operations and maintenance) within the broader infrastructure workforce. It provides a picture of the current status quo, marking a starting point from which governments and industry will need to accelerate workforce supply and capability efforts in pursuit of Net Zero Infrastructure by 2050.

It is this current workforce, adequately upskilled, that will be actioning current and future Net Zero Infrastructure targets. The policy and technology landscape will continue to evolve over the next three decades as we progress along our decarbonisation maturity curve, and today's workforce will need to be upskilled accordingly. Industry, government and training and education sectors will need to work closely to ensure respective net zero actions are coordinated and complementary to boost the pool of workers and uplift their capability.

Work is already underway, for example, infrastructure and transport ministers across the country have created the Infrastructure Decarbonisation Working Group (under the auspices of the Infrastructure and Transport Ministers' Meeting) to progress the decarbonisation of infrastructure and transport. Further to this, the Australian Government is developing net zero plans that cut across other sectors with an infrastructure component (such as the built environment, energy and resources).

While over half of the current infrastructure workforce contribute to decarbonisation efforts, more can be done to engage the rest

130,000 infrastructure workers are currently engaged in activities that contribute to reducing infrastructure project emissions ('*Net Zero Infrastructure workforce*').

This cohort comprises 105,000 workers already engaged in the infrastructure sector as defined by Infrastructure Australia across a wide range of roles – as engineers, scientists, architects, project managers, technicians, trades workers and labourers.[3] Together, they represent 53% of the current infrastructure workforce.

An additional 25,000 workers not captured in the above group also contribute to decarbonising project delivery, such as Economists, Financial/Cost Controllers and Policy Professionals.

With only half of the current infrastructure workforce contributing to net zero outcomes, there is significant opportunity to extend awareness and responsibility of decarbonisation efforts across the rest of the workforce.

White collar roles have a higher impact on reducing emissions, and carry varying workforce challenges

The Net Zero Infrastructure workforce can be split into five occupational groups based on their impact on reducing overall project emissions and distinct workforce challenges, of which three groups are identified as having the highest impact:

- **Concentrated Points of Vulnerability:** Environmental Experts and Engineering Managers— influence emissions reduction outcomes during the upfront project planning stage as well as other stages of the lifecycle. Compared to the other occupations analysed, net zero skill requirements for these roles are relatively established. The key workforce challenges are to ensure sufficient supply and monitor evolving industry needs and technical changes that may require workforce upskilling.
- **High Impact Potential:** Economists, Financial/ Cost Controllers, Policy and Procurement Specialists — are 'non-typical infrastructure' roles that support key decarbonisation efforts.[4] A low percentage of job advertisements for these roles specify net zero skills, however demand is growing. The key challenge for this group is to upskill workers with specific construction knowledge needed to maximise net zero outcomes in the sector.
- **High Demand and Many to Upskill:** Construction Managers, Architects, Engineers and Technicians — are 'typical infrastructure' roles with a high impact on reducing emissions across various project stages. This is a large and diverse group of workers representing almost 40% of the workforce with high demand growth for net zero skills. The key workforce challenge is to upskill a broad range of occupations in net zero skills from a low base.

Collectively, the high impact occupations account for almost two thirds of the Net Zero Infrastructure workforce and comprise exclusively of white-collar professionals.

The remaining two occupational groups, although necessary to broader infrastructure delivery, are assessed as having moderate to low impact on net zero outcomes. They comprise predominantly technical experts, trades workers and labourers with a heavy focus on construction stage activities. While there is high competition and unmet demand for these roles, there is relatively low demand for net zero specific skills compared to the high impact occupations.

Stakeholders across governments, industry and education and training sectors will need to work together to address workforce challenges

Given the diverse range of occupations and skills contributing to reducing emissions in infrastructure delivery, stakeholders will need to work together, at both national and state and territory levels, to address workforce challenges identified in this report.

Four recommendations are proposed to build workforce capacity. These recommendations leverage initiatives and mechanisms currently underway to achieve Net Zero Infrastructure and can be commenced immediately. See **Table 1** on the next page.

Other factors outside the scope of this work will have significant impact on the speed and success of decarbonisation efforts

This report is identifying the workers and skills that currently contribute to reducing infrastructure project emissions. Findings are based on the assessment of the workforce and skills demand as it currently stands, and provides a baseline for the growing industry capacity needed to reach 2050 net zero targets.

Stakeholders note that other factors outside the scope of this work will also have significant impact on decarbonisation outcomes for the sector. These include impact on the regional communities pivotal to the energy transition, supply chain readiness particularly of low carbon construction materials, and emerging and future skills as industry, policies and technologies evolve over the next three decades. Future workforce initiatives should also seek to address these considerations identified as having significant impact on the speed and success of net zero efforts.

Table 1: Table of recommendations

Opportunity	Recommendation
Infrastructure, with workers distributed across the transport, buildings, utilities and resources sectors, is an enabling industry that will support decarbonisation efforts across key sectors of the economy. **Work is underway at a national level to articulate the pathways to decarbonise sectors across infrastructure.** **While there is currently high awareness of the need to decarbonise infrastructure projects, industry reports low confidence on capacity to deliver on this vision and, for certain occupations, poor understanding of the specific skills that might be called upon.** **There is an opportunity to specify and uplift workforce capability to deliver Net Zero Infrastructure across key sectors of the economy. This would provide confidence in the market and workers on what they should invest in, and the benefits of doing so.** **Further, industry capability should be tracked to monitor progress, emerging needs and identify future opportunities to boost supply and uplift capability.**	The Australian Government, working with states and territories, should - **1. Coordinate actions to boost infrastructure workforce supply and skills uplift across key sectors (transport, energy and the built environment) and jurisdictions.** *This should include:* • Specifying the Net Zero Infrastructure workforce and skills needed across the economy within Australian Government decarbonisation plans, identifying any skills complementarities and overlaps across the key sectors. • Coordinating efforts on overlapping workforce issues to reduce potential cross-sector competition and strengthen the impact of interventions to boost supply, upskill current capability, and attract and retain talent. Options for further exploration include: • Working with industry to develop an initiative targeted at designing and delivering training to the Net Zero Infrastructure workforce. • Building on existing knowledge such as the analysis provided in this report and work underway across jurisdictions and by the relevant Jobs and Skills Councils. This could include: – Developing and promoting a 'national catalogue' of education and training offerings to build awareness of Net Zero Infrastructure pathways, attract new entrants and encourage upskilling of current workers in the sector. – A national stocktake of accredited and unaccredited training currently on offer and promotion of nationally consistent approaches to net zero skills training development and recognition. This could inform Jobs and Skills Councils on their review of relevant training packages, as well as industry development of Continuing Professional Development modules. **2. Track capability of the infrastructure workforce to achieve net zero over time and monitor the progress, identifying emerging needs and future opportunities to boost supply and uplift capability.** • This should build on established work. Potential options could include regular modelling to predict demand and supply gaps, building on Jobs and Skills Australia's *Clean Energy Generation* report, or annual updates on workforce supply and industry sentiment via Infrastructure Australia's annual Market Capacity reporting. As these actions cut across multiple sectors, jurisdictions and portfolios, they would need to be supported by the Department of Employment and Workplace Relations, the Department of Climate Change, Energy, the Environment and Water, Jobs and Skills Australia and relevant Jobs and Skills Councils, where appropriate. For the transport sector, these actions could be progressed immediately by the Infrastructure Decarbonisation Working Group under the Infrastructure and Transport Ministers' Meetings.

Opportunity	Recommendation
Given the high demand for infrastructure workers across key sectors, evidence of the skills transferability and actual worker mobility between these sectors could inform workforce strategies and identify opportunities to enhance worker mobility across adjacent infrastructure sectors.	BuildSkills Australia, supported by Jobs and Skills Australia and Infrastructure Australia, should - **3. Undertake research on pathways and worker mobility across adjacent infrastructure sectors and jurisdictions into high impact net zero roles.** • This research should include analysis of skills transferability, actual worker mobility in practice, and pathways from education and training from adjacent sectors • Findings of this research should be published to improve transparency of career pathways and mobility opportunities; encourage workers and businesses to invest in training and upskilling; and the education and training sector to address any gaps identified.
90% of professional roles in infrastructure (Engineers, Architects and Scientists) are already engaged in activities that contribute to reducing emissions across an infrastructure asset's lifecycle. **Professional roles have the potential to make the greatest contribution to reducing the overall emissions footprint of an infrastructure project, owing to their focus on front end design and planning stages of the asset lifecycle.** **Yet professions core to the development and delivery of infrastructure (such as Construction Managers, Architects and Engineers, and Business Case Developers) have the lowest confidence in their ability to reduce upfront carbon.[5]** **There is an opportunity to develop industry-wide training on carbon fundamentals. This would improve consistency of approach and definitions across the supply chain.**	The Australian Sustainable Built Environment Council, working with relevant professional associations and government, should – **4. Explore options to develop an industry wide approach for a Carbon Management Fundamentals program for infrastructure professionals and leaders.** • In the first instance, the program should cover the high-level fundamentals to carbon management in infrastructure, such as collaboration needed across professions and the key principles from PAS2080: governance & leadership, roles & responsibilities, carbon in decision-making, measurement & reporting • In the longer term, the program could explore developing more in-depth training modules targeted at specific carbon measurement, low carbon solutions, and the role and actions required from key professions in infrastructure decarbonisation, i.e. targeted training modules for: Business Case Advisors & Economists, Procurement Professionals, Designers, and Construction Managers.

1. Introduction

All governments across Australia have now committed to a net zero future. At the national level, the Net Zero Plan will guide our transition towards the legislated target of net zero greenhouse gas emissions by 2050.

It will be supported by six decarbonisation sectoral plans, currently underway, to capture emission reductions across the full breadth of the economy. Similar polices and plans now exist in every state and territory to reach net zero by 2050, if not earlier.

As JSA pointed out in its seminal *Clean Energy Generation* report, ambitious workforce and skills policies are needed to achieve our net zero targets. JSA's report provided the first definition of Australia's clean energy workforce, with infrastructure acknowledged as an enabling sector supporting the national energy transition. It also identified a range of broad policy settings and structural changes needed to reach net zero by 2050.

Building on the scene set by JSA, this report takes a more granular look at the workforce needed to decarbonise infrastructure as a key emitting sector. It identifies the roles, occupations and skills that currently contributes to reducing emissions across the asset lifecycle (across planning, design, construction, operations and maintenance). This report provides a picture of the current status quo, marking a starting point from which governments and industry will need to accelerate workforce supply and capability efforts in pursuit of Net Zero Infrastructure targets.

Decarbonising infrastructure delivery supports economy wide net zero ambitions

Currently, infrastructure and buildings are directly responsible for almost one third of Australia's total carbon emissions, and indirectly responsible for over half of all emissions.[6] Decarbonising the infrastructure sector will make a meaningful contribution to meeting national emissions reductions targets and play an important role in our nation's net zero transition, both as a high emitting sector in itself and as an enabling sector critical to decarbonising other parts of the economy.

On transport infrastructure for example, the Australian Government has committed to reducing emissions by investing in projects that promote integrated and sustainable land use, supporting industry changes to advance decarbonisation and working with state and territory governments to promote the use of lower emissions construction materials and transport technologies.[7] It is also developing the Transport and Net Zero Infrastructure Roadmap— one of six sectoral emissions reductions plans setting out the pathway to reach Australia's net zero target by 2050.

All governments are actively working together to progress the decarbonisation agenda across infrastructure, which is now a key priority for infrastructure and transport ministers across the country. This includes commitments to reduce embodied emissions through the delivery of land transport infrastructure (via the Federation Funding Agreement Schedule on Land Transport Infrastructure) and progressing nationally consistent policies under the auspices of Infrastructure and Transport Ministers' Meetings to quantify the economic impacts of carbon emissions and measure whole-of-life carbon in transport infrastructure project proposals.

Work is also currently in train to set out the pathway to net zero across other key infrastructure related sectors including housing, energy and resources.

The emerging need for a skilled infrastructure workforce to support the net zero transition

The infrastructure sector will need a workforce with the skills to reshape how it plans, designs, builds and operates assets to deliver on the net zero agenda.

In recognition of the skills challenges ahead, governments have started turning attention to preparing the workforce needed to maximise opportunities from the net zero transition. For example, the Australian Government is developing a National Energy Workforce Strategy to create a skilled workforce across clean energy supply and demand and enabling occupations. The recently established Net Zero Economy Authority is working to smooth transitions and create new opportunities for affected workers and communities in emissions-intensive industries, particularly in regional areas where these sectors are often concentrated, via initiatives such as the Net Zero Jobs Plan, the Energy Jobs Plan, and the Regional Workforce Transition Plans.

However, these net zero related workforce initiatives are primarily targeted at the energy transition with infrastructure captured as an enabling sector, rather than a high emitting sector that will need to fundamentally change the way it does its business.

New training initiatives have been recently established with aims to deliver a workforce that meets emerging industry skills needs

The education and training sector has recognised the need to uplift net zero skills and related competencies by the construction workforce. Several targeted initiatives around the country have been recently established to address this need, for example:

- The Western Australian *Clean Energy Skills National Centre for Excellence* (commenced in December 2024) will design and deliver training in clean energy science, engineering, construction, and operation in support of Western Australia's clean energy transformation. It is co-funded by the Australian and Western Australian governments through the National Skills Agreement and Turbocharging TAFE Centres of Excellence measure.
- Melbourne Polytechnic's *Clean Economy Skills Lab for Residential Building and Construction* (announced August 2024), funded by the Victorian Government, aims to equip workers with expertise in emerging sustainable development and clean energy fields. It will work with industry and TAFE partners to co-design new approaches for skills development, aligned with industry directions and projected need.
- In New South Wales, *the Institute of Applied Technology Construction* (opened in February 2024) is focused on future innovations and leadership in Construction. Working in collaboration with TAFE NSW, Western Sydney University, and CPB Contractors, it aims to design and deliver market-leading training rapidly adapts to industry needs. It currently offers a range of short courses on sustainability.

Most of these initiatives are currently at the initial stages of needs definition and testing market demand for new or updated training offerings.

Laying the groundwork for infrastructure workforce decarbonisation

This report, produced as part of the Infrastructure Net Zero initiative, marks the first steps towards better understanding the workforce required to decarbonise infrastructure projects. Given the lack of robust demand data and the emerging nature of this field, the analysis focuses on identifying the current workforce and activities that support net zero outcomes across the infrastructure lifecycle, as well as industry demand for the skills needed to reduce project emissions.

Wider efforts to decarbonise the industry across the supply chain and in particular, construction materials, which will also have significant impacts on reducing total infrastructure emissions, are outside the scope of this study.

2. Defining the Net Zero Infrastructure workforce

This report defines and quantifies the current '**Net Zero Infrastructure workforce**'– that is, the workers currently with responsibilities that contribute to reducing project emissions.

First, a list of **activities** that contribute to reducing emissions was identified across the asset lifecycle (planning, design, construction and operations and maintenance). These activities fall into four broad categories: carbon economics and government, procurement and material sourcing, material and waste usage, and energy demand.

The identified activities were then mapped to 36 **occupations** (based on the Australian and New Zealand Standard Classification of Occupations classification) and a wide range of **roles** that form the Net Zero Infrastructure workforce.

Finally, online job advertisements for the identified roles were analysed to assess the demand for **skills** that contribute to decarbonising (over the five-year period 2018-19 to 2023-24).

Net zero activities are identified

Based on literature reviews and consultations with stakeholders, 23 net zero activities were identified across four broad categories: Carbon Economics and Governance, Procurement and Materials Sourcing, Material and Waste Usage, and Energy Demand. These activities were also mapped to infrastructure lifecycle stages: planning, design, construction and operations and maintenance. **Figure 1** outlines Net Zero Infrastructure activities identified in this study.

Figure 1: Identified activities that contribute directly to Net Zero Infrastructure outcomes

	PLANNING	DESIGN	CONSTRUCTION	OPERATIONS & MAINTENANCE
Carbon Economics & Governance	**Carbon Management & Assessment:** management strategy that defines project goals and environmental policies. **Carbon Measurement & Reporting:** applying standard methods for measuring and reporting whole-of-life carbon impact. E.g. monetising carbon reduction impact.	**Carbon Modelling:** forecast emissions associated with various design options and assess against carbon emission requirement. **Low-Carbon Design Approach:** put governance structures in place to identify, promote and implement whole-life carbon reduction opportunities.	**Carbon Modelling:** forecast emissions associated with various construction sequencing and procurement decisions. **Carbon Tracking:** regularly monitor and report on the infrastructure's carbon performance.	**Carbon Tracking:** regularly track and report on the infrastructure's carbon performance. **Carbon Audits:** set guidelines for assessing operational efficiency and accuracy of carbon tracking.
Procurement & Material Sourcing	**Procurement Criteria:** set clear procurement criteria that supports the selection of suppliers who can avoid carbon-intensive products/ services.	**Material Selection:** use alternative low-carbon materials (e.g., wood, composites, green steel). **Material Specifications:** specify materials and resources available locally.	**Procurement Incentives:** set procurement incentives promote suppliers and subcontractors to avoid carbon-intensive products/services. **Material Sourcing:** procure materials and resources locally. **Green Logistics:** use just-in-time delivery and low-emission transport methods.	
Material & Waste Usage	**Optimise Land Use:** supporting/ providing for green spaces within infrastructure site and minimisation of disturbances. **Waste Management Plan:** minimise waste through up-front planning with consideration to circular economy guidelines.	**Material Optimisation:** to use less material while still meeting specifications e.g., modular design. **Waste Reduction:** minimise design requiring temporary infrastructure construction.	**Construction Optimisation:** choose lower-resource construction methods (e.g., prefabrication). **Waste Reduction:** reduce wastage of temporary construction material e.g., concrete waste, and where possible, choose reuseable materials and recycle.	**Asset Management:** prolong material/equipment life, replacing only when necessary. **Waste Management Plan:** implement waste management plan and continually improve sustainable practices.
Energy Demand	**Specifications:** set required for energy efficiency within infrastructure buildings and facilities.	**Electrification:** designed to only be powered through electrical means – no natural gas. **Energy Efficiency:** energy-efficient building/infrastructure design e.g., passive design strategies, zoning.	**On-site Generation:** Consider sourcing power from renewables on site e.g., solar on site.	**Energy Monitoring:** install energy management systems.

Net zero activities are mapped to roles and occupations

The identified net zero activities were mapped to occupations based on the Australian and New Zealand Standard Classification of Occupation (ANZSCO) definitions. A total of 36 occupations were identified as undertaking activities that contribute to reducing infrastructure emissions. Of the occupations identified, 28 are identified as part of the infrastructure workforce and eight are 'net zero specific' occupations which would otherwise not be engaged by the infrastructure sector.[8]

Specific roles undertaken by each occupation were then identified across project lifecycle stages, which enabled assessment of the extent of their potential impact to reduce emissions. For example, engineering managers are engaged across the project planning, design and construction stages and thus have three roles. Electricians are engaged in the construction and operations and maintenance stages and have only two roles in the project lifecycle.

Table 2: List of Net Zero Infrastructure workforce occupations and roles

Group	Occupation (ANSZCO)	Roles
Engineers, Architects, Scientists	**Architects and Landscape Architects**	Architect, Design Manager, Landscape Architect, Landscape Designer, Managing or Lead Architect, Principal Landscape Architect
	Chemical and Materials Engineers	Materials Engineer
	Civil Engineering Professionals	Building or Façade Engineer, Civil Engineer, Civil Lead and Principal Engineer, Civil Managers and Supervisors, Fire Engineer, Geotech Engineer, Geotechnical Lead or Principal Engineer, Lead or Quantity Survey Manager, Quantity Surveyor, Site Manager, Structural Engineer, Structural Designer, Structural Lead
	Electrical Engineers	Control Engineer, Electrical Engineer, Electrical Lead, Energy Efficiency Specialist, Energy Engineer, Engineering and Design Manager
	Electronics Engineers	Electronic Engineer, Electronic Lead
	Engineering Managers	Engineering Manager, Head of Engineering
	Environmental Scientists	Conservation Officer, Environmental Compliance Specialist, Environmental Consultant, Environmental Scientist
	Industrial, Mechanical and Production Engineers	Mechanical Engineer, Mechanical Lead, Operations Engineer, Production Engineer, Production Engineering Manager, Production Lead
	Other Engineering Professionals (for the purpose of this report, referenced as Environmental Engineers)	Engineer, Environmental Engineer, Lead or Managing Engineers and Professions, Various Specialist Engineers
	Other Specialist Managers (for the purpose of this report, referenced as Environmental Managers)	Environmental Manager, Environmental Planner/Scientist, Environmental Studies Professor, Metallurgical or Materials Technicians, Quality Manager
	Surveyors and Spatial Scientists	Building Surveyor, Land Surveyor, Lead or Survey Manager, Surveyor

Group	Occupation (ANSZCO)	Roles
Project Managers	**Construction Managers**	Conservation Scientist, Construction Manager, Energy Efficiency Specialist
	Occupational and Environmental Health Professionals	HSE Advisor, HSE Manager, Safety Manager, Quality Manager
	Purchasing and Supply Logistics Clerks	Procurement Manager, Purchasing Leads, Purchasing Officer
	Contract, Program and Project Administrators	Project Administrator/Coordinator, Project Controls, Project Director, Project Manager, Project Officer, Project Sponsor
Net Zero Specific[9]	**Accountants (for the purpose of this report, referenced as Financial/Cost Controllers)**	Carbon Accountant/Auditor, Energy Analyst, Energy Analyst/Auditor
	Economists	Economists
	Intelligence and Policy Analysts	Intelligence and Policy Analysts
	Management and Organisation Analysts	Management and Organisation Analysts
	Policy and Planning Managers	Government Policy Officer, Intelligence and Policy Analysts
	Production Managers	Alternative Energy Manager
	Urban and Regional Planners (for the purpose of this report, referenced as Environmental Planner)	Environmental Planner
	Science Technicians	Environmental Technician

Group	Occupation (ANSZCO)	Roles
Technicians and Trades Workers	**Architectural, Building and Surveying Technicians**	Architectural Draftsperson, Building Certifier, Building Inspector, Civil Inspector, Construction Estimator, Environmental Technician, Planning Enforcement Officer
	Civil Engineering Draftspersons and Technicians	Civil Draftsperson, Civil Engineering Technician, Environmental Technician
	Electrical Engineering Draftspersons and Technicians	Civil Designer, Electrical Engineering Draftsperson, Electrical Engineering Technician, Environmental Technician
	Electronic Engineering Draftspersons and Technicians	Electronic Technician
	Mechanical Engineering Draftspersons and Technicians	Electronic Technician, Mechanical Draftsperson, Mechanical Engineering Technician
	Other Building and Engineering Technicians	Maintenance Coordinator, Maintenance Manager, Supervisor, Superintendent, Maintenance Officer, Maintenance Planner, Maintenance Technician
	Building and Plumbing Labourers	General Construction Labourer
	Concreters	General Construction Labourer
	Paving and Surfacing Labourers	General Construction Labourer
	Structural Steel Construction Workers	General Construction Labourer
Finishing Trades and Labour	**Electrical Distribution Trades Workers**	Field Service Engineer
	Electricians	Electrician
	Safety Inspectors	Safety Inspector

Net zero skills demand was analysed based on job advertisements

Analysis of job advertisements for Net Zero Infrastructure roles highlighted a range of 'net zero specific' skills that contribute directly to decarbonisation outcomes and more general 'net zero enabling' skills in demand. While the specific skills challenge varies depending on the occupation, 'environmental science' and 'renewable energy' skills are most in demand, requested in 18% and 17% all Net Zero Infrastructure job advertisements respectively (between 2018-19 to 2023-24). See **Table 3**.

In addition to net zero skills, stakeholders note there continues to be demand for general skills such as digital skills and, leadership and communication skills. Further analysis of general skills demand however is not within the scope of this study.

Table 3: Top 25 most requested net zero specific and net zero enabling skills

Top 25 INZ Specific Skills	% INZ Jobs Requesting Skill	Top 25 INZ Enabling Skills	% INZ Jobs Requesting Skill
Environmental Science	18.17%	**Renewable Energy**	17.63%
Environmental Engineering	7.38%	**Biodiversity**	5.84%
Natural Resource Management	7.12%	**Environmental Protection**	5.33%
Land Management	6.67%	**Water Treatment**	4.88%
Environmental Planning	5.35%	**Water Quality**	3.96%
Environmental Compliance	5.18%	**Hydrology**	1.96%
Environmental Consulting	3.67%	**Wind Power**	1.71%
Environmental Management Systems	3.01%	**Hazard Analysis**	1.53%
Environmental Risk Assessment	1.82%	**Solar Energy**	1.24%
Environmental Policy	1.25%	**Greenhouse Gas**	1.00%
Sustainable Design	1.12%	**Wind Turbines**	0.71%
Environmental Studies	0.93%	**Agronomy**	0.67%
Retrofitting	0.68%	**Hydropower**	0.66%
Environmental Remediation	0.67%	**Plant Identification**	0.56%
Environmental Stewardship	0.63%	**Aquatic Ecology**	0.53%
Waste Removal	0.59%	**Solar Panels**	0.47%
Energy Conservation	0.56%	**Ecological Restoration**	0.47%
Sustainability Improvement	0.49%	**Soil Science**	0.46%
Sustainable Agriculture	0.44%	**Water Conservation**	0.45%
Carbon Accounting	0.35%	**Renewable Energy Systems**	0.45%
Environmental Education	0.32%	**Wildlife Management**	0.42%
Solar Systems	0.32%	**Soil Sampling**	0.40%
Environmental Impact Statements	0.31%	**Renewable Energy Markets**	0.36%
Green Building	0.31%	**PV Systems**	0.36%
Energy Analysis	0.23%	**Hazardous Material Handling**	0.33%

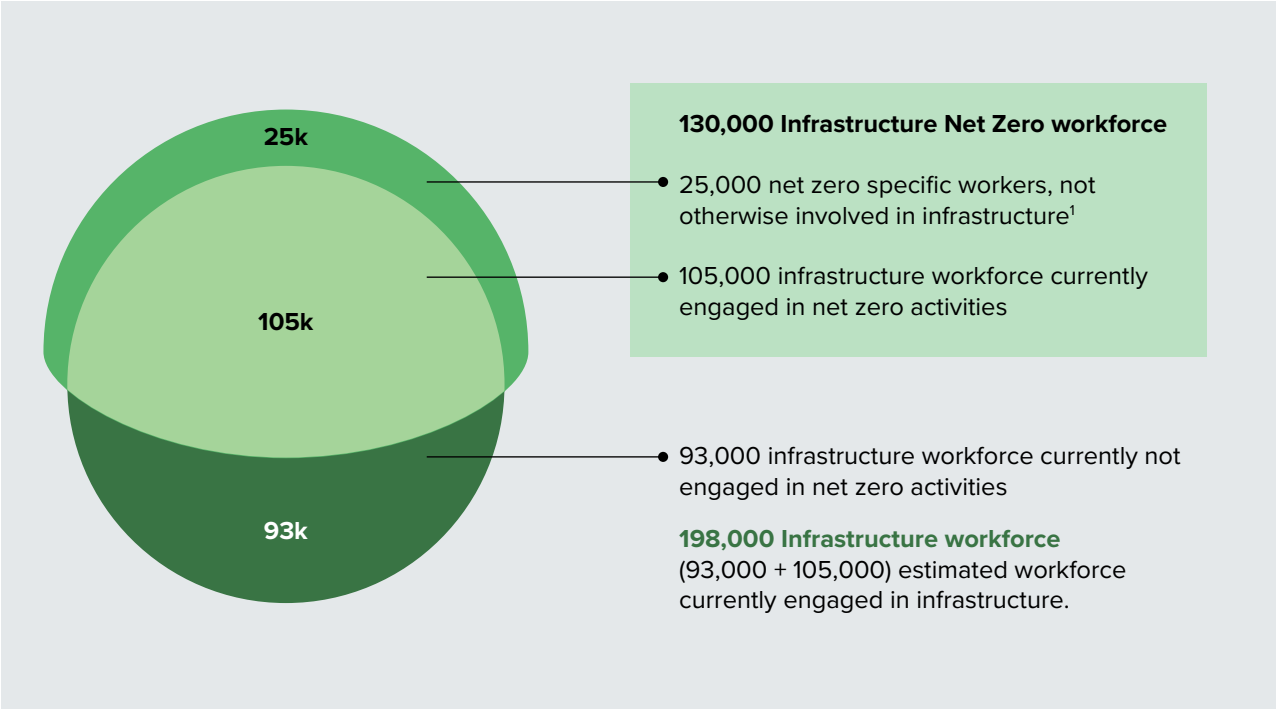
3. Current workforce supply

130,000 workers are estimated to be engaged in the Net Zero Infrastructure workforce

Adopting the taxonomy of the Net Zero Infrastructure workforce outlined in **Section 2**, there is an estimated **130,000 workers in occupations currently engaged in activities that contribute to the decarbonisation of infrastructure delivery**, comprising of:

- **105,000 workers in the infrastructure sector** that contribute to net zero outcomes -these workers represent approximately half (53%) of the total 198,000 infrastructure workforce.
- **25,000 'net zero specific workers'** that contribute to net zero outcomes and that would otherwise not be involved in infrastructure.[10] These roles include policy managers and financial/cost controllers who are not typically captured under the Australian and New Zealand Standard Industrial Classification (ANZSIC) construction industry classification.

Figure 2: Estimated engaged workforce supply for Net Zero Infrastructure workforce, as at August 2024



[1]Workers contributing to net zero outcomes who would otherwise not be involved in infrastructure. These roles include for example, policy managers and accountants who are not typically captured under the ANZSIC construction industry classification.

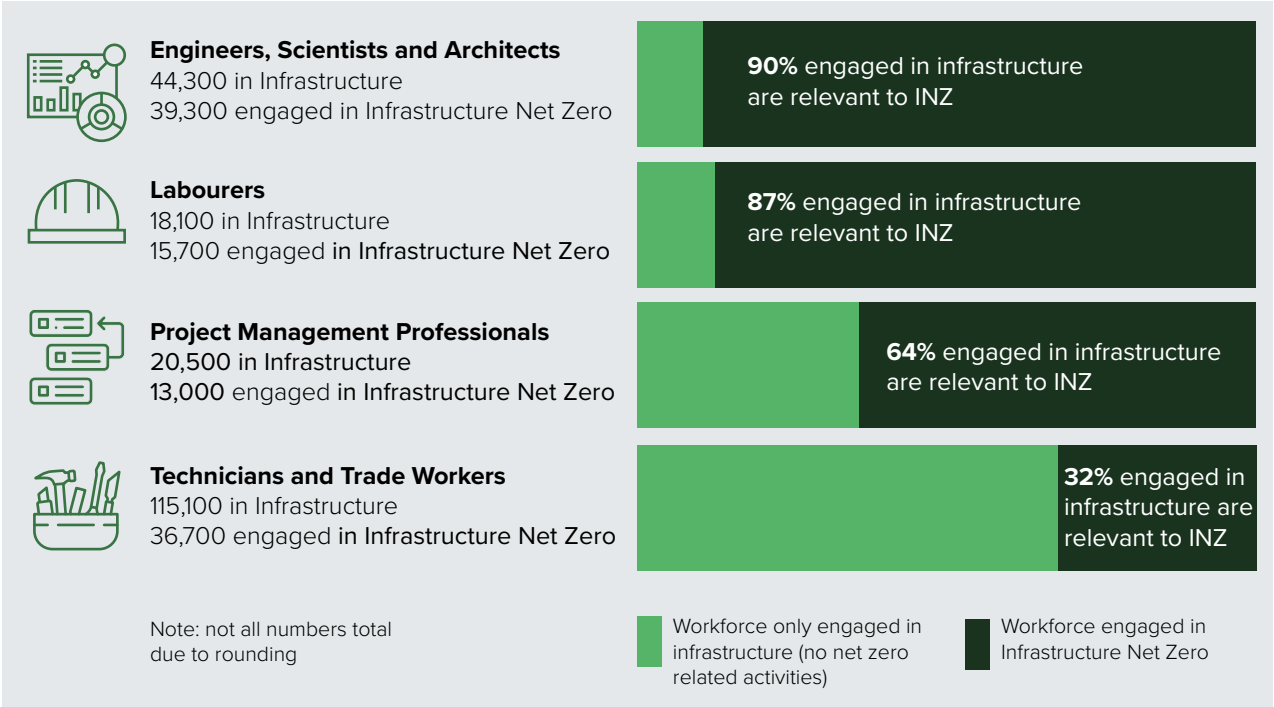
Half of the current infrastructure workforce contributes to net zero, more can be done to engage the rest

While approximately half of the current 198,000 infrastructure workforce are engaged in activities that contribute to net zero outcomes, the level of involvement varies by occupations.

Engineering, Scientists, and Architects and Labourers are already heavily involved in net zero related activities (90% and 87% respectively), while 64% of Project Management Professionals and 32% of Technicians and Trades Workers currently working in infrastructure engage in net zero activities. It should be noted that while only approximately a third of Technicians and Trades Workers engage in net zero related activities, this translates to 36,700 workers due to the sheer size of this cohort. See **Figure 3**.

With only half of the current infrastructure workforce contributing to net zero outcomes, there is a significant opportunity to extend awareness and responsibility of decarbonisation efforts across the rest of the workforce.

Figure 3: Percentage of infrastructure workers engaged in net zero activities by occupational groups



Engineers, Scientists and Architects have higher representation in the Net Zero Infrastructure workforce

Infrastructure sector professionals (Engineers, Scientists and Architects) represent almost a third of the Net Zero Infrastructure workforce, compared to only 23% of the wider infrastructure workforce.

By occupational groups, the current 130,000 Net Zero Infrastructure workforce comprises:

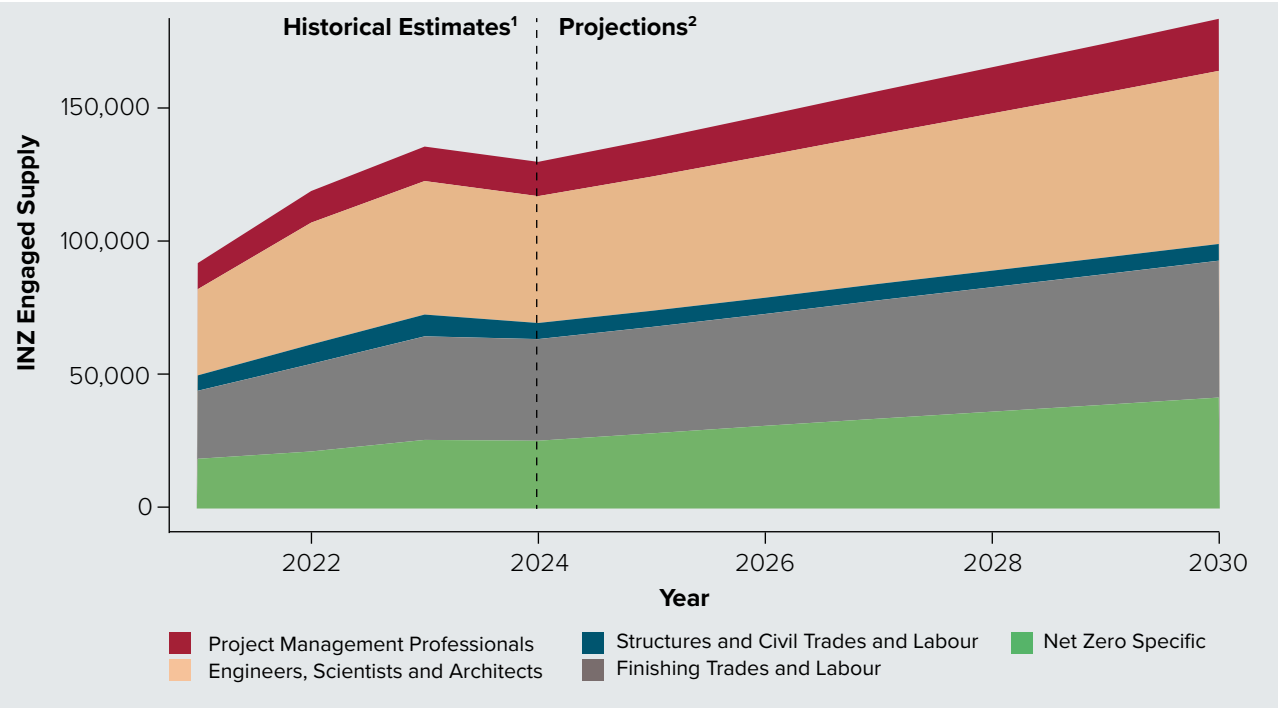
- 30% infrastructure sector Engineers, Scientists and Architects
- 20% Net Zero Specific professionals (e.g. Financial/Cost Controllers, Economists, Policy Professionals)
- 29% Finishing Trades and Labour
- 10% Project Managers
- 11% Structures and Civil Trades, Technicians and Labour

It should be noted that this section assesses only the volume of net zero related activities each occupation is engaged in, while the sections below analyse the potential impact of those occupations in getting infrastructure assets to net zero.

Supply of workers is expected to increase steadily, however demand remains unquantified

The Net Zero Infrastructure workforce is expected to grow to 200,000 by 2030, following a period of slight decline between 2023-2024. This short-term contraction likely reflects a normalisation of workforce dynamics after a temporary surge in supply from 2020 to 2023 due to COVID-19 impacts, which included delayed retirements and workforce re-entry.

Figure 4: Estimated engaged INZ workforce projected to 2030



1. Historical Estimates from ABS Labour Force Survey and Census. We triangulate these datasets to segment labour supply into more granular regional and occupational splits.
2. Projections are based on workforce entrants from training and migration and exits from retirement modelling. We then apply a population growth factor to estimate supply to 2030.

3. Achieving net zero across the asset lifecycle

On its path to net zero, the infrastructure workforce will need to reassess and potentially redesign many activities across the asset lifecycle. To inform and guide future decisions for workforce development, this section identifies the most impactful occupations needed to decarbonise infrastructure delivery. It focuses on early stages of an asset's lifecycle where there is greatest potential for impact, including the planning, design, construction, and operational stages of infrastructure projects.

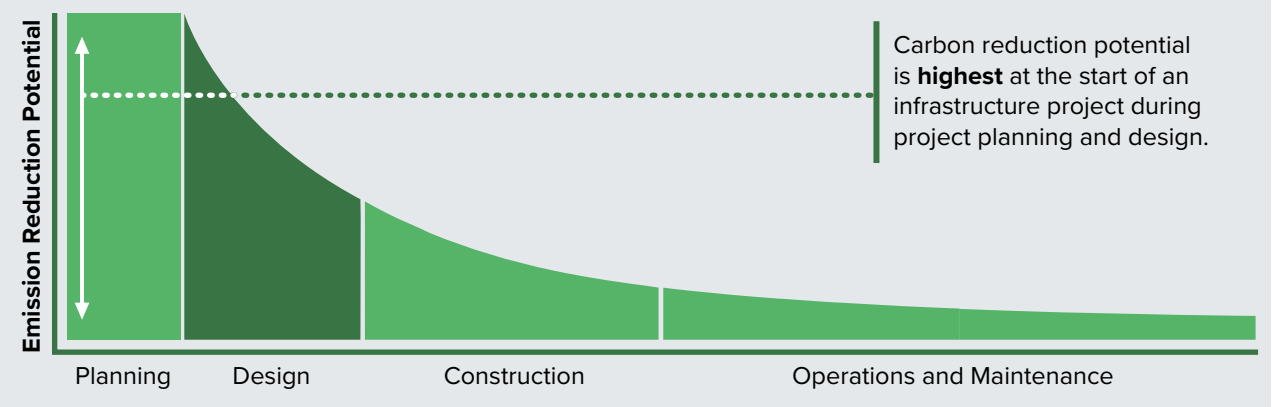
For each stage of the project lifecycle, key activities which drive decarbonisation outcomes are defined and then mapped against occupations, and the associated skills in demand outlined. Only activities that impact operational and embodied emissions are captured.

Findings in this section are informed by desktop research validated through consultation with industry experts. See **Appendix** for a detailed methodology.

Planning stage: setting carbon management expectations

Decisions made during the planning stage of a project are crucial for shaping its overall carbon management strategy. During this stage, high-impact decisions are made, such as monetising and evaluating the emissions of different infrastructure options with the potential to optimise existing infrastructure or invest in building new assets. When new infrastructure is needed, the planning stage provides an opportunity to understand the social cost of emissions and set clear objectives for carbon management, after which decisions can be made to lower emissions output at each stage of the project.

Figure 5: Emissions reduction potential across the value chain



During consultation, stakeholders stressed the importance of embedding net zero considerations during this stage of project delivery. Government representatives highlighted the need to account for the cost of carbon emissions in the project business case to enable informed and sustainable decision-making. Meanwhile, industry stakeholders highlighted the value of setting clear low-carbon procurement criteria to incentivise low-carbon solutions and more broadly, provide certainty for investment in these solutions.

Policy, planning, accounting and economics experts should adapt to meet technical challenges

Effective decision making during the planning stage relies on a blend of technical and analytical expertise. For example, while decarbonisation is a key project goal, achieving it can be hindered by factors such as budget constraints, limited access to low-carbon materials or technologies, or stakeholder resistance. Balancing these pressures requires flexible planning and strong governance. Feedback from consultations emphasised the need to incorporate these skills into traditionally non-technical roles to strengthen governance and support informed decisions. Professionals in areas such as policy, planning, accounting, and economics were encouraged to adapt their expertise to better address technical challenges.

Examples of the different occupations involved during the planning stage include:

- **Policy and Planning Managers** are involved in most activities, working with technical advisors in setting the carbon management direction.
- **Economists** prepare economic analysis including monetising the social impact of emissions to support decision making.
- **Environmental Engineers and Scientists** inform procurement criteria and carbon management and assessment activities.
- **Architects and Engineers** inform energy efficiency specifications and designs for effective material selection and waste minimisation.
- **Contract, Program and Project Administrators** work across carbon emissions and energy efficiency related activities.
- **Construction Managers** inform carbon management and assessment criteria, ensuring specifications can be feasibly delivered.

A complete list of occupations can be found below:

	Decarbonisation opportunities	Occupations
Carbon emission and governance activities	**Setting the carbon management and assessment strategy that defines project goals and environmental policies.** **Articulating the set of standard methods for measuring and reporting whole-of-life carbon impact.**	Architectural, Building and Surveying Technicians; Civil Engineering Professionals; Construction Managers; Contract, Program and Project Administrators; Economists; Engineer; Engineering Managers; Environmental Engineer; Environmental Manager; Environmental Scientists; Financial/Cost Controllers; Intelligence and Policy Analyst; Lead or Managing Engineers and Professionals; Management and Organisation Analyst; Occupational and Environmental Health Professionals; Policy and Planning Managers; Quantity Surveyors; Surveyors and Spatial Scientists; Quality Manager; Various Specialist Engineers
Procurement and material sourcing activities	**Setting clear procurement criteria to support the selection of suppliers and contractors who can avoid carbon intensive products and services.**	Civil Engineering Professionals; Engineer; Engineering Managers; Environmental Engineer; Environmental Manager; Policy and Planning Managers; Waste/Recycling Coordinator
Materials and waste usage activities	**Considering land use optimisation upfront, such as efficient precinct planning, waste mitigation strategies.** **Minimising waste through upfront planning with consideration to circular economy guidelines.**	Architects and Landscape Architects; Architectural, Building and Surveying Technicians; Chemical and Materials Engineers; Civil Engineering Draftspersons and Technicians; Civil Engineering Professionals; Electrical Engineering Draftspersons and Technicians; Environmental Scientists; Intelligence and Policy Analysts; Environmental Planner/Scientist; Policy and Planning Managers; Purchasing and Supply Logistics Clerks; Surveyors and Spatial Scientists; Urban and Regional Planners
Energy demand activities	**Defining energy efficiency standards and specifications for new and/or existing infrastructure.**	Financial/Cost Controllers; Architects and Landscape Architects; Architectural, Building and Surveying Technicians; Contract, Program and Project Administrators; Electrical Engineering Draftspersons and Technicians; Electrical Engineers; Policy and Planning Managers

Design stage: defining whole-of-life carbon

Decisions made during the design stage specify the extent of infrastructure built, materials used, and how a facility operates throughout its life. These decisions have far-reaching implications for whole-of-life emissions—influencing emission outputs during construction, operation, and decommissioning phases. Adopting low-carbon design strategies, such as low-build solutions, smart design practices and the use of sustainable materials, offers significant potential for reducing emissions. To maximise impact, benchmarks and standards, including rating tools and relevant policies, should be consistently applied throughout all design activities.

Engineers, Scientists and Architects must deepen expertise in low carbon solutions to maximise impact on project delivery

Engineers, Scientists, and Architects play a critical role, with many high-carbon impact decisions placed on these professionals in this stage.

Stakeholder feedback highlighted the importance of Engineers and Architects developing a deeper understanding of low carbon solutions and integrating these systematically into decision-making, alongside traditional considerations such as safety, accessibility, and cost. It was also highlighted through consultation that data and digital specialists may be involved during this stage, for reporting, data management, and opportunities leveraging digital engineering for carbon estimation and management.

Examples of the different occupations involved during the design stage include:

- **Architects, Electrical, and Civil Engineering Professionals** are involved in all decarbonisation activities with the ability to make design decisions that prioritise low-carbon approaches across all elements of an infrastructure project.
- **Financial/Cost Controllers and Economists** support Architects and Engineers to quantify the carbon emissions output of design options.
- **Environmental Engineers** support activities such as carbon modelling and materials selection.
- **Construction Managers** support Architects and Engineers in understanding the down-stream implications of design options and ensure designs can be feasibly delivered.

A complete list of occupations can be found below:

	Decarbonisation opportunities	Occupations
Carbon emission and governance activities	**Carbon modelling to forecast emissions associated with design options and assessing against emission requirements.** **Low carbon design which identifies, promotes and implements whole-life carbon reduction opportunities.**	Architects and Landscape Architects; Architectural, Building and Surveying Technicians; Civil Engineering Professionals; Construction Managers; Data and Digital Specialists; Electrical Engineers; Engineering Managers; Environmental Engineer; Financial/Cost Controllers; Lead or Manager Engineer and Professionals; Various Specialist Engineers
Procurement and material sourcing activities	**Selecting and specifying alternative low-carbon materials and/or materials available locally.**	Architects and Landscape Architects; Chemical and Material Engineers; Civil Engineering Professionals; Electrical Engineers; Environmental Engineers; Purchasing and Supply Logistics Clerks
Materials and waste usage activities	**Material optimisation and waste reduction through designs which use less materials and minimise waste whilst still meeting design specifications**	Architects and Landscape Architects; Architectural, Building and Surveying Technicians; Chemical and Materials Engineers; Civil Engineering Draftspersons and Technicians; Civil Engineering Professionals; Environmental Scientists; Surveyors and Spatial Scientists
Energy demand activities	**Designing for energy efficient and low carbon outcomes including electrification and passive design strategies.**	Architects and Landscape Architects; Electrical Engineering Draftspersons and Technicians; Electrical Engineers; Electronics Engineers; Engineering Managers; Industrial, Mechanical and Production Engineers; Mechanical Engineering; Draftspersons and Technicians; Production Managers

Construction stage: delivering on low-carbon solutions

The extent that a project achieves its decarbonisation targets is dependent on whether it is built in accordance with what is specified in the design. During the construction stage, the greatest opportunities for reducing emissions come from procurement, including the sourcing of materials and decisions regarding waste. Setting expectations upfront ensures that desired outcomes are achieved.

Stakeholders highlighted two key priorities during this stage:

- Aligning procurement criteria with decarbonisation targets and moving beyond simply selecting delivery partners based on the lowest cost.
- Setting realistic specifications for low-carbon materials.

Many stakeholders noted that while low-carbon materials are available, they often lack the scale needed for large infrastructure projects. This challenge underscores the need for more comprehensive upfront planning and strategic direction across industry to ensure these materials can be scaled effectively.

Environmental advisory roles shifting from compliance to education and stewardship in decarbonisation

During this stage, project management professionals play a key role by implementing design and procurement specifications, supported by environmental engineers and sustainability advisors. Industry feedback noted potential challenges arising from ambiguity and a lack of standardisation in low-carbon expectations.

Stakeholders also noted a shift in environmental advisory roles, such as Environmental Engineers and Sustainability Advisors moving from a compliance focus to playing a greater role in education and stewardship—pushing organisations to better incorporate net zero considerations in all business decisions.

Examples of the different occupations involved during the construction stage include:

- **Construction Managers** and **Purchasing Clerks** make critical procurement, materials and waste decisions across all construction activities.
- **Engineering Professionals** support design of temporary infrastructure requirements and potential redesign based on low carbon initiatives.
- **Financial/Cost Controllers** support construction activities through modelling and tracking carbon emissions.
- **Electricians** and **Safety Inspectors** support the onsite implementation of energy efficiency solutions and inform optimisation methods with safety implications.
- **Building and Plumbing Labourers** and **Concreters** have direct input into making waste reduction decisions.

A complete list of occupations can be found below:

	Decarbonisation Opportunities	Occupations
Carbon emission and governance activities	**Carbon modelling to forecast emissions associated with various construction sequencing and procurement decisions.** **Carbon tracking to monitor and report on the infrastructure asset's carbon performance.**	Construction Managers; Environmental Engineer; Financial/Cost Controllers
Procurement and material sourcing activities	**Setting procurement incentives to encourage suppliers and subcontractors to avoid carbon-intensive products and services.** **Sourcing materials locally.** **Using just in time delivery and low-emissions transport methods.**	Chemical and Materials Engineers; Civil Engineering Professionals; Construction Managers; Contract, Program and Project Administrators; Occupational and Environmental Health Professionals; Metallurgical or Materials Technician; Purchasing and Supply Logistics Clerks; Quality Manager
Materials and waste usage activities	**Construction optimisation by choosing lower-resource construction methods of construction.** **Reducing waste of temporary construction materials and where possible, selecting reusable materials.**	Architectural, Building and Surveying Technicians; Building and Plumbing Labourers; Civil Engineering Draftspersons and Technicians; Civil Engineering Professionals; Concreters; Construction Managers; Contract, Program and Project Administrators; Environmental Engineer; Environmental Manager, Engineer; Engineering Managers; Industrial, Mechanical and Production Engineers; Occupational and Environmental Health Professionals; Environmental Professionals; Paving and Surfacing Labourers; Safety Inspectors; Structural Steel Construction Workers; Various Specialist Engineers
Energy demand activities	**Low carbon energy sourcing decisions, such as sourcing power from renewables on site.**	Construction Managers; Electrical Engineering Draftspersons and Technicians; Engineer; Electrical Engineers; Electricians; Electronic Engineering Draftspersons and Technicians; Electronics Engineers; Industrial, Mechanical and Production Engineers; Mechanical Engineering Draftspersons and Technicians; Scientists; Science Technicians

Operations and maintenance stage: focusing on long-term carbon emissions

The operations and maintenance phase is often the longest phase in an infrastructure asset's lifecycle, affecting the long-term carbon emissions of infrastructure assets. The ability for continued carbon emissions reduction relies on the ongoing application of low-carbon practices, including opportunities to reduce operating emissions, and enhance asset management.

Key considerations include continually updating operations and maintenance plans as time progresses and as infrastructure or carbon emission policies and targets are updated. Regular reviews and updates on infrastructure carbon emission performance goals are essential.

Mastering digital skills and emerging technologies is key to optimising energy performance

During this phase, Industrial, Mechanical and Production Engineers and Maintenance Managers and Technicians make crucial decisions regarding the asset's energy efficiency and management. Financial/Cost Controllers, Economists, and Environmental Engineers can play a greater role in supporting sustainable operations. Stakeholders noted the need for these professionals to deepen their understanding of emerging technologies and strengthening their digital skills, particularly to reduce an asset's ongoing energy consumption.

Stakeholders noted that digitalisation is opening up new opportunities for critical decarbonisation efforts, with many organisations implementing digital systems to monitor and track emissions.

Examples of the different occupations involved during the operations and maintenance stage include:

- **Industrial, Mechanical and Production Engineers** and **Maintenance Managers and Technicians** make critical asset management decisions which can prolong material and equipment life, replacing only when necessary.
- **Electricians and Electrical Distribution Trades Workers** support the implementation of energy efficiency retrofitting solutions within existing infrastructure facilities.
- **Financial/Cost Controllers and Economists** support operational activities through modelling and tracking carbon emissions.
- **Environmental Managers** support energy monitoring and waste management plans.
- **Occupational and Environmental Health Professionals** support carbon audits and reviews of operations against compliance requirements.

A complete list of occupations can be found below:

	Decarbonisation Opportunities	Occupations
Carbon emission and governance activities	**Carbon tracking to regularly monitor and quantify an asset's carbon performance.** **Carbon audits which set guidelines for assessing operational efficiency in carbon tracking and promotes ongoing improvement.**	Architectural, Building and Surveying Technicians; Environmental Scientists; Financial/Cost Controllers; Industrial, Mechanical and Productional Engineers; Occupational and Environmental Health Professionals; Quality Manager
Procurement and material sourcing activities	**Asset management in prolonging material and equipment life.**	Chemical and Materials Engineers; Industrial, Mechanical and Production Engineers; Maintenance Planner; Maintenance Coordinator; Maintenance Manager, Supervisor, Superintendent; Maintenance Officer; Maintenance Technician
Materials and waste usage activities	**Energy monitoring, such as installing energy management systems.**	Contract, Program and Project Administrators; Industrial, Mechanical and Production Engineers; Environmental Engineer; Environmental Manager; Waste/Recycling Coordinator
Energy demand activities	**Implementing waste management plans to continually improve sustainable practices.**	Electrical Distribution Trades Workers; Electrical Engineering Draftspersons and Technicians; Electrical Engineers; Electricians; Financial/Cost Controllers; Industrial, Mechanical and Production Engineers; Occupational and Environmental Health Professionals; Safety Inspectors

A note on the limitations of this analysis

Net zero outcomes rely on adjacent and enabling sectors

Efforts to reduce - and ultimately eliminate - carbon emissions from infrastructure delivery depend heavily on enabling inputs such as low carbon materials, advanced technologies and clean energy. Achieving this requires coordinated cross-sector efforts to ensure the timely and effective supply of these critical resources. While beyond the scope of this report, it should be acknowledged that these adjacent and enabling sectors themselves will also require substantial workforce upskilling as they transition toward net zero.

Tackling whole-of-life carbon requires a systemic approach to project delivery

This research presents net-zero activities as they attach to specific stages of project delivery. In practice, decarbonisation efforts are interconnected across the entire project lifecycle. For example, decisions made during the planning and design stages of an infrastructure project will define the specific activities required in the later construction and operations stages. Failure to subsequently secure the workers with the skills needed to carry out key construction stage activities might limit the carbon reduction potential as planned or designed.

In practice, industry practitioners are encouraged to adopt a more holistic approach to workforce planning – one that considers the full range of decarbonisation opportunities across all stages of project delivery, in order to maximise impact and minimise potential skills mis-match.

Most Net Zero Infrastructure roles will span multiple stages of the infrastructure life cycle, rather than being limited to a single project stage. The extent and breadth of net zero activities that a worker undertakes across the lifecycle can indicate their potential impact on reducing overall emissions. The next section explores Net Zero Infrastructure occupations in more detail, focusing on their relative potential to drive emissions reduction across infrastructure projects.

4. Occupations by net zero impact

Net Zero Infrastructure occupations are analysed with reference to their potential impact on reducing overall carbon emissions on infrastructure projects and specific workforce challenges. Three groups of occupations are identified as having potential impact on reducing carbon emissions:

- Concentrated Points of Vulnerability: Environmental Experts and Engineering Managers
- High Impact Potential: Economists, Financial Controllers, Policy and Procurement Specialists
- High Demand and Many to Upskill: Construction Managers, Architects, Engineers and Technicians

The remaining occupations were further split into:

- Moderate Impact: technical experts critical to one project stage
- Low Impact: various roles across the supply chain

Collectively, the high impact occupations account for almost two thirds of the Net Zero Infrastructure workforce and comprise exclusively of white-collar professionals. The key workforce challenges for these roles are to ensure adequate supply of workers with the net zero skills to meet growing demand.

In comparison, the moderate and low impact groups of occupations are predominantly trades, labourer or technician roles. While there is high competition and unmet demand for these roles, as indicated by above average numbers of repeat job advertisements within a 6 month period, there is relatively low demand for net zero specific skills compared to the high impact occupations.

Analysis of each occupational grouping is detailed below.

Concentrated Points of Vulnerability: Environmental Professionals and Engineering Managers

Concentrated Points of Vulnerability encompass six occupations covering mainly Environmental and Engineer Manager roles that have a high impact on influencing emissions reduction outcomes during the upfront project planning stage as well as other stages of the lifecycle. These roles account for over 10% of the current Net Zero Infrastructure workforce and engage in almost a quarter (24%) of all net zero activities across the project lifecycle.

Figure 6: ***Concentrated Points of Vulnerability*** occupations and activities across the infrastructure lifecycle

Occupation	Planning	Design	Construction	Operations and Maintenance
Engineering Managers				
Environmental Scientist				
Occupational and Environmental Health Professionals				
Environmental Engineers				
Environmental Managers				
Environmental Planner				

Net zero specific skills accounted for an average 17% of roles advertised, much higher than the 5% average for all roles across the Net Zero Infrastructure workforce. However, demand for net zero specific skill grew at only 5%, lower than the average for all roles at 13%. This suggests that collectively, job designs for these roles are relatively established compared to other roles across the Net Zero Infrastructure workforce.

The fastest growing net zero skills in job advertisements for Concentrated Points of Vulnerability roles include Environmental Data Analysis, Environmental Monitoring, Environmental Stewardship and Carbon Management, which broadly aligns with their expertise as environmental specialists.

Industry and government stakeholders observe that job designs for environmental roles appear to be expanding beyond just monitoring and compliance, towards leading and guiding organisations to incorporate environmental considerations into decision making. This supports the analysis of job advertisements demonstrating growing demand for general skills for these roles.

The key workforce challenges for this group of occupations are to ensure sufficient supply and monitor evolving industry needs or technical changes that may require workforce upskilling, for example in strategic decision-making and technical environmental analysis, monitoring and management skills.

High Impact Potential: Economists, Financial Controllers, Policy and Procurement Specialists

High Impact Potential describe five occupations that are involved in few, but critical, activities that inform emission reduction outcomes. Most of these workers, such as Economists, Financial and Cost Controllers, and Policy Specialists play key roles that shape the design and planning of infrastructure delivery.

These high impact roles account for approximately 13% of the Net Zero Infrastructure workforce and are engaged in almost a third of all net zero activities across the project lifecycle.

Figure 7: ***High Impact Potential*** occupations and activities across the infrastructure lifecycle

Occupation	Planning	Design	Construction	Operations and Maintenance
Purchasing and Supply Logistics Clerks				
Economists				
Financial/Cost Controllers				
Intelligence and Policy Analysts				
Policy and Planning Managers				

Job advertisements for this group of occupations specify the lowest percentage of net zero skills (2%) compared to the workforce average (5%). However, demand for these are growing at a slightly faster rate than the workforce average (14% compared to 13%).

The fastest growing Net Zero Infrastructure skills specified in job advertisements for this group of occupations are: Energy Analysis, Environmental Studies, Carbon Accounting and Environmental Policy.

Stakeholders noted these roles will need to prioritise upskilling in two key areas: acquiring the technical skills required to assess and make effective Net Zero Infrastructure decisions and gaining knowledge about the infrastructure construction context. For example, under the Transport and Infrastructure Ministers Meeting, governments across country have committed to valuing emissions, with many revising their business case guidelines accordingly. As such, economists will increasingly need the capability to monetise the social impact of emissions to support decision making. Further, less is known about the specific skills gaps and future demand for newer roles such as financial controllers within the context of decarbonising infrastructure delivery.

As the momentum to decarbonise infrastructure delivery builds, roles with specialist net zero expertise continue to be called upon to advise on and guide carbon reduction strategies. The key challenge for this group of occupations is to identify the construction specific knowledge and net zero skills needed to upskill workers accordingly.

High Demand and Many to Upskill: Construction Managers, Architects, Engineers and Technicians

High Demand and Many to Upskill describe seven occupations that resemble typical infrastructure workers — Construction Managers, Architects, Engineers and Technicians which have high impact on reducing emissions across various stages of the infrastructure lifecycle.[11]

This is the largest group of occupations in terms of workers represented, accounting for almost 40% of the total Net Zero Infrastructure workforce, and are engaged in approximately a fifth of net zero activities across infrastructure projects.

Figure 8: ***High Demand and Many to Upskill*** occupations and activities across the infrastructure lifecycle

Occupation	Planning	Design	Construction	Operations and Maintenance
Construction Managers				
Architects and Landscape Architects				
Chemical and Materials Engineers				
Civil Engineering Professionals				
Electrical Engineers				
Industrial, Mechanical and Production Engineers				
Architectural, Building and Surveying Technicians				

Job advertisements for these roles specify a slightly lower percentage of net zero specific skills (4% compared to the workforce average of 5%) but high demand growth for these skills (17% compared to Net Zero Infrastructure workforce average of 13%).

The fastest growing Net Zero Infrastructure specific skills specified in job advertisements include: Energy Conservation, Environmental Compliance, Environmental Risk Assessment, and Retrofitting.

Given the breadth of the occupations this group covers, stakeholders have highlighted that the nature of the skills mismatch and any associated barriers to upskilling workers in these roles would vary depending on the specific occupation. For example, in addition to the need to design and offer new Net Zero Infrastructure electives in training pathways (tertiary qualifications and training packages), certain regulatory, licencing procurement rules might hinder the uptake or development of new Net Zero Infrastructure skills.

The key workforce challenge for this group would be to build net zero capability across a large cohort of infrastructure workers from a low baseline.

Moderate Impact – Mostly Technical Experts Critical to One Project Stage

Mostly technical experts, critical to one project stage describe include occupations that are responsible for Net Zero Infrastructure activities that are critical to one particular project stage (although total activities may span several stages). While their impact on overall total emissions reduction is moderate (not high), their criticality rests on the nature of the specific or technical skills they possess.

This group consists of eight occupations representing many technical roles currently in shortage. Collectively, roles in this group had the highest growth in repeat job advertisements (60% compared to workforce average of 35%). They account for approximately one fifth of the total Net Zero Infrastructure workforce and are engaged in only 8% of net zero activities across the project lifecycle.

Figure 9: *Mostly Technical Experts* occupations and activities across the infrastructure lifecycle

Occupation	Planning	Design	Construction	Operations and Maintenance
Other Building and Engineering Technicians				
Production Managers				
Civil Engineering Draftspersons and Technicians				
Mechanical Engineering Draftspersons and Technicians				
Electronics Engineers				
Electrical Engineering Draftspersons and Technicians				
Electricians				

General skills first, net zero skills on the rise

There is at present low demand for net zero skills in these roles, which account for only 1% of job advertisements for these roles (compared to the workforce average of 5%). However, demand for net zero specific skills is growing at the fastest rate of all occupational groups analysed, at 23% compared to the workforce average of 13%. Jobs advertisements for these roles suggest more demand for general skills than net zero skills.

The immediate workforce challenge for this group of occupations does not appear to be net zero specific, but rather on upskilling of general skills. However, future demand should be monitored, due to the high demand growth for net zero skills observed over the analysed period.

Low Impact - Various Contributors, Mainly Construction Stage Workers

The **Various Contributors group** of ten occupations are engaged in a few activities across the infrastructure lifecycle, with a more specific focus on the construction project stage than other groups.

This group represents 16% of the Net Zero Infrastructure workforce and are engaged in a fifth (20%) of net zero activities across projects. They have a relatively low impact on overall total emissions reduction of a project.

There is low demand for net zero skills (3% compared to 5% workforce average) and low growth for these skills (4% compared to 13%).

Due to their low impact on decarbonising outcomes, these occupations could be de-prioritised for direct workforce interventions to upskill on net zero and monitored for supply only.

Figure 10: *Various Contributors* occupations and activities across the infrastructure lifecycle

Occupation	Planning	Design	Construction	Operations and Maintenance
Management and Organisation Analysts				
Surveyors and Spatial Scientists				
Science Technicians				
Electronic Engineering Draftspersons and Technicians				
Safety Inspectors				
Contract, Program and Project Administrators				
Building and Plumbing Labourers				
Concreters				
Paving and Surfacing Labourers				
Structural Steel Construction Workers				

5. Policy directions and recommendations

The Net Zero Infrastructure workforce comprises a broad range of professional (Engineers, Architects, Scientists, Accountants), manager, trades, technician and labourer roles, each with varying impacts on ultimate emissions outcomes and carries unique workforce challenges. A wide range of stakeholders across industry, governments and education and training sectors, at both national and state and territory levels, will need to work together to address workforce challenges to delivering Net Zero Infrastructure across the asset lifecycle.

A recent survey of industry readiness to decarbonise infrastructure delivery in New South Wales has found that despite a high level of awareness of upfront carbon in the infrastructure sector, respondents (over a third of government and a fifth of industry) have low confidence in their own capability to reduce upfront carbon.[12]

Urgent action is needed to achieve our net zero targets, and there is already work planned or underway across the country. The following section provides a discussion of the key considerations and recommended policy directions for how stakeholders can work together to address the workforce challenges. The proposed actions aim to leverage and build on existing initiatives and mechanisms currently underway to achieve Net Zero Infrastructure and can be commenced immediately.

RECOMMENDED POLICY DIRECTION

coordinate actions to address net zero workforce challenges across key infrastructure sectors; and monitor progress

Infrastructure, with workers distributed across the transport, buildings, utilities and resources sectors, is an enabling industry that will support decarbonisation efforts across key sectors of the economy.

There is work underway to define workforce challenges in key infrastructure sectors

To support the national Net Zero Plan, led by the Department of Climate Change, Energy, the Environment and Water, the Australian Government will need to develop pathways to decarbonise key sectors of the economy. Four key sectors - transport, energy, built environment and resources - will have infrastructure implications and associated workforce considerations. The construction workforce will need to be able to service each of these sectors and as such, should be considered a cross-cutting issue across multiple sector initiatives.

Governments have already commenced work to define the workforce challenge. In the transport sector for example, the Australian Government is working with state and territory counterparts under the Infrastructure and Transport Ministers' Meeting's Infrastructure Decarbonisation Working Group (IDWG), to identify opportunities to boost workforce capability for the sector. The IDWG is expected to agree on a workplan in 2025.

In energy, construction is considered an enabling industry for the energy transition, as referenced by JSA in their *Clean Energy Generation* report. Work is also under way on a National Energy Workforce Strategy, which will outline a national framework to uplift the sector's workforce capability.

Employers are unsure of emerging net zero skill needs, which may act as a barrier to investment

Stakeholders note that some parts of the construction industry are struggling to clearly define emerging roles and the skills needed in the renewables and net zero space. As an industry characterised by low profit margins and project-based work, employers are focused first and foremost on winning and delivering work. In the absence of a long-term project pipeline, employers may take a shorter term, project-based view on workforce and skills needs. This is one potential reason why industry is hesitant to invest in workforce planning and upskilling in net zero skills. Furthermore, without clear direction and demand from the market, it is also difficult for training providers to successfully develop targeted training programs.

Anecdotally, some stakeholders are seeing relatively low uptake of sustainability courses while completion rates for some micro-credentials can also be much lower than traditional forms of accredited course. This could be due to a lack of awareness of the career opportunities and pathways that net zero capability offers workers in construction. A lack of buy-in from employers and poor demand signals from the market on the value of this training may inhibit awareness and interest from learners.

There is an opportunity for cross sector alignment where possible, to align training needs identification, design and delivery on the development of net zero skills capability uplift across the country. Collectively, sector specific initiatives should clearly articulate the infrastructure workforce components, align where possible on definitions and actions, and consider any cross-sector overlaps. This would send a clear signal to the market on where to invest to boost supply and support capability uplift.

The Australian Government, working with states and territories, should:

1. **Coordinate actions to boost infrastructure workforce supply and skills uplift across key sectors (transport, energy and the built environment) and jurisdictions.**

This should include:

- Specifying the Net Zero Infrastructure workforce and skills needed across the economy within Australian Government decarbonisation plans, identifying any skills complementarities and overlaps across the key sectors.
- Coordinating efforts on overlapping workforce issues to reduce potential cross-sector competition and strengthen the impact of interventions to boost supply, upskill current capability, and attract and retain talent.

Options for further exploration include:

- Working with industry to develop an initiative targeted at designing and delivering training to the Net Zero Infrastructure workforce.
- Building on existing knowledge such as the analysis provided in this Report and work underway across jurisdictions and by the relevant Jobs and Skills Councils.

This could include:

  - Developing and promoting a 'national catalogue' of education and training offerings around the country to build awareness of Net Zero Infrastructure pathways, attract new entrants and encourage upskilling of current workers in the sector.
  - A national stocktake of accredited and unaccredited training currently on offer and promote nationally consistent approaches to net zero skills training development and recognition. This could inform Jobs and Skills Councils on their review of relevant training packages, as well as industry development of Continuing Professional Development modules.

2. **Track capability of the infrastructure workforce to achieve net zero over time and monitor the progress, identifying emerging needs and future opportunities to boost supply and uplift capability.**

- This should build on established work. Potential options could include regular modelling to predict demand and supply gaps, building on Jobs and Skills Australia's Clean Energy Generation report, or annual updates on workforce supply and industry sentiment via Infrastructure Australia's annual Market Capacity reporting.

As these actions cut across multiple sectors and portfolios, they would need to be supported by the Department of Employment and Workplace Relations, Jobs and Skills Australia, relevant Jobs and Skills Councils, and the Department of Climate Change and Department of Climate Change, Energy, the Environment and Water where appropriate.

For the transport infrastructure sector, these actions could be progressed immediately by the Infrastructure Decarbonisation Working Group.

RECOMMENDED POLICY DIRECTION

research to fill knowledge gaps, starting with pathways from adjacent sectors

This report takes a first step to define and quantify the Net Zero Infrastructure workforce and assesses the potential impact of occupations to reduce emissions in the project delivery. Stakeholders have identified further evidence gaps that are beyond the scope of this report but are working on further investigations.

A top research priority is understanding pathways and worker mobility across sectors

This research has found that there is high demand for net zero skills in a group of high impact 'typical' infrastructure roles, which collectively represent almost 40% of the current Net Zero Infrastructure workforce ('High Demand and Many to Upskill'). An additional 20% of the workforce of 'Mostly Technical Expert' infrastructure workers have a moderate impact but are in very high demand with the highest repeat job advertisements growth (60% compared to workforce average of 35%).

In a tight labour market where employers are competing for workers across sectors, a key gap in current understanding is pathways and worker mobility across adjacent infrastructure sectors. Policy and industry stakeholders have highlighted the value of better understanding the pathways via which workers may move across these adjacent industries as means to address workforce shortages and skills gaps, and to increase economic-wide labour productivity.

Given the high demand for infrastructure workers across key sectors, evidence of the skills transferability and actual worker mobility between these sectors could inform workforce strategies and identify opportunities to enhance worker mobility across adjacent infrastructure sectors. Findings of this research should also be published to increase transparency of career pathways and mobility opportunities that could be unlocked by workers and businesses who invest in training and upskilling.

BuildSkills Australia, the Jobs and Skill Council representing the built environment sector (comprising the construction, property and water industries), has a mandate to address current and emerging workforce challenges and maximise workforce outcomes for the sector, and would be well placed to drive this pathways research.

Further, JSA's research and analysis capabilities, including for example via its Data on Occupation Mobility program, could also be leveraged to progress research on pathways and worker mobility across adjacent infrastructure sectors.

Other knowledge gaps include impact on regions, future skills, migration and regulatory settings

Other research areas identified for future investigation to help identify issues and opportunities to boost workforce supply and upskill existing infrastructure workers in net zero are:

- **Implications for the regions**, which is an important area for future investigation is regional differences in supply and demand of net zero skills, particularly given the key role regional locations will play in the nation's energy transition.
- **Emerging and future skills**, with this report taking a retrospective look at demand trends for net zero skills mapped to existing occupations as indicated by job advertisements. It provides a limited look at how role designs and occupations may change in the future as the economy evolves away from traditional energy sources. For example, stakeholders have noted the increasing importance of carbon accountants, and data and digital specialists needed to leverage digital engineering for carbon estimation and management.
- **Suitability of current migrant settings** to address short term skills gaps. In 2024, the Australian Government introduced Skills in Demand (SID) visa to help address critical skill shortages across a variety of industries, including construction. Most trades are eligible for skilled work visas under the SID program,

or otherwise under a Labour Agreement. It is unclear whether these changes have helped to ease the skills shortage in construction.

- **Regulatory, licencing or procurement settings** that might hinder the uptake or development of new Net Zero Infrastructure skills, or limit worker mobility across jurisdictions. For example, national harmonisation in trade licensing is often cited as a potential means to ease workforce shortages. The Australian Government is working with states and territories businesses and unions to design a national licensing scheme that enables electrical trades workers to work across jurisdictions without reapplying for a separate licence or paying additional fees, in order to help ease workforce shortages in sectors such as housing construction and clean energy.

  While the current Automatic Mutual Recognition (AMR) scheme allows workers in a wide range of occupations to be licensed in one state/territory and work in another state/territory without having to apply for a separate licence or pay additional fees, many licenses are exempt under AMR and not all jurisdictions participate in the scheme. With regard to electrical trades for example, some regulatory burdens that reduce labour mobility and increase costs remain under the current system. A national licensing scheme could address these burdens and supersede any existing mutual recognition arrangements for electrical occupations.

BuildSkills Australia, supported by Jobs and Skills Australia and Infrastructure Australia, should -

3. **Undertake research on pathways and worker mobility across adjacent infrastructure sectors and jurisdictions into high impact net zero roles.**

- This research should include analysis of skills transferability, actual worker mobility in practice, and pathways from education and training from adjacent sectors.
- Findings of this research should be published to improve transparency of career pathways and mobility opportunities; encourage workers and businesses to invest in training and upskilling; and the education and training sector to address any gaps identified.

RECOMMENDED POLICY DIRECTION

deliver more targeted industry-wide training to upskill high impact professional roles

Our analysis indicates that 90% of professional roles in infrastructure (Engineers, Architects and Scientists) are already engaged in activities that contribute to reducing emissions across the project lifecycle. Professional roles have the potential to make the greatest contribution to reducing the overall emissions footprint of an infrastructure project, owing to their focus on front end design and planning stages of the asset lifecycle.

Furthermore, professionals who are not typically counted as part of the infrastructure workforce (as defined by Infrastructure Australia), such as Financial/Cost Controllers, Economists and Policy Analysts have a high impact in driving net zero outcomes.

Yet the recent New South Wales survey of infrastructure industry's readiness to decarbonise the sector found that within the industry, professions core to the development and delivery of infrastructure (such as construction managers, architects and engineers, and business case developers) have the lowest confidence in their ability to reduce upfront carbon.[13] Upskilling these high impact professional workers will be critical to the achieving its net zero ambitions.

Professional associations recognise the need to upskill in net zero, following release of key polices, guidance and reporting requirements

In a relatively short period of time, a number of foundational policies and guidance have been released which will guide how Net Zero Infrastructure will be achieved:

- A solid foundation: A common definition for net zero infrastructure and how to get there - ASBEC
- Policy on the application of the national carbon values - Infrastructure Australia & Infrastructure and Transport Ministers' Meetings
- Embodied Carbon Measurement for Infrastructure: Technical Guidance (National Measurement Guidance) - Infrastructure and Transport Ministers' Meetings
- Decarbonising infrastructure delivery policy and Embodied Carbon Measurement for Infrastructure: Technical Guidance (NSW version) - Infrastructure NSW
- Guide to assessing greenhouse gas emissions - Infrastructure Australia

Professional associations recognise the need to upskill their members with respect to new reporting obligations and evolving industry needs on decarbonisation. In response, many are delivering sustainability training via their Continuing Professional Development programs, such as:

- Chartered Accountants Australia and New Zealand offers a range of micro courses such as the sustainability reporting.
- Engineers Australia's 'Carbon Measurement Fundamentals for Engineers' provides guidance on quantifying, evaluating and presenting project carbon costs, by means of carbon assessment, lifecycle costing and environmental product declarations.
- The Royal Institute of Chartered Surveyors offers members training on adopting their whole life carbon assessment (WLCA) standard, for more consistent and accurate carbon measurement in the built environment.
- The Australian Institute of Architects developed its 'Embodied Carbon Curriculum', funded by the Australian Government Department of Climate Change, Energy, the Environment, and Water, to help architects embed consideration of embodied carbon in their practices and embrace opportunities to improve outcomes.

There is an opportunity to develop industry-wide training on carbon fundamentals

Many professions, including those listed above, play key roles during the high impact planning and design project stages of infrastructure delivery, engaging with fundamentals of how carbon is measured, managed and reported. While each profession will have its own technical lens, there is an opportunity to develop an industry-wide understanding of the common foundations on which carbon decisions are made.

One example of an industry wide approach is the Institute of Civil Engineers UK's 'Carbon Management in Infrastructure' program in the United Kingdom. The program offers training for all infrastructure professionals across the supply chain, providing guidance on applying PAS 2080 to infrastructure projects with aims of reducing carbon and reducing cost. This type of sector wide training improves consistency of approach and definitions across the supply chain.

Based on findings from this research and other sources such as Infrastructure NSW's Capability Surveys, a common foundations program for infrastructure professionals could include the following areas for capability uplift as priority:

- Introduction/overview and principles for carbon management in infrastructure
- Carbon accounting, measurement and estimation
- Decarbonisation in business cases, planning and risk assessment
- Low carbon solutions for design and construction
- Decarbonisation in procurement and early market engagement.

Given its role as the peak body for organisations across the infrastructure lifecycle and its partnerships with industry bodies and professional associations, ASBEC is well placed to facilitate an industry wide approach to explore the development of a Carbon Management Fundamentals program for infrastructure professionals in Australia.

The Australian Sustainable Built Environment Council, working with relevant professional associations and government, should -

4. **Explore options to develop an industry wide approach for a Carbon Management Fundamentals program for infrastructure professionals and leaders.**

- In the first instance, the program should cover the high-level fundamentals to carbon management in infrastructure, such as collaboration needed across professions and the key principles from PAS2080: governance & leadership, roles & responsibilities, carbon in decision-making, measurement & reporting.
- In the longer term, the program could explore developing more in-depth training modules targeted at specific carbon measurement, low carbon solutions, and the role and actions required from key professions in infrastructure decarbonisation, i.e. targeted training modules for: business case advisors & economists, procurement professionals, designers, and construction managers.

Endnotes

1 Infrastructure Australia 2024, *2024 Infrastructure Market Capacity Report*, Infrastructure Australia, available at https://www.infrastructureaustralia.gov.au/2024-infrastructure-market-capacity-report

2 Infrastructure Australia 2024, *Embodied Carbon Projections for Australian Infrastructure and Buildings*, Infrastructure Australia, available at https://www.infrastructureaustralia.gov.au/embodied-carbon-projections. As of FY 2023, operating and embodied emissions from infrastructure and buildings (comprising transport, utilities and buildings) are almost one third of Australia's total carbon emissions, and with enabled emissions, they would be responsible for over half of all the country's emissions.

3 Infrastructure Australia 2024, 2024 Infrastructure Market Capacity Report, Infrastructure Australia, available at https://www.infrastructureaustralia.gov.au/2024-infrastructure-market-capacity-report

4 Roles not counted as part of the infrastructure workforce by Infrastructure Australia, see *2024 Infrastructure Market Capacity Report*, Infrastructure Australia, available at https://www.infrastructureaustralia.gov.au/2024-infrastructure-market-capacity-report

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6 Infrastructure Australia 2024, *Embodied Carbon Projections for Australian Infrastructure and Buildings*, Infrastructure Australia, available at https://www.infrastructureaustralia.gov.au/embodied-carbon-projections As of FY 2023, operating and embodied emissions from infrastructure and buildings (comprising transport, utilities and buildings) are almost one third of Australia's total carbon emissions, and with enabled emissions, they would be responsible for over half of all the country's emissions.

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Online ISBN: XXXXXXXXXX

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