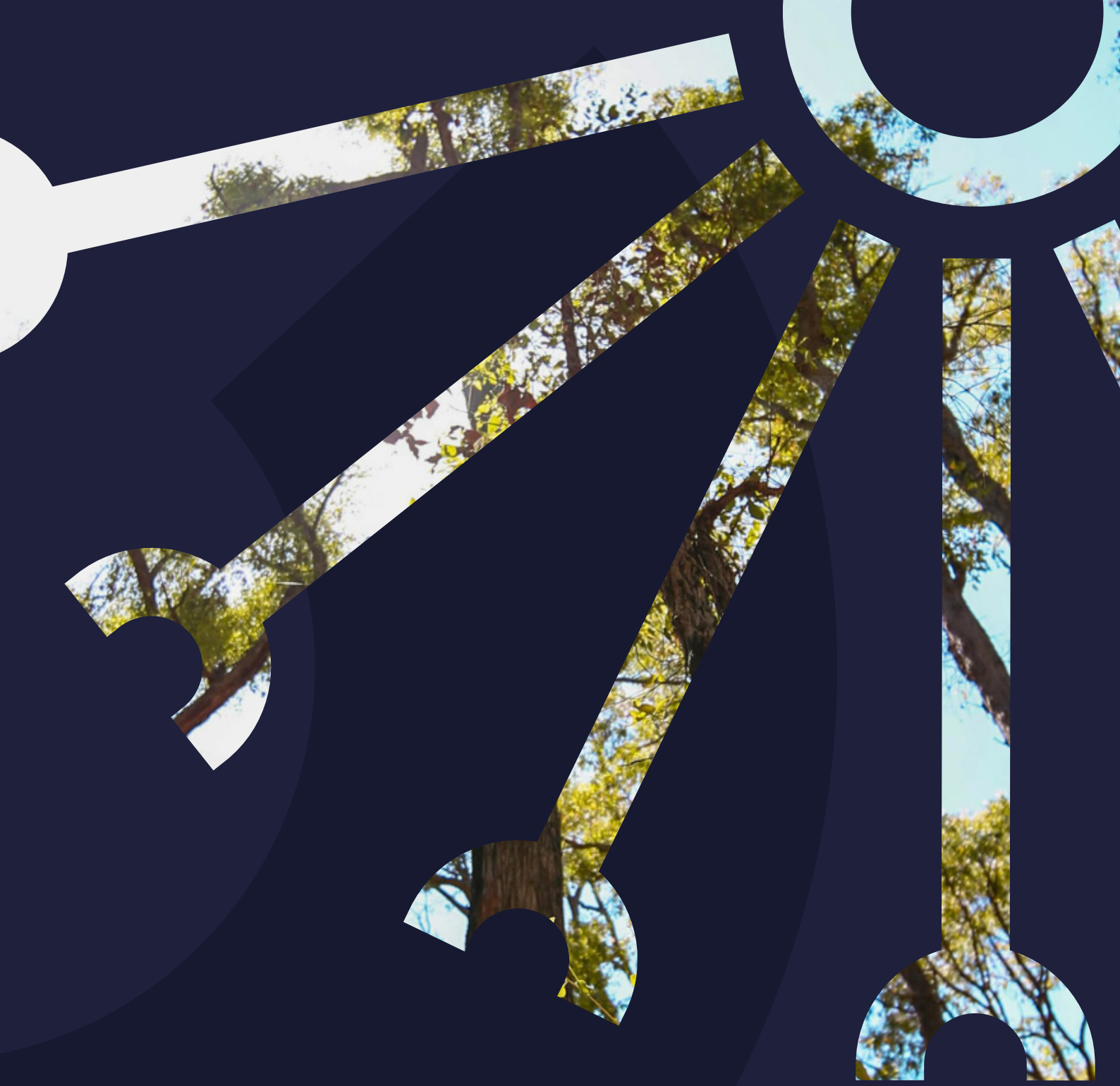

THE FUTURE CARBON WORKFORCE

A development plan

RACE for 2030

UTS

POWERING AUSTRALIA

ACKNOWLEDGEMENTS

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CITATION

Carbon Market Institute (2026) The Future Carbon Workforce: A Development Plan. Report for Powering Australia and RACE for 2030 CRC.

DISCLAIMER

ACKNOWLEDGMENT OF COUNTRY

Powering Australia wishes to acknowledge the First Nations of Australia and recognise their enduring connection to Country through culture, people, place and story. We honour the knowledge systems that have sustained these lands and waters for thousands of generations and recognise the vital role of First Nations leadership and self-determination in shaping a just and sustainable future. As Australia undergoes a significant clean energy and industrial transition, we acknowledge the importance of respectful partnership, cultural integrity, and shared purpose to realise the full opportunity of the Clean Energy Transition.

PROJECT CONTEXT

Australia's carbon sector will play a central role in meeting the country's 2035 climate target and its pathway to net zero emissions by 2050. Delivering the carbon removals and abatement embedded in that ambition depends on a substantial and rapidly growing workforce, spanning carbon capture, utilisation and storage, soil and vegetation projects, plantation forestry, carbon market trading, and Indigenous market participation. There are challenges to overcome, including a nascent and fragmented sector, skill shortages, and the need to scale the workforce nearly five-fold within a decade.

The project aims to contribute to the development of Australia's carbon sector by:

- Quantifying the workforce needed to deliver Australia's carbon removals to 2035 and beyond.
- Identifying potential skill shortages and priority actions to build a suitably skilled carbon workforce.
- Growing jobs and providing pathways to secure employment across the carbon subsectors.
- Communicating the workforce opportunities and challenges to industry and policy makers.
- Facilitating Indigenous participation across the carbon sector.
- Delivering better economic outcomes for First Nations communities.

SECTOR COMPETITIVENESS PLANS (SCPS) – CYAN VENTURES AND DELOITTE

Powering Australia has developed sector competitiveness plans (SCPs) to identify opportunities where Australia has a unique advantage to foster clean-tech manufacturing across six areas:

1. Renewable Energy Generation
2. Industrial Decarbonisation
3. Transport
4. Electricity Transmission and Distribution
5. Carbon
6. And the cross-cutting study of opportunities for First Nations businesses.

Each SCP identifies anchor opportunities based on national need and likelihood of success, outlines workforce requirements, and recommends targeted actions to leverage Australia's strengths and build resilient supply chains.

WORKFORCE DEVELOPMENT PLANS (WDPS) – CARBON MARKET INSTITUTE

One of the key challenges to scaling Australia's carbon sector is developing the workforce amidst skill shortages. Responding to this challenge, Powering Australia partnered with the RACE for 2030 Cooperative Research Centre and commissioned the Carbon Market Institute (CMI) to develop The Future Carbon Workforce: A Development Plan. The WDP aims to characterise Australia's carbon sector and its workforce requirements, identify barriers and enablers to developing a scaled carbon workforce, and set the foundations for collaboration between industry, government, education, and training providers to develop a robust workforce. It is anchored to Australia's 2035 climate target and situates the opportunities identified in the relevant Sector Competitiveness Plan within the context of the whole carbon sector.

1. Executive summary

This carbon sector workforce development plan (WDP) aims to:

- Characterise Australia's carbon sector with a focus on its supply dimensions
- Illustrate carbon workforce requirements from now until 2035
- Identify barriers and enablers to the development of a scaled carbon workforce
- Provide recommendations for government and policy stakeholders, educational institutions and industry

This WDP is anchored to Australia's 2035 climate target and the apparent need to develop a carbon workforce that can deliver the carbon removals embedded in Australia's 2035 climate ambition. The WDP also reflects a higher-level view on Australia's outlook towards net zero emissions by 2050. This framing is distinct from work which is based on the carbon sector's potential to deliver abatement.

The WDP has been developed using a combination of stakeholder interviews, desktop research, and modelling. It addresses the whole carbon sector to situate and provide context for the specific opportunities highlighted in the Sector Competitiveness Plan (SCP) as well as enabling recommendations which benefit the sector as a whole. It does not however consider in detail organisational engagement with carbon markets including through strategy, sustainability and procurement teams beyond the carbon market trader cohort. These professions may require additional focus in Australia's workforce requirements.

The Carbon Market Institute's (CMI) commissioned workforce modelling estimates that Australia's carbon sector needs to provide just over 50Million tonnes (Mt) CO2 in 2035 and be delivering closer to 175 MtCO2 in 2050. This is a significant increase from the 2025 base of 14MtCO2. Delivery of this amount of abatement requires a substantial workforce, with a nearly five-fold growth projection between now and 2035, requiring close to 11,500 full time workers. In line with projected growth in the plantation forestry and soil and vegetation subsectors, the largest workforce increase, in absolute terms, are needed in the land and field worker-based occupations, while plant and equipment operator roles see the largest percentage increases. Other roles requiring strong increases in numbers include scientists, engineers, and technical and tradespeople. The challenge associated with scaling the required workforce is compounded by current shortages in key areas such as engineering, environmental science, construction workers and industrial plant operators.

Major barriers to building and developing the required workforce in the carbon sector identified in this WDP include:

- Limited awareness of the importance and longevity of the carbon sector amongst new entrants
- Limited consideration of workforce development alongside policy initiatives
- Long lead times entailed in carbon sector projects development
- Low accessibility and availability of suitable accredited courses and training
- Barriers to participation for Indigenous peoples grounded in structural and accessibility limitations of educational opportunities elements
- Lack of fundamental knowledge on Indigenous land rights and law amongst other participants

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2. Introduction

As a Party to the Paris Agreement, Australia has committed to achieving net zero emissions by 2050, with incremental Nationally Determined Contributions (NDCs) creating a ratcheting mechanism for ambition. Australia's 2035 NDC sets a target of a 62-70% reduction in emissions on 2005 levels, and its Net Zero Plan (the Plan) guides the transition towards a net zero emissions economy in a fair and orderly manner[2]. Underpinning the Plan are six sector specific emissions reduction plans, which outline specific activities to reduce emissions. Across all sectors, there is a substantial role for the carbon market to support Australia's transition towards net zero.

Australia's carbon market is an important vehicle for channelling investment towards industrial and land-based abatement activities. In the land sector, it facilitates land restoration and management activities that can improve agricultural productivity and natural capital, build climate resilience and adaptation and drive regional and rural employment opportunities. The market can enable regional economic diversification, job creation and support for Indigenous and community outcomes. In the industrial context, it incentivises additional emissions reductions and creates frameworks for businesses to invest in projects that deliver positive environmental, social and economic benefits. This includes novel carbon removals technologies like carbon capture, utilisation and storage as well as carbon dioxide removal (CCUS). Industrial carbon removals can help support transition of workers in heavy emitting industries by creating new employment opportunities aligned with their existing skillset.

The carbon market in Australia is largely established through the Australian Carbon Credit Unit (ACCU) Scheme, the centralised carbon crediting framework, and the reformed Safeguard Mechanism, that provides the compliance driver for continued emissions abatement. The ACCU Scheme is a legislative instrument underpinned by the Carbon Credits (Carbon Farming Initiative) Act 2011 (CFI Act) and associated rules. Since 2011, the ACCU Scheme has delivered over 169 Mt of greenhouse gas abatement[3], and its role is expected to grow as Australia's NDC trajectory steepens. Although abatement of greenhouse gases is the central aim of the CFI Act, many projects are developed with the explicit intention of delivering "co-benefits", which include ancillary cultural, economic, environmental and social outcomes. Co-benefits and contribution to broader government policy priorities are particularly important to the broader social license of the ACCU Scheme. Also administered by the Clean Energy Regulator (CER), the reformed Safeguard Mechanism requires Australia's largest emitting facilities to reduce their emissions, year on year using onsite decarbonisation projects or investment in carbon credits.

As the ACCU Scheme's role expands and shifts to support Australia's 2035 NDC and net zero target, a clear understanding of sectoral and workforce growth requirements is needed to support the transition. This WDP builds on the Carbon Sector Competitiveness Plan (SCP) commissioned by Powering Australia[4], and is intended to inform policy and training decisions to support participation in the carbon sector. This WDP focuses on the time horizon from 2025 to 2035, with a high-level view to 2050. To support a holistic understanding of the carbon sector, five subsectors were identified and analysed for current employment, education and training opportunities, barriers to participation, and enabling factors to grow the sector. The subsectors are carbon capture, utilisation and storage and carbon dioxide removal (CCUS), soil and vegetation projects, plantation forestry projects, carbon market traders, and Indigenous market participants. Definition of subsectors was required as each contains a distinct set of activities occurring over different timeframes which affect the pace and composition of the workforce. The Indigenous carbon subsector was broken out as a distinct sector to reflect the unique opportunities and constraints for Indigenous carbon project involvement, be it through project ownership or partnership arrangements. This subsector is also intended to capture Indigenous-led ACCU method development and application. Over time, it is expected that Indigenous representation will increase across projects in the other subsectors.

The CMI has developed the Carbon Sector WDP, to support the achievement of Australia's 2035 NDC and is consistent with Australia's Net Zero Plan, through a combination of stakeholder interviews, desktop research, and modelling. This WDP is intended to underpin future policy and program development by stakeholders, including government, industry and education providers. Importantly, the recommendations will support development of a carbon workforce that is grounded in social license considerations for the regional and Indigenous communities that are critical to the success of carbon project delivery.

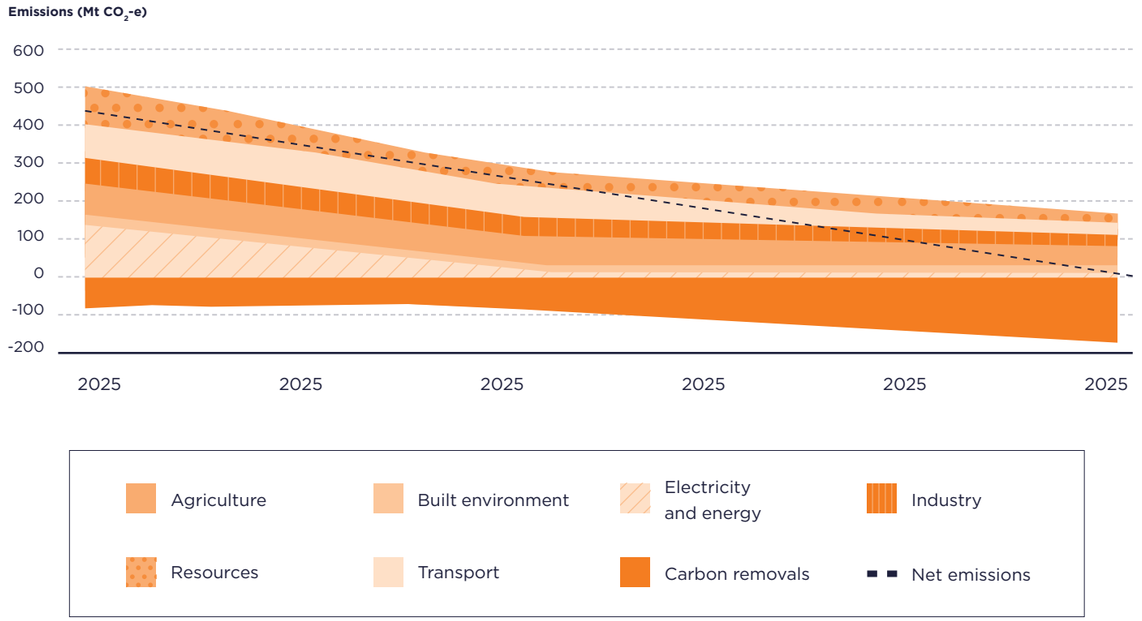
Notes/Sources: 2. Department of Climate Change, Energy, the Environment and Water, 2025, *Australia's Net Zero Plan*. 3. Ibid p.77. 4. Cyan Ventures & Deloitte, 2025, Carbon Sector Competitiveness Plan – Draft Report, Powering Australia.

3. The carbon sector

3.1 – APPROACH TO THE CARBON SECTOR

The emissions profile for Australia's projected economy wide net zero transition is shown in Figure 1. The presence of residual emissions in 2050 underlines the need for carbon removals to 2050 and beyond.

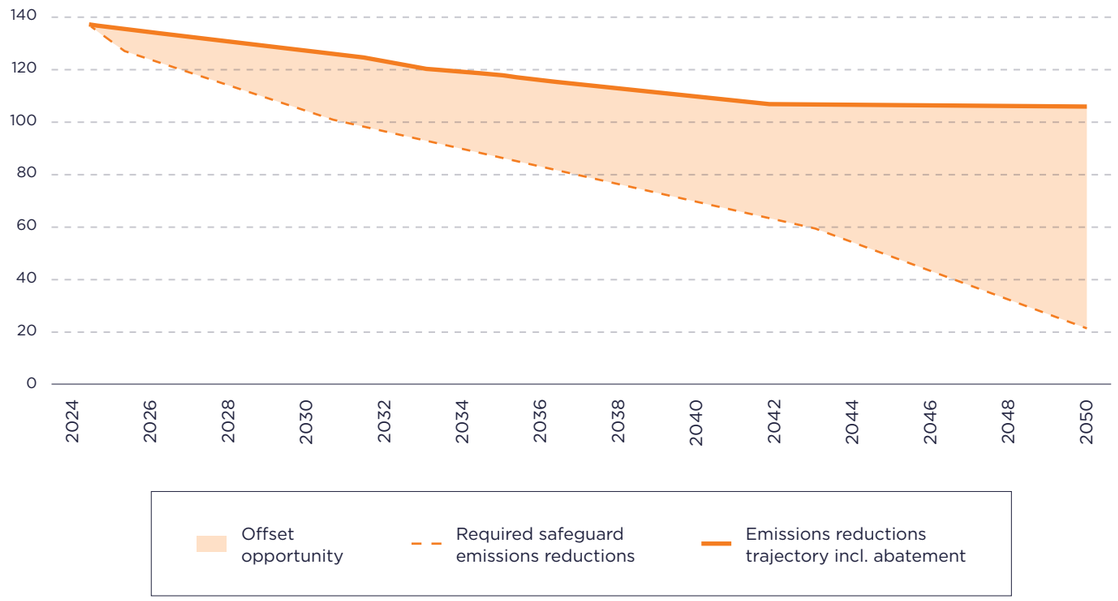
Figure 1: Project emissions under the Treasury Baseline Scenario by Sector[5]



The land sector is expected to play an increasingly important role on Australia's journey to net zero, remaining a net emissions sink and providing over 140 $MtCO_2$ of new net abatement[6]. Currently, approximately 23% of Australia's emission emanate from hard-to-abate sectors[7]. While decarbonisation opportunities for hard-to-abate industries grow, such as low carbon liquid fuels and low carbon technologies, transition timelines mean other abatement methods are required[8]. The need for other abatement methods, including carbon credits, means there is a substantial role for the carbon market in Australia's net zero transition as shown in Figure 2.

Notes/Sources: 5. Department of Climate Change Energy the Environment and Water, 2025, *Australia's Net Zero Plan.* 6. Ibid. p.117. 7. Department of Climate Change Energy the Environment and Water, 2025, *National Inventory Report 2023.* 8. Cyan Ventures & Deloitte, 2025, *Carbon Sector Competitiveness Plan – Draft Report*, Powering Australia

Figure 2 Required emissions reductions 2025–2050 (SCP)[9]



Australia's carbon market is largely established though:

- The Reformed Safeguard Mechanism which creates a demand driver by placing compliance obligations on industrial facilities that meet the participation threshold
- Voluntary action related to organisational net zero targets and Beyond Value Chain Mitigation (BVCM)
- The ACCU Scheme, a legislated framework that enables development of carbon projects

In the context of this work, the carbon sector is aligned with the supply side of the carbon market and characterised by activities or projects which remove and sequester or utilise carbon dioxide.

The Carbon SCP states a strong, credible domestic carbon sector supports hard-to-abate industries contribute to an orderly transition to net zero while retaining exports and sovereign manufacturing capability[10]. The SCP further identifies the integrity of the ACCU Scheme, at a Scheme and methods level, and the strength of measurement and reporting frameworks are foundational to the success of the carbon sector. Longer term, success will additionally require investment which enables scaling of technologies suited to Australia's natural advantages in the nature-based and engineered carbon abatement landscape. The SCP suggests Australia's natural advantages include strong potential for renewable energy, geological storage potential and land-based opportunities.

This WDP addresses the carbon sector as a whole to situate and provide context for the specific opportunities highlighted in the SCP and enable recommendations which benefit the entire sector. It does not however consider detailed organisational engagement with carbon markets including through strategy, sustainability and procurement teams beyond the carbon market trader cohort.

Notes/Sources: [9]Ibid. [10]Cyan Venture & Deloitte, 2025, *Carbon Sector Competitiveness Plan – Draft Report*, Powering Australia.

For this project CMI has defined the carbon sector as consisting of the following subsectors:

1. **CCUS** which includes carbon, capture and storage, carbon capture utilisation and storage and direct air capture (DAC) as representative of more novel carbon dioxide removal (CDR)
2. **Soil and vegetation projects** including blue carbon and biochar
3. **Plantation forestry projects**
4. **Carbon market traders**
5. **Indigenous carbon projects,** which captures Indigenous organisations participating in, or owning carbon projects, or contributing to method development. Indigenous professionals are assumed as a percentage of other subsectors

The SCP target opportunity areas of plantation forestry and geological storage, as well as the additional target areas of savanna fire management, DAC and biochar and algae sit within each of the subsectors listed Detailed inclusion can be seen in the sections on workforce needs to each sector.

3.2 – WHOLE OF SECTOR WORKFORCE MODELLING

CMI commissioned high-level workforce modelling to provide an indication of the possible size and role distribution of a future carbon sector workforce. The workforce modelling is based on the five carbon subsectors. The model starts with actual ACCU issuances in 2025 from the CER and then anchors the required abatement from each subsector to the Australian Government's modelling of the land sector's contribution to its 2035 NDC[11], and Net Zero target[12]. Abatement attributed to CCUS, DAC and biochar are the two exceptions. Carbon dioxide removal amounts for CCUS are derived from CSIRO[13] and DCCEEW data[14], while a nominal amount based on historical growth rates is added for biochar. Using abatement quantities derived from the Treasury modelling provides an independent, internally consistent set of abatement quantities. Moreover, using Treasury modelling for abatement needs means the workforce needs presented support delivery of Australia's 2035 NDC.

The model translates abatement requirements into ACCU issuances for each carbon subsector. This means ACCUs used for insetting will be represented in the modelling if they're reflected in Treasury's modelling. Importantly this approach differs from one which assess the workforce needed to deliver the potential abatement each subsector could provide and is likely to produce a conservative result.

ACCU estimates in the SCP[15] were not used as a modelling base because it provides ACCU supply estimates for only two subsectors and estimates are based on subsector potential. Assessing workforce requirements on subsector potential may overestimate the required workforce and provide skewed insights into the required roles. Using the Treasury modelling as a base means the required ACCU quantities relied on in this WDP are lower than those given in the SCP. For example, this model assumes plantation forestry contributes 6 $MtCO_2$ abatement in 2035 rather than 15 $MtCO_2$ and geological storage assumes 6$MtCO_2$ abatement rather than 45$MtCO_2$. This means the size of the workforce for these subsectors will be significantly smaller than if SCP estimates were used. ACCU issuance modelling from other sources estimate total ACCU issuances in 2035 to be approximately 50 $MtCO_2$[16] which is more aligned with this modelling which estimates issuances to be 52 $MtCO_2$ in 2035.

Model Architecture:
The model uses the financial size of each subsector, determined by multiplying the ACCUs issuance ($MtCO_2$) for each subsector with an ACCU production cost ($/$MtCO_2$) annual salaries and workforce composition estimates over time to estimate the number and distribution of full-time equivalent (FTE). Presenting data as FTE means multiple people may be represented by 1 FTE. For examples two workers who spend 50% of their time on carbon related activities and 50% of their time on other duties at a workplace, appear as 1 FTE. The modelling extends beyond the 2025 to 2050 timeframe to allow for the workforce needs for different phases of an ACCU project to be represented. For example, the workforce for a soil carbon project starts 4 years before the first ACCU issuance with a workforce largely comprised of carbon project developers, environmental and land scientists and land field workers. This evolves over time as the project progresses to its first ACCU issuance to include more land and field workers and less environmental and carbon project developers.

Model Assumptions:
Key assumptions in this modelling include:

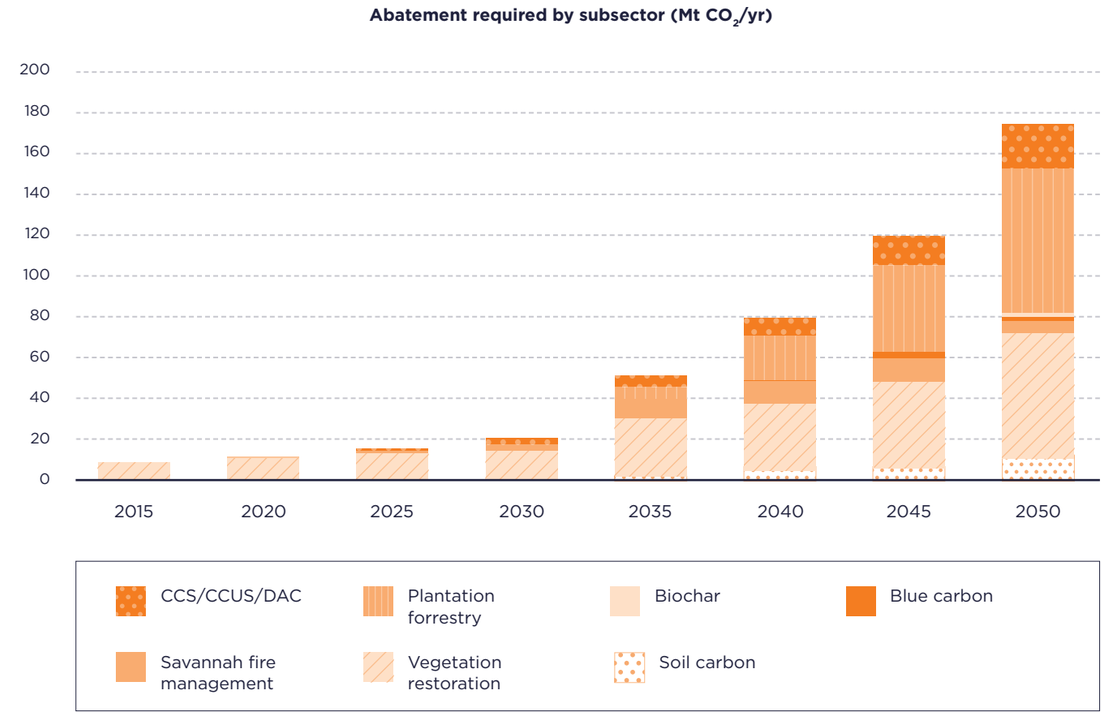
- ACCU issuance amounts in each subsector are independent
- ACCU requirements and therefore issuance is steady in the years beyond 2050
- ACCU production cost ($/MtCO2) is independent of the amount of ACCUs produced
- ACCUs for subsectors not described in treasury model remain the same percentage of the total carbon sector abatement over time
- A 10% discount rate is applied to costs over time as per CSIRO sequestration potential report[17]
- Technology is relatively static over time
- DAC is representative of CDR

More detail on modelling assumptions, and model architecture is contained in Appendix C.

Notes/Sources: [11]Treasury, 2025, *Australia's Net Zero Transformation: Treasury Modelling and Analysis*. [12]CCA, 2024, *2035 Emissions Reduction Targets Report*. [13]CSIRO, 2025, *Modelling Sectoral Pathways to net zero emissions*. [14]DCCEEW, 2025, *Australia's Emissions Projections*. [15]Cyan Ventures & Deloitte, 2025, *Carbon Sector Competitiveness Plan – Draft Report*, Powering Australia. [16]CCA, 2023, *Modelling results & Impacts Australian Carbon Credit Unit Market Analysis*. [17]CSIRO (2022), *Australia's Carbon Sequestration Potential*, report to Climate Change Authority.

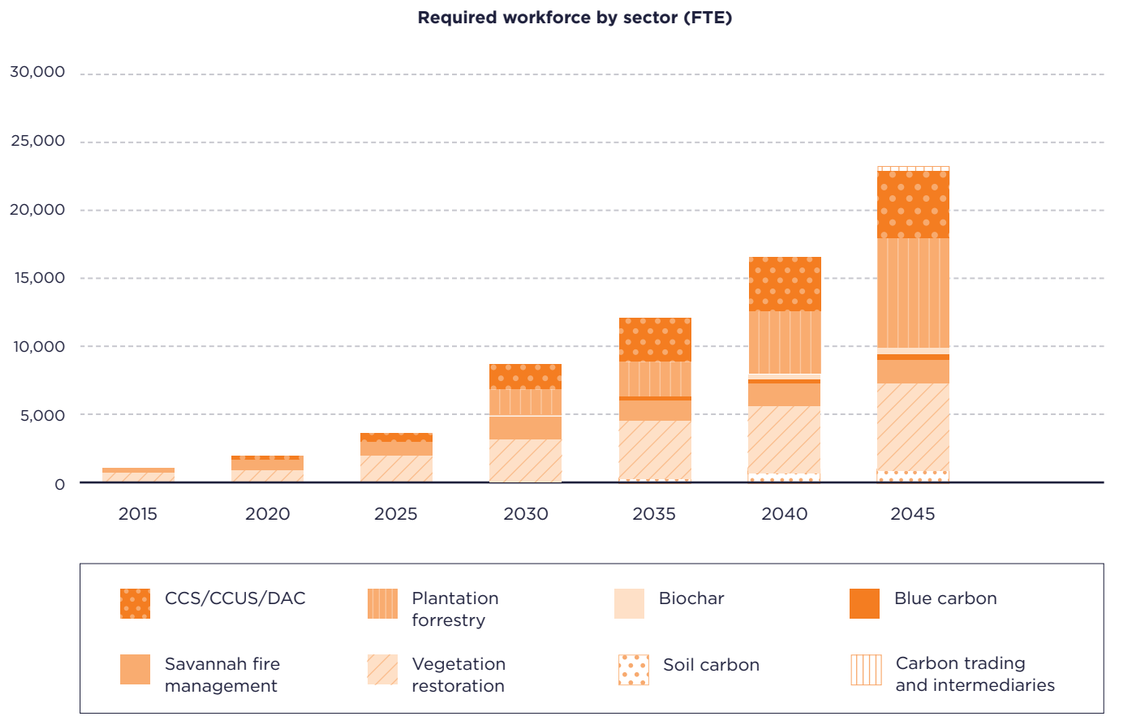
Model results:
ACCU issuances from source data relied on for modelling are shown in Figure 3. This data shows a significant increase in the amount of abatement provided by each subsector is needed between now and 2050 across all subsectors.

Figure 3: Abatement by carbon subsectors to 2050



The total FTE required shows that the employment requirements for the sector requires a similarly large increase to 2050. See Figure 4.

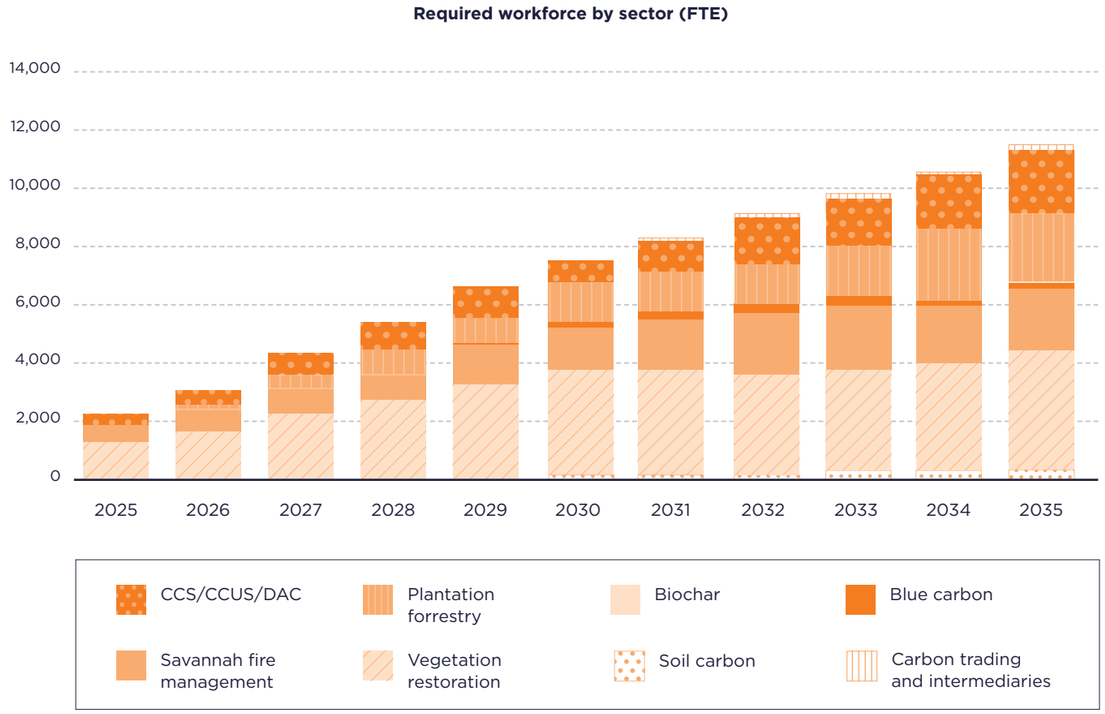
Figure 4: FTE by subsector to 2050



The total workforce by subsector shown for all years is a modelled result due to the absence of an authoritative source for current number of workers in the carbon sector. Industry review suggests in some subsectors the workforce is smaller than anecdotal evidence would suggest. Possible causes of the discrepancies could stem from presentation of data as FTE and relatively small amounts of carbon sequestered (ACCU issuance) by some time intensive methods.

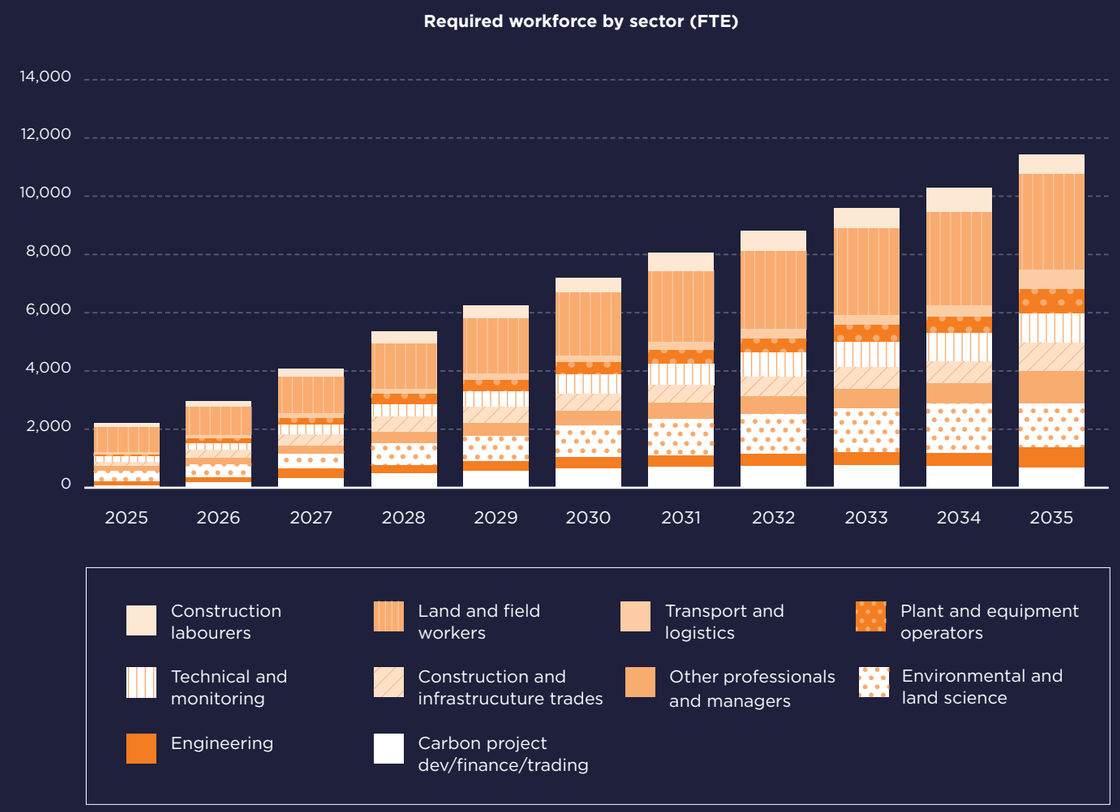
Focussing in on the 2025 to 2035 timeframe in Figure 5, it is estimated that the workforce needs to grow approximately five-fold by 2035, with over half of this growth needed before 2030. The vegetation management, plantation forestry and CCUS sectors show the largest increases in FTE in this timeframe.

Figure 5: FTE by subsector from 2025 to 2035



Changes in employment by role are shown in Figure 6. Modelling indicates increased demand will be largest in absolute terms, for land and field workers, consistent with the increases in the plantation forestry and vegetation restoration subsectors. Plant and equipment operators and construction and infrastructure trades require the largest percentage increases. Other technical roles, including scientists, engineers and technical trades require consistent growth to 2035. Changes in FTE by role reflect the change in number of ACCUs for each subsector as well as changes in requirements across the phases of a carbon project.

Figure 6: Breakdown of workforce needed for the carbon sector by role description 2025 – 2035



It is estimated that increases in Indigenous employment in the carbon sector (Figure 7) will predominantly follow increases in savanna fire management and vegetation methods unless specific programs are introduced to expand Indigenous participation.

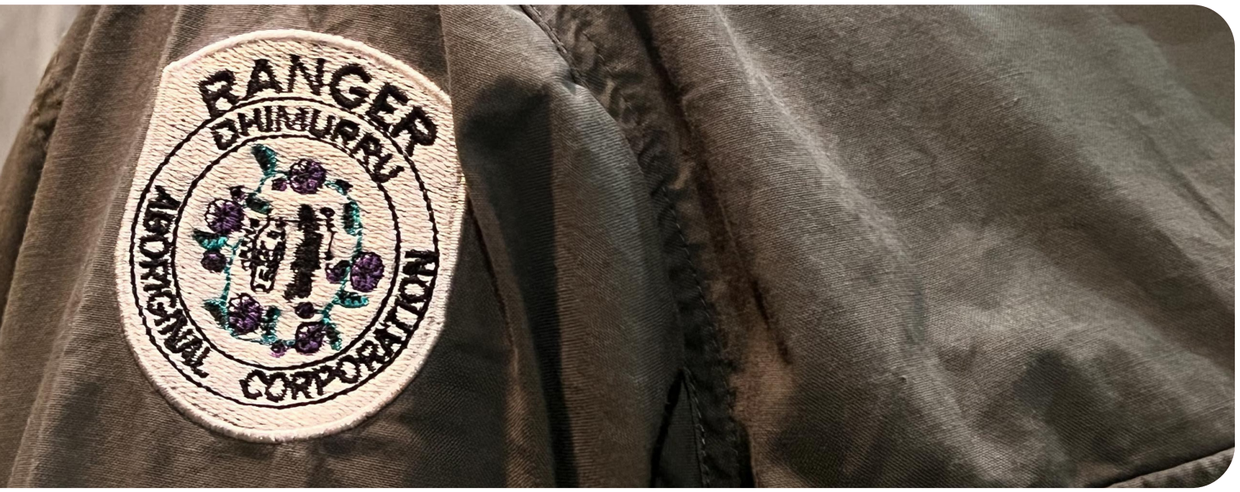
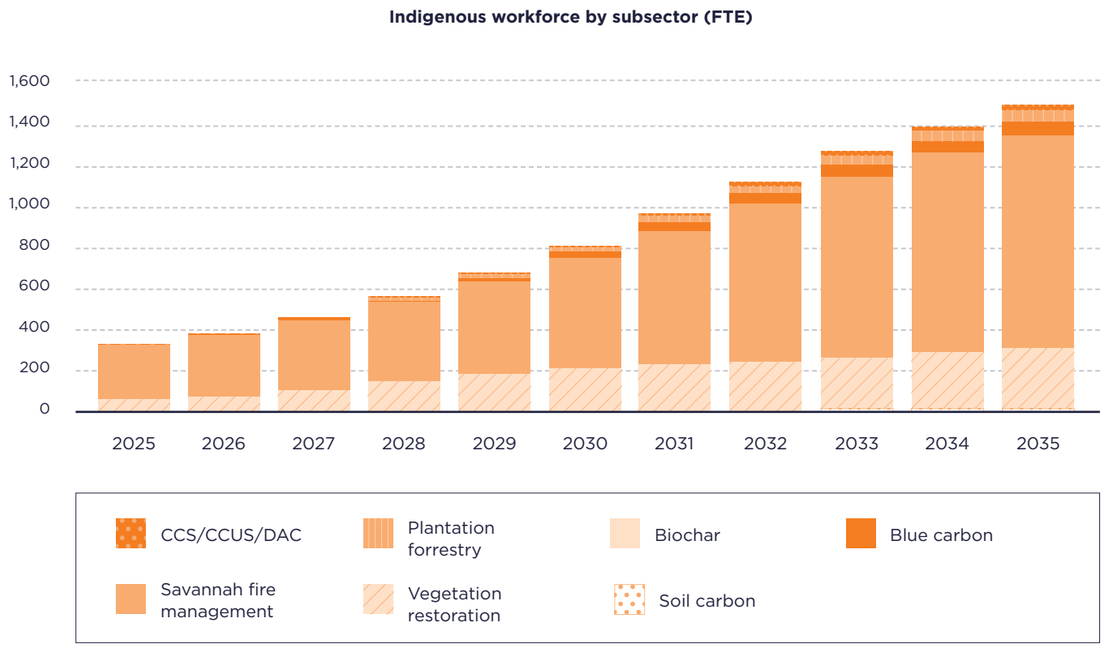
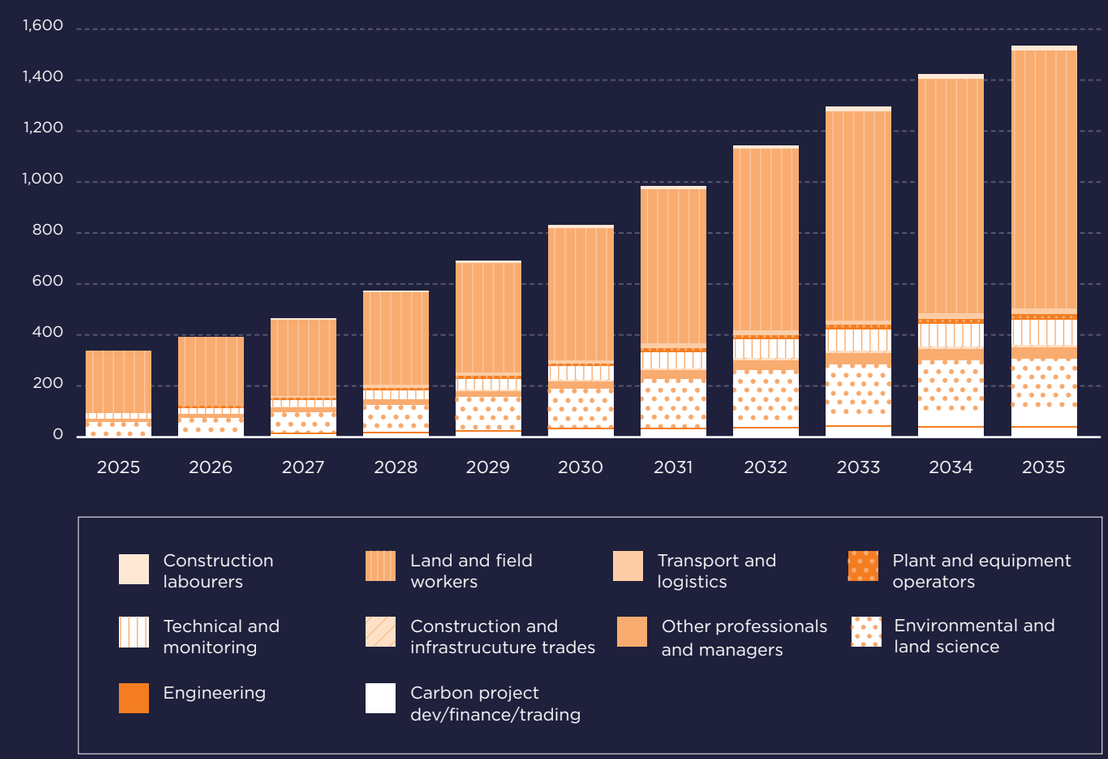


Figure 7: Indigenous workforce by subsector (FTE)



As seen in Figure 8, increases in Indigenous employment are likely to be in the land and field roles, aligned with increases in savanna fire management ACCU issuance.

Figure 8: Indigenous workforce by role 2025 – 2050



3.3 – WORKFORCE MODELLING GROWTH COMPARISON

Workforce modelling shows strong growth is needed across the carbon sector with total workforce increasing from approximately 2,500 FTE to close to 11,500FTE in 2035 and 26,000 in 2050.

This could be made more challenging by shortages in roles considered key to the carbon industry. Jobs and Skills Australia[18] report in 2025 there were national or regional shortages in 23 of the 56 roles used in this work to model the carbon sector (See Table 1). Significantly there were shortages in 6 of the 7 Environmental and land science roles considered and in all the Construction and Infrastructure Trades. Shortages were also recorded in key adjacent roles such as external auditors (OSCA code 211231), Agricultural Consultants (OSCA Code 144123) and Agricultural Research Scientist (OSCA code 244131).

Assessing the size of the challenge is made more difficult by a lack of current data on employment in the carbon sector and representation of carbon specific roles in literature. For example, this work uses modelling to estimate the size of the 2025 carbon sector workforce due to a paucity of authoritative data detailing the existing workforce. In addition, this analysis needs to be considered as indicative because carbon sector specific roles such as carbon project developer needed to be approximated from more the more general roles available as OSCA occupations (Project Developer OSCA code 131431) and ANZSCO groups (economist and valuers ANZSCO group 2245). A complete mapping of the roles considered with mapping to OSCA and ANZSCO codes can be seen in Appendix C.

Economy wide growth rates for the relevant occupational groups from Jobs and Skills Australia Employment Projections[19] are significantly lower than those suggested by this modelling. Although not a like for like comparison, in many cases the growth rates for the carbon sector are an order of magnitude larger than the economy wide projections, indicating intervention is needed to create the required workforce. Roles used in modelling were mapped to ANZSCO Unit Groups to allow comparison of workforce projections.

Notes/Sources: 18. JSA (2025) Occupation Shortage List. 19. JSA (2025) Employment Projections.

Table 1: Growth rates and shortages

Code	Sub-group name	Model role**	OSCA code	ANZSCO Unit Grp	ANZSCO unit group name	2025 FTE	2030 FTE	2035 FTE	5yr change %	10yr change %	*National shortage
1a	**Carbon project dev/finance/training**					**160**	**742**	**890**	**364**	**457**	
1a	Carbon project dev/finance/ training	Carbon project developer	131431	2245	Land Economists and Valuers	14687	17367	18994	18	29	No
		Carbon accountant	211131	2211	Accountants	210295	228043	245260	8	17	No
		Carbon credit aggregator	223999	2249	Other Information and Organisation Professionals	57124	66261	72327	16	27	No
		Broker/trader (carbon)	212332	2222	Financial Dealers	21240	22397	23888	5	12	No
		Financial analyst	212332	2222	Financial Dealers	21240	22397	23888	5	12	No
		Legal specialist (carbon/environment)	281331	2713	Solicitors	100238	111941	121536	12	21	Yes
		Compliance specialist	111632	1399	Other Specialist Managers	68817	76755	82872	12	20	No
1b	**Engineering**					**114**	**342**	**605**	**200**	**431**	
1b	Engineering	Civil Engineer	243231	2332	Civil Engineering Professionals	76286	85120	92295	12	21	Yes
		Mechanical Engineer	243532	2335	Industrial, Mechanical and Production Engineers	40100	45195	49349	13	23	No
		Electrical Engineer	243331	2333	Electrical Engineers	32250	36131	39279	12	22	Yes
		Chemical Engineer	243131	2331	Chemical and Materials Engineers	7147	8087	8804	13	23	No
		Process Engineer	243999	2339	Other Engineering Professionals	17110	19233	21039	12	23	No
		Environmental Engineer	243935	2339	Other Engineering Professionals	17110	19233	21039	12	23	Yes
1c	**Environmental and land science**					**386**	**1161**	**1761**	**201**	**356**	
1c	Environmental and land science	Ecologist	244333	2343	Environmental Scientists	31524	34328	36769	9	17	Yes
		Soil Scientist	244432	2343	Environmental Scientists	31524	34328	36769	9	17	Yes
		Botanist	244632	2345	Life Scientists	10520	11568	12598	10	20	No
		Hydrologist	244533	2344	Geologists, Geophysicists and Hydrogeologists	14015	15439	16334	10	17	Yes
		Remote Sensing Specialist	241233	2322	Surveyors and Spatial Scientists	19559	21553	23199	10	19	Yes
		Agronomist	244133	2341	Agricultural, Fisheries and Forestry Scientists	9438	10265	11088	9	17	Yes
		Forestry Scientist	244135	2341	Agricultural, Fisheries and Forestry Scientists	9438	10265	11088	9	17	Yes

Table 1: Continued

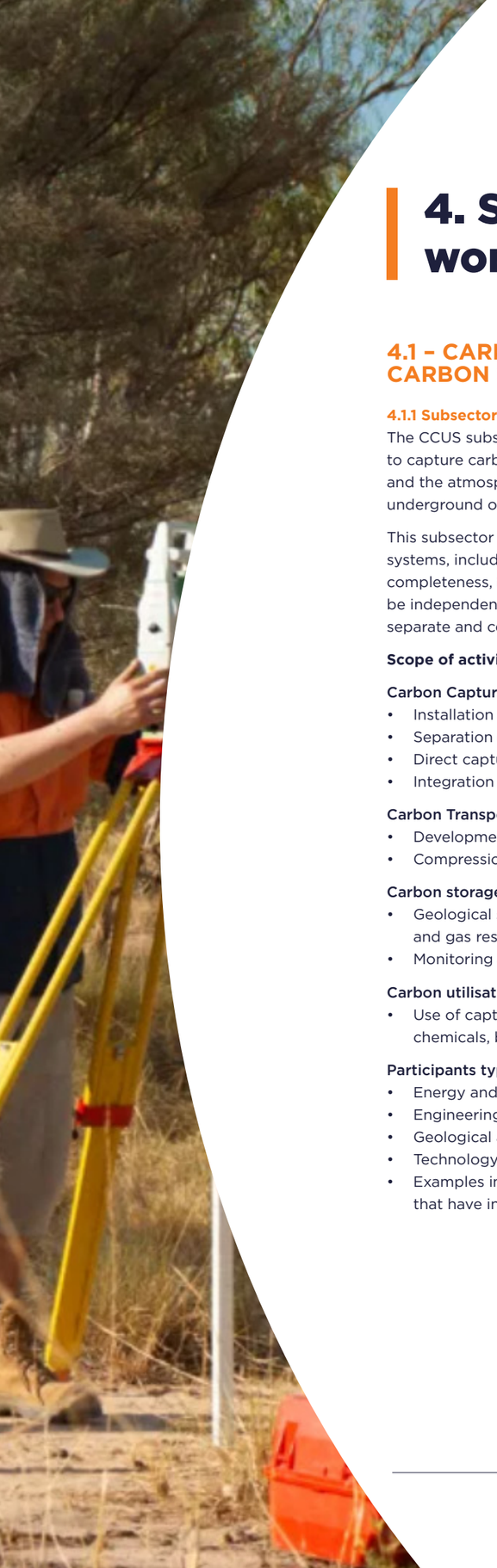
Code	Sub-group name	Model role**	OSCA code	ANZSCO Unit Grp	ANZSCO unit group name	2025 FTE	2030 FTE	2035 FTE	5yr change %	10yr change %	*National shortage
1d	**Other professionals and managers**					**156**	**496**	**761**	**217**	**387**	
1d	Other professionals and managers	Project Manager	131131	1331	Construction Managers	128188	147311	156627	15	22	Yes
		HR Manager / Specialist	111331	1323	Human Resource Managers	92889	104401	113121	12	22	No
		Communications / Stakeholder Manager	221231	2253	Public Relations Professionals	30791	34591	37319	12	21	No
		IT / Data Manager	113232	1351	ICT Managers	89883	103370	112762	15	25	No
		Procurement Officer	571331	5911	Purchasing and Supply Logistics Clerks	117522	123922	130794	5	11	No
		Policy Adviser	223332	2244	Intelligence and Policy Analysts	45428	52688	56861	16	25	No
		Administrator / Office Manager	171231	5121	Office Managers	136601	141105	148117	3	8	No
2a	**Construction and infrastructure trades**					**129**	**573**	**884**	**343**	**584**	
2a	Construction and infrastructure trades	Fencing Contractor	331131	3223	Structural Steel and Welding Trades Workers	77184	79449	82956	3	7	Yes
		Earthworks Operator (Trade)	741234	7212	Earthmoving Plant Operators	48644	49231	50734	1	4	Yes
		Welder	331133	3223	Structural Steel and Welding Trades Workers	77184	79449	82956	3	7	Yes
		Plumber	363131	3341	Plumbers	103573	108958	114160	5	10	Yes
		Electrician	381231	3411	Electricians	194917	207935	218278	7	12	Yes
2b	**Technical and monitoring**					**386**	**1161**	**1761**	**201**	**356**	
2b	Technical and monitoring	Field Technician (Environmental)	311532	3114	Science Technicians	22432	23174	24363	3	9	No
		Sensor / Instrumentation Operator	311599	3114	Science Technicians	22432	23174	24363	3	9	No
		MRV Data Collector	311199	3113	Primary Products Assurance and Inspection Officers	3854	3922	4062	2	5	No
		Laboratory Analyst	244231	2342	Chemists, and Food and Wine Scientists	10245	11305	12250	10	20	No
		Geographic Information System (GIS) Officer	311533	3121	Architectural, Building and Surveying Technicians	84203	91155	96143	8	14	Yes

*, #N/A indicates that not data was available for these roles.
** Model role names are not always the same as OSCA descriptions but are seen to be the best match. See appendix C for more detail.

Table 1: Continued

Code	Sub-group name	Model role**	OSCA code	ANZSCO Unit Grp	ANZSCO unit group name	2025 FTE	2030 FTE	2035 FTE	5yr change %	10yr change %	*National shortage
3a	**Plant and equipment operators**					**80**	**408**	**688**	**413**	**765**	
3a	Plant and equipment operators	Excavator Operator	741234	7212	Earthmoving Plant Operators	48644	49231	50734	1	4	Yes
		Grader Operator	741235	7212	Earthmoving Plant Operators	48644	49231	50734	1	4	Yes
		Bulldozer Operator	741233	7212	Earthmoving Plant Operators	48644	49231	50734	1	4	Yes
		Harvester Operator (Forestry)	741131	7211	Agricultural, Forestry and Horticultural Plant Operators	16122	16050	16761	0	4	Yes - Regional
		Pyrolysis / Biochar Plant Operator	732999	7129	Other Stationary Plant Operators	25455	26224	27202	3	7	No
3b	**Transport and logistics**					**63**	**258**	**410**	**313**	**555**	
3b	Transport and logistics	Truck Driver (General)	713131	7331	Truck Drivers	189200	190350	196852	1	4	Yes
		Articulated Truck Driver	713231	7331	Truck Drivers	189200	190350	196852	1	4	Yes
		Logistics Coordinator	571131	5911	Purchasing and Supply Logistics Clerks	117522	123922	130794	5	11	No
		Pipeline Operator	399132	3992	Chemical, Gas, Petroleum and Power Generation Plant Operators	9539	9923	10405	4	9	No
4a	**Land and field workers**					**1161**	**1761**	**201**	**356**		
4a	Land and field workers	Farm Hand / Agricultural Worker	841399	8424	Mixed Production Farm Workers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
		Tree Planter	842932	8431	Forestry and Logging Workers	#N/A	#N/A	#N/A	#N/A	#N/A	No
		Fencing Labourer	821331	8213	Fencers	13854	14110	14588	2	5	No
		Weed Control Worker	842131	8432	Garden Labourers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
		Habitat Restoration Crew	842131	8432	Garden Labourers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
		Savanna Fire Management Ranger	244334	2343	Environmental Scientists	31524	34328	36769	9	17	#N/A
4b	**Construction labourers**					**1161**	**1761**	**201**	**356**		
4b	Construction labourers	General Construction Labourer	821132	8211	Building and Plumbing Labourers	73043	75226	77695	3	6	#N/A
		Site Clean-up Worker	821132	8211	Building and Plumbing Labourers	73043	75226	77695	3	6	#N/A
		Earth-moving Support Worker	821135	8211	Building and Plumbing Labourers	73043	75226	77695	3	6	#N/A
		Pipeline Construction Labourer	821632	8211	Building and Plumbing Labourers	73043	75226	77695	3	6	No

*, #N/A indicates that not data was available for these roles.
** Model role names are not always the same as OSCA descriptions but are seen to be the best match. See appendix C for more detail.



4. Subsector workforce needs

4.1 – CARBON CAPTURE, UTILISATION AND STORAGE CARBON SUBSECTOR

4.1.1 Subsector description

The CCUS subsector encompasses industrial technologies and infrastructure designed to capture carbon dioxide emissions from industrial processes or energy production and the atmosphere, transport the captured CO_2, and either store it permanently underground or utilise it in other industrial or commercial applications.

This subsector is primarily associated with large-scale industrial facilities and energy systems, including power generation, oil and gas facilities and heavy industry. For completeness, this WDP also considers DAC, as representative of CDR. DAC can be independent of large scale-industrial facilities as it uses chemical processes to separate and concentrate atmospheric CO_2.

Scope of activities

Carbon Capture

- Installation and operation of capture technologies at industrial facilities
- Separation of CO_2 from flue gases or process emissions
- Direct capture of CO_2 (CDR) using DAC and enhanced rock weathering (ERW)
- Integration of capture systems with existing industrial operations

Carbon Transport and infrastructure

- Development and operation of pipelines or transport systems for captured CO_2
- Compression and handling facilities

Carbon storage

- Geological storage of CO^2 in deep underground formations such as depleted oil and gas reservoirs or saline aquifers
- Monitoring and verification of long-term storage integrity

Carbon utilisation

- Use of captured CO_2 as an input for industrial products such as synthetic fuels, chemicals, building materials, or mineralisation processes

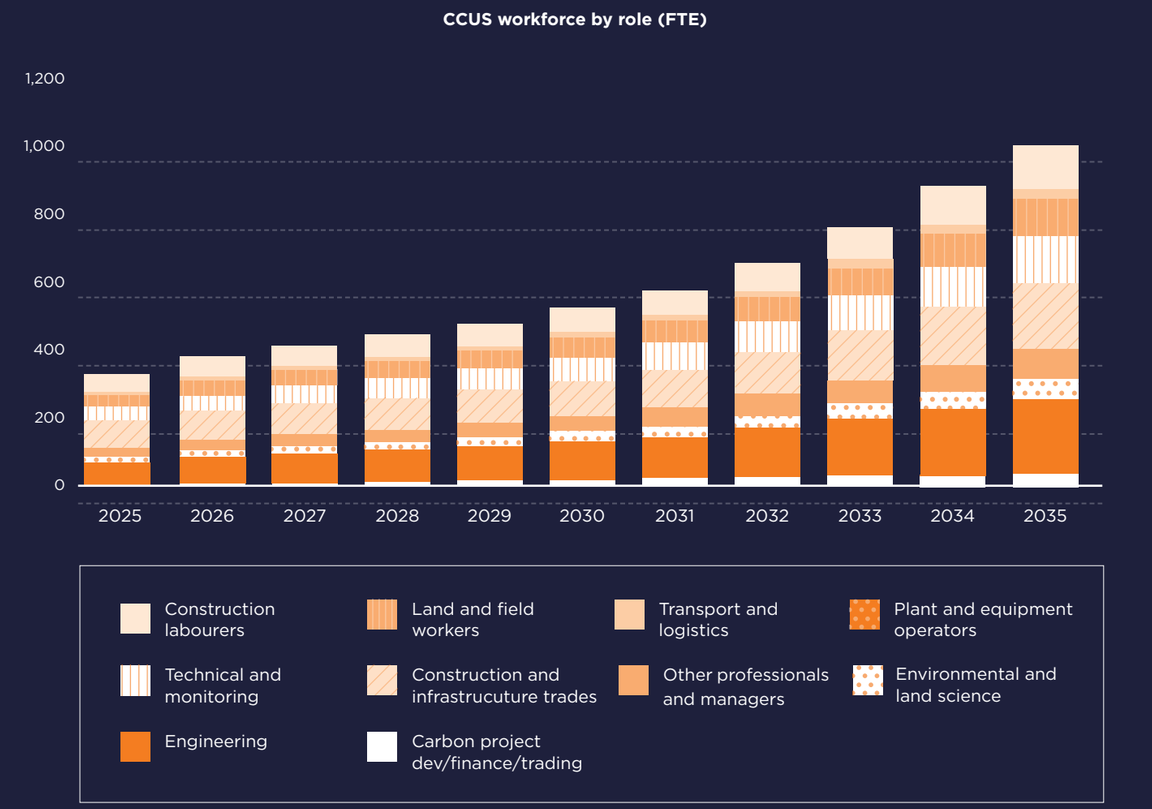
Participants typically include

- Energy and industrial companies implementing CCS technologies
- Engineering and infrastructure companies
- Geological and subsurface specialists
- Technology developers and equipment manufacturers
- Examples include large energy companies such as Woodside Energy and Shell that have invested in CCS-related projects globally

4.1.2 Overview of current and future workforce (modelling insights)

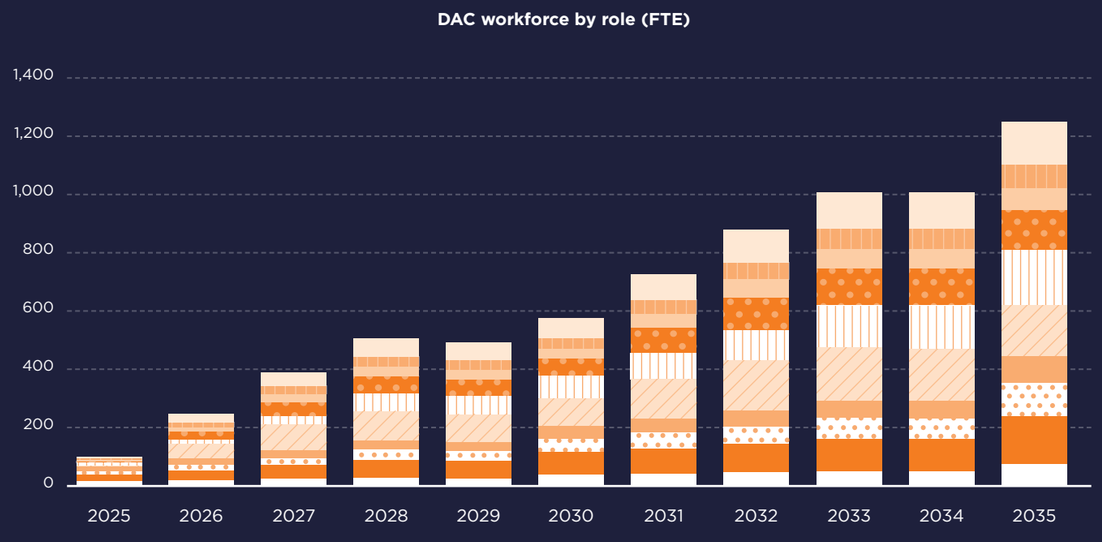
Abatement in the CCUS subsector is derived from existing and expected projects in the natural gas, cement, power generation, hydrogen production, oil extraction and chemicals industry. The abatement trajectory is largely driven by ratcheting of the Safeguard Mechanism[20], time for technology deployment[21], and net zero pathway requirement[22]. Employment in the CCUS subsector is expected to increase considerably through to 2050 as durable removals for net zero targets become more important. The subsector currently consists largely of pilot plants which will transition to larger scale operation over time. Most of the growth in abatement and hence workforce is expected from 2030 onwards. See Figure 9 and Figure 10.

Figure 9: Overview of current and future CCUS workforce to 2035



[20]DCCEEW, 2025, Australia's Emissions Projections 2025.
[21]CSIRO, 2025, Australian Carbon Dioxide Removal Roadmap.
[22]CSIRO. 2025, Modelling sectoral pathways to net zero emissions.

Figure 10: Carbon Dioxide Removal Workforce as indicated by Direct Air Capture (DAC) workforce by occupation type to 2035



4.1.3 Skills and capability needs including barriers and enablers

Skills required in the CCUS subsector include technical and non-technical. Technical roles required in the future CCUS workforce include engineering, chemistry, construction, geology, software development, environmental science, researchers, product developers and MRV personnel as well as maintenance and operational technicians. Jobs focussing on transforming captured carbon into valuable commercial products, such as through mineralisation, span chemical engineering, manufacturing and business development. Feedback from stakeholders suggests a full suite of non-technical disciplines is also needed with policy, communications, finance and investor relations skills and expertise, meaning extra support may be needed for these professions as the carbon sector evolves.

Deployment of CCUS requires initiation of complex industrial projects resulting in requiring a diverse range of skills which change as the project progresses through the initiation, construction, commissioning and operating phases. Additionally, the required skillset varies somewhat between the more mature technologies, such as CCS at the well head, and those which employ more nascent technologies like DAC or ERW. Many of the skills required for more mature CCUS, are like those required in the oil and gas industry including reservoir engineers, subsurface engineers and geologists[23], suggesting some of the emerging workforce needs could be met from the current oil and gas workforce[24] after targeted training in carbon sector specific content. However, the projected shortage of technical plant operators and lack of clear direction on the future importance of CCUS may mean this does not occur[25]. Shortages in 2025 in the engineering disciplines may also impact the ability to build the required workforce at scale.

Key barriers to attracting the necessary workforce include:

- Insufficient understanding of the abatement potential[26]
- Lack of legislative instruments for ACCU creation from emerging DAC and ERW technologies[27]
- Social acceptance[28].

In addition to the barriers to workforce development identified in literature, stakeholders noted a poor understanding of the subsector, lack of recognition of the importance of CCUS in Australia's climate policy suite, the pace of CCUS projects, geographical location, wages, lack of ACCU methods and concerns about the longevity of the industry as contributing to difficulties in attracting and retaining their workforce. Additionally, the industry is not homogenous with utilisation technologies facing unique barriers to workforce development due to the technological readiness level of the technologies. These emerging areas warrant frequent review of jobs and skills to align growth with industry requirements.

The time to develop CCUS projects and a lack of suitable ACCU methods for novel approaches was identified by stakeholders. This insight reinforces the SCP observation that streamlining regulation for CCUS is an opportunity for the sector[29], The opportunities identified in the SCP related to DAC, including the need to scale up DAC technologies and creating appropriate ACCU methods were identified as current barriers to expanding the industry during stakeholder engagement.

While some literature acknowledges CCUS projects should be developed in consultation with regional and Indigenous communities, and Traditional Owners[30], this was not prominent in literature or during stakeholder engagement. Notably, Indigenous equity shareholding in clean energy sector is increasing, so workforce development should be prioritised to establish clear pathways for Indigenous participation and engagement in CCUS projects.

Enabling factors which could lead to the growth of the CCUS industry highlighted in the stakeholder engagement include:

Government policy: Governments have a role in creating stable policy signals and intent to support investment, including streamlining regulation relating to project pathways in the CCUS sector as well as incorporating mechanisms to drive creation of appropriate qualifications in the education sector. Policy signals which support or underwrite investment can also reduce project risk. The review and creation of methods under the ACCU Scheme should be another area of focus. Provision of research funding, in particular for the utilisation activities could bring nascent technologies to market more quickly, bridging the financial gap between laboratory innovation and commercial viability while contributing to attracting and maintaining the subsector's workforce.

Education: The education sector could play a key role in the CCUS sector development. CCUS combines heavy mechanical/chemical engineering with complex geoscience and climate economics, resulting in the sector relying heavily on technical colleges and universities to train workers and provide input into public policy. Vocational trade upskilling should include documenting the transferrable skills already available and then creating accredited courses which top-up the existing skillsets with a select carbon capture content to reduce time needed in on-the-job training and increase industry participation to account for a contracting talent pool. Education programs, including Micro-credentials on the fundamentals of CCUS, including its role in the Australian policy and the ongoing requirement for CCUS to maintain net zero, could be used to improve visibility of the sector and understanding of its importance to Australia's climate ambitions. Attracting numbers into traditional technical STEM courses such as engineering and geosciences are also a key part of the education pipeline. The impact of partnerships with industry for course need, design and delivery should be explored to keep programs focussed on delivering job-ready graduates efficiently.

Industry: Industry commercial investments, physical infrastructure assets, and actual workforce data drive the real-world standardisation of CCUS jobs and skills, making them best placed to partner with government, education providers and research institutions to accelerate skill development, increase awareness and develop standardised credentials. Industry's role in workforce evolution includes work-integrated learning and placements, reskilling programs and assisting development of specialised micro-credentials. Industry could consider competency mapping and reviewing remuneration pathways across CCUS to ensure they are competitive whether the project is using mature or nascent technologies.

[23]CSIRO, 2023, Australia's carbon sequestration potential. [24]IEA, 2022, Skills Development and Inclusivity for Clean Energy Transitions. [25]JSA, 2023, The Clean Energy Generation. [26]Ibid. [27]CCA, 2023, The role of carbon sequestration in accelerating Australia's decarbonisation. [28]UTS, 2026, Building a Workforce Novel Carbon Dioxide Removal Technologies in Australia: Scoping Report - University of Technology Sydney – Figshare.

4.2 SOIL AND VEGETATION CARBON SUBSECTOR

4.2.1 Subsector description

The soil and vegetation carbon subsector comprises activities focused on increasing, managing, and monitoring carbon stored in soils, vegetation, and coastal ecosystems, as well as technologies that stabilise organic carbon in soils such as biochar. The subsector primarily operates across agricultural landscapes, rangelands, conservation areas, and coastal environments, where land management or activities increase carbon sequestration in natural systems.

Key Project Categories	
Category	**Description**
Soil carbon	Projects focused on increasing soil organic carbon in agricultural or grazing landscapes through regenerative or improved land management practices.
Vegetation restoration and management	Projects that increase carbon stored in native vegetation through regeneration, restoration, or improved management of existing ecosystems. Vegetation management is further divided into permanent plantings and native forest regeneration (HIR) to allow the modelling to account for the differing workforce and cost profiles for these methods.
Blue Carbon	Restoration, protection, or improved management of coastal ecosystems such as mangroves, saltmarshes and seagrass meadows that store large amounts of carbon in biomass and sediments.
Biochar	Production and application of biochar derived from biomass to agricultural soils to stabilise carbon and enhance long-term soil carbon storage.

Scope of activities

Carbon Project Development and Implementation

- Identifying suitable landscapes for soil and vegetation carbon projects
- Designing projects that increase soil organic carbon or enhance vegetation biomass through ecological restoration or improved land management
- Working with landholders, farmers, Indigenous land managers, and conservation organisations to implement sequestration activities
- Applying approved carbon accounting methodologies and project frameworks

Land Management and Ecosystem Restoration and Management

Soil carbon projects in agricultural landscapes through practices such as improved grazing management, cover cropping, organic amendments, and reduced tillage

- Regeneration or restoration of native vegetation where carbon sequestration is a primary objective
- Landscape restoration activities that increase biomass and soil carbon while delivering biodiversity and ecosystem benefits
- Coastal ecosystem restoration and protection (blue carbon), including mangroves, saltmarshes and seagrass systems
- Application of biochar to agricultural soils to increase stable carbon storage

Monitoring, Measurement and Carbon Stock Management

- Measuring and modelling changes in soil organic carbon and vegetation biomass
- Field sampling, soil testing, ecological surveys and remote sensing
- Ongoing monitoring and reporting of carbon stock changes over time
- Supporting verification processes required under carbon accounting standards

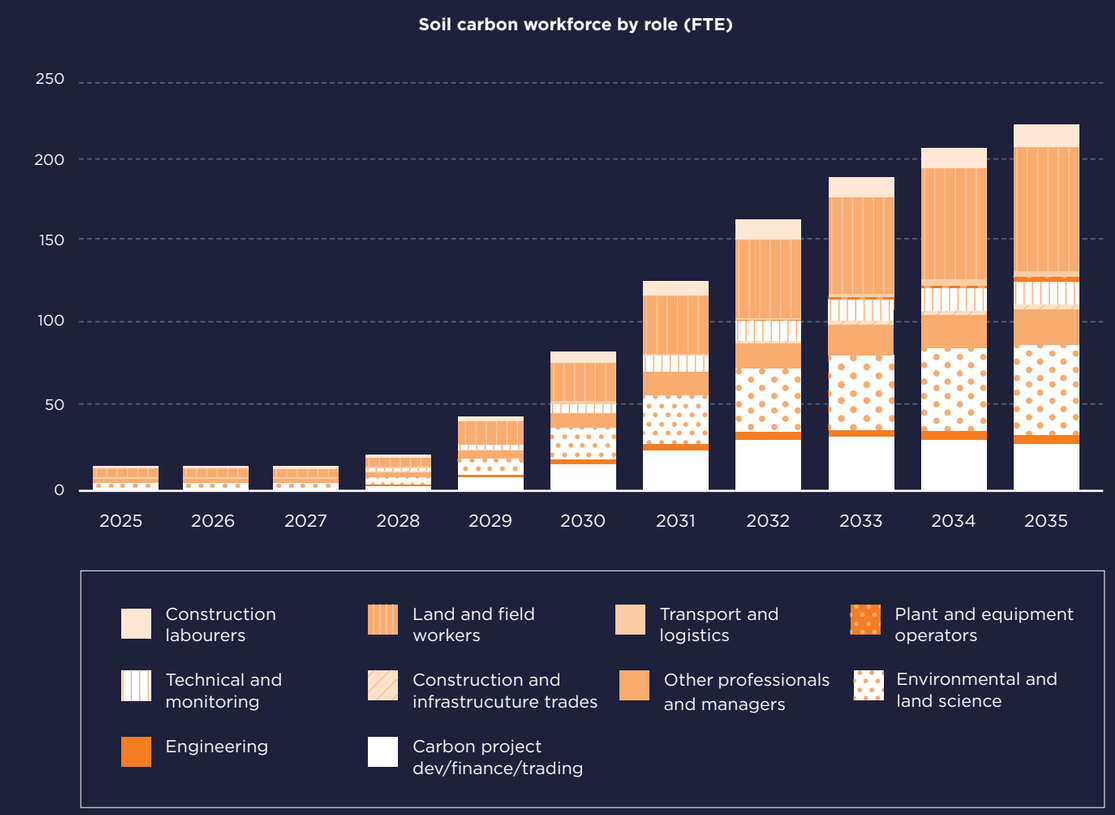
Participants in this subsector typically include:

- Carbon project developers focused on land-based sequestration
- Natural capital and ecosystem restoration organisations
- Agricultural and environmental consultancies
- Soil scientists, ecologists and agronomists
- Monitoring and measurement specialists
- Landholders participating in carbon projects
- Specialised legal and financial advisors
- Auditors verifying project outcomes in line with ACCU Scheme requirements

4.2.2 Overview of current and future workforce (modelling insights)

Employment profiles for the constituent parts of the soil and vegetation subsector can be found in Figure 11, Figure 12 and Figure 13. The vegetation sector has been subdivided into permanent plantings and native forest regeneration (human induced regeneration (HIR)) to allow the different cost bases associated with the two methods to be accounted for when determining the monetary size of the industry.

Figure11: Overview of soil carbon subsector workforce to 2035



A high-level industry review suggests estimates of the workforce engaged in activities related to soil carbon are low. This is potentially attributable to the low number of ACCU issuances and the presentation of the data as FTE.

The unevenness in employment profiles for vegetation projects related to permanent plantings (seen in Figure 12) is attributable to slow abatement growth from 2025 to 2030 and a reduction in the workforce needed between the project establishment and transition and operational phases.

Figure 12: Overview of vegetation – permanent plantings carbon subsector workforce to 2035

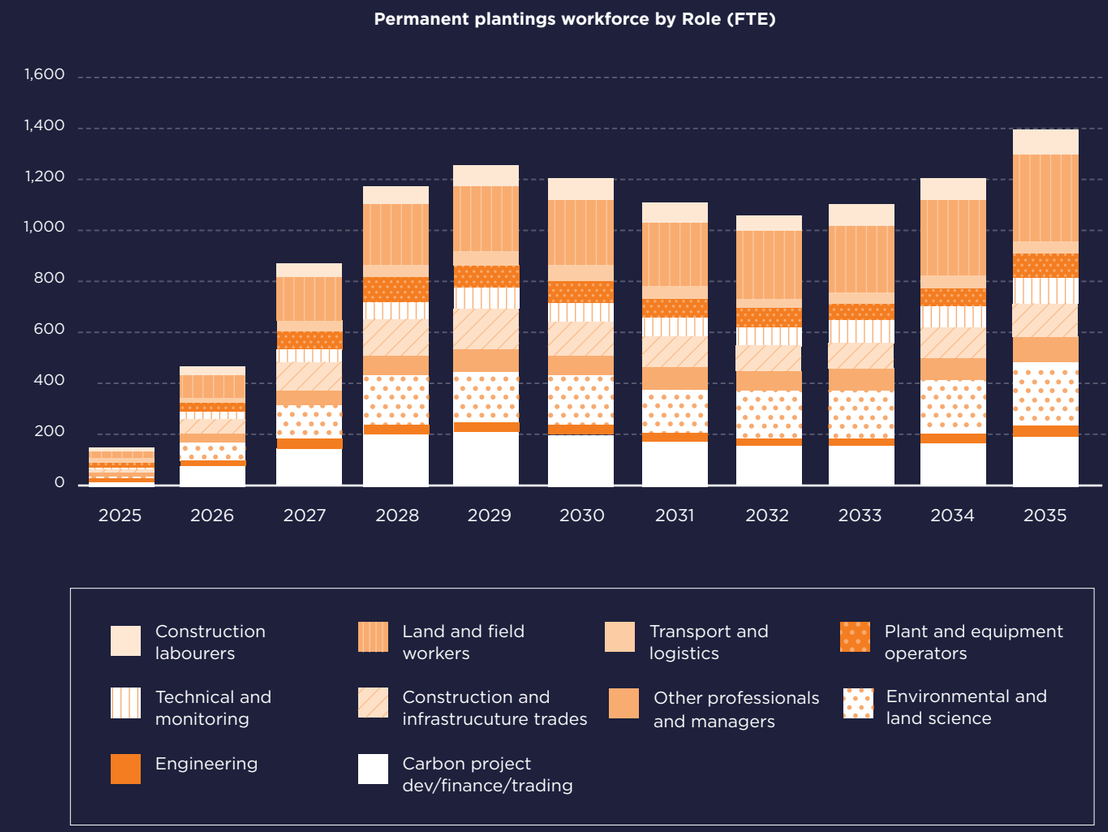
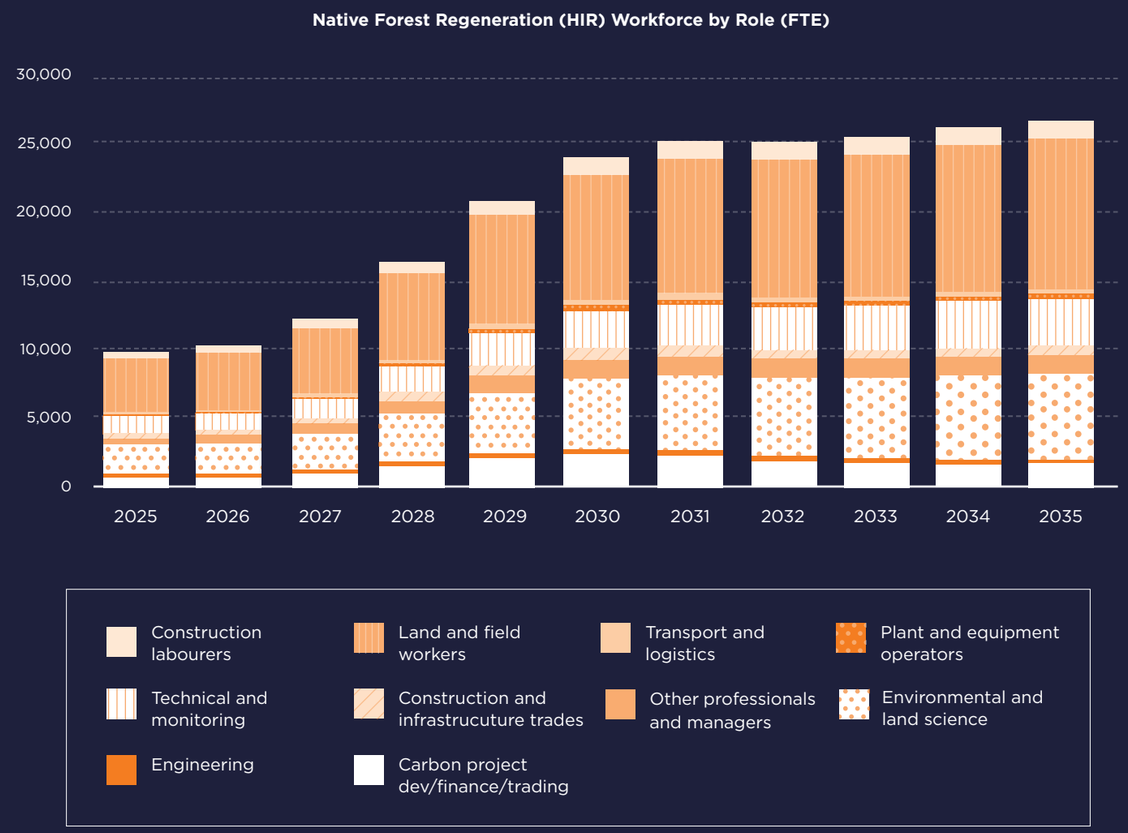


Figure13: Overview of native forest regeneration (HIR) workforce by occupation type to 2035

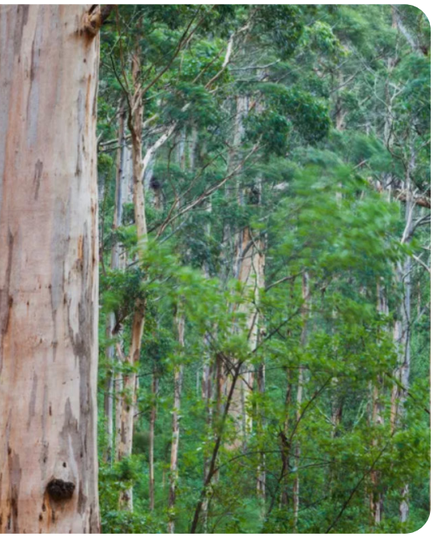


Under the broad categories identified above, personnel in the soil and vegetation carbon sector are currently employed in a wide array of specific roles, including as soil and vegetation scientists, agronomists, foresters, ecologists, modellers, data scientists, project managers, auditors and assurance managers, legal advisers, financial planners, stakeholder engagement positions, Traditional Owner and Indigenous partnership managers, and government relations managers. There are currently few direct qualification pathways into the soil and vegetation carbon sector, so most people employed in this sector transition from related disciplines, including agriculture, forestry, ecology and land management. This can involve several months of on-the-job training to develop required skills.

Future employment profiles of both soil and vegetation carbon subsectors are expected to considerably increase from around 2030 onwards as Australia's carbon market continues to scale, with Land and Field roles representing the most significant pool of employment. Technical and Monitoring roles will increase for both subsectors, but vegetation projects are likely to involve more Construction and Infrastructure related roles, correlating with the greater on-property changes required in most vegetation projects – e.g. fence construction to exclude livestock or feral herbivores under native forest regeneration methods, or agricultural contracting to undertake permanent planting activities. The growth of roles in this subsector reflects the significant role that the land sector is expected to play as a carbon sink through to 2050, as identified in the Treasury modelling.

Although adjacent to project development, trusted advisors, such as Natural Resource Management Groups, grower groups, and independent agronomists, play a critical role in project delivery through the provision of credible and independent advice. Stakeholder interviews suggested trusted advisors will play a continuing and increasingly important role in supporting uptake and delivery of soil and vegetation carbon projects, as part of agricultural sector decarbonisation . Alongside trusted advisors, key roles that are likely to grow and emerge in the future workforce can be grouped under the following categories:

- **Monitoring Reporting and Verification:** compliance managers, field technicians, remote pilots (drone operators), sampling scientists, automation, auditors and artificial intelligence specialists.
- **Project delivery:** stakeholder engagement specialists, relationship managers, operations managers, carbon-ecology specialists, science communications specialists.
- **Method development:** researchers, legislative drafters, policy-science translators, specialists involved in R&D, piloting and creation of new ACCU methods.



4.2.3 Skills and capability needs including barriers and enablers

Skills required to participate in the soil and vegetation carbon sector currently include: foundational science knowledge (often in agronomy, ecology, forestry and soil/vegetation management); knowledge of the ACCU Scheme and carbon methods, their application and permanence obligations; communication skills to translate methods into the language of landholders, break down and explain risks, uncertainty and trade-offs; stakeholder management to develop delivery partnerships; and systems thinking to integrate projects with existing business and land management practices.

The demand for these skills is likely to grow, as well as demand for more specific skills in Indigenous engagement, and monitoring, reporting and verification (MRV). MRV and field practitioners with technical remote sensing skills, Geographic Information Systems (GIS) and MRV are consistently identified as a critical skills gap in the soil and vegetation carbon sector. On the other side of the MRV equation, the stringent requirements for ACCU project reports and requirements for ACCUs to be audited by Category 2 auditors exposed another market skills gap. As the number of land sector projects increases, there will need to be a comparative increase in Category 2 auditors to ensure that the carbon market continues to operate smoothly, without compromising the rigorous MRV requirements of the Scheme. These crunch points are reflected in Jobs and Skills Australia's Occupation Shortage List, which notes an overall shortage in auditors, as well as surveyors and spatial scientists. For the latter, the long training gap is identified as the shortage driver .

Several key barriers and constraints to participation in the current workforce have been identified. These include:

Workforce and education: There are a limited number of degrees and accredited courses, including those for continued professional development which offer curriculum relevant to this subsector thus signalling opportunities for standardised carbon literacy programs, vocational training and tertiary curriculum integration. Additionally, existing courses often do not incorporate field-practice, leading to further training requirements when graduates enter the workforce. Course structure is often not accessible for those likely to enter the roles, with a heavy emphasis on written assignments. There are also few courses with a focus on interdisciplinary skills such as science communication, or scientific legislative drafting. These areas were identified by industry as current skills gaps in the subsector. The long-lead time of apprenticeships and qualifications in the agricultural sector was further identified as a barrier for young people entering this sector . Current course structure and availability combined with the limited number of experienced mentors further reduces the awareness of the subsector.

Market and policy: Regulatory complexity and rule-changes to ACCU methods present barriers to uptake of projects, and therefore job creation in the soil and vegetation sectors. Additionally, government resourcing for method development means that methods may not be available or appropriate for uptake of projects – this is particularly noticeable with respect to a lack of methods that reflect integrated, whole-of-farm ecosystem management. The ACCU Scheme's reliance on government policy means that the Australian carbon sector's growth is highly dependent on long-term policy stability to send the right market investment signal. Market enablers which could result in building scale of projects and related jobs include a reliable price floor through the Safeguard Mechanism, a vibrant secondary, voluntary market and a co-benefit framework for valuing and pricing of premium outcomes.

Skills areas where the current workforce is likely to experience growth include:

- technical expertise in natural capital and biodiversity;
- carbon and nature project modelling;
- MRV skills,
- inancial reporting,
- auditors,
- policy and regulatory knowledge,
- stakeholder engagement and communication;
- sector-specific project management;
- seed collection and production;
- agronomy;
- and farm management.

To grow participation in the soil and vegetation carbon sector, enabling practices can be developed at three different opportunities.

Education: Education systems from secondary through to tertiary should recognise and incorporate carbon and carbon accounting knowledge as part of STEM units. Partnerships between industry and secondary schools to provide students with clarity on STEM pathways into the carbon sector could enable development of a workforce-ready cohort of graduates from a young age[34]. There should also be due consideration to how sector-specific training can be incorporated into existing training programs and qualification pathways at tertiary and professional levels. Degrees, qualifications and certified courses should be aligned with the reality of participating in the carbon market in the soil and vegetation carbon subsector. Domestically, Australia's CSIRO Generation STEM Program provides a framework for students and workers in NSW to better understand application of STEM subjects across different sectors[35]. The New Zealand Government's Jobs for Nature program[36] demonstrates the success of government funded training, education and upskilling in the environmental services sector. This program found that embedding training and qualifications within projects and activities worked well for many participants in the sector. A similar approach to the Defence Industry Pathways Program[37], with government funding to support internships or traineeships within organisations could enable expansion of the soil and vegetation carbon subsector.

Industry: Creation of a professional development framework for agriculture and carbon subsector participants aimed at facilitating cross-sector knowledge sharing and up-skilling could include establishing a peer-to-peer knowledge network, a network of mentors to support workforce development and field days. Consideration could also be given to establishing a formal accreditation framework for the carbon industry to drive skills and professional development and support consistent professional service delivery, consistent with the 2022 ACCU Scheme Review recommendations. The ACI Code of Conduct could be considered as a potential vehicle with which to implement this. The ACI Code already assists in codifying professional integrity standards and provides related best-practice training which could be enhanced.

Government policy: Governments have a role to play in sending consistent policy signals that enable the development of training and qualification pathways that lead to jobs in the soil and vegetation carbon subsector. Governments can also enable industry growth through funding that supports research & development (R&D) investments and university partnerships in the subsector. Targeted government funding for R&D of methods that synergise carbon accounting with existing land management practices, may improve uptake and grow the subsector. The role of government in developing robust carbon methods that facilitate uptake was identified in the SCP. Equally, the SCP recognises the important role of governments in supporting necessary uptake of improved MRV for carbon projects[38].

[23]CSIRO, 2023, Australia's carbon sequestration potential. [24]IEA, 2022, Skills Development and Inclusivity for Clean Energy Transitions. [25]JSA, 2023, The Clean Energy Generation. [26]Ibid. [27]CCA, 2023, The role of carbon sequestration in accelerating Australia's decarbonisation. [28]UTS, 2026, Building a Workforce Novel Carbon Dioxide Removal Technologies in Australia: Scoping Report - University of Technology Sydney – Figshare.

[33]Jobs and Skills Australia, 2025, Connecting for impact: Aligning productivity, participation and skills. [34]Toorak College, 2026, Industry Partnerships. [35]CSIRO, Generation STEM. [36]Jobs for Nature, 2025, Final Programme Review. [37]TAFE WA South Metropolitan, Defence Industry Pathways Program. [38]Cyan Ventures & Deloitte, 2025, Carbon Sector Competitiveness Plan – Draft Report, Powering Australia.

4.3 PLANTATION FORESTRY CARBON SUBSECTOR

4.3.1 Subsector description

The plantation forestry carbon subsector comprises activities where managed forest plantations are established, maintained, and managed to generate carbon sequestration outcomes, often alongside timber production.

These projects typically involve long-term forest management systems that store carbon in biomass and harvested wood products and may generate carbon credits under approved methodologies.

Scope of activities

Plantation Establishment and Management

- Establishment of plantation forests designed for carbon sequestration and/or timber production
- Silviculture, forest management and harvesting operations
- Long-term forest management planning

Carbon Project Development

- Designing plantation-based carbon projects under recognised carbon accounting methodologies
- Registering and managing projects within carbon crediting frameworks
- Integrating carbon revenue into plantation business models

Carbon Monitoring and Reporting

- Forest inventory and biomass measurement
- Remote sensing and forest growth modelling
- Monitoring carbon stock changes over time

Participants typically include:

- Plantation forestry companies
- Forestry investment and asset management firms
- Forestry management service providers
- Landholders hosting plantation carbon projects

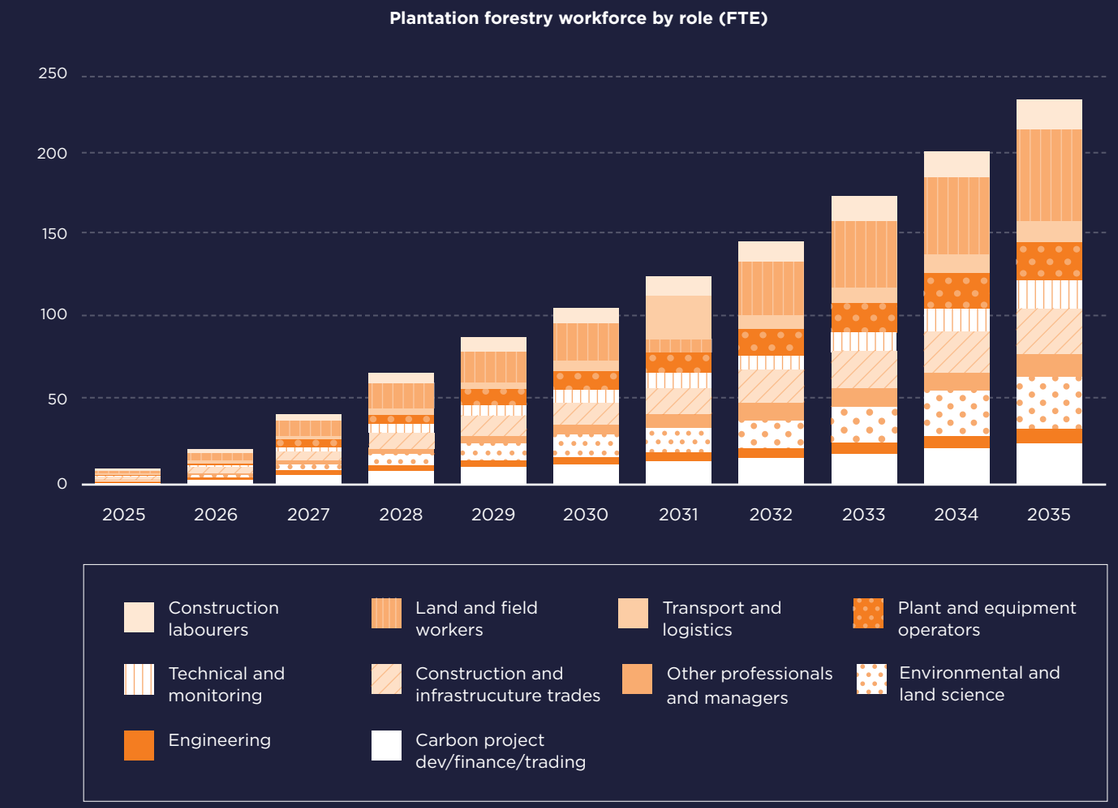
4.3.2 Overview of current and future workforce (modelling insights)

The plantation forestry carbon subsector workforce is currently comprised of a diverse mix of roles spanning:

- Foresters;
- silvicultural specialists;
- forest managers;
- carbon project developers;
- GIS and spatial analysts;
- carbon modellers;
- environmental scientists;
- auditors;
- compliance specialists;
- commercial;
- legal; and
- stakeholder engagement.

Insights from the focus group corroborate the modelling outcomes in Figure 14, highlighting that core forestry capability remains the foundational skillset underpinning the subsector, with carbon-specific expertise typically developed through applied, on-the-job experience.

Figure 14: Overview of plantation forestry carbon subsector to 2035



National workforce findings from Jobs and Skills Australia identify ongoing shortages in forestry and agriculture-related occupations[39]. In fact, attracting people to the forestry industry has been identified by all 11 Regional Forestry Hubs as an industry priority[40].

Looking ahead, forestry will increasingly require business models and skillsets that enable the integration of carbon-related value streams into core forestry operations[41]. Modelled outputs suggest that participation in the forestry subsector sharply increases from 2035 onwards, with relatively even growth in occupation types, with the most significant employment in Land and Field Workers and Environmental and Land Science. Focus group participants have indicated that further roles are likely to expand across several key areas:

- **Project delivery and operations:** field foresters, carbon project managers, stakeholder engagement specialists, and land-use planners capable of balancing commercial forestry and carbon outcomes. There is a potential future opportunity for integrated forest-carbon project managers.
- **Monitoring, Reporting and Verification (MRV):** remote sensing specialists, GIS analysts, carbon modellers, audit and compliance professionals, and data scientists supporting automated monitoring systems.
- **Markets and methods:** carbon market specialists, policy and methodology experts, and professionals who can translate regulatory requirements into operational practice.

These key areas are reflected in the workforce modelling, which highlights that jobs in this subsector will steadily increase from 2030, with the majority of workers employed in project delivery, followed by technical MRV roles, and construction and infrastructure.

[39]Australian Forest Products Association, 2025, Submission to Jobs and Skills Australia - Analysis of Skill Shortages in the Forestry and Timber Industry. [40]Skills Impact, 2021, Forest and Timber Products Industry Skills Report. [41]Forest Works, 2012, Industry Skills Scan.

4.3.3 Skills and capability needs including barriers and enablers

The current skills profile for the plantation forestry carbon subsector reflects a combination of traditional forestry expertise and emerging carbon and digital capabilities. Core skills include forestry and land management knowledge (e.g. silviculture, species selection, plantation management), alongside an understanding of carbon methodologies, regulatory frameworks, and project compliance requirements under the ACCU Scheme. Technical capabilities in GIS, spatial analysis, and carbon modelling are also critical, particularly for project planning and estimation of carbon stocks. Focus group findings further emphasised the importance of commercial acumen, stakeholder engagement, and the ability to navigate complex regulatory environments.

Barriers to workforce entry reflect both challenges within the forestry subsector and the emerging complexity of carbon markets. Forestry, as the main entry point, continues to face low levels of awareness, negative perceptions, and a restrictive skills and training delivery system[42], which reduces student interest and limits the pipeline of new entrants. Education pathways for carbon-based forestry are also relatively narrow, with few options that combine practical forestry skills with carbon knowledge. Focus group participants suggested that linking carbon forestry more directly to biodiversity restoration and nature-positive outcomes, rebranding the sector as a tech-driven 'green career' (rather than extractive), and aligning recruitment with environmental stewardship would make the subsector more appealing to a new, younger workforce looking for careers that impact climate action actively.

A further barrier is the limited incentives to upskill outside of the job as the main driver for training in the forestry subsector is when it is a requirement of the job[43]. Focus group participants noted that many graduates lack hands-on experience, meaning employers need to invest in significant on-the-job training, which can slow workforce growth. These challenges are made more difficult by competition for workers from other industries, ongoing shortages in regional areas, and a lack of clear career pathways into carbon forestry roles. In addition, policy uncertainty and changing regulations can make it harder for employers to commit to long-term workforce investment, further limiting the subsector's ability to grow.

As the subsector evolves, demand is expected to increase for more advanced and hybridised skillsets. These include digital and data-driven capabilities (e.g. remote sensing, automation, and analytics), carbon accounting and natural capital literacy, and integrated project and asset management skills. MRV has been consistently identified as a critical and growing capability area. There is also an increasing need for multidisciplinary professionals, who can combine forestry expertise with carbon market knowledge, regulatory understanding, and commercial decision-making.

Key enablers for workforce development include:

Education: Provision of targeted programs for upskilling of existing forestry and land management professionals, expansion of accredited flexible and modular training pathways recognised by industry, and stronger collaboration between industry and education providers were seen as key enablers to building and maintaining a pipeline of forestry professionals. Focus group insights suggest the most effective approach to scaling the current workforce is to build on existing workforce capabilities within forestry by layering in carbon-specific knowledge through practical, applied training. This gap in training could be an opportunity for vocational education training (VET) sector and/or industry co-developed micro-credential qualifications. Curriculum focus areas include digital tools, data, remote sensing and analytics.

Industry: Industry-led training initiatives, such as those supported by ForestWorks, alongside work-integrated learning and partnerships with education providers, will be critical to building a scalable workforce. There is an opportunity to improve the appeal of the subsector to attract more workers by better communicating career pathways and aligning training with emerging roles in digital monitoring, carbon markets, and integrated land-use management. Industry organisations could assist by offering short courses and micro-credentials related to carbon for the forestry industry to reduce reliance on on-the-job training. Industry designed courses are likely to be most able to balance technical and practical training needs.

Government Policy: Government policy recognition of the changing role of forestry in the Australian landscape would support attracting and retaining of forestry professionals, particularly in articulating its dual role in advancing nature-positive goals, delivering biodiversity restoration and building climate resilience. The role for forestry is outlined in the Net Zero Plan and underlying modelling, however, there needs to be explicit government policy developed to provide industry certainty of this role and its link to achieving global biodiversity goals. This could include government support for reskilling of existing forestry professionals to participate in the ACCU Scheme and attracting ecologists and conservation specialists.

[42]ForestWorks, 2023, Forestry Workforce Training Program Scoping Study. [43]Skills Impact, 2022, Forest and Wood Products Industry Skills Report. [43]Skills Impact, 2022, Forest and Wood Products Industry Skills Report.

4.4 CARBON TRADING SUBSECTOR

4.4.1 Subsector description

The carbon trading subsector consists of organisations and professionals involved in the purchase, sale, brokerage, aggregation, and market facilitation of carbon credits for compliance and voluntary carbon markets.

Scope of activities

Carbon Credit Trading and Brokerage
- Buying and selling carbon credits on behalf of clients or for proprietary trading
- Brokerage services connecting credit buyers and project developers
- Market-making and liquidity provision

Market Advisory and Portfolio Management
- Advising organisations on carbon market participation and procurement strategies
- Carbon portfolio development and management
- Risk management and forward contracting

Market Infrastructure and Services
- Carbon credit aggregation and structured transactions
- Market intelligence and price analysis
- Development of financial instruments linked to carbon markets

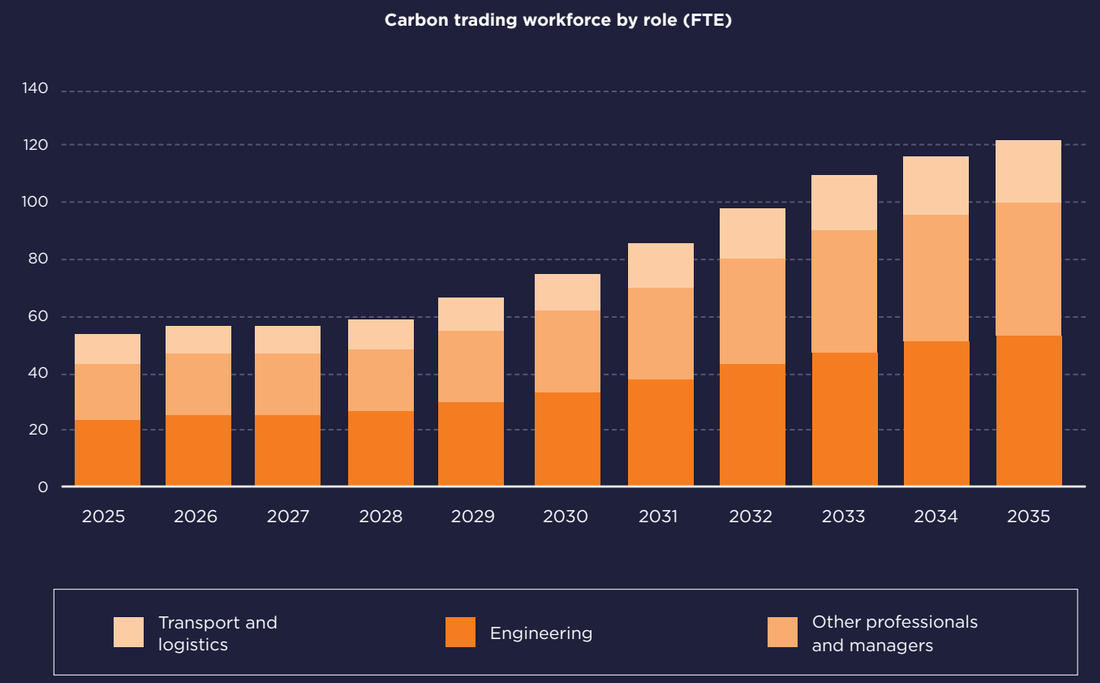
Participants typically include:
- Carbon trading firms and brokers
- Environmental market advisory firms
- Financial institutions participating in carbon markets
- Corporate carbon procurement teams

This subsector excludes:
- Carbon project developers and land-based sequestration project operators as they are included in other subsectors
- MRV providers
- Carbon credit registries or regulatory bodies

4.4.2 Overview of current and future workforce (modelling insights)

The carbon trading subsector plays a critical role in facilitating market liquidity, price discovery, and connecting project developers with buyers. Modelling is shown in Figure 15.

Figure 15: Carbon trading workforce by occupation type to 2035.



Occupation types for the carbon trader subsector were tailored to the individual subsector because the activities undertaken are markedly different to the other subsectors. In the early years, the trading workforce is expected to grow in line with ACCU issuances but should taper off as experience and liquidity grow.

4.4.3 Skills and capability needs including barriers and enablers

Stakeholders suggested the current skill set required by carbon traders is like commodity trading, meaning traders need to be conversant with contracting, relevant laws, financial accounting, buying, selling and market analysis. However, managing risk, specific policy understanding and relationships with ACCU providers (counterparty list) has increased prominence due to the evolving government policy landscape with respect to climate change and carbon markets. Carbon trading requires some additional legal requirements, beyond that needed for general commodity trading, such as an Australian Financial Service Licence (AFSL).

Barriers to growing and attracting workers to the carbon trading are somewhat derived from the nature of the market. The carbon market is relatively new market meaning education, career pathways and remuneration standards are still emerging with carbon traders being drawn from the existing commodity trading cohort or carbon policy professionals. Perceptions regarding carbon market longevity and constant changes in government policy create additional barriers to entry. Jobs and Skills data from 2025 show there were no shortages for Commodities traders (OSCA code 531332)[44] which provides a base for growth.

The current prevalence of over-the-counter trades resulting in commercial in confidence data and different levels of transparency and liquidity compared with other commodity trading was seen as an area which new entrants needed to navigate. For some stakeholders the lack of commercially available tools constituted a barrier though this was not universal. It does however mean the skills to create analytical tools is important to some organisations.

An added complexity in the market is the presence of participants in large corporate organisations who buy and sell credits but do not consider themselves traders and are not part of trading organisations. These large corporate participants may not approach the market in the same way, have different training needs and required different communication pathways to established traders. This may constitute a barrier to attracting new entrants, retaining existing and upskilling as it potentially reduces the size of the trading pool and provides an alternate career pathway.

Enablers for acquiring skills and to attract new entrants to carbon trading lie largely within the trading profession itself though there is also a complementary role for governments. Enablers include:

Government: The carbon trading sector is highly dependent on regulatory frameworks and policy stability to enable market certainty. Carbon prices and trades are directly impacted by policy decisions. Stakeholders identified part of the value proposition for new employees is contributing to Australia's climate goals, meaning increased recognition of the importance of the carbon market would help attract new entrants to the subsector. Alignment or interoperability between the carbon and other environmental markets could also help grow the subsector as it creates demand for trading in emerging markets.

Industry: Consensus from stakeholders was the skills needed to be a successful carbon trader should largely be learned on the job and be complementary to the person's existing skill set. The identification of short courses and micro-credentials which address environmental markets, specific legal requirements such as AFSL and policy for existing traders and the fundamentals for trading for those with a carbon and policy background could be considered to reduce on the job training time. Emphasising the opportunities which exist when working in a nascent market were seen as key to attracting new carbon market traders.

Education: Formal education was not seen as responsive enough to the changing policy landscape which impacts carbon trading. This suggests short courses and micro credentials offered by industry organisations could be a preferable capacity building pathway. Additional government funding and industry standards could ensure that the workforce is formally trained in consumer law, Native Title rights, greenwashing compliance and other relevant policy.

[44]JSA (2025) Occupation Shortage List

First Nations carbon subsector

4.4.4 Subsector description

The First Nations (Indigenous) carbon subsector encompasses activities undertaken by Aboriginal and Torres Strait Islander organisations, enterprises, ranger groups, and Traditional Owners that participate in, manage, or support carbon projects. In addition to Indigenous-owned or managed Country, this subsector includes participants in projects on freehold land where Indigenous groups may have an interest through Native Title, Indigenous Land Use Agreements, or other partnerships or employment opportunities.

This subsector includes both direct project delivery and governance roles, where Indigenous groups lead or co-develop carbon initiatives while integrating carbon market participation with broader cultural, environmental, and community outcomes. Indigenous professionals providing services to carbon projects are also included in this subsector, though other Indigenous carbon sector professionals are included as a portion of the modelling for other subsectors.

Scope of activities

Carbon Credit Trading and Brokerage

- Development of carbon projects, especially on Indigenous-owned or Indigenous-managed land and sea country
- Participation in carbon project partnerships with project developers or investors
- Project governance, cultural heritage assessments, and decision-making

Land and Sea Country Management

- Indigenous ranger programs undertaking land management activities that contribute to carbon sequestration or emissions reduction
- Activities such as savanna burning, ecosystem restoration, land stewardship and conservation management
- Integration of Indigenous Ecological Knowledge with carbon project methodologies

Community Participation and Capacity Building

- Training and employment of Indigenous rangers and land managers
- Community governance structures overseeing carbon project participation
- Capacity building for Indigenous-led carbon enterprises

Participants in this subsector include:

- Carbon trading firms and brokers
- Environmental market advisory firms
- Financial institutions participating in carbon markets
- Corporate carbon procurement teams

This subsector excludes:

- Indigenous land councils and Traditional Owner corporations
- Indigenous ranger groups and land management organisations
- Indigenous-owned carbon enterprises and project partnerships
- Community-controlled organisations involved in carbon project governance
- Indigenous-owned businesses providing other professional services
- Indigenous professionals working in non-Indigenous organisations

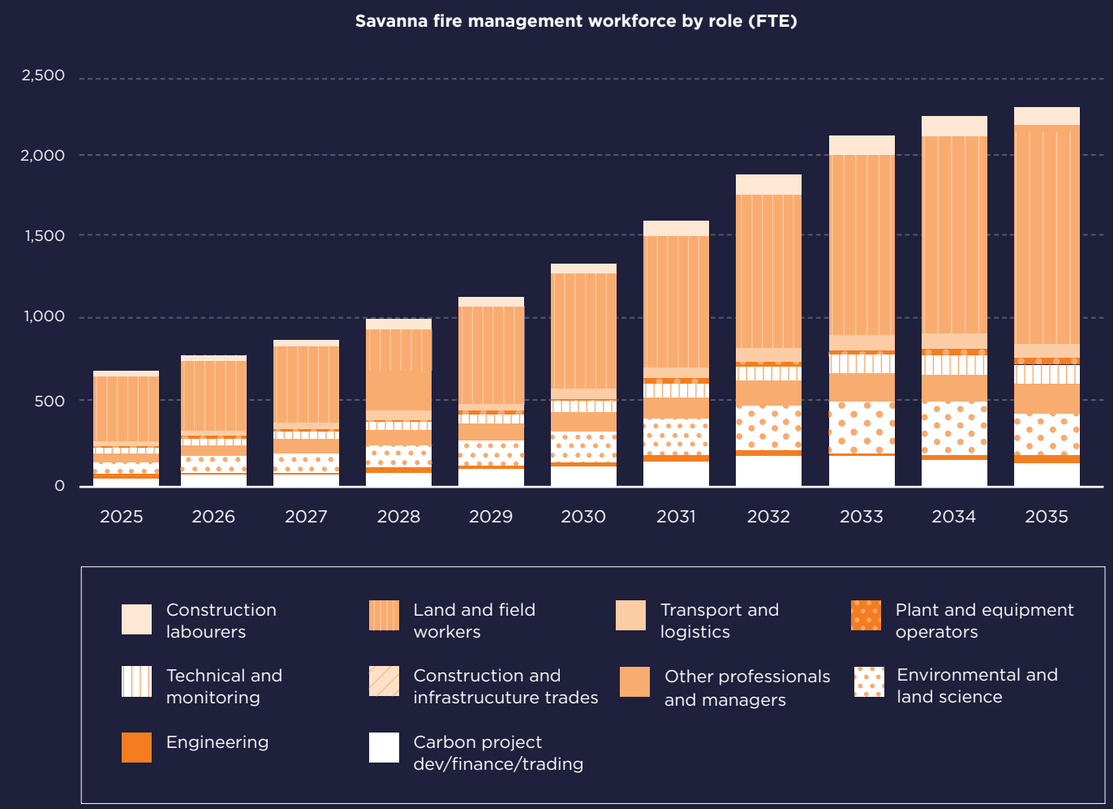
4.4.5 Overview of current and future workforce (modelling insights)

The majority of participants in the Indigenous carbon subsector are currently employed in the delivery of carbon projects, particularly those under the Savanna Fire Management methods, as rangers (land and field workers, see Figure 16), with some stepping into leadership roles such as Fire or Ranger Coordinator. This has been catalysed through the highly successful Federal Government-funded Indigenous Ranger Program which combines traditional ecological knowledge with modern science to care for Country and increasingly participate in ACCU projects. This program could be significantly scaled to meet Indigenous employment demands through inclusion of new method opportunities (e.g. Blue carbon, Ungulates) and alignment with nature-positive/ biodiversity programs.

Figure 16: Indigenous workforce by occupation type to 2035

Currently, savanna fire management undertaken for projects registered under the ACCU Scheme method is the dominant employment driver, including planning, burning and fire suppression activities (See Figure 17). Figure 17 includes FTE for Indigenous and non-Indigenous workers. Land management activities that are central to Agriculture and Vegetation carbon projects' success are another strong employment driver, including biodiversity and invasive species management and monitoring, and vegetation management. It should be noted that the patchwork of land tenure, including the extinguishment of Native Title, fragmentation of claims, and limited access to freehold land, across southern Australia can limit Indigenous employment in, and ownership of projects. These limitations are likely to persist into the future. In these jurisdictions, roles are often sub-contracted labour roles or cultural heritage assessment roles. Partnerships in carbon project development offer an alternative means to participation.

Figure17: Savanna fire management workforce by occupation type to 2035.



Some Indigenous market participants are presently involved in business management, including administration roles, finance, method development, project planning and leadership. Leadership and governance roles, directorships of Registered Native Title Body Corporates (RNTBCs) and other such organisations, represent one of the most significant future employment opportunities. This is for both Indigenous organisations and beyond to other organisations engaged in carbon project development and delivery. Project delivery and coordination is a growing employment opportunity for Indigenous market participants, as are community engagement roles. The latter is particularly tied to ACCU Scheme reforms regarding project consent. Other future employment opportunities may include policy roles, method development roles, carbon project developers/agents and carbon brokers/traders. Stakeholders engaged in the development of the Carbon WDP highlighted land management-based roles are likely to remain the dominant source of employment for Indigenous people in the carbon sector in future, consistent with revenue reinvestment already practiced by Indigenous organisations participating in land-based carbon projects.

Indigenous employment in the carbon sector is expected to increase from 2030 onwards, in line with subsector modelling that incorporated Indigenous participation. As expected, savanna fire management remains the dominant employment driver, with employment sharply increasing between 2030 and 2033, aligning with uptake of the 2026 Savanna Fire Management methods through new project registration and transfer of existing projects, as well as anticipated extension of project activities to the Northern Arid Zone[45]. As identified in stakeholder interviews, Indigenous participation in Professional and Management roles, as well as Environmental and Land Science, and Technical and Monitoring roles, is expected to increase from 2030.

Sources: [45]Emissions Reduction Assurance Committee, 2024, "Extending Savanna Fire Management to the Northern Arid Zone," Proponent-led Method Development 2024: Expressions of Interest Assessment summaries, pp.9-11.

4.4.6 Skills and capability needs (incl. barriers and enablers)

Skills required for Indigenous stakeholders to participate in the carbon sector can be divided into three broad categories:

- **Project delivery:** cultural fire knowledge; land, water and biodiversity knowledge; carbon and natural capital accounting; field-based assessments; geospatial monitoring and map creation; operational skills including 4WD and power equipment operation; plant and animal handling; machinery operation; and drone operation[46].
- **Governance and leadership:** compliance; strategic planning; financial and contract literacy; understanding eligible interested holder consent; workforce management; media management; stakeholder engagement; contract negotiation; report writing and balancing cultural authority with corporate obligations[47]. Some stakeholders noted a need for increased commercial awareness to support project delivery.
- **Policy and advocacy:** policy literacy; negotiation with government and industry; and translation of Indigenous perspectives into regulatory language.

There are two main barriers to Indigenous participation in the carbon sector, these are educational and structural. Technical barriers are a subset of these main barriers. Notably, some Indigenous organisations, particularly across the North of Australia, are already working to address technical and educational barriers through the delivery of on-Country learning, peer-to-peer or community-based learning program predicated on culturally mandated delivery of ecological knowledge, and apprenticeships. However, the structural barriers do not necessarily reflect that these efforts are already underway. Opportunities to build on these existing programs and create an enabling environment are outlined in the subsequent section.

Educational barriers: For Indigenous carbon subsector participants, the delivery mode and Western construct of many formal qualification programs required to participate in the ACCU Scheme is a barrier to participation creating a mismatch with traditional, community-based learning. While Indigenous land managers possess deep generational knowledge of ecology and fire, navigating the modern carbon economy requires highly specialised legal, financial, and digital technical literacy. Current education offerings are often poorly suited to remote communities as they require study off Country, rely heavily on delivery of programs in English, and depend on written assessments. Furthermore, existing pathways fail to recognise inherent or cultural knowledge[48]. Technical barriers are manifest in delivery mode for qualifications required to undertake project-level MRV. As identified in the soil and vegetation carbon subsector stakeholder group, there are limited practical-based educational pathways to careers in MRV, and this limitation in addition to the delivery mode represents a direct barrier to Indigenous participation.

Structural barriers: Indigenous stakeholders face significant structural barriers to carbon market participation, including land tenure fragmentation, limited financial and institutional capacity, and market complexity. As mentioned earlier, a patchwork of land tenure means that many Indigenous market participants across southern Australia do not hold exclusive Native Title rights over their Country and are therefore restricted to contracted project delivery roles rather than project ownership. While partnerships are one way for Indigenous organisations to participate in project delivery, the ACCU Scheme restricts consent requirements to groups with a Native Title Determination (inclusion of Registered Claimants as an Eligible Interest Holder is expected as part of the ACCU Scheme Reforms Bill presented in 2026).

In addition, many Indigenous organisations or stakeholders face financial and institutional capacity barriers to navigating the ACCU Scheme, with limited access to trusted legal and financial advice constraining market participation. As the SCP identifies, the ACCU scheme is increasingly shifting towards lowest cost abatement purchases to ensure compliance with the Safeguard Mechanism[49].

[46]Indigenous Carbon Industry Network 2026, Submission: Joint Standing Committee on Northern Australia inquiry into preparing for emerging industries in Northern Australia; Russell-Smith & Sangha, 2018, Emerging opportunities for developing a diversified land sector economic in Australia's northern savannas, Rangeland Journal 40(4); Charles Darwin University, 2025, Northern Institute Triennial Report (2022-2024); Skills Impact, Agriculture and Production Horticulture Industry Reference Committee, Carbon & Agribusiness Management Project, 2023. [47]Indigenous Carbon Industry Network 2026, Submission: Joint Standing Committee on Northern Australia inquiry into preparing for emerging industries in Northern Australia; Charles Darwin University, 2025, Northern Institute Triennial Report (2022-2024). [48]Robinson et al, 2013, Australia's Indigenous Carbon Economy: A National Snapshot, Geographical Research 2014; Charles Darwin University, 2025, Northern Institute Triennial Report (2022-2024). [49]Cyan Ventures & Deloitte, 2025, Carbon Sector Competitiveness Plan – Draft Report, Powering Australia, p.59.

Stakeholder interviews highlighted that this trend may present a further challenge to Indigenous participation, as cultural co-benefits may not be adequately recognised or prioritised in purchasing strategies. Finally, the legislative and administrative complexity of the ACCU Scheme, the limited methods that are appropriate to the Indigenous estate, and inconsistent access to transparent market information further inhibit participation[50].

To strengthen Indigenous participation in the carbon sector, stakeholders consulted and the accompanying desktop review identified several enabling practices that can be embedded at both educational and structural settings. Central to all opportunities to build Indigenous participation was the meaningful inclusion of Indigenous organisations and individuals in the design, governance and delivery of participation pathways. Strong governance, particularly at the RNTBC level, was consistently identified as the most critical enabler of successful market participation. Participants in this project's engagement identified that carbon projects involving Indigenous ownership or genuine partnership tend to deliver stronger outcomes for communities, including clearer career pathways, greater longer-term workforce retention, and enhanced cultural safety in project delivery. Importantly, the SCP identifies Indigenous empowerment through direct participation, the application of Indigenous Ecological Knowledge, and support to grow Indigenous-led environmental management services as key pathways for increasing Indigenous participation[51] A central priority to enhance Indigenous participation is enabling Indigenous groups to directly manage carbon projects, be it through project ownership models or equitable partnerships.

To enable expanded Indigenous participation in the carbon sector will require a strategic effort to create more inclusive education pathways, and participation opportunities.
Enablers include:

Government: The Federal Government should expand funding for Indigenous capacity building to enable participation in the ACCU Scheme. This includes through allocation of funding for long-term Indigenous education programs on Country, grant allocations to enable the establishment of new businesses, and building on and extending the existing Indigenous Ranger Program. Additionally, CMI notes existing budget allocations for Indigenous legal advice[52], and suggests that this could be extended to establish independent, culturally safe legal advice hubs that review carbon contracts and other partnership or benefit sharing agreements on behalf of Traditional Owners. Government financial support could be utilised to de-risk projects between registration and initial ACCU delivery, enabling greater autonomy for Indigenous groups wanting to participate in the carbon sector. Finally, on the policy side, the Government could enable greater participation by prioritising and expanding methods that create explicit opportunities for Indigenous stakeholders.

Industry: The carbon sector can support growth of the Indigenous carbon subsector through collaboration with Indigenous organisations to develop guidelines for best practice partnership frameworks between Indigenous and non-Indigenous organisations that support participation and equitable benefit-sharing models. Establishing a dedicated allocation for independent legal, financial and governance support within existing partnership and funding agreements[53] is another way to facilitation participation. A further enabler could be the delivery of professional training for Indigenous participants funded by government, but co-designed and delivered with community/regional leaders. Project delivery and finance arms of the carbon sector can also enable Indigenous participation through the development of a standardised valuation framework that values opportunities for Indigenous leadership as part of ACCUs. This in turn could inform dedicated corporate procurement programs (including as part of the Safeguard Mechanism) that guarantee a higher price floor for ACCUs with verified Indigenous cultural and environmental co-benefits and drive job creation through demand. Finally, the carbon sector can collaborate with Government to develop interoperable carbon and nature methodologies that better align with Indigenous caring for Country practices, creating new opportunities to grow the subsector.

Education: As described above under "Barriers", educational requirements to participate in the carbon sector are incongruous with the capacity, opportunity, and cultural requirements of many Indigenous participants. Therefore, educational enablers for the Indigenous carbon subsector exist at a variety of levels. Tantamount is the delivery of education on-Country, especially through two-way educational programs that recognise and incorporate cultural learnings, education and language. Additionally, participants and literature highlight community-led training and research as a key factor to enabling participation in the Indigenous carbon subsector[54]. Embedding mentorships or cadetships within existing education systems was identified as another means of enabling young Indigenous stakeholders to understand the opportunities to participate in the subsector. Once in the workforce, professional education opportunities including micro-credentials exist, but are not necessarily accessible[55]. Improving accessibility of such opportunities could build commercial and legal literacy for RNTBC Boards to strengthen governance, or develop technical skills in rangers.

[50]Indigenous Carbon Industry Network 2022, Mapping the Opportunities for Indigenous Carbon in Australia, private report; Robinson et al, 2013, Australia's Indigenous Carbon Economy: A National Snapshot, Geographical Research 2014. [51]Ibid, pp. 38-41. [52]Commonwealth of Australia, 2024, Budget 2024-25: Budget Measures: Budget Paper No. 2, p. 55. [53]Robinson et al, 2013, Australia's Indigenous Carbon Economy: A National Snapshot, Geographical Research 2014; Indigenous Carbon Industry Network 2026, Submission: Joint Standing Committee on Northern Australia inquiry into preparing for emerging industries in Northern Australia; Russell-Smith & Sangha, 2018, Emerging opportunities for developing a diversified land sector economic in Australia's northern savannas, Rangeland Journal 40(4); Polidano et al, 2025, Indigenous Business and Corporation Snapshot Study 4.0, The University of Melbourne; Department of Climate Change, Energy, the Environment and Water, 2025, Australia's Net Zero Plan; NIAA, 2026, Closing the Gap: Commonwealth Annual Report 2025, and Commonwealth Implementation Plan 2026. [54]Charles Darwin University, 2025, Northern Institute Triennial Report (2022-2024). [55]Robinson et al, 2013, Australia's Indigenous Carbon Economy: A National Snapshot, Geographical Research 2014; Charles Darwin University, 2025, Northern Institute Triennial Report (2022-2024); Indigenous Carbon Industry Network 2022, Mapping the Opportunities for Indigenous Carbon in Australia, private report; Department of Climate Change, Energy, the Environment and Water, 2025, Australia's Net Zero Plan; NIAA, 2026, Closing the Gap: Commonwealth Annual Report 2025, and Commonwealth Implementation Plan 2026.

7. Recommendations

Recommendations are designed to respond to barriers and enablers identified throughout the report and in turn realise the carbon workforce needed to deliver Australia's 2035 NDC.

There are several opportunities for government and policy stakeholders to support jobs and skills development in the carbon sector. These are broadly structural opportunities, related to the ACCU Scheme's legislative basis and policy and market design.

For Australia's carbon sector to facilitate national climate targets, support from the education sector including universities, TAFEs, TAFE Centres for Excellence, registered training organisations and secondary schools, is needed for well-established and nascent technologies. Accessibility is a key enabler of a just transition for a workforce which is largely located outside major centres and can be based on adjacent industries with transferrable but incomplete skills.

Industry can contribute towards workforce development at the individual organisational level as well as through collaborative efforts across the sector. Industry organisations are holders of institutional knowledge and broad networks and could be leveraged to build capability and understanding of the sector to deliver work-integrated learning and sector-developed training.

Some recommendations will require collaboration from more than one stakeholder group and will have broader applicability to other workforce development plans released by Powering Australia.

Recommendation 1: Strengthen the enabling policy environment to grow and mature Australia's carbon sector.

Rationale: The historical lack of policy certainty on the role of carbon markets in Australia's climate policy suite and transition towards net zero was highlighted in a range of stakeholder interviews as undermining confidence in workforce attraction, retention and growth. In sub-sectors such as CCUS, the lack of policy priority was emphasised as a key barrier to workforce development. Additionally, there is little alignment with Global Biodiversity Targets and nature-positive goals which are often inextricably linked in land sector projects. While the Government's Net Zero Plan addresses the role of carbon markets and the important contribution of carbon removals, it does not provide a comprehensive strategic outlook on carbon markets, as was previously recommended by the Climate Change Authority and the CMI.

Discussion: Market-based mechanisms, particularly carbon markets, are central to delivering Australia's climate ambitions. They present the potential to:

- Enable companies to set and achieve ambitious decarbonisation targets through credible investment signals;
- Provide essential flexibility where emissions reduction technologies remain uncertain or commercially unviable; and
- Unlock significant economic, environmental, and social value, particularly in regional Australia, through First Nations participation, and through nature-based and resilience outcomes.

However, a shared long-term view of how these markets will evolve is currently lacking. Investment horizons are effectively constrained to 3–5 years, limiting the scale and pace of capital deployment. This uncertainty is reflected across key frameworks, including the ACCU Scheme, the Safeguard Mechanism, and Australia's 2035 emissions reduction targets all of which operate on shorter policy cycles than the 15–20+ year lifespans of the assets and projects they are intended to support. The result is a structural mismatch between policy timeframes and investment needs amplifying risk, dampening confidence, and slowing progress.

There is an opportunity for the Government to take a more coordinated approach to the role of markets in facilitating Australia's transition towards net zero and negative emissions, alongside meeting Global Biodiversity Framework targets and national adaptation plans.

Actions:

- **1.1** The Commonwealth Government articulates a shared understanding of the role of carbon markets in Australia's transition towards net zero, aligning the carbon WDP with broader climate, agriculture, and regional development strategies in key strategic policies including the ACCU scheme, Safeguard Mechanism, Future Made in Australia and Powering the Regions programs.
- **1.2** Governments (State and Commonwealth) commit to integrating a jobs and skills consideration into new policy and policy consultations to facilitate strategic development of education and training programs that support required outcomes.
- **1.3** The Commonwealth Government investigates project approvals processes for areas to increase efficiency and coordination to reduce lead time from project inception to ACCU issuance

Recommendation 2: Develop a roadmap, which articulates a strategic vision and implementation plan to mature Australia's carbon workforce towards 2035 for government, education and industry stakeholders.

Rationale: A carbon sector roadmap is critical to ensuring the sector can meet the scale, complexity, and pace of Australia's decarbonisation and net zero objectives, including ensuring workforce capability keeps pace with the growth and complexity of the sector. A coordinated approach is required to address fragmented skills pathways, emerging workforce shortages, and inconsistent levels of market readiness, education and training provision across jurisdictions and industries.

A national roadmap would provide a shared strategic framework for government, education providers, and industry stakeholders to align priorities, coordinate investment, and build workforce capability in a targeted manner. Mapping sector growth would support the identification of future skills needs, emerging occupations, education and training gaps, and opportunities to strengthen workforce participation across regional, First Nations, and transitioning communities.

Discussion: A coordinated roadmap and implementation plan led by an industry organisation, in conjunction with stakeholders, is necessary to attract people to the carbon sector and put focus on key current shortages which may impede scaling of the carbon sector in the future. Investigations into shortages and growth were somewhat hampered by a lack of carbon sector specific data, suggesting a deeper dive into shortages, including adjacent areas such as the auditing and policy skillsets, may identify more areas for inclusion in the roadmap. Key to creating the roadmap is clarifying and coordinating available funding for sector development. It is also necessary to clarify skills needs and align these with available education curriculum and industry training as well as attract people to core technical disciplines such as engineering, environmental sciences, construction and technical trades. Indigenous training opportunities should be established as well as industry-wide opportunities to improve knowledge on Indigenous rights and law. Broader promotion of carbon opportunities will be critical to seeing the sector grow at scale.

Actions:

- **2.1** Commonwealth Government works with industry and the education sector to develop a taxonomy of roles and skills needed in the carbon sector to support Australia's 2035 NDC.
- **2.2** Commonwealth Government to set carbon workforce jobs targets for employment in the carbon sub-sectors to provide a strategic vision for the sector and focus government policy and educational initiatives for the close to 11,500 extra full-time roles needed to support the lower end of Australia's 2035 NDC target range (65%). Additional resources needed to target the higher end of Australia's 2035 NDC (70%) should be considered as part of the process.
- **2.3** An Industry organisation to create a roadmap that maps career pathways into roles required in the sector. Additionally, consideration could be given to:
    a) A deep dive to identify all relevant current shortages in the carbon sector starting with mapping the existing carbon sector workforce.
    b) Prioritisation of pathways related to core technical disciples, construction and trades to avoid compounding effects from existing shortages.

c) Investigation into transferrable skills and creation of complimentary courses, particularly for workers in sunsetting and transitioning industries

d) Opportunities to integrate carbon sector content into existing employment and reskilling programs.

e) Assessing regional sector workforce supply and demand and the influence of other programs aimed at net zero transition to highlight the opportunities in regional and rural areas to retain emerging workforces and allow timely redirection of those in sunset industries.

f) Articulation of milestones, responsible stakeholders, resource requirements and timing, to create the pipeline of funding, policy, curriculum and skilled needed to deliver the required workforce

g) Indigenous participation should be a key focus, in the roadmap establishing Indigenous training programs and pathways to enable economic opportunities for Indigenous participants across the full carbon project lifecycle including leadership roles.

- **2.4 Commonwealth Government to establish industry-wide programs to improve knowledge in the carbon sector on Indigenous rights and law. In this program Indigenous stakeholders would impart fundamental knowledge on Indigenous rights and law, to support culturally appropriate market participation.**
- **2.5 Industry organisation initiates programs to better promote opportunities and growth in the carbon sector. These should aim to:**

  a) Raise awareness of the industry and all constituent parts needed.

  b) Highlight the carbon sector needs a range of skills which goes beyond engineering and technical skills to incorporate communications, policy, advocacy and planning.

  c) Promote the sector to new entrants.

  d) Promote the sector to those who are able or interested in working in interdisciplinary teams.
- **2.6** Government coordinates funding and investment between governments, education providers and industry to underpin the delivery of the roadmap, with a particular priority on:

  a) Acquiring and create targeted training and reskilling programs, particularly for regional economies and to promote Indigenous participation.

  b) Advancing research and development for novel technologies, such as CCS and CCUS

Recommendation 3: Enhance current educational offerings and establish new ones to support the development of Australia's carbon workforce, addressing key curriculum gaps and improving accessibility and leadership pathways for Indigenous and regional workforce cohorts

Rationale: The current education provision does not sufficiently reflect the interdisciplinary and evolving nature of carbon markets, including project development, land sector integration, regulatory compliance, and emerging carbon technologies such as CCUS. Enhancing existing educational offerings and developing new programs is required to build the capability of Australia's carbon workforce and address identified gaps in skills, training pathways, and applied knowledge across all sub-sectors.

Targeted curriculum development is needed to align education and training with industry demand and ensure graduates are work-ready for roles across the carbon economy and that the current workforce are upskilled and up to date. Improving accessibility for Indigenous and regional cohorts is essential to support equitable workforce participation, recognising these groups are central to land-based carbon project development and broader sector growth.

A coordinated uplift in education and training provision will strengthen workforce supply, improve regional capability, and support inclusive participation in Australia's transition to a net zero economy.

Discussion: Stakeholder interview and desktop research highlighted persistent barriers and gaps in the current education and training ecosystem that risk constraining the development of a fit-for-purpose carbon workforce. Whilst these vary across the sub-sectors covered, broadly they include limited availability of specialised carbon market and project development courses, fragmented and inconsistent curriculum coverage across institutions, and a lack of applied, work-integrated learning opportunities.

Accessibility barriers remain significant for Indigenous and regional learners, including geographic distance, digital access constraints, and limited culturally appropriate training pathways.

In addition, limited alignment between industry needs and educational offerings contributes to skills mismatches, particularly in emerging areas. Addressing these gaps will be critical to ensuring the workforce pipeline is both scalable and inclusive, and capable of supporting the integrity and growth of Australia's carbon market.

Actions:

- **3.1** Educational institutions partner with industry to embed carbon-focused cadetships at a secondary educational level. An industry cadetship program should learn from existing models to develop pathways for secondary students to undertake work experience, access mentors, and complete subjects that enable participation in the carbon sector. Cadetships could offer graduate positions as part of completion of a relevant tertiary degree, thus creating a cohort of workforce ready sector participants.
- **3.2** Tertiary educational institutions embed carbon management, including financial, considerations into existing land-use and forestry education pathways and continuing professional development.
- **3.3** Educational institutional review existing curricula with industry to identify opportunities to introduce carbon sector content into current courses and introduce new courses.
- **3.4** Educational institutions conduct applied research into novel or emerging technologies and related skills needed. Through the R&D pipeline, and as technology progresses, appropriate curriculum development should address gaps for both new entrants and professional upskilling.
- **3.5** Educational institutions leverage existing partnerships with industry and/or establish new partnerships to inform curriculum design and ensure it address latest technological developments in industry as well as workforce needs.
- **3.6** Educational institutions and government contract existing organisations focused on workforce like Powering Australia or the Net Zero Economy Authority to create specific education pathways for those with transferable skill sets to facilitate a pipeline of sector-ready workers in a timely and economically efficient way to address identified workforce shortages.
- **3.7** Government, education and industry stakeholders develop collaborative approaches and pathways to facilitate Indigenous participation and leadership in the carbon sector. An Indigenous-led national strategy could help to foster Indigenous-led training and accreditation programs focused on carbon sector skills covering the project carbon life cycle. A dimension of this program should address business leadership pathways to facilitate participation in corporate and non-corporate roles.
- **3.8** Education providers prioritise rural, regional and on-Country offerings to capture a dispersed workforce with hybrid delivery (online and in-person) provided where regional offerings are not available.

Recommendation 4: Deploy industry-led frameworks, partnerships and programs to improve workforce capabilities and support career progression.

Rationale: The carbon industry and its market participants are uniquely positioned to drive workforce development because they hold the immediate commercial capital, operational assets, and data ecosystems required to turn policy targets into real-world capabilities. Relying solely on government policy and educational institutions may not be sufficient to scale Australia's carbon industry to the level required. Industry-led frameworks would enable skills development to match the anticipated pace of market development.

Developing these frameworks, partnerships, and programs is critical to:

- mitigating critical workforce shortages,
- safeguarding market integrity,
- de-risking investment;
- accelerating transferable skills and sub-sector mobility, and
- commercialising technology.

Discussion: The scaling of Australia's carbon sector depends on coordinating stakeholders, including government, industry, and education sectors to co-design initiatives to support a fit-for-purpose workforce pipeline. For Indigenous stakeholders, this requires dismantling structural and educational barriers such as off-Country relocation and rigid Western training methods. Broader industry expansion demands clear professional skills-based training, targeted micro-credential courses, and partnership frameworks to alleviate labour shortages in areas such as CCUS and forestry.

Actions:

- **4.1** Led by an industry organisation, industry collaborates to develop clear role definitions, competency frameworks and training programs, to support career progression, remuneration and capability uplift. The CMI could spearhead this work program with appropriate financial support from industry and/or government. Key initiatives within this work program could include:
  - a) Establishing a mentor network to facilitate peer-to-peer learning and sector cohesion.
  - b) Partnering with training organisations to co-design short courses and micro-credentials to fill recognised skill gaps and create industry supported content thereby creating industry led education to support workforce development.
  - c) Supporting locally delivered, accessible professional development opportunities with a particular focus on rural, regional and on-Country engagement
  - d) Developing tools, guiding principles and governance to support efficacy and mobility of the workforce. For example, there is opportunity to develop guidelines in partnerships with Indigenous-led organisations to which facilitate skills transfer and equitable employment outcomes for Indigenous industry participants. Guidance could also be developed for corporates on supporting skills and initiatives which can support a broad range of ESG and Reconciliation Action Plan commitments and incorporate Indigenous knowledge into education programs.
- **4.2 Individual organisations support the development of the broader carbon workforce through novel compensation packaging, proactive opportunities for Indigenous participation, and programs to support both upskilling and exchange of technical and cultural knowledge. Organisations could:**
  - a) Design compensations packages which are responsive to the nascent nature of the sector and adjacent industries. This could include items such as:
    - Recognising the pay scale offered by industries with adjacent skillsets,
    - Offering location allowances for remote work.
    - Utilising programs which support and offering compensated apprenticeships and intern positions.
    - Share packages or profit sharing to compensate for initial low offerings.
  - b) Provide opportunities for Indigenous employees outside project specific roles, including through supporting their upskilling into more technical roles – e.g. MRV.
  - c) Prioritise internal upskilling at all levels to grow capability, enabling the sector to scale rather than compete for a small, experienced pool.
  - d) Identify opportunities for exchange of technical and cultural knowledge domestically and internationally.

Appendix A: Acronym List

Name	Abbreviations
Australian Bureau of Agricultural and Resource Economics and Sciences	ABARES
Australian Carbon Credit Unit	ACCU
Australian Financial Services Licence	AFSL
Australian and New Zealand Standard Classification of Occupation	ANZSCO
Carbon Capture and Storage	CCS
Carbon Capture, Utilisation and Storage	CCUS
Carbon Dioxide Removal	CDR
Carbon Market Institute	CMI
Carbon Dioxide	CO2
Commonwealth Science and Industrial Research Organisation	CSIRO
Direct Air Capture	DAC
Enhanced Rock Weathering	ERW
Full time equivalent	FTE
Geographic Information System	GIS
Human Induced Regeneration	HIR
Jobs and Skills Australia	JSA
Liquified Natural Gas	LNG
Monitoring, Reporting and Verification	MRV
Million tonnes	Mt
Nationally Determined Contribution	NDC
Occupation Standard Classification for Australia	OSCA
Research and Development	R&D
Registered Native Title Body Corporates	RTNBC
Sector Competitiveness Plan	SCP
Vocational Education Training	VET
Workforce Development Plan	WDP

Appendix B: Methodology

The project was realised in four-phases: project inception, stakeholder engagement, desktop research and workforce modelling, and analysis and reporting.

The Figure A1 provides an overview of CMI's approach and key deliverables.

Figure A1: Workforce development plan methodology

a) Stakeholder engagement

A key input into this WDP are insights from stakeholders who are engaged with or participate in the carbon workforce. CMI engaged with the following stakeholder groups via focus groups, 1:1 interviews, and surveys:

- **2** Individuals engaged with CCS and CCUS and CDR
- **3** Individuals engaged in plantation forestry projects
- **4** Individuals engaged with soil and vegetation projects
- **5** Individuals involved who interact with the carbon market by buying, selling or trading carbon credits
- **6** Indigenous stakeholder engaged in the carbon workforce

Key objectives for engagement included to:

- **7** Define the skills and qualifications of the current workforce
- **8** Gain insight into the workforce opportunities, barriers and enablers
- **9** Identify the skills needed and pathway to participation for the future workforce.

Refer to Appendix A for further details including numbers engaged per stakeholder group and an overview of the questions asked during the engagements.

b) Workforce modelling

The second key input into development of this WDP is workforce modelling, which included:

- Researching, defining and characterising the current workforce;
- Analysing relevant government and industry data and
- Modelling and forecasting future workforce size and composition.

Refer to Appendix B for further details including key assumptions, references and approach.

Appendix C: Stakeholder engagement

c) Number of stakeholders engaged per consultation approach

As indicated in the table 2, 63 stakeholders participated in engagement activities (out of 178 that were approached to contribute) across the five stakeholder subsectors. Engagement approaches utilised included: focus groups, 1:1 interviews, and surveys. All participation was voluntary and insights shared were analysed at an aggregate level.

Table 2: Details of stakeholder engagement.

Sector Subsectors	Engagement approach	# participated/ responded
CCS/CCUS	1-hour online focus group	9
	Survey sent to attendees and invitees after focus group	1
	Additional 1-1 interviews	1
Soil and vegetation	1-hour online focus group	9
	Survey sent to attendees and invitees after focus group	2
Plantation forestry	1-hour online focus group	8
	Survey sent to attendees and invitees after focus group	1
Plantation forestry	1-hour online focus group	10
	Survey sent to attendees and invitees after focus group	0
First Nations stakeholders engaged in carbon industry	1-1 interviews at Savanna Fire Burning ICIN conference	5
	Focus group at Savanna Fire Forum conference hosted by ICIN	4
	Focus group with ICIN staff and members	9
	Additional 1-1 interviews	3
	Additional focus group	2
	Survey sent to organisations that engage with First Nations stakeholders engaged in carbon	2
Total stakeholder engagements		65

d) Delivery approach

All focus groups and interviews were conducted via Microsoft Teams, apart from the focus group and interviews conducted in-person at the Savanna Fire Forum. Focus groups and interviews were semi-structured and a survey was sent as a follow up to both participants and non-attendees.

All surveys were developed via Survey Monkey, and all engagement invitations included a link to an Ethical Guidelines and Use of Research document.

The following questions were asked participants during their engagement, tailored as needed to suit each stakeholder group:

Current Workforce Profile

1. What roles and skill sets are most critical today? Are these skills transferable from existing capabilities in Australia?

Measurement, Reporting and Verification

2. What skills are required to support measurement, verification, ongoing monitoring and reporting?

Barriers and Constraints

3. What are the main barriers to attracting, training, or retaining skilled workers?

Enablers

4. What would enable the creation of a skilled workforce? What opportunities does this industry offers worker?

5. Are there currently any programs or incentives to encourage workers to enter the industry?

Future Pathways

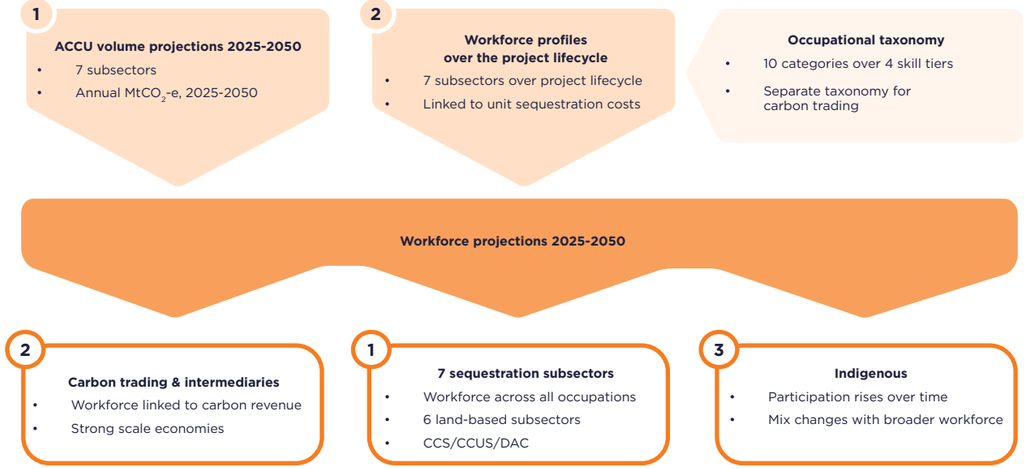
6. How do you expect skills requirements to change over the next 5–10 years as carbon markets, methodologies, or technologies evolve?

7. What pathways will be needed to build this workforce (education, training, cross-sector transition)?

Appendix D: Workforce modelling approach

The workforce model has two input layers and one integration layer and 3 outputs. The model architecture presented as a flow diagram is shown in the figure A2.

Figure A2: Workforce growth model architecture



Input layers

ACCU Projections.

This layer generates projections, in tonnes of CO_2 each subsector delivers in each year from 2025 to 2050.
The projections are almost entirely CO2 sequestered but include some avoided emissions (e.g. some CCS and some savanna fire management).

Treasury's 2025 Net Zero Transformation report[56] is used as the basis as it provides an internally consistent set of abatement requirements which are aligned with Australia's climate ambition. The Treasury projects sequestration by new projects across four types (reforestation; forest regeneration and blue carbon; soil carbon; and savanna fire management), in addition to the 'existing land sector' (which includes existing ACCU-generating projects, as well as other land-based net carbon sinks).

Treasury's modelling is then used to build estimates for five of the six land-based sub-sectors with the following parameters built into the estimates:

- 13.5 Mt of the 'existing land sector' is distributed (an amount equal to the ACCUs generated by existing ACCU-generating projects in 2025) across the five subsectors, according to each project's CER method[57] assuming 2025 ACCUs generated by existing projects continue to be generated at the current rate.
- Treasury's 'existing land sector' abatement is omitted from the estimate, because it comprises non-ACCU-generating net carbon sinks such as unmanaged natural regeneration.
- Treasury's 'reforestation' category is distributed the between plantation forestry and vegetation restoration, phasing over time from 2025 ACCU amount towards CSIRO[58] estimates of their relative economic potential tonnage (but constrained by Treasury's total) in 2050.
- The bulk Treasury's 'forest regeneration and blue carbon' category is allocated to vegetation restoration and a fraction to blue carbon (growing from zero today to 14% by 2050).
- A small fraction of Treasury's soil carbon projection is allocated to biochar, up to 1.6Mt in 2050.
- Treasury's savanna fire management projections are reflected unchanged.

Two subsectors are modelled with further detail, to reflect the variation in cost between the different methods. Firstly, vegetation restoration is split into permanent plantings and human-induced regeneration. Human-induced regeneration accounted for 76% of vegetation restoration issuance in 2025, but permanent plantings are projected to grow more rapidly, reaching the majority share by 2040. That is consistent with the strong growth in reforestation (which includes non-plantation reforestation) in the Treasury scenario.

Secondly, a CCS/CCUS/DAC sector is added with abatement projections based on current projects and CSIRO estimates. The abatement projections include tonnage from:

- Moomba CCS, with abatement increasing to full capacity of 1.7Mt[59],
- Emissions reductions of 6Mt per year by 2040 from LNG Safeguard facilities using CCS, rather than by reducing flaring and fugitives[60].
- Other industrial emissions abated using CCS informed by CSIRO Sectoral Pathways Review Final Report (September 2025) for the A50 G2 scenario[61].
- A conservative projection for DAC is also included as representative of novel CDR methods. Starting at 0 in 2025 and rising to 5Mt by 2050 (2% of CSIRO's estimated 2050 capacity)[62]

[56]Treasury (2025), Australia's Net Zero Transformation: Treasury Modelling and Analysis, Chart 3.14, p. 28 projects total land sector sequestration as part of modelling the broader pathway to net zero. [57]CER, Quarterly Carbon Market Report, December Quarter 2025. [58]CSIRO (2022), Australia's Carbon Sequestration Potential, Fitch P et al. [59]Santos (2024). Moomba CCS project: 1.7 Mt CO_2 per year capture and storage capacity. [60]DCCEEW (2025), Australia's emissions projections 2025 November 2025 (p 60) [61]CSIRO (2025), Modelling Sectoral Technology Pathways to 2035 and Net Zero Emissions – Final report [62]CSIRO (11 2025) Australian Carbon Dioxide Removal Roadmap

Workforce profile over the project lifecycle

Production cost per tonne

ACCU costs, as shown in Table 3, are derived from interview with industry partners for all subsectors except blue carbon, biochar, DAC and CCUS. Costs for blue carbon, biochar and CCUS are derived from CSIRO . Originally all costs were derived from CSIRO however a targeted validation with key stakeholders suggested the figures were not reflective of current practice and significantly lower than those currently faced by the industry. See table 3.

Table 3: Cost structure overview

Subsector	$/tonne	Labour (Overall.)	Cost estimate Source
Soil Carbon	19	63%	Industry
Perm. Plantings	30	58%	Industry
HIR	25	74%	Industry
Savanna Fire Management	23	75%	Industry
Blue Carbon	39	50%	CSIRO
Biochar	123	33%	CSIRO
Plantation Forestry	27	49%	Industry
CCS/CCUS/DAC	67	82%	CSIRO

A 10% discount rate is applied to costs over time as per CSIRO sequestration potential report[64].

Labour Share

The proportion of each project's total costs that are allocated to wages and salaries varies by subsector and phase. Establishment phases tend to have higher labour shares (55–80%) due to the prevalence of on-site works, while operational phases vary widely, from 30% for capital-intensive biochar operations to 80% for labour-intensive HIR field work. These shares are derived from ABS industry-level labour share data, adjusted for the specific characteristics of carbon projects.

Project life cycle

The model captures project lifecycles by phasing capital and operating expenditure across a 10-year project lifecycle, with different occupational mixes during establishment versus steady-state operation. Beyond 10 years, costs are assumed to continue indefinitely at the steady-state rate.

Each subsector has a capex/opex profile. Capital expenditure is concentrated in years 1–3 for most subsectors, while operating expenditure ramps up to full capacity over 2–4 years. Plantation forestry (50% capex) and CCS/CCUS (70% capex) are capital-intensive upfront; savanna fire management (10% capex) is predominantly operational. These splits are informed by CSIRO cost decompositions, ABARES farm cost data, and industry benchmarks.[65]

Carbon sequestrations for each project type attain full operating tonnage with a delay after project inception that was set as an approximate match to what is known about the real-world profile of sequestration for each project type. CCS/CCUS sequestrations, for example, are modelled as delivering at full scale from the time the project is operational. Plantation forestry, by contrast, is modelled as delivering at full scale once trees have attained their maximum timber production maturity.

Occupational Taxonomy

The carbon workforce, engaged in abatement activities, is broken into ten high level categories is designed to capture the occupational structure of land-based and CCS ACCU-generating projects. A second taxonomy was developed for the 'carbon trading and intermediaries' subsector because it requires a radically different occupation mix. The workforce taxonomies were informed by project documentation, CMI member workshops, and desktop research[66]. The taxonomies are consistent with, but more detailed than, the taxonomy developed in the Jobs and Skills Australia study "The Clean Energy Generation" which identifies critical occupations across the entire clean energy workforce[67]. The workforce taxonomy for roles involved in carbon abatement activities including mapping to can OSCA codes, ANZCO groupings and annual salaries can be seen in table 4. The taxonomy for the 'carbon traders and intermediaries can be seen in table 5.

Table 4: Occupations taxonomy and mapping

Code	Sub-group name	Model role**	OSCA code	OSCA Occupation Title	OSCA Unit Grp	OSCA Unit Group Name	Maj Grp	Skill Level	Median Annual Salary (A$)	Salary Source	ANZSCO Unit Grp	ANZSCO unit group name
1a	**Carbon project dev/finance/training**											
1a	Carbon project dev/finance/ training	Carbon project developer	131431	Property Developer	1314	Property Developers	1	1	$135,000	JSA / Seek (2025)	2245	Land Economists and Valuers
		Carbon accountant	211131	Accountant (General)	2111	Accountants and Corporate Treasurers	2	1	$104,000	JSA (ANZSCO 2211), May 2025	2211	Accountants
		Carbon credit aggregator	223999	Information and Organisation Professionals nec	2239	Other Information and Organisation Professionals	2	1	$110,000	Seek / PayScale (2025)	2249	Other Information and Organisation Professionals
		Broker/trader (carbon)	212231	Financial Market Dealer	2122	Financial Dealers	2	1	$120,000	JSA / PayScale (2025)	2222	Financial Dealers
		Financial analyst	212332	Investment Analyst	2123	Investment Specialists	2	1	$120,000	JSA / PayScale (2025)	2222	Financial Dealers
		Legal specialist (carbon/ environment)	281331	Solicitor	2813	Solicitors	2	1	$130,000	JSA (2025)	2713	Solicitors
		Compliance specialist	111632	Regulatory Affairs Manager	1116	Workplace Compliance Managers	2	1	$105,000	JSA / Seek (2025)	JSA / Seek (2025)	Other Specialist Managers
1b	**Engineering**											
1b	Engineering	Civil Engineer	243231	Civil Engineer	2432	Civil Engineering Professionals	2	1	$102,000	JSA (2025)	2332	Civil Engineering Professionals
		Mechanical Engineer	243532	Mechanical Engineer	2435	Industrial, Mechanical and Production Engineers	2	1	$105,000	JSA (2025)	2335	Industrial, Mechanical and Production Engineers
		Electrical Engineer	243331	Electrical Engineer	2433	Electrical Engineering Professionals	2	1	$108,000	JSA (2025)	2333	Electrical Engineers
		Chemical Engineer	243131	Chemical Engineer	2431	Chemical and Materials Engineering Professionals	2	1	$110,000	JSA (2025)	2331	Chemical and Materials Engineers
		Process Engineer	243999	Engineering Professionals nec	2439	Other Engineering Professionals	2	1	$108,000	JSA (2025)	2339	Other Engineering Professionals
		Environmental Engineer	243935	Environmental Engineer	2439	Other Engineering Professionals	2	1	$102,000	JSA (ANZSCO 2343), May 2025	2339	Other Engineering Professionals

Table 4: Continued

Code	Sub-group name	Model role**	OSCA code	OSCA Occupation Title	OSCA Unit Grp	OSCA Unit Group Name	Maj Grp	Skill Level	Median Annual Salary (A$)	Salary Source	ANZSCO Unit Grp	ANZSCO unit group name
1c	**Environmental and land science**											
1c	Environment and land science	Hydrologist	244533	Hydrologist	2445	Geoscientists and Hydrologists	2	1	$105,000	JSA (2025)	2344	Geologists, Geophysicists and Hydrogeologists
		Remote Sensing Specialist	241233	Geospatial Specialist	2412	Geospatial Information Professionals and Surveyors	2	1	$99,000	JSA (ANZSCO 2322), May 2025	2322	Surveyors and Spatial Scientists
		Agronomist	244133	Agronomist	2441	Agricultural, Fisheries and Forestry Scientists	2	1	$97,000	JSA (2025)	2341	Agricultural, Fisheries and Forestry Scientists
		Forestry Scientist	244135	Forester	2441	Agricultural, Fisheries and Forestry Scientists	2	1	$95,000	JSA (2025)	2341	Agricultural, Fisheries and Forestry Scientists
1d	**Other professionals and managers**											
1d	Other professionals and managers	Project Manager	131131	Construction Project Manager	1311	Construction Project Managers	1	1	$140,000	JSA / Seek (2025)	1331	Construction Managers
		HR Manager / Specialist	111331	Human Resources Manager	1113	Human Resources Managers	1	1	$120,000	JSA (2025)	1323	Human Resource Managers
		Communications / Stakeholder Manager	221231	Communications Officer (Public Relations)	2212	Communications Officers (Public Relations)	2	1	$95,000	JSA (2025)	2253	Public Relations Professionals
		IT / Data Manager	113232	ICT Project Manager	1132	ICT Managers	1	1	$140,000	JSA (2025)	1351	ICT Managers
		Procurement Officer	571331	Procurement Officer	5713	Procurement and Purchasing Officers	5	3	$85,000	JSA (2025)	5911	Purchasing and Supply Logistics Clerks
		Policy Adviser	223332	Policy Analyst	2233	Intelligence and Policy Analysts	2	1	$105,000	JSA (2025)	2244	Intelligence and Policy Analysts
		Administrator / Office Manager	171231	Office Manager	1712	Office and Payroll Managers	5	2	$75,000	JSA (2025)	5121	Office Managers
2a	**Construction and infrastructure trades**											
2a	Construction and infrastructure trades	Fencing Contractor	331131	Metal Fabricator	3311	Structural Steel and Welding Trades Workers	3	3	$80,000	Seek / PayScale (2025)	3223	Structural Steel and Welding Trades Workers
		Earthworks Operator (Trade)	741234	Excavator Operator	7412	Earthmoving Plant Operators	7	4	$95,000	JSA (2025)	7212	Earthmoving Plant Operators
		Welder	331133	Welder (First Class)	3311	Structural Steel and Welding Trades Workers	3	3	$85,000	JSA (2025)	3223	Structural Steel and Welding Trades Workers
		Plumber	363131	Plumber (General)	3631	Plumbers (General)	3	3	$104,000	JSA (ANZSCO 3341), May 2025	3341	Plumbers
		Electrician	381231	Electrician (General)	3812	Electricians	3	3	$114,000	JSA (ANZSCO 3411), May 2025	3411	Electricians

Table 4: Continued

Code	Sub-group name	Model role**	OSCA code	OSCA Occupation Title	OSCA Unit Grp	OSCA Unit Group Name	Maj Grp	Skill Level	Median Annual Salary (A$)	Salary Source	ANZSCO Unit Grp	ANZSCO unit group name
2b	**Technical and monitoring**											
2b	**Technical and monitoring**	Field Technician (Environmental)	311532	Earth Science Technician	3115	Science Technicians	3	2	$72,000	JSA (2025)	3114	Science Technicians
		Sensor / Instrumentation Operator	311599	Science Technicians nec	3115	Science Technicians	3	2	$70,000	JSA (2025)	3114	Science Technicians
		MRV Data Collector	311199	Agricultural Technicians and Inspection Officers nec	3111	Agricultural Technicians and Inspection Officers	3	2	$68,000	JSA (2025)	3113	Primary Products Assurance and Inspection Officers
		Laboratory Analyst	244231	Chemist	2442	Chemists, and Food and Wine Scientists	3	2	$70,000	JSA (2025)	2342	Chemists, and Food and Wine Scientists
		GIS Officer	311533	Geospatial Technician	3115	Science Technicians	3	2	$78,000	JSA (2025)	3121	Architectural, Building and Surveying Technicians
3a	**Plant and equipment operators**											
3a	**Plant and equipment operators**	Excavator Operator	741234	Excavator Operator	7412	Earthmoving Plant Operators	7	4	$95,000	JSA (2025)	7212	Earthmoving Plant Operators
		Grader Operator	741235	Grader Operator	7412	Earthmoving Plant Operators	7	4	$92,000	JSA (2025)	7212	Earthmoving Plant Operators
		Bulldozer Operator	741233	Bulldozer Operator	7412	Earthmoving Plant Operators	7	4	$90,000	JSA (2025)	7212	Earthmoving Plant Operators
		Harvester Operator (Forestry)	741131	Agricultural and Horticultural Mobile Plant Operator	7411	Agricultural, Horticultural and Logging Plant Operators	7	4	$78,000	JSA (2025)	7211	Agricultural, Forestry and Horticultural Plant Operators
		Pyrolysis / Biochar Plant Operator	732999	Stationary Plant Operators nec	7329	Other Stationary Plant Operators	7	4	$82,000	JSA (2025)	7129	Other Stationary Plant Operators
3b	**Transport and logistics**											
3b	**Transport and logistics**	Truck Driver (General)	713131	Truck Driver (General)	7131	General Truck Drivers	7	4	$102,000	JSA (ANZSCO 7331), May 2025	7331	Truck Drivers
		Articulated Truck Driver	713231	Articulated Truck Driver	7132	Articulated and Tanker Truck Drivers	7	4	$108,000	JSA (2025)	7331	Truck Drivers
		Logistics Coordinator	571131	Logistics Officer	5711	Logistics Officers	5	2	$80,000	JSA (2025)	5911	Purchasing and Supply Logistics Clerks
		Pipeline Operator	399132	Gas or Petroleum Production Technician	3991	Chemical, Gas, Petroleum and Power Generation Plant Technicians	7	3	$110,000	JSA (2025)	3992	Chemical, Gas, Petroleum and Power Generation Plant Operators

Table 4: Continued

4a	**Land and field workers**											
4a	**Land and field workers**	Farm Hand / Agricultural Worker	841399	Mixed Production and Aquaculture Farm Workers nec	8413	Mixed Production and Aquaculture Farm Workers	8	5	$60,000	JSA (2025)	8424	Mixed Production Farm Workers
		Tree Planter	842932	Forestry Worker	8429	Other Garden and Forestry Workers	8	5	$58,000	JSA (2025)	8431	Forestry and Logging Workers
		Fencing Labourer	821331	Fencer	8211	Construction and Demolition Labourers	8	5	$65,000	JSA (ANZSCO 8211), May 2025	8213	Fencers
		Weed Control Worker	842131	Garden Labourer	8421	Garden Labourers	8	5	$55,000	JSA (2025)	8432	Garden Labourers
		Habitat Restoration Crew	842131	Garden Labourer	8421	Garden Labourers	8	5	$57,000	JSA (2025)	8432	Garden Labourers
		Savanna Fire Management Ranger	244334	Park Ranger	2443	Environmental Conservation Professionals	4	3	$65,000	NIAA / ILC (2025)	2343	Environmental Scientists
4b	**Construction labourers**						**1161**	**1761**	**201**	**356**		
4b	**Construction labourers**	General Construction Labourer	821132	Builder's Labourer	8211	Construction and Demolition Labourers	8	5	$72,000	JSA (ANZSCO 8211), May 2025	8211	Building and Plumbing Labourers
		Site Clean-up Worker	821132	Builder's Labourer	8211	Construction and Demolition Labourers	8	5	$65,000	JSA (2025)	8211	Building and Plumbing Labourers
		Earth-moving Support Worker	821135	Earthmoving Labourer	8211	Construction and Demolition Labourers	8	5	$68,000	JSA (2025)	8211	Building and Plumbing Labourers
		Pipeline Construction Labourer	821632	Pipe Layer	8211	Construction and Demolition Labourers	8	5	$75,000	JSA (2025)	8211	Building and Plumbing Labourers

Table 5: Carbon Trader workforce taxonomy

Revenue Stream	Role
Trading and Brokerage	Carbon Trader (Bank Desk)
	OTC Carbon Broker
	Carbon Derivatives Specialist
	Forward Contracting Specialist
	Risk Analyst / Quant
	Trading Operations / Compliance
Advisory	Carbon Market Advisory Consultant
	Carbon Portfolio Manager
	Carbon Risk Analyst
	Carbon Legal Specialist
	Policy and Regulatory Analyst
	Support and Administration
Market Intelligence	Carbon Market Analyst / Price Reporter
	Carbon Data Scientist / Quant
	Carbon Research Analyst
	Carbon Data Engineer / IT
	Sales and Client Relations

Carbon Traders Model and ACCU Price

Carbon trading activity and workforce needs are driven by market revenue rather than ACCU numbers or amount of abatement resulting in a separate, revenue-based model being used to determine workforce size.

The calculation model is → total market value → intermediary share → intermediary revenue pool → revenue per FTE → total trading FTEs.

The core inputs are: ACCU spot price ($35.5/t in 2025, based on CER quarterly data); secondary market turnover ratio (1.82×, reflecting repeat trading of units between issuance and surrender); and intermediary share of trades (35%, derived from RepuTex market analysis). Revenue per FTE is benchmarked against comparable financial services roles: $700k for brokerage/trading, $350k for advisory, $600k for aggregation, and $420k for market intelligence.

The trading workforce is allocated across three activity segments: brokerage and trading (the largest segment), advisory and compliance (serving safeguard mechanism entities and voluntary buyers), and market operations (aggregation, market intelligence, financial instruments). As the ACCU market grows in size and value, the trading workforce grows less than proportionally, as productivity is assumed to increase with market scale, as is commonly found in financial markets. Revenue-per-FTE remains the same, but margins for trading and other activities fall in alignment with broader financial market experience.

ACCU prices derived from the Australin Carbon Market Outlook[68] and ABARE[69] and can be seen in table 6.

Table 6: ACCU price used for Carbon Trading workforce

Year	$/Tonne	Source
2026	37	Australian Carbon Market Outlook (EY)
2027	34	Australian Carbon Market Outlook (EY)
2028	33	Australian Carbon Market Outlook (EY)
2029	39	Australian Carbon Market Outlook (EY)
2030	44	Australian Carbon Market Outlook (EY)
2031	52	Australian Carbon Market Outlook (EY)
2032	62	Australian Carbon Market Outlook (EY)
2033	69	Australian Carbon Market Outlook (EY)
2034	70	Australian Carbon Market Outlook (EY)
2035	69	Australian Carbon Market Outlook (EY)
2036	71	Australian Carbon Market Outlook (EY)
2037	71	Australian Carbon Market Outlook (EY)
2038	75	Australian Carbon Market Outlook (EY)
2039	75	Australian Carbon Market Outlook (EY)
2040	78	Australian Carbon Market Outlook (EY)
2041	81	ABARES
2042	84	ABARES
2043	87	ABARES
2044	89	ABARES
2045	92.	ABARES
2046	95	ABARES
2047	98	ABARES
2048	100	ABARES
2049	103	ABARES
2050	106	ABARES

Indigenous participation rates

Indigenous employment in the carbon sector is modelled using subsector-specific participation rates. Rates are imposed based on ABS Census Indigenous employment shares in related industries, with an approximate adjustment for location (for example, the Indigenous share of employment in agriculture and forestry is 2.1% nationally and 11.3% in Northern Australia)[70].

Base participation rates in 2025 are shown in table 7.

Table 7: Assumed Indigenous participation rates in alternate subsectors

Subsector	Rate (2025)	Basis
Savanna Fire Management	27.4%	DERIVED from ranger program data
Blue Carbon	15.0%	ASSUMPTION.
Soil Carbon	5.2%	ASSUMPTION.
Vegetation Restoration	4.2%	ASSUMPTION.
Plantation Forestry	2.1%	ASSUMPTION.
Biochar	2.2%	ASSUMPTION. Pilot-scale. Close to national average ~2.2%.
CCS/CCUS/DAC	1.5%	ASSUMPTION.

The savanna fire management rate (27%) is derived from ranger program data: approximately 1,900 IRP positions with a 0.55 FTE conversion factor, of which an estimated 30% contribute to carbon projects and 80% to savanna specifically.[71] This is the only subsector with strong direct evidence. Within each subsector, Indigenous participation rates rise reflecting growing Indigenous engagement in carbon projects, expanding ranger programs, and increasing recognition of traditional land management expertise.[72]

Integration Layer

In the integration layer, ACCU amounts, ACCU cost and workforce profiles are combined to project the workforce in FTE terms for each calendar year from 2025 to 2050.

Year by year, this layer multiplies projected abatement amount by the workforce profile, producing FTE counts across 10 occupational categories. The workforce is activated, where needed, prior to the tonnages delivered, providing for the years of project inception, site preparation, construction, and vegetation development that often precede commercial delivery of ACCUs by a given project.

For each of the subsectors, a cost-based model connects tonnes of sequestration by each carbon subsector at a point in time into workers by occupation across time. The calculation model runs as follows:

abatement amount × cost per tonne → total expenditure × labour share → wages bill; combining the occupation FTE mix over time, and salaries by occupation = FTE profiles by occupation over time.

An Indigenous carbon Workforce overlay generates subsector-specific Indigenous workforce estimates, based on estimated current and potential participation rates applied to total employment in each carbon sector.

Outputs

The model produces three output streams. The main one is the Carbon Subsector Workforce stream. It generates employment projections across subsectors 10 occupations for the period 2025–2050, with estimates back to 2013 where relevant. The Carbon Trading and Intermediary Workforce is also estimated using a revenue-based model for market participants. The Indigenous Carbon Workforce overlay generates subsector specific First Nations workforce estimates, based on estimated current and potential indigenous participation rates applied to the workforce in each carbon sector.

[71]NIAA (2024), Indigenous Ranger Program. 2,900 positions across 320 ranger groups; target 3,800 by 2030.
[72]ICIN (2024), Indigenous Carbon Industry Network. 23 member organisations, 35 projects, ~1.2 Mt ACCUs per annum.