Department of Climate Change, Energy, the Environment and Water

Renewable Energy Sector Board

Review of the Board's plan and recommendations to the Minister about implementation of the plan

September 2024

NSW GOVERNMENT

Acknowledgement of Country

Department of Climate Change, Energy the Environment and Water acknowledges the traditional custodians of the land and pays respect to Elders past, present and future.

We recognise Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to place and their rich contribution to society.

Artist and designer Nikita Ridgeway from Aboriginal design agency – Boss Lady Creative Designs, created the People and Community symbol.

Renewable Energy Sector Board

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Executive summary

In recognition of the rapidly evolving renewable energy landscape, the former Minister for Energy requested the NSW Renewable Energy Sector Board conduct a review of our plan and consider how our recommendations could help unlock investments in local manufacturing for the renewable energy sector. This review highlights how our plan responds to supply chain risks reaffirmed by key changes in the energy landscape, identifies further opportunities and challenges for implementation, and updates our advice to focus action on delivery of the NSW Electricity Infrastructure Roadmap by NSW Government.

Our plan for the renewable energy sector supports mitigation of supply chain risks

Recent public health and geopolitical disruptions have highlighted the risks of overreliance on complex and lengthy supply chains to enable critical infrastructure delivery. As New South Wales moves towards a more affordable, clean and reliable energy system, vulnerabilities to supply chain disruptions need to be mitigated. Our plan supports mitigation of these risks with minimum requirements and stretch goals for local content, and considers how to foster opportunities for trainees, apprentices, First Nations workers and underrepresented groups in the sector. Our plan also makes recommendations to NSW Government on actions needed to drive sustainable growth and competitiveness of our local industries and realise the benefits for local workers and communities.

The changing energy landscape reaffirms our plan and informs our recommendations

There is a resurgence of 'green' industrial policies around the world aiming to drive decarbonisation, strengthen local supply chains and achieve greater energy security. Our plan includes requirements to support and develop the renewable energy sector so that New South Wales avoids losing skilled workers, entrepreneurs and capital to places with more supportive policy settings. It also positions New South Wales to capitalise on the business activity, workforce development and technological opportunities presented by the energy transition. Our plan is aligned with the Australian Government's Future Made in Australia Bill.

Australia is responding to the changing energy landscape by leveraging its strong relationship with the United States to accelerate battery manufacturing, secure critical minerals and access benefits from the US Inflation Reduction Act (IRA). This is reinforced by the Future Made in Australia Bill to attract capital investment in areas of national interest such as renewable energy. Rapid decarbonisation of the grid and high labour standards position New South Wales to benefit from international demand for lower embodied carbon components produced locally and level the playing field of international trade via initiatives such as the Carbon Border Adjustment Mechanism (CBAM) in the EU. These strengths, coupled with a strong policy ambition to revitalise our manufacturing base, will help New South Wales take advantage of the opportunities presented by the energy transition.

Australia's renewed focus on domestic manufacturing must address skills shortages, particularly in regional areas. New South Wales has responded by launching the $150 million Renewable Manufacturing Fund to support capability and capacity growth of the local renewable energy sector.

Opportunities for the sector must leverage and strengthen our competitive advantages

Our plan identified opportunities for New South Wales to secure critical supply chains for development of the Roadmap by localising parts of the manufacturing process and building and maintaining local community support for the transition.

New South Wales could competitively supply the components needed to connect new electricity generation and storage capacity, as it has a significant share of the world's copper resources and substantial capacity to produce aluminium and steel.

While NSW has an abundance of critical minerals for the sector, Australia faces increasing international competition to supply raw materials so will need to prioritise opportunities where our reputation for reliability and security, and low emissions production provides an advantage on balance of costs.

Strengthening local supply chains by implementing local content requirements (LCRs) can help mitigate Roadmap delivery risks by reducing project delays due to logistics and increasing resilience to global shocks. According to analysis we commissioned in the preparation of this review, local supply chains can also avoid up to 38% of emissions associated with the use of copper, aluminium and steel in delivering the Roadmap, by taking advantage of the decarbonised NSW electricity grid and higher efficiency manufacturing in NSW compared to other jurisdictions.

Realising the benefits of localisation requires key challenges for suppliers to be addressed, such as investment in new and expanded facilities, and ensuring suppliers' products meet the quality and standards required by their customers.

Review of our plan has found most recommendations have yet to be implemented

Progress is being made with development of local supply chains including a framework to reinvest REZ access fees and creation of transition pathways for the fossil fuels energy workforce. However, most recommendations have yet to be implemented particularly for long-term planning for local content, jobs, skills and training.

Developments in the local supply chain include investment in local production of polysilicon and utility-scale solar panels, innovation in solar panel copper-plate technology, and increased steel milling capacity for solar, wind and power line structures.

The long-term energy service agreements (LTESA) awarded to date by AEMO Services under the Roadmap anticipate 40% of the $8.5 billion in total project contract value (TPCV) will be sourced from local supply chains. EnergyCo's $1 billion Waratah Super Battery (WSB) is expected to create over 100 regional jobs during construction.

AEMO Services has considered our recommendations in its four tenders to date, and EnergyCo has considered our recommendations in its network projects. However, commitments for First Nations participation and under-represented groups have not met our minimum requirements across the majority of Roadmap projects.

Our review reinforces the need to invest in local supply chains supporting Roadmap delivery

With the right level of public and private investment, local suppliers are increasingly establishing and expanding their supply chains which could lead to increased LCRs for Roadmap projects. AEMO

Services has identified emerging technologies for renewable energy and storage through its tenders for which we will continue to monitor and recommend minimum requirements as soon as practicable.

The new developments in policy and regulatory frameworks governing the sector since publication of our plan highlight where further investment will be required into the 2030s, particularly for long-duration storage and renewable generation to maintain downward pressure on electricity prices. The increased need for investment reaffirms the case for strengthening our local supply chains to help ensure the energy transition benefits New South Wales and maintains social licence.

In our plan we estimated electricity customers would contribute between 0.4% and 1.9% more in their bills to deliver the minimum requirements and stretch goals for local content in electricity infrastructure. While surveys have consistently shown electricity consumers are willing to pay more to support greater use of local content, we understand the recent increases in electricity prices may impact this sentiment.

Actions to renew focus and accelerate implementation of our plan

The NSW Government supported or supported in principle all 15 of our plan's recommendations which included how AEMO Services and EnergyCo can maximise local content in Roadmap projects, and how NSW Government can build the capacity and capability of the sector.

We reaffirm our advice to the Minister and make the following additional recommendations to renew focus and accelerate capacity and capability building of the NSW renewable energy sector:

1. Create a local content policy for the sector, amend the Act for planning and regulatory reviews, enhance work health and safety codes of conduct, and their monitoring and compliance to enhance local procurement.
2. Support supply chain development and industry participation by developing a supply chain directory of local manufacturers, providing tender readiness training and productivity improvement programs to SMEs, and enhancing compliance, knowledge sharing and reporting.
3. Develop and implement a sector skills and training strategy including the establishment of industry run training centres and a sector body to raise awareness of career opportunities, coordinate, coach and support employment and deliver a group training organisation model particularly for under-represented groups.
4. Support development of First Nations capabilities to increase procurement of Indigenous businesses, share benefits, and enhance collaboration and participation in the energy transition.

1 Introduction

The NSW Electricity Infrastructure Roadmap (the Roadmap) provides local workers and industries with a once-in-a-generation opportunity to participate in the energy transition.

To realise these opportunities, the Minister for Energy has established the NSW Renewable Energy Sector Board to prepare a plan for the NSW renewable energy sector. Through our plan and advice to the Minister, AEMO Services as the NSW Consumer Trustee, and the Energy Corporation of NSW (EnergyCo), we are helping to set Australia's renewable energy industry on solid foundations in a way that:

- supports the growth and competitiveness of the industry
- ensures the benefits of renewable energy projects are shared with workers, their families and communities.

1.1 Our vision and plan for the renewable energy sector

Our plan was published in September 2022, setting out ways to maximise the opportunities from the Roadmap and minimise adverse impacts for regions, communities and workers.

The problem we seek to address is defined by international and local factors and constraints. The global effort to develop clean energy sources is critical for mitigating the impact of climate change and bringing forward new sources of reliable, affordable electricity generation and storage infrastructure.

However, the overreliance on complex and lengthy international supply chains is a vulnerability that must be mitigated. Recent disruptions to global supply chains caused by health crises and geopolitical developments have underscored the need to secure critical supply chains, including by localising parts of the manufacturing process for electricity infrastructure. In addition, the energy transition will only succeed if it benefits and is accepted by local communities.

To help local workers and industries take advantage of the opportunities presented by the Roadmap, our plan recommended that projects under the Roadmap include minimum requirements and stretch goals for the use of local content.[1] These cover goods, services and other inputs for the construction and operation of Roadmap infrastructure. Our plan also gives specific consideration for how to foster opportunities for trainees and apprentices, as well as groups such as women, young people and First Nations peoples who are underrepresented in the sector.

In our plan, 'local content' relates to materials, equipment, components and services produced in Australia and New Zealand. In the context of First Nations participation requirements, 'local' relates to Australia only.

[1] AEMO Services when implementing our plan adopted the concept 'baseline requirements'. For consistency with our plan, we refer to minimum requirements throughout this document; however, baseline requirements and minimum requirements are equivalent.

AEMO Services has incorporated our recommended minimum local content requirements in the Tender assessment criteria for generation, storage and firming projects under the Roadmap.

EnergyCo as the Infrastructure Planner has incorporated our advice in the:

- tender for a Central-West Orana Renewable Energy Zone (CWO REZ) network operator
- procurement of System Integrity Protection Scheme (SIPS) services to support the Waratah Super Battery (WSB) project.

Together, the Roadmap contracts awarded to date will source $3.5 billion from local supply chains. This equals around 40% of the $8.5 billion in total project contract value (TPCV) awarded to date. The computation of the $3.5 billion investment covers 'local content' as previously defined and includes small and medium enterprises (SMEs) classified as companies with up to 200 employees.

Box 1 provides an overview of the Roadmap and the Board.

Box 1. The Electricity Infrastructure Roadmap and the Renewable Energy Sector Board

The Roadmap is the state's 20-year plan to transform our electricity system into one that is more affordable, clean and reliable.

By 2030, the Roadmap will drive the delivery of at least 12 gigawatts (GW) of new renewable energy capacity and 2 GW of long-duration storage. The Roadmap is enabled by the *Electricity Infrastructure Investment Act 2020* (the Act).

The Renewable Energy Sector Board

The Minister for Energy established the NSW Renewable Energy Sector Board in February 2021, as required under the Act. Our members include representatives from unions, the steel, electricity and manufacturing sectors, the renewable energy industry and electricity customers.

The Act requires us to prepare and provide to the Minister a plan for the NSW renewable energy sector, including the operation of the sector and the manufacture and construction of infrastructure in the sector.

Our vision

Our vision is to make sure our local workers, communities and industries reap the economic benefits of the transition to affordable reliable and clean electricity.

Our plan sets out how to do this in ways that are cost-effective for all electricity consumers, drive sustainable growth and the competitiveness of our industry, and provide quality jobs for new and existing workers in New South Wales.

Our plan and how it takes effect

As required under the Act, our plan sets out how to cost-effectively achieve the following objectives:

- maximise the use of locally produced and supplied goods and services
- maximise employment of suitable qualified local workers
- foster opportunities for apprentices and trainees.

In preparing the plan, we also ensured it protects the financial interest of electricity customers and is consistent with Australia's international trade obligations.

Following consideration by the regulator Independent Pricing and Regulatory Tribunal (IPART), the Minister approved the plan. It was published in September 2022. The Minister and the NSW Consumer Trustee must now take our plan into account when exercising their functions under the Act.

The plan provides guidance to the Consumer Trustee and EnergyCo on how to maximise the use of local content and workers in generation, storage and network infrastructure projects under the Roadmap. Our recommendations also apply to the allocation of renewable energy zone (REZ) access rights.

The Act requires us to monitor and review our plan and make recommendations to the Minister about its implementation. The Electricity Infrastructure Investment Regulation 2021 also requires us to review our plan at least once every 2 years after it has been approved by the Minister.

Our advice to the NSW Government

The plan also sets out our broader advice to the NSW Government on actions needed to drive sustainable growth and competitiveness of our local industries and realise the benefits for local workers and communities presented by the Roadmap.

These recommendations are categorised under the following themes:

1. Long-term planning for local content, jobs and skills
2. Supply chain development
3. Skills and training.

The NSW Government supported, or supported in principle, all 15 of our recommendations.

1.2 Purpose of this document

Since the publication of our plan in September 2022, there have been significant developments in the energy markets both in Australia and overseas. Governments across the world, including the United States (the US), the European Union (the EU) and certain countries in Asia, have announced stronger climate ambitions with increased investment into clean energy development and supply.

Australia and New South Wales have also seen increased investor and government interest in accelerating and de-risking the energy transition through local manufacture of renewable energy components.

At the same time, the NSW Government has made clear its commitment to rebuild domestic manufacturing. It will do this by increasing tender weightings in government procurement to 30%, securing local content, job creation, small business, and ethical supply chains. The NSW Government will also set up a NSW Jobs First Commission to support NSW manufacturers (Minns 2023a).

Prior to the 2023 NSW Election, in recognition of the rapidly evolving energy transition landscape, the former Minister requested we:

- conduct a review of our plan, once the local content outcomes of the first Roadmap tenders were known
- consider how our recommended minimum requirements and stretch goals could help unlock investments in added local manufacturing capacity for the renewable energy sector.

In line with the above, this document:

- provides an overview of the key changes in the global and national energy transition landscape
- reaffirms the opportunities we have identified for the NSW renewable energy sector
- summarises the outcome of our review of the plan
- reiterates and updates our advice to the Minister on key complementary policies and enabling actions to help Roadmap projects meet and, over time, exceed the minimum requirements.

Concurrently with this review of our plan, we have prepared an addendum to our plan, and developed a process for increasing the local content requirements (LCRs) over time. Figure 1 sets out how these documents complement each other.

This review of our plan is based on information current as of 30 June 2024.

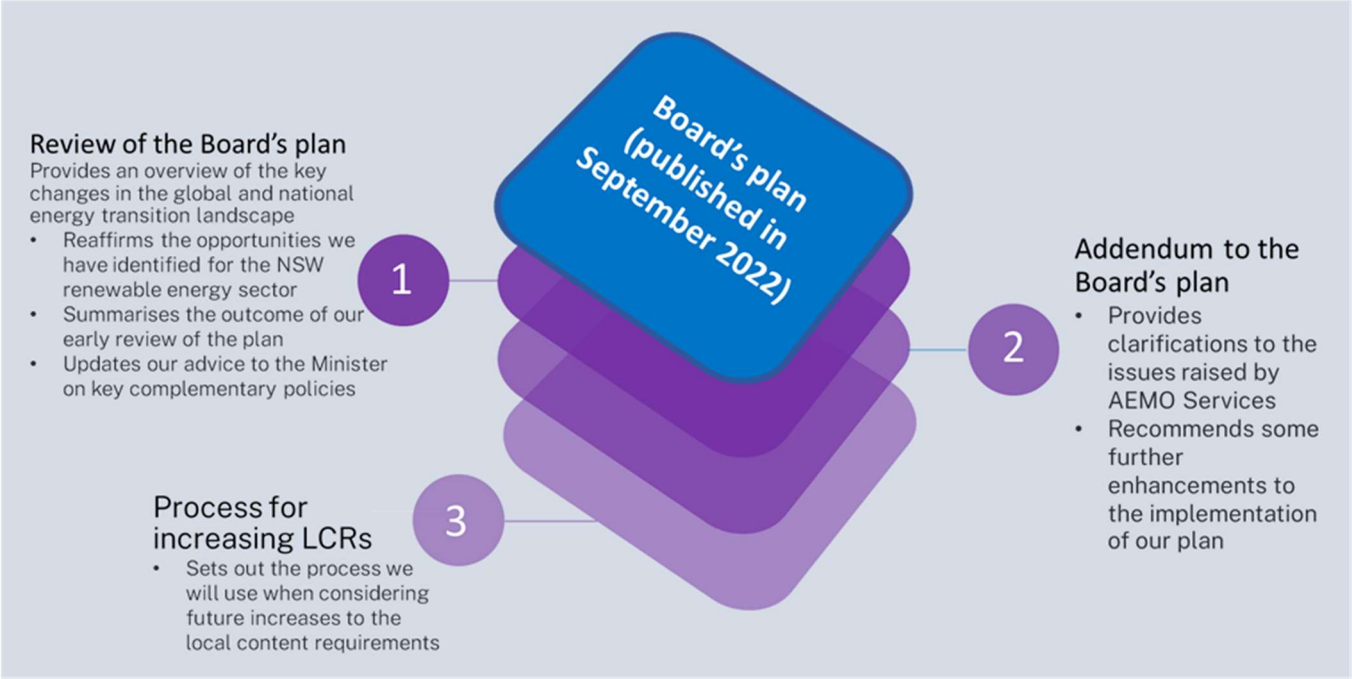

Figure 1: Relationship between our documents

2 The changing global and national landscape

Global events such as Russia's invasion of the Ukraine and the COVID-19 pandemic have created new energy security challenges and caused compounding disruptions to international energy supply chains.[2] This has coincided with an urgent need for countries to decrease reliance on fossil fuels to mitigate the worst impacts of climate change (IPCC 2023, p. 4).

In response, the deployment of renewable energy is accelerating globally. The International Energy Agency (IEA) forecasts that the world's renewable energy capacity will increase by more than 440 GW in 2023, a significant acceleration from the 340 GW added in 2022.

As a result, the world's total renewable electricity capacity is expected to reach 4,500 GW in 2024 – equal to the total power output of China and the US combined (IEA 2023a pp. 8, 9, 16). China and India are the main drivers behind clean energy expansion, with China estimated to account for close to 50% of the world's clean energy capacity by 2027.

Acceleration of the energy transition has contributed to the emergence of 'green' industrial policy to both drive decarbonisation and secure political support for ambitious transition policies (Kaufman et al. 2023).

Many countries – including the US – have introduced requirements for domestically manufactured and produced goods and services for renewable energy projects, aiming to strengthen local supply chains and achieve greater energy security (Hogan 2021). Consequently, the number of local content policies for solar and wind increased from 4 in 2000 to 31 in 2021 (Lin 2023).

This section sets out the major developments internationally and in Australia and identifies some of the key opportunities and challenges for New South Wales.

2.1 'Green' industrial policy is seeing a resurgence across the world

2.1.1 The United States is accelerating its energy transition

The *Inflation Reduction Act of 2022* (the IRA) marks a significant increase in the climate ambitions of the US. Through the IRA, the US will invest nearly US$370 billion to accelerate its transition to renewable energy and reduce carbon emissions by 40% by 2030 (The White House 2023a, p. 5–6).

The IRA aims to accelerate investment in domestic manufacturing capacity, encourage domestic procurement of critical supplies and jump-start clean energy technologies such as hydrogen and carbon capture (McKinsey and Company 2022).

[2] In 2021, Russia was the world's largest exporter of fossil fuels, including of natural gas (IEA 2022a; IEA 2023a). Sanctions on Russian gas drove European and Asian gas prices, and consequently electricity prices in some markets, to record highs in 2022 (IEA 2023a).

Through providing targeted investment and production incentives, the IRA will reduce the cost of energy for families and small businesses, create new jobs, strengthen renewable energy supply chains and accelerate investment in clean energy solutions (The White House 2023a, p. 5).

To avail themselves of the incentives, companies must pay workers (including employees of contractors and subcontractors) the local prevailing wage and hire apprentices for a set proportion of the project workforce (US DOL 2023). In this way, the IRA supports high labour standards, helps expand well-paying union jobs and supports pathways into the industry that allow workers to earn while they learn (US Department of the Treasury 2023).

2.1.2 The European Union has responded to the IRA

In March 2023, the EU announced the Green Deal Industrial Plan and a proposed *Net-Zero Industry Act*. Developed in part as a response to the IRA, the plan aims to support scaling up of the EU's manufacturing capacity for the net zero technologies and products needed to meet Europe's climate targets (Kaufman et al. 2023; EC 2023c).

In October 2023, the EU announced the European Wind Power Action Plan. The plan is aimed at enabling the EU to grow its installed wind capacity to more than double, from just over 200 GW in 2022. It is structured around (EC 2023b):

- acceleration of deployment through faster permitting and increased predictability, by
  - streamlining approvals processes
  - providing greater visibility of the demand pipeline through wind pledges, mid-term auction schedules and long-term plans for renewables
- improved auction design, including
  - strengthening non-price criteria such as carbon content and circular economy measures to reward environmental sustainability, innovation, high-quality products, and the contribution to a resilient supply chain
  - identifying cybersecurity risks, to support necessary chances in procurement processes and auction design as well as enabling screening of foreign direct investments.

The Green Deal Industrial Plan and the Wind Power Action Plan follow earlier significant announcements, including the:

- European Green Deal, announced in 2019, the EU's roadmap for becoming the first climate-neutral continent
- REPowerEU plan, launched in May 2022 to help Europe gain energy independence and diversify its energy supply away from Russian fossil fuels.

The EU's Carbon Border Adjustment Mechanism (CBAM) commenced in October 2023. The mechanism aims to prevent circumvention of the EU's climate policies by companies relocating to jurisdictions with less ambitious green standards, or the replacement of EU products by more carbon-intensive imports. The CBAM is compatible with the EU's international trade obligations and encourages global industry to embrace greener and more sustainable technologies (EC 2023a).

The EU is also progressing legislation to ban products made using forced labour out of the EU market. Under the proposed approach (European Parliament 2023):

- all import and export of the related goods would be halted at the EU's borders, if it is proven that a company has used forced labour
- goods that have already reached the EU market would be withdrawn, and donated, recycled or destroyed
- for geographical areas and economic sectors at high risk of using forced labour, companies would need to prove the goods have not been produced using forced labour.

Australia and the EU have also been negotiating a bilateral free-trade agreement since 2018. The negotiations are currently on hold but are likely to resume in 2025 (Sapir 2023).

2.1.3 Canada, Japan, South Korea and Taiwan have introduced incentives to support local renewable energy sectors

Canada

Like the EU, Canada has announced tax credits and investment plans to support its renewable energy sector in response to the US IRA. The measures amount to US$80 billion in incentives to the Canadian renewable energy industry and include tax credits for clean energy projects and sustainable infrastructure investments (Ghantous 2023).

Canada has also taken steps to protect its renewable energy sector manufacturing capacity by imposing import duties on wind tower sections and select other steel components made in China. This was on the grounds that the subsidies provided by the Chinese government constituted dumping (CBSA 2023; Hohnstein et al. 2023).[3]

Japan

Japan introduced LCRs for offshore wind projects in 2020, with 'local contribution' accounting for 40 points of a total of 240 points or a weighting of about 17%.[4] The local contribution consists of a 'regional economic spin-off effect' and a 'domestic economic spin-off effect', each with 10 points. The remaining 20 points are allocated to demonstrated engagement with stakeholders such as administrative agencies and fishery operators (Lin 2023).

Proponents are ranked in 6 categories, from 'top runner' to 'fail'. Top ranked projects receive a 100% score, while projects ranked as 'fail' are disqualified from bidding There are no specific requirements for what should be captured under the local contribution. The framework is considered at low risk of violating WTO regulations (Lin 2023).

South Korea

South Korea introduced LCRs for offshore wind projects in late 2021, with proponents meeting or exceeding the requirements receiving a bonus in the renewable energy certificate (REC) calculation

[3] Under World Trade Organisation (WTO) rules, subsidies are considered unfair trade practice ('dumping'). In Australia, the Anti-Dumping Commission is due to make its final recommendation in early and mid-2024 on 2 cases relating to wind towers and sections imported from China (DISR 2024).

[4] The total score of 240 points comprises 120 for supply prices, 120 points for wind farm construction capabilities, 80 points for project implementation capabilities, and 40 points for local contribution (Lin 2023).

for the project. As South Korea already has a competitive manufacturing sector for submarine cables, substations and ships, the local content policy focuses on the locally nascent wind turbine production (Lin 2023).

The total potential score for local content is 100 points, and is based on the wind turbine cost structure (Lin 2023):

- 36.4 points for the nacelle (subdivided into nacelle assembly, gearbox, generator, etc.)
- 30 points for the underwater foundation
- 14.3 points for the blade
- 12.7 points for the tower
- 6.6 points for the cables.

Proponents exceeding 50 points receive additional RECs for the project. The framework is considered at high risk of violating WTO regulations (Lin 2023). In early 2023 the Korean Energy Agency signalled it would abolish the LCRs and REC incentive (Pulse 2023).

Taiwan

Taiwan introduced LCRs in 2018, with a stated objective to build a 'self-sufficient supply chain for the offshore wind power industry' (Hogan 2021; DIS 2018). Prior to the acceleration in Taiwan's ambitions for offshore wind, onshore wind projects had not been subject to LCRs (Gao et al. 2021).

Under the initial approach, proponents for projects planned for commissioning in 2021–25 had to commit to providing a supply chain plan. Non-compliance with the supply chain plan results in a performance bond being forfeited each month. A delay greater than 10 months results in a reduction in the 20-year feed-in-tariff (FiT) (Hogan 2021).

Taiwan later updated the local content policy framework, effective from the 2022 auctions onward. The Industrial Development Bureau (IDB) labelled 26 components grouped in 5 categories as 'key development items.' Project proponents must commit to locally obtaining all key development items for at least 60% of the proposed capacity, across the categories' power facilities, underwater foundations, and wind turbine components.

To be a qualified bidder, project proponents must also gain an additional 10 points from 'point-adding items', meaning they must either (Hogan 2021; Lin 2023):

- locally procure more key development items than the required 60% capacity minimum
- locally procure other items the IDB deems 'point-adding'.

2.2 Australia and New South Wales must respond to the changing global landscape

The international policy developments outline above – especially those in large economies such as the US and EU – shape the context in which our plan for the NSW renewable energy sector operates and is implemented.

The US and EU are highly developed economically and technologically, containing sizeable internal consumer bases and large pools of investment capital. Both also operate extensive energy markets.

These factors alone attract skilled labour and infrastructure investment from all over the world. The US's IRA and EU's Green Deal Industrial Plan further reinforce the appeal for firms and workers to locate in the US or EU.

Without an effective plan to support and develop the renewable manufacturing sector, New South Wales may lose skilled workers, entrepreneurs and capital to places with more supportive policy settings – like the US or EU.

The business activity, workforce development and technological breakthroughs that could drive the NSW renewable energy sector and economy may materialise elsewhere instead. This risk is especially pressing given the substantial cultural, linguistic, legal and regulatory similarities between Australia, the US and Europe. Recognising these challenges, the Australian Renewables Industry Summit highlighted the need to support the local industry and safeguard local jobs in a manner similar to the US's IRA (ARIS 2023).

The remainder of this section sets out the key implications of the recent changes in the international policy landscape for our plan and the NSW renewable energy sector. Section 2.3 provides an overview of recent policy developments in Australia.

2.2.1 Australia is leveraging its strong relationship with the US

By providing competitive subsidies and incentives for private investment, the IRA is likely to draw major clean energy investment towards the US (McKinsey and Company 2022). This may include highly skilled workers and manufacturing activity from New South Wales and elsewhere in Australia (EA 2023).

However, the IRA also presents a significant economic opportunity for Australia. This was reiterated by the Australia–United States Climate, Critical Minerals and Clean Energy Transformation Compact (the Compact) (Prime Minister of Australia 2023).

The objectives of the compact are to:

- accelerate the expansion and diversification of end-to-end clean energy supply chains, including for solar, wind, storage and clean hydrogen
- promote responsible, sustainable and stable supply of critical minerals
- drive the development of emerging battery technologies
- support the development of emerging markets for clean hydrogen and its derivatives.

Australia and the US will set out concrete actions toward the objectives laid out in the Compact by May 2024, within 12 months of having committed to the Compact (Prime Minister of Australia 2023). Key initiatives include (The White House 2023b):

- a battery supply chain working group to explore the deepening of both countries' manufacturing capability and work on battery technology research and development
- a taskforce on critical minerals to support bilateral collaboration on critical minerals and materials for clean energy as well as for defence supply chains.

President Biden also intends to ask the US Congress to add Australia as a 'domestic source' within Title III of the *Defense Production Act* (The White House 2023c).[5] The US would then consider Australia as a domestic producer of critical supplies, including critical minerals and clean energy technology. As a result, Australian companies in some renewable sectors could access subsidies and other benefits from the IRA, while still being located in Australia (Smith and McIlroy 2023).

2.2.2 New South Wales can benefit from its rapid decarbonisation and high labour standards

While the EU is leading the way with the CBAM and the proposed ban on goods made with forced labour, other markets are considering similar policies (Kardish et al. 2023). By providing recognition for higher environmental and labour standards in countries such as Australia these policies will help level the playing field of international trade.

New South Wales has strengths in the production of steel, aluminium and copper (ISF and SGS 2022). We also have an abundance of minerals that are critical for the renewable energy sector, including cobalt, copper, silver and rare earth elements (Department of Regional NSW 2024).[6]

The decarbonisation of the NSW electricity grid is among the fastest in Australia and relative to many other countries in the world. Consequently, renewable energy components produced locally will have lower embedded emissions than those made overseas. Australia also has stringent modern slavery regulations and was the second country globally to introduce anti-modern slavery laws (Accenture 2023a, p. 32. 35–37, 27).[7]

These strengths, coupled with a strong policy ambition to revitalise our manufacturing base, will help New South Wales take advantage of the opportunities presented by the global move towards a more responsible and sustainable renewable energy sector.

2.2.3 New South Wales must support its renewable manufacturing sector – in the right way

Complex long-term challenges such as the energy transition are well suited to an industrial strategy approach. Further, modern supply chains are increasingly fragile – as became evident during the COVID-19 pandemic, the 2021 obstruction of the Suez Canal by the containership *Ever Given*, and a fire at a key semiconductor factory that led to a global microchip shortage (Accenture 2023a, p. 20-21; Bivens 2023).

Industrial policy can be effective in helping local companies take advantage of opportunities presented by long-term challenges such as the energy transition. For example, from 2003 to 2011

[5] Title III of the DPA provides financial measures, such as loans, loan guarantees, purchases and purchase commitments, to improve, expand and maintain US domestic production capabilities to support national defence and homeland security procurement requirements. Title III also authorises US Federal Government procurement and installation of equipment in plants, factories and other industrial facilities owned by the government or private persons (FEMA 2021).

[6] See section 3.1 further information.

[7] See section 3.2 for further information.

China successfully used LCRs to enable the growth of local wind turbine manufacturing (Accenture 2023a, p. 48).

However, if not designed appropriately, industrial policy can become an anti-competitive force or even jeopardise achievement of the overarching objective to decarbonise our electricity grid. For example, Taiwanese companies were even caught using overseas suppliers to meet their local content commitments in some instances (Gao et al. 2021).

This experience highlights the risks of designing industrial or local content policy that is too prescriptive. In contrast, our approach:

- provides local suppliers including small and medium-sized enterprises (SMEs) and First Nations suppliers with full, fair and reasonable opportunities, while remaining consistent with Australia's international trade obligations
- focuses on products and components where local suppliers are or could be competitive
- maintains flexibility for renewable energy project proponents to choose how they meet the overarching minimum requirements.

A review of the implementation of our plan (see section 4) will also support continuous improvement of both the design and implementation of our local content framework for the Roadmap.

2.3 Australia has a renewed focus on domestic manufacturing and jobs

Echoing the international developments outlined above, New South Wales and Australia have seen an increased focus on domestic manufacturing and jobs, both in renewable energy and more broadly.

The 2023 Jobs and Skills Report found that the development of the renewable energy sector is one of the 'megatrends' shaping the economy (Jobs and Skills Australia 2023). It highlights that skills shortages have held back progress in this and other areas of the economy, with the scarcity of labour being particularly pronounced in regional areas.

This section provides an overview of developments since the publication of our plan in September 2022, covering New South Wales, other states and territories, and the Commonwealth.

2.3.1 The NSW Government is committed to domestic manufacturing and building the pipeline of skilled workers

The NSW Government has announced it will prioritise local content in New South Wales and support stronger domestic manufacturing capacity. As part of this, NSW Government intends to (Minns 2023a):

- set a local content target minimum of 50% for future rolling stock contracts by the end of its first term
- increase tender weightings to 30% for local content, new jobs, ethical supply chains and small business
- establish a NSW Jobs First Commission as an independent body to

- support the establishment and growth of local industries
- advocate for local firms bidding for government tenders.

To strengthen the Government's focus on skills, jobs and regions, NSW Premier Chris Minns has appointed (Minns 2023b):

- the Hon Steve Whan MP, Minister for Skills, TAFE and Tertiary Education
- the Hon Courtney Houssos MLC, Minister for Finance, to the new, additional portfolio of Domestic Manufacturing and Government Procurement.

In October 2023, the NSW Parliament launched an inquiry into the state's procurement framework and practices. The inquiry will consider how to transform the state's procurement framework and practices to (Houssos 2023):

- maximise value for money
- increase transparency
- promote better social, economic and labour market outcomes
- increase procurement from Aboriginal-owned businesses, women-owned businesses and social enterprises
- boost skills and training.

Preliminary findings show the NSW Government spends about $42 billion on goods and services, construction and with other suppliers annually (NSW Parliament 2024). After the conclusion of its first phase, the Inquiry made recommendations to improve governance and practice to ensure transparent, fair and effective procurement in the State which are also pertinent to the renewable energy sector.

The Renewable Manufacturing Fund will support new local manufacturing capacity

Supporting implementation of our plan, the NSW Government has launched the $275 million Net Zero Manufacturing Initiative, which includes $150 million to support renewable manufacturing.

The fund aims to grow NSW supply chain capacity and capability for the renewable energy sector, improve supply chain resiliency and drive economic growth in New South Wales. It will provide grants to develop local renewable energy supply chain manufacturing capacity in areas where New South Wales has a competitive advantage, including components for wind towers, solar and batteries.

Other initiatives aligned with our plan include:

- NSW Government's Clean Technology Innovation Program within the Net Zero Industry and Innovation Program
- Special Activation Precincts, which are part of the NSW Government's 20-Year Economic Vision for Regional NSW
- the establishment of the Future Jobs and Investment Authorities to help coal-producing regions to develop new industries and economic opportunities (NSW Government 2023g).

2.3.2 Work is underway to transform Australia's energy systems

Solar Sunshot targets Australia's renewables ambition

In March 2024, the Australian Government announced a $1 billion investment in the 'Solar Sunshot' program to help boost the country's solar panel manufacturing capacity (Prime Minister of Australia, 2024). The program will be designed and delivered by the Australian Renewable Energy Agency (ARENA) in collaboration with industry. It will provide grants and other support for manufacturers to create and expand capacity to produce components and services to the entire supply chain of the solar panel sector.Net Zero Manufacturing Initiative

In February 2024 the NSW Government launched the Net Zero Manufacturing Initiative. The initiative will offer $275 million in grants through 3 funds: Renewable Manufacturing, Clean Technology Innovation and Low-Carbon Product Manufacturing. This fund was developed in response to a recommendation of the Board.

National Energy Transformation Partnership

The National Energy Transformation Partnership is a framework for Australian, state and territory governments to work together on reforms to help transform Australia's energy system to achieve net zero by 2050. Priority work agreed under the Partnership includes establishing the Capacity Investment Scheme, developing a First Nations Clean Energy Strategy, providing concessional finance and facilitate the timely delivery of transmission projects and other. The Partnership is also progressing a National Energy Workforce Strategy to help forecast workforce capabilities and needs relating to the energy transformation.

The Australian Government will leverage its purchasing power to support local industry

The Buy Australian Plan is a program to improve the approach to public procurement, with focus on supporting domestic industry and manufacturing. The plan seeks to bolster opportunities for Australian businesses – including SMEs and First Nations Businesses – to supply major infrastructure projects and other government procurement (Australian Government 2023a).

The Future Made in Australia Office, established in the Department of Finance, will (Australian Government 2023a):

- coordinate implementation of the Buy Australian Plan across the Australian Public Service
- strengthen engagement with states and territories to deliver economic, social and environmental benefits to regions, industry sectors and communities
- build the procurement and contracting capabilities of the Australian Public Service
- engage directly with businesses and industry sectors to help lift their competitive capabilities.

The Australian Government will provide $22.7 billion over the next decade to (Australian Government 2024a):

- attract investment in key industries by streamlining approvals for projects in renewable energy, cultural heritage and planning;
- promote the energy transition;
- strengthen resources and economic security, including supporting local supply chains;

- promote innovation in science and emerging technologies;
- improve tertiary education;
- develop skills and training for priority industries;
- support small businesses; and
- improve resilience to natural disasters among other initiatives.

This was announced as part of the Australian 2024-25 Budget, when the Australian Government introduced the Future Made in Australia Bill. The Bill establishes the criteria and decision-making processes to attract private capital to areas of national interest such as renewable energy generation, energy storage and critical minerals processing. The Bill states that decision makers must have regards the Community Benefit Principles when assessing projects and initiatives. These principles include developing skilled and inclusive workforces and strengthening local supply chains. After being passed by Parliament and receiving the royal assent later in 2024, the Future Made in Australia Act will take effect and will support investment in areas where Australia has a competitive advantage and areas of strategic priority for the nation. The National Energy Transformation Partnership will help Australia achieve net zero by 2050

In August 2022 the Australian, state and territory governments agreed to the National Energy Transformation Partnership, a framework to collaborate on reforming Australia's energy system to achieve net zero by 2050 (Australian Government 2022).

The partnership will (Australian Government 2022):

- accelerate the deployment of firmed renewable power
- help states and territories secure finance for transmission and REZ projects
- develop a First Nations Clean Energy Strategy, a National Energy Workforce Strategy and a National Renewable Energy Supply Chain Energy Action Plan.

The Australian Government will continue to consult with industry and community stakeholders to inform the implementation of work streams under the partnership (Australian Government 2022).

Community Engagement Review

One example of this consultation with community stakeholders is the Australian Energy Infrastructure Commissioner's Review of Community Engagement (Dyer 2023). The Review analysed over 500 submissions and more than 250 survey responses relating to Australia's energy transition. It provided recommendations to the Australian Minister for Climate Change and Energy to address the challenges and take advantage of the opportunities facing regional areas as the country decarbonises its energy grid. The Clean Energy Finance Corporation's new investment mandate includes local content

The Clean Energy Finance Corporation's (CEFC) new investment mandate came into effect in July 2023. Under the new mandate, projects must have an Australian Industry Participation (AIP) Plan.[8]

[8] Under the *Australian Jobs Act 2013,* projects that have been awarded Australian Government contracts, grants, payments or investments of $20 million or more may be required to prepare an AIP. Plans are approved

This recognises the importance of increased sovereign capacity to the deployment of clean energy technologies and resilient clean energy supply chains (CEFC 2023a).

The CEFC must also:

- consult the Department of Finance on the application of the Buy Australian Plan
- where practical, encourage the increased use of local content in the deployment of clean energy technologies.

The new mandate also strengthens requirements for consideration of environmental and social impacts. Where practical, the CEFC should in its investments consider that (CEFC 2023a):

- social licence for the deployment of clean energy technologies is essential to their success
- the provision of local employment opportunities in the delivery of clean energy technologies is a priority for the Australian Government.

The new mandate also lowered the benchmark rate of return on investment. The CEFC must now target a rate of return between 2 and 3 percentage points per year above the 5-year Australian Government bond yield (CEFC 2023b).

This is considered a more realistic target and in principle will allow for a broader range of projects to be financed than the previous benchmark rate of between 3 and 4 percentage points above the 5-year Australian Government bond yield (CEFC 2023b).

The CEFC will also invest $4.7 billion to support investment in transmission projects in New South Wales. This investment will enable the delivery of clean energy generation, grid infrastructure and long-duration storage under the Roadmap (DCCEEW 2024a).

The Capacity Investment Scheme and the RESB Plan

In November 2023, the Australian Government announced the expansion of the Capacity Investment Scheme (CIS) - a national framework to encourage new investment in renewable energy generation and storage. This involves competitive tenders for renewable energy generation and storage projects to deliver an additional 32 GW of capacity nationwide by 2030. Successful projects will receive long-term revenue underwriting that reduces financial risk to support investment.

The first CIS tender seeking bids from projects from across the National Electricity Market (NEM) opened on 31 May 2024. The tender is looking to secure 6 GW of renewable capacity. Of this, between 2.2 and 3.7 GW of capacity will be allocated to NSW.

Project bids will be assessed for the social license and First Nations commitments they include, including in relation to developing the local supply chain and workforce. The tender guidelines set out social license and First Nations requirements for NSW projects that are aligned with those used under NSW Roadmap tenders. This is intended to ensure that proponents in NSW will have regard to the Board's social license requirements regardless of whether they participate in CIS or NSW Roadmap tenders.

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by the Australian Department of Industry, Science and Resources. However, the implementation of the plan is monitored by the individual funding agencies (Australian Government 2024a).

The NSW Government has received feedback from stakeholders raising concerns social license or First Nations commitments being included in bids into the CIS by proponents are not as rigorous or meaningful as those included in bids into NSW Roadmap tenders based on a perception the requirements are lower. The NSW Government has raised this with the Australian Government, which is now investigating what changes may be required to ensure alignment, particularly in relation to local content.

Regional Investment Framework

The Australian Government established the Regional Investment Framework to foster the development of regional economies and labour markets, as discussed in the State of Australia's Regions Report 2024 (Infrastructure Australia 2024). The Framework outlines guiding principles and priority areas to steer government and private investment into regional areas. It was developed in consultation with local communities and various levels of government to promote regional strengths and understand the concerns and aspirations of residents. Facilitating Australia's transition to renewable energy is a key objective of the framework, especially through the development of Renewable Energy Zones (REZs).

Proposed Western Sydney Pumped Hydro Project

The Western Sydney Pumped Hydro (WSPH) is a project proposed by Australian owned ZEN Energy to repurpose a disused coal washery site on the eastern side of Lake Burragorang, approximately 24 km upstream from the Warragamba Dam wall.

The WSPH project will store energy during periods of surplus electricity generation and has the potential to deliver 1,000 megawatts of on-demand electricity or up to eight continuous hours at peak times to 500,000 local homes. Water NSW has awarded ZEN Energy a development agreement and under the agreement ZEN Energy will get access to WaterNSW land and reservoirs to support the development of a pumped hydro project through the feasibility and planning stage. If they are successful during this stage Zen Energy will then enter into an agreement with WaterNSW to undertake the construction and operation of the project.

If the project proceeds it is expected to create approximately 1500 construction jobs and 80 ongoing operations jobs. (WaterNSW 2024)

2.3.3 Local content policy in other states

Australian states and territories provide opportunities for local businesses and workers to supply government projects through legislation and comprehensive supporting policies.

We strongly support the measures already in place and under development elsewhere, noting the minimum requirements in our plan apply to Australia and New Zealand. New South Wales has strengths in parts of the renewable energy supply chain (see section 3.1), and we recognise other regions will have complementary advantages in other parts of the supply chain.

Since the development and publication of our plan, New South Wales' neighbouring east coast states Queensland and Victoria have released new plans and strategies signalling greater ambition for the renewable energy sector:

- The Queensland Energy and Jobs Plan (QEJP) was released in 2022. Commitments include releasing local content targets to develop renewable energy supply chains, and the appointment of a Renewable Energy Jobs Advocate.
- The Queensland Clean Energy Workforce Roadmap, released in October 2023, sets out actions to build the future workforce, partner with industry and prepare Queensland's regions for growth.
- In Victoria, the reestablishment of the State Electricity Commission (SEC) is expected to support 59,000 renewable energy jobs, with 10% of those being apprenticeships and traineeships.
- The Victorian Clean Economy Workforce Development Strategy 2023–2033 provides a planning and investment framework to support the workforce and create training pathways to meet industry's growing demand for skills.
- Victoria's 2023–24 budget committed $220 million towards clean and renewable energy skills and training (Victorian Government 2023). A Victorian Energy Jobs Plan is also under development, expected to be released by mid-2024 (Victorian Minister for Energy and Resources 2023).

Table 1 provides an overview of these policies, including application to the renewable energy sector and key updates since release of our plan. Table 2 sets out the key skills and workforce strategies that have been released elsewhere in Australia since publication of our plan.

In addition to the local content framework and minimum requirements, our plan provided advice to the NSW Government on how to build up the capacity and capability of the NSW renewable energy sector. Section 5 of this document revisits and reiterates key points from that advice, considering these developments in other states and territories.

Table 1: Local content policies and legislation in other states and territories

Jurisdiction	Local content policy and legislation	Application to renewable energy
Australian Capital Territory (ACT)	The Canberra Region Local Industry Participation Policy 2017 sets the framework for considering local capability and economic benefits in government procurement. The complementary Secure Local Jobs policy: • requires businesses that want to work with the ACT Government to show how they will create jobs for the local community • strengthens government's procurement practices to ensure contracts are only awarded to businesses that meet the highest ethical and labour standards.	To help meet Canberra's 100% renewable electricity target, the ACT Government selected large-scale renewable electricity generators through a series of 'reverse auctions.' Each generator was required to meet set conditions and milestones, including investing in the ACT renewable energy industry (ACT Government 2021). Proponents tendering for work on renewable energy projects with the ACT Government must also comply with the LIPP and obtain a Secure Local Jobs certificate.
Northern Territory	The Buy Local Plan gives local businesses greater opportunity to tender and win government work (NT Government 2018). The plan ensures the largest proportion possible of every dollar spent by government stays in the Northern Territory. It also aims to improve the way local benefits are identified, valued and realised at all stages of the procurement and contracting lifecycle. A Buy Local Industry Advocate is an independent link between government and businesses.	The Buy Local Plan applies to government spend on infrastructure, goods and services generally, including renewable energy where relevant.
Queensland	The *Queensland Industry Participation Policy Act 2011* requires a local industry policy, which is the Queensland Charter for Local Content. The Charter applies to government agencies, government owned corporations and government rail entities.	Buy Queensland will apply to the QEJP and the buildout of the Queensland SuperGrid. The QEJP includes commitments to:

Jurisdiction	Local content policy and legislation	Application to renewable energy
	The Principles of the Charter are to be consistent with the Buy Queensland government procurement guidance. Buy Queensland 2023 uses public spending to drive the government's economic, ethical, social and environmental objectives that support Queenslanders. Under the Buy Queensland approach, government agencies must: • source at least 30% of procurement by value from Queensland SMEs • increase government procurement with Aboriginal and/or Torres Strait Islander businesses to 3% of 'addressable spend' • invite at least one local supplier to respond, except where the goods or services are not able to be supplied by a local supplier • conduct a Local Benefits Test for significant procurement where a weighting of between 10 and 30% may be applied.	• invest $11.6 million to build capacity in the manufacturing sector and encourage local content • release local content targets to develop renewable energy supply chains and policy mechanisms to improve investment certainty • increase the Renewable Energy and Hydrogen Jobs fund to $4.5 billion, with investment criteria to include new and ongoing employment. The Queensland REZ (QREZ) initiative will invest $145 million to attract investment for large-scale renewable projects. Principles underpinning QREZ development include prioritising: • local procurement, manufacturing and supply chain opportunities • the development and employment of local people. The Queensland Resources Council has also developed a voluntary Code of Practice for Local Content (2013) under which Queensland operated resource and energy companies submit an annual spend by postcode figures for QRC's annual reporting. 2022 is QRC's latest publicly available annual report.
South Australia	The South Australian Industry Participation Policy is underpinned by the *Industry Advocate Act 2017* (SA). The policy applies to government agencies and private parties contracting to the government.	Currently, the South Australian Government is prioritising large-scale generation and storage projects and hydrogen production. Key Major Projects are the Hydrogen Jobs Plan | (registered with Industry Capability Network), Project

Jurisdiction	Local content policy and legislation	Application to renewable energy
	For procurement above $550,000, the industry participation component in evaluation will have a minimum weighting of 15%, or 20% of projects above $10 million. Where the purchase of structural and reinforcing steel is involved, a 20% industry participation weighting is given. The SA IPP also includes the Aboriginal Economic Participation Policy, which recommends that where a procurement up to $550,000 presents an opportunity for Aboriginal business, the applicant should seek a quote from an eligible business. For Major Projects above $50 million, a Tailored Industry Participation Plan is required, with the following aims: • SA workers deliver a minimum of 90% of labour hours • Apprentices, trainees, Aboriginal workers and long-term unemployed deliver 20% of all labour hours • Where there is structural or reinforcing steel, including the fabrication of structural steel, minimum 20% industry participation is required An Industry Advocate supports implementation of the policy, investigates complaints and monitors compliance, including reporting on project delivery.	EnergyConnect (SA section). Port Augusta Energy Park and the Port Bonython Hydrogen Hub. The *Hydrogen and Renewable Energy Act 2023* (SA), when enacted, aims to create a streamlined licensing and regulatory system for the lifecycle of large-scale hydrogen and renewable energy projects. Under proposed regulations, applicants for a renewable energy infrastructure licence must prepare an assessment of the benefits to South Australia, including local industry participation. This can cover sourcing domestically manufactured equipment or domestically supplied services to deliver the project or supporting the establishment of new manufacturing capability.
Victoria	The Local Jobs First Policy comprises the Victorian Industry Participation Policy and the Major Projects Skills Guarantee. The *Local Jobs First Act 2003* (VIC) sets a mandatory weighting of 10% for industry development and 10% for job outcomes in	The *Local Jobs First Act 2003* applies to the Victorian Renewable Energy Target (VRET) auctions. VRET 2 is expected to support 920 direct jobs and attract $1.48 billion of investment in new Victorian renewable energy

Jurisdiction	Local content policy and legislation	Application to renewable energy
	standard projects. Projects considered strategic by the government must meet LCRs of at least: 90% for construction projects; 80% for services projects or maintenance projects; and 80% for the maintenance or operations phase. The Minister may also determine other matters relating to strategic projects, such as steel products, uniform and PPE equipment. All projects above $50 million in investment are automatically deemed strategic. The Minister for Industry and Employment may also set requirements for standard projects with total project value of less than $50 million. Where standard projects are also construction projects with a budget minimum of $20 million, apprentices, trainees, cadets must be engaged for a minimum of 10% of the total estimated hours of work for the project and the Minister may set other requirements. The Local Jobs First Commissioner advocates on behalf of Victorian SMEs, promotes skills development, and oversees compliance with local content and job commitments.	projects, with $1 billion of this being spent in local supply chains. The Victorian Government's new State Electricity Commission (SEC) will invest an initial $1 billion towards delivering 4.5 GW of power through renewable energy projects. The Victorian Government will own 51% of the SEC.
Western Australia	The Western Australian Industry Participation Strategy is underpinned by the *Western Australian Jobs Act 2017* (WA). The strategy provides local industry, in particular SMEs, with greater opportunities to access and compete for government contracts. The strategy includes:	Western Australia's Energy Transformation Strategy Stage 2 aims to create energy security, transition affected workers and promote local jobs. It includes the establishment of an Energy Industry Development Team to work with local manufacturers and the mining industry to increase the uptake of locally supplied renewable energy options for remote mine sites.

Jurisdiction	Local content policy and legislation	Application to renewable energy
	• a requirement for prospective suppliers to complete and submit a participation plan above relevant thresholds • initiatives to support regional businesses such as Local Content Advisers located in each Regional Development Commission. It is complemented by the Western Australian Buy Local Policy 2022, which covers lower-value procurements.	Additionally, the Industry Participation Strategy applies to WA Government procurement.

Table 2: Key skills and workforce strategies in other states and territories

Jurisdiction	Skills and workforce strategies
Queensland	Queensland Energy and Jobs Plan will support workers with a $150 million Job Security Guarantee, backed by an Energy Workers' Charter, to ensure workers in publicly owned coal fired power stations can continue their careers within these energy businesses or pursue other career pathways. The Energy (Renewable Transformation and Jobs) Bill 2023 outlines commitments to enshrine a Job Security Guarantee and Job Security Guarantee Fund. Additionally, the plan commits to appointing a Renewable Energy Jobs Advocate, establishing an Energy Industry Council, developing a Future Energy Workforce Roadmap and investing $90 million to establish 2 new regional transmission and training hubs. The Queensland Government has announced a $17 million grant to establish a renewable energy training facility focusing on apprentices. The Renewable Energy and Hydrogen Jobs fund will be a $4.5 billion investment. The fund`s investment criteria will include new and ongoing employment, consistent with the government`s employment and procurement policies. Queensland best practice community standards include the 'Construction and operation of solar farms - code of practice 2024.' The code provides practical guidance to duty holders on how to comply with their work health and safety and electrical safety duties during the design, construction, commissioning, operation, maintenance and end of life management of solar farms. The Standards Best Practice Industry Conditions (BPIC) were designed to attract and retain a workforce with optimal levels of skills and experience on building construction projects with a total project value over $100 million. It sets the Queensland Government's expectations for the wages and conditions on these large projects and ensures that relevant stakeholders can interact in a positive, collaborative way through to successful project completion. The BPIC has been instrumental in reducing disparities in wages and conditions between regional and metropolitan areas, which helps maintain the supply of labour to projects in regional areas.
South Australia	A South Australian Skills Plan is under development to address skills gaps across industries.
Victoria	The Clean Economy Workforce Development Strategy 2023–2033 provides a planning and investment framework to support the workforce and create training pathways to meet industry's growing demand for skills.

	The Victorian Government is bringing together 200 experts for an energy jobs and skills forum to shape its Victorian Energy Jobs Plan. The Victorian Government's energy and training package aims to deliver 6,000 apprentices, trainees and skilled renewable energy workers. The energy and training package includes establishing the SEC Centre of Training Excellence to work with the Victorian Registration and Qualifications Authority to accredit courses in renewable energy.
Western Australia	Western Australia has invested $280 million to upskill and reskill in preparation for future demand to support fast-track industries including the renewable hydrogen industry. The Western Australian Government has co-funded a $17 million Green Skills Training Centre focused on training technicians in various industries including renewable energy.

3 Opportunities for the NSW renewable energy sector

This section:

- sets out the key opportunities we have identified for the NSW renewable energy supply chains
- articulates the strategic benefits associated with greater use of local suppliers
- highlights some of the key challenges that need to be addressed before the full benefits of localisation can be realised.

3.1 New South Wales has opportunities to competitively supply the renewable energy sector

As illustrated in Figure 2, the Roadmap is estimated to require more than 3.7 million photovoltaic (PV) modules, nearly 2,200 wind towers and more than 2,900 battery units. To connect this new generation and storage capacity with consumers, New South Wales will require around 5,000 transmission towers. Between 2023 and 2035, the rollout of the Roadmap will also require approximately (Accenture 2023a):

- 1.6 mega tonnes (Mt) of steel for wind towers and anchor cages, solar panel mounting frames and structures, and transmission towers
- 110 kilo tonnes (kt) of aluminium for frames for solar panels and solar inverter casing
- 60 kt of copper for electrical wiring and transmission.

Figure 2: Renewable energy components needed for the Roadmap, based on the 2023 Infrastructure Investment Objectives Report (AEMO Services 2023g), the 2024 Integrated System Plan (AEMO 2023a), and ISF and SGS (2022)

3.1.1 New South Wales has strengths in the production of aluminium, copper and steel

Aluminium is mainly used in solar panel frames on utility-scale solar farms, which are predominantly imported from China. Significant quantities of aluminium are also projected to be required in transmission lines (ISF and SGS 2022, p. 32).

Australia is a major producer of aluminium with sufficient capacity to supply manufacturers of all renewable technologies components for New South Wales should these be manufactured locally (ISF and SGS 2022, p. 32).

Australia's largest aluminium smelter is located at Tomago in the Hunter region of New South Wales with the operator, Tomago Aluminium committed to fully decarbonising the smelter by 2035 at the latest, through sourcing electricity supply from renewable sources and energy storage technologies (Tomago Aluminium 2022).[9]

Australia has one of the largest shares of the world's copper resources, and New South Wales accounts for more than one-fifth of this. Copper is a critical mineral for renewable energy, and is used for its electricity and heat conductivity in cables, wiring and heat exchangers.

Copper is mainly needed for utility-scale solar, pumped hydro and onshore wind farms. Notably, offshore wind farms use more than double the copper needed for onshore wind farms, due to lengthy cables connecting the offshore wind farm to the shore (IEA 2024).

New South Wales produces more than half of Australia's total crude steel output at BlueScope's Port Kembla facility. Locally produced steel could be used in wind farms, including concrete reinforcement and wind tower sections (ISF and SGS 2022, p. 32).

Solar farms need steel for supporting infrastructure (inverters, transformers and telecommunication systems), which is prefabricated overseas and imported to Australia.

Steel is also used in mounting structures, which could be manufactured in New South Wales but are currently mostly imported as a part of prefabricated kit (ISF &and SGS 2022, p. 32).

3.1.2 New South Wales has an abundance of critical minerals

New South Wales also has an abundance of minerals that are critical for the renewable energy sector, including cobalt, nickel, silver and rare earth elements (Department of Regional NSW 2024; ISF and SGS 2022 p. 32). This provides opportunities in mining and mineral processing, including for battery storage (ISF and SGS 2022, p. 32).

In particular, New South Wales has vast deposits of nickel and cobalt. Both are essential materials for lithium battery manufacturing. New South Wales also has small deposits of lithium (ISF and SGS 2022, p. 86). Australia faces increasing international competition to supply raw materials so will need to prioritise opportunities where our reputation for reliability and security provides an advantage on balance of costs (Accenture 2021). While stronger global demand for battery components led to shortages and price increases in the lithium, nickel, cobalt and manganese markets in the past (Accenture 2023b), the recent development of lower-cost production capacity

[9] Even when the electricity supply is fully decarbonised, there will still be some residual carbon emissions from the consumption of carbon anodes in the production of aluminium.

overseas has impacted the viability of locally produced commodities such as nickel (BHP 2024, p. 17).

Australia's competitiveness is strengthened by the large diversity of mineral reserves available in the country. This allows for the integration and co-location of mining operations, reducing capital and operational expenses. In addition, Australia's socio-economic and political stability is seen as a guarantee of supply chain stability and high environmental, social and governance standards (ISF and SGS 2022, p. 117). End-customers are increasingly looking to source battery materials from mines with sustainability certification, and producers expect net zero emissions to become a supply chain requirement (ISF and SGS 2022, p. 86). These trends are likely to further boost Australia's and New South Wales' international competitiveness. New South Wales also has opportunities to co-locate minerals processing and reprocessing, supporting a move towards a circular economy (ISF and SGS 2022, p. 86).

3.1.3 New South Wales can leverage its strengths to supply the renewable energy sector

New South Wales currently imports most of the key components needed for the Roadmap and the energy transition more broadly. Consequently, much of the raw material inputs are embodied in imported components and not sourced locally (ISF and SGS 2022, p. 10).

However, New South Wales has ample opportunity to develop and expand local capacity to supply the renewable energy sector. By leveraging our abundant supply of raw materials, coupled with existing strengths in manufacturing, New South Wales can become competitive in several parts of the renewable energy supply chain.

Figure 3 illustrates key opportunities for New South Wales in wind, solar, battery storage, pumped hydro and transmission, as well as the emerging circular economy sector.

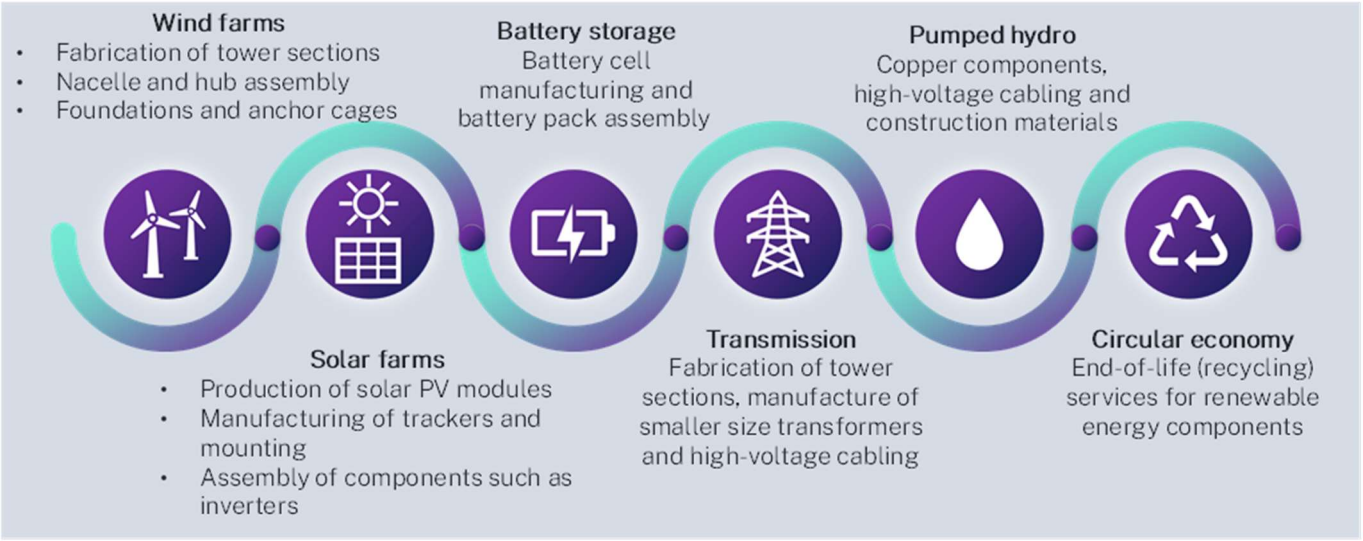

Figure 3: Renewable energy opportunities for New South Wales

Sources: ISF and SGS 2022; Accenture 2023a; ACIL Allen 2022

3.2 Strengthening local supply chains can help mitigate risks for the Roadmap

Acceleration of the global energy transition has amplified the pressure on supply chains by increasing demand for the raw materials and components needed for renewable energy projects. In the medium term, global production of renewable energy materials and components will increase in response to this surge in demand.

However, Australia and New South Wales remain vulnerable, given the relatively small scale of our energy transition in global comparison.

To secure timely delivery of components, renewable energy projects in Australia and New South Wales may need to pay a cost premium. This in turn would result in a higher cost of electricity paid by end-customers. Crucially, if paying a cost premium is not sufficient to secure supply of key components, projects will be delayed.

The high degree of concentration further compounds the risk of supply chain disruptions causing delays and/or adding costs to renewables projects. China controls at least half of the key inputs globally, and has at least 60% of the world's manufacturing capacity in key components for solar, wind and battery storage. Economic sanctions have had adverse impacts on the supply of critical raw materials produced in Russia, including aluminium and nickel (Accenture 2023a p. 13, p. 17; IEA 2023b p. 82).

Section 2 highlighted some of the key developments in the US, EU and Asia, where countries are implementing policies to improve the self-sufficiency and reliance of renewable energy supply chains. This section sets out some of the key strategic benefits for New South Wales from greater localisation of renewable energy supply chains, including increased resiliency from global shocks and improved social licence.

3.2.1 Localisation can mitigate the risk of delays to project delivery

Hold-ups in accessing materials and components on the critical path can create significant delays to project completion. By reducing the length of the supply chain, localisation can reduce the risk of delays to project delivery (Accenture 2023a).

However, achieving this benefit means the entire supply chain needs to be localised. For example, if cobalt mined in the Democratic Republic of Congo is shipped to Australia for refining, exported for manufacturing overseas and re-imported in batteries or wind turbines the flows would lengthen the supply chain even further (Accenture 2023a, p. 14, p. 17).

Realising the opportunities for New South Wales highlighted in section 3.1 could reduce (Accenture 2023a, p. 19):

- major delays for individual projects caused by supply chain disruptions by 35–46%
- the risk of a 6-month delay to the Roadmap rollout from 11% to just 1%.

The reduction in aggregate risk to the Roadmap recognises that projects are often interconnected through using the same pool of labour, as well as common infrastructure and equipment. As a consequence, delays in one project can cascade to other projects reliant on the same resources (Accenture 2023a, p. 19).

Localisation can also help mitigate systemic risks that pose an increased threat to global supply chains. These low probability, high severity events can affect an entire supply chain, or even multiple supply chains. Systemic risks that localisation can help mitigate include (Accenture 2023a, p. 20–21):

- global pandemics, which restrict the movement of people and goods. The COVID-19 pandemic is a recent example
- natural disasters affecting a key area, transport line or port. This happened when a volcano erupted in Iceland in 2010 and grounded planes across large parts of Europe
- trade disruptions, where geopolitical forces block or disrupt trade. Recent examples of countries restricting exports include China (rare earths) and Indonesia (nickel)
- other unforeseen events such as accidents, terrorism, recessions and cyberattacks also pose threats to global supply chains. In 2021, the Suez Canal was blocked for 6 days by a container ship, which added 2-3 weeks of delay to an eighth of global trade. The cost was estimated at US$10 billion per day.

However, we recognise the reduction in these systemic risks is partially offset by an increase in concentration risk as reliance on local suppliers grows. This is especially the case as the impacts of climate change such as extreme weather intensify. For example, during the 2022 floods on Australia's east coast, 70,000 tonnes of construction freight could not be delivered, and 245,000 tonnes were rerouted. The total cost of these disruptions was $2.3 million. Cement, a component of concrete, was the worst impacted commodity, with 45% not reaching its destination (Accenture 2023a, p. 21).

It is important that the implementation of the LCRs be flexible to allow stakeholders to mitigate the impact of logistical or economic disruptions.

3.2.2 Expanding responsible supply chains in New South Wales can help build social licence and reduce embedded emissions

Social licence

Jobs and economic growth are key building blocks of social licence, together with energy reliability and efficiency, visual and environmental factors, and perceived health impacts (ARENA 2015).

Greater use of local content in the Roadmap buildout could add up to $1.3 billion to the NSW economy, and create up to 3,410 new jobs (Accenture 2023a). This contribution to the NSW economy can help build and maintain social licence for the Roadmap, both in the communities hosting the new electricity infrastructure and New South Wales as a whole.

By boosting employment state-wide, greater use of local content can contribute to the Roadmap's social licence with electricity customers who pay for the Roadmap costs through their bills.[10] However, it is also essential for aspects of supply chains to be co-located in and around the REZs, where the majority of disruptions caused by the buildout will occur (Accenture 2023a, p. 25).

[10] See section 4.6 for more on Roadmap costs and cost recovery.

The impact of failing to maintain the support of local communities in which infrastructure projects take place can be significant. In the US, more than 1 in 10 renewable energy projects were delayed, paused or cancelled due to social licence issues in the period 2008–21 (Accenture 2023a, p. 25).

In Australia, an estimated $20 billion worth of infrastructure projects have been delayed or cancelled due to community opposition over the past decade. For example, social licence issues have driven up costs and resulted in year long delays to a number of Victorian transmission projects, including the Western Renewables Link and Western Victoria Transmission Network (Accenture 2023a, p. 25).

We recognise localisation will not resolve all social licence issues, such as concerns about health and safety, visual impacts and the environment. However, by providing high quality, secure employment in the REZs, Roadmap projects can deliver tangible benefits to local communities hosting the new renewable energy infrastructure.

Initially, the majority of jobs created by the Roadmap buildout and the energy transition will be in construction. However, by 2030 between one-third and one-half of utility-scale wind and solar jobs could be in operation and maintenance, with the wind sector accounting for the majority of these (CEC 2020, p. 20; ISF and SGS 2022).

By providing secure employment, these ongoing jobs can play an important role in revitalising local economies and allowing young people to gain employment in their local areas.

Modern slavery

Renewable energy supply chains are complex and at times opaque, but there is growing evidence of reliance on modern slavery in the production of aluminium, copper and steel (Accenture 2023a, p. 27–28).

Historically, the costs of responsible procurement have outweighed the benefits for developers, as the final product – electricity – is commoditised (Accenture 2023a, p. 47). However, as expectations for corporate social responsibility have increased and awareness of modern slavery has grown, the renewable energy industry has recognised the need to act.

As an example, the Clean Energy Council (CEC) in collaboration with its Risks of Modern Slavery working group has developed a pledge against modern slavery. This sets the ambition for the sector's operations and supply chains being free of adverse human rights impacts, including modern slavery (CEC 2024).

Australia also has some of the most stringent modern slavery regulations and was the second country globally to introduce anti-modern slavery laws (Accenture 2023a, p. 27). The *Modern Slavery Act 2018* (Cth) creates an obligation for businesses with annual revenue of $100 million or more to report on their efforts to assess and address modern slavery risks. The National Action Plan to Combat Modern Slavery 2020–25 provides a strategic framework for Australia's response to modern slavery (Australian Government 2020). The NSW *Modern Slavery Act 2018* further establishes an Anti-slavery Commissioner (Communities and Justice 2023).

The increased value placed on higher labour standards in Australia and large economies such as the EU creates a strategic advantage for the NSW renewable manufacturing and resource sectors. For example, Australia's leading aluminium, copper and steel producers all disclose data in publicly available modern slavery statements. While these report some exposure to modern slavery, these risks are minor (Accenture 2023a, p. 29).

Lower embedded emissions

The Roadmap will make a significant and necessary contribution towards New South Wales' target of reaching net zero emissions by 2050. However, many key inputs to the renewable rollout remain highly emissions intensive to produce. These include aluminium, copper and steel, which are largely imported but where New South Wales has strong capabilities (Accenture 2023a, p. 30).

Localising the supply chains for these can help avoid up to 38% of emissions associated with the buildout of the Roadmap, including (Accenture 2023a, pp. 32, 35–37):

- 37% of steel production emissions
- 41% of aluminium production emissions
- 37% of copper production emissions.

These emissions reductions arise primarily from the projected decarbonisation of the NSW electricity grid and greater efficiency of manufacturing, when compared to international locations such as China (Accenture 2023a).[11]

Should the NSW industry adopt new energy-efficiency or low-carbon manufacturing practices more rapidly than competitors, the emissions reductions could be even greater (Accenture 2023a, p. 33). Progress is already underway. For example (Tomago Aluminium 2022; BlueScope 2024):

- Tomago Aluminium has committed to moving to as close to 100% renewable energy as possible by 2030 and achieving net zero emissions by 2050
- BlueScope has an objective of reducing the emissions intensity of steel making by 12% by 2030 and achieving net zero emissions by 2050.

Supporting the net zero transition, the NSW Government is providing up to $275 million for industrial decarbonisation under the Net Zero Manufacturing Initiative (NSW Government 2024a).

3.3 Realising the benefits of localisation requires addressing key challenges

Stronger local supply chains can help provide strategic benefits for New South Wales, including:

- mitigating the risk of delays to the rollout of projects under the Roadmap
- helping build social licence in the communities hosting the new electricity infrastructure and New South Wales as a whole
- mitigating the risk of modern slavery in renewable energy supply chains
- reducing the embedded emissions associated with the Roadmap buildout.

However, realising the strategic benefits of using more local goods, services and workers in Roadmap projects is not without challenges. Local suppliers will need to:

- invest in new and expanded facilities. The increased focus on local content throughout Australia will increase demand and may put pressure on local providers' capacity to supply. For

[11] A greater degree of localisation will also lower transport emissions, but this contribution is relatively modest.

localisation to mitigate risks to project delay, it is essential local suppliers are able to deliver the components needed for the Roadmap rollout on time and at the required volumes. In turn, given that Australia and NSW are relatively small and remote markets, local suppliers do not have the same depth and stability of demand seen in larger jurisdictions such as the EU or the US.

- ensure their products meet the quality and other procurement standards required. Developers, engineering, procurement and construction firms (EPCs) and original equipment manufacturers (OEMs) have established processes for engaging with suppliers, which typically include strict quality requirements and standards for doing business. These policies usually apply at a global level, so it is essential local suppliers are able to demonstrate compliance in both their products and operations.

Recognising these challenges, the process we have developed for increasing LCRs over time emphasises the need for local suppliers to build relationships with developers, EPCs and OEMs when exploring investments in new or expanded capacity.

Furthermore, the ability to increase local content hinges on having enough energy available for large manufacturers in NSW and Australia. As the renewable energy capacity continues to increase, natural gas will support demand during peak energy usage times. The planned transition from fossil fuels will ensure NSW and Australia can expand the local supply chains, our goals, and local jobs.

In May 2024, the NSW Government extended the operation of the Eraring Power Station by two years to manage reliability and price risks to electricity consumers (NSW Government 2024c). The facility, which will now operate until August 2027, will generate at least 6 terawatt hours per year to provide reliability of energy delivery in the State during this period of transition.

For certain components, localised production would require coordination across several states, such as between New South Wales, Queensland and Victoria. For example, Australia does not manufacture wind turbine blades, and a new facility would require demand beyond New South Wales (ISF and SGS 2022, p. 78).

Another challenge to greater localisation relates to Australia's comparatively high labour costs. Australia ranks among the 10 highest average annual wage economies in the world, according to the Organisation for Economic Co-operation and Development (OECD 2024). This means that the costs of producing goods and certain services locally tend to be higher than those of some of Australia's trading partners. However, these higher rates paid to local workers tend to be spent and reinvested locally, which supports economic growth. Considering this and other macroeconomic benefits, localisation of the renewable energy sector supply chain could produce an increase of up to $1.3 billion in real gross state product for NSW (Accenture 2023a).

4 Review of our plan

In recognition of the rapidly evolving energy transition landscape, the former Minister requested we:

- conduct a review of our plan, once the local content outcomes of the first Roadmap tenders were known
- consider how our recommended minimum requirements and stretch goals could help unlock investments in added local manufacturing capacity for the renewable energy sector.

Our plan identified considerations for refining and modifying local content minimum requirements, set out in Figure 4.

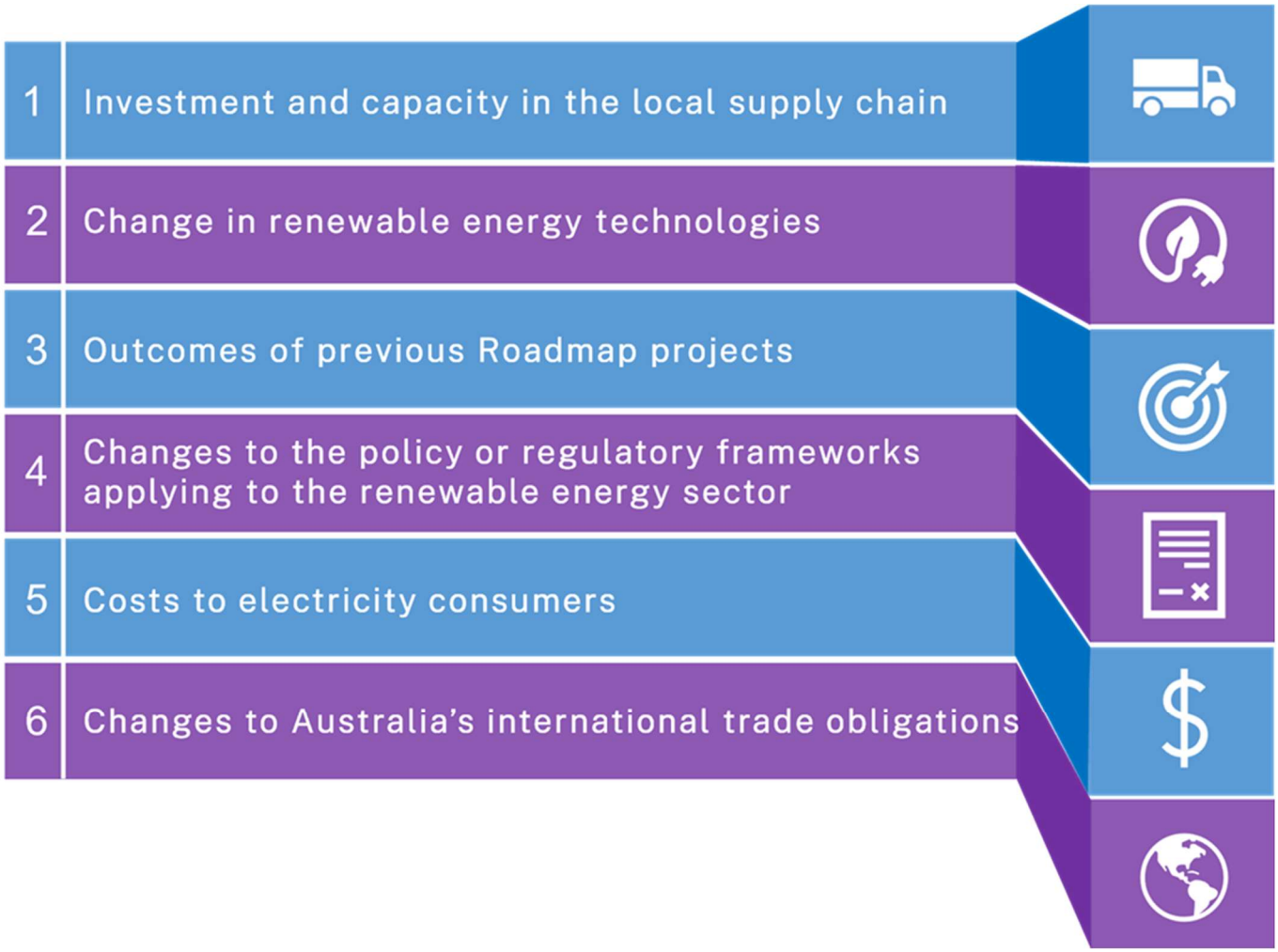

Figure 4: Considerations for refining and modifying local content minimum requirements

This section sets out our analysis of our local content framework and recommended minimum requirements, in line with these considerations. The analysis covers the first 22 months of implementation since publication of our plan in September 2022.

The sections below discuss the outcomes of the first 4 tenders conducted by AEMO Services, the outcomes of which had been made public by mid-2024. We also provide an overview of EnergyCo's tenders for the CWO REZ network operator and the WSB project.

Our analysis is based on information provided to us by AEMO Services and EnergyCo, and is limited by commercial confidentiality and the need to ensure Roadmap tenders remain competitive.

Progress is being made with development of local supply chains including a framework to reinvest REZ access fees and creation of transition pathways for the fossil fuels energy workforce. However, commitments for First Nations participation and underrepresented groups have not met our minimum requirements across the majority of Roadmap projects.

4.1 Implementation of our plan

AEMO Services and EnergyCo have considered our recommendations in the first Roadmap generation, storage, firming and network project tenders.

4.1.1 AEMO Services has considered our recommendations in its tenders

AEMO Services considered our recommendations throughout all the tender processes it has run under the Roadmap, including in eligibility criteria, merit assessment, due diligence and contractual commitments.

As of July 2024, 4 AEMO Services tenders have closed:

- Tender 1 for generation and long-duration storage awarded long-term energy service agreements (LTESAs) to (AEMO Services 2023a):
  - 3 renewable generation projects with total capacity of 1,395 MW
  - 1 long-duration storage project with a continuous discharge capacity 50 MW over at least 8 hours (or more than 400 MWh of electricity).
- Tender 2 for firming infrastructure awarded LTESAs to 6 projects representing 1,075 MW of firming infrastructure with almost 3 GWh of energy storage (AEMO Services 2023e). These included 3 battery energy storage systems (BESS) projects and 3 demand response projects.
- Tender 3 for generation and long-duration storage awarded LTESAs to (NSW Government 2023d):
  - 2 renewable generation projects with capacity totalling 750 MW
  - 3 long-duration storage projects totalling continuous discharge capacity of 524 MW over at least 8 hours (or nearly 4,200 MWh of electricity).
- Tender 4 for generation infrastructure opened in October 2023. It awarded LTESAs to 2 projects which combined represent 312 MW of renewable energy generation. One of the projects included 372 MWh of storage capacity.

See section 4.4.1 for more information on the LTESAs awarded to date.

4.1.2 EnergyCo has incorporated our recommendations

Central-West Orana REZ network operator tender

EnergyCo considered our plan in the competitive process to select a network operator for the CWO REZ. Following a competitive tender process, EnergyCo selected ACE Energy as the first ranked proponent as network operator for the CWO REZ.

The NSW Government entered a commitment deed with ACE Energy in December 2023, confirming the consortium as the as preferred network operator for the CWO REZ (NSW Government 2023f).

ACEREZ, a consortium formed by ACCIONA, Cobra and Endeavour Energy, will seek regulatory and planning approval to deliver, operate and maintain the REZ transmission network for the next 35 years. This includes new high-capacity transmission lines, energy hubs and related infrastructure. Following the approval process, award of the final contract and financial close are scheduled for the second half of 2024 (NSW Government 2023f).

Waratah Super Battery project

EnergyCo considered our plan during the procurement of SIPS services to support the WSB project. The SIPS is designed to monitor transmission lines and enable the battery to act as a shock absorber in the event of any sudden fault on the transmission system.

In 2022, EnergyCo requested that tenderers take into consideration our plan and the First Nations Guideline. Tenderers were asked to submit an Industry and Aboriginal Participation Plan (IAPP) returnable schedule considering the requirements of these documents.

On 14 October 2022, Transgrid was directed as network operator to carry out the WSB project, which included specific requirements regarding our plan:

- prepare and implement an Australian Industry Participation Plan (AIPP) with supplementary details addressing any relevant matters from the Board's plan and First Nations Guidelines not covered by the AIPP
- report to EnergyCo on Transgrid's progress against these commitments.

Following the completion of the competitive procurement process, EnergyCo appointed Akaysha Energy as the successful SIPS service provider. Akaysha Energy will work closely with Transgrid as network operator to deliver the service, while complying with the ministerial requirements regarding our plan.

4.2 Investment and capacity in the local supply chain

The local content minimum requirements in our plan were based on an estimate of the capacity of local suppliers, including SMEs. Since publication of our plan, local suppliers have shown increased interest in establishing and expanding local supply chains.

This section sets out examples of these developments in New South Wales and elsewhere in Australia. Over time, these investments to boost local capacity can lead to increased LCRs for Roadmap projects.

4.2.1 The sun is rising on the local solar panel industry

Sydney-based start-up SunDrive has developed a copper-based technology for solar panels that, according to the company, could cut installed costs by up to 30%. SunDrive states its solar panels have several advantages over conventional technologies (Webster 2023):

- Copper is around 100 times cheaper than silver and 1,000 times more abundant.
- SunDrive's plated-copper technology allows for thinner silicon wafers, cutting costs further.

- Once applied to the silicon, SunDrive's copper electrodes are more conductive than silver-paste electrodes. This reduces resistive losses and improves efficiency.
- The technology also allows for a higher density of narrower lines of electrodes. This enables more light absorption and further boosts efficiency.

SunDrive has plans for a 3-phase roll-out of its solar panel production (Parkinson 2023):

- the first factory will target the premium rooftop market with capacity of 1 GW, and will focus on cell metallisation and modules
- a second factory, lifting total capacity to 2 GW, will focus on rooftop modules and cell production, including texturing and junction cells
- a third factory, taking the total capacity to 5 GW, will focus on utility-scale solar, with plans for full integration, including polysilicon, ingots, wafers and glass production.
- Sundrive's direct copper plating replaces the screen-printed silver electrodes, which can reduce the material costs of the cell by up to 8%. Direct copper plating also avoids the complexity associated with depositing a seed layer for electroplating and then having to remove the unwanted metal by etching once the copper electrode has been formed. (Yu et al 2023.)

The company has received funding from both the private and public sectors, including Grok Ventures, Blackbird Ventures, Virescent Ventures, the Clean Energy Finance Corporation and ARENA (ARENA 2020; Webster 2023).

In Queensland, Australian-owned Quinbrook Infrastructure Partners has announced an $8 billion plan to build the first Australian polysilicon production plant. Located in northern Queensland, the plant will create more than 1,000 jobs in construction and operation (Vorrath 2023).

Polysilicon is a component in the solar panel supply chain. Silicon is abundant in Australia in the form of quartz. However, it is shipped overseas for purification and transformation into polysilicon, which is then returned to Australia. The Queensland facility has the potential to rank amongst the greenest in the world due to access to low-cost renewable energy and locally sourced silica quartz (Vorrath 2023).

Tindo Solar, Australia's first manufacturer of solar panels, launched its utility-scale panel in March 2022. The South Australian manufacturer had previously specialised in high quality residential and commercial rooftop panels. The move into the utility-scale market is driven by customer demand for Australian-made panels to help address concerns around landfill waste and forced labour issues often present in foreign supply chains (Vorrath 2022).

4.2.2 Australian steel provides solid foundation for renewables

Austube Mills is an Australian manufacturer of structural steel tubes and pipes, with facilities in Newcastle and Brisbane as well as Dalian in China. The company supplies the domestic and international markets, investing in research and product development for a wide range of applications. It currently produces around 220,000 tubes per year, up to 13.3 m in length, but has existing capacity to output 350,000 tubes per year.

Austube Mills has recently adapted its Australian facilities to produce torque tubes for solar tracking systems.[12] The company supplies tubes to Australian and foreign projects. It also manufactures other products for solar farms, some of which are designed to the specifications of particular projects.

Orrcon Steel, a subsidiary of BlueScope Steel, has committed funds to build additional capacity for the renewable energy sector. This includes new manufacturing mills such as at Unanderra in New South Wales to produce larger tubulars for renewable energy and other infrastructure projects.

The mill is expected to become operational by mid-2024. The investment represents a commitment to more than 20 full-time equivalent new roles,[13] and a total capital commitment of up to $70 million (BlueScope 2023a, p.30).

The investment builds on Orrcon Steel's operations in Queensland and South Australia, which supply tubular products for Australian solar farms. Its product offering could also be used on wind farms as well as transmission and distribution power lines. In Queensland, Orrcon Steel has partnered with solar tracking systems manufacturers Nextracker and Baojia to launch a solar tube processing facility in Northgate, Brisbane. The facility will initially create 16 employment positions and will have the capacity to produce 50,000 tonnes of torque tubes, which is equivalent to 2.5 GW of utility-scale solar farms, over its expected lifetime. This new facility was opened partly in response to the Queensland Government's efforts to encourage local manufacturing in the renewable supply chain.

BlueScope is also investing to enhance its Australian manufacturing capacity and capabilities. This includes a plan to create an Advanced Steel Manufacturing Precinct to manufacture components for the renewable energy sector. The precinct will see new manufacturing equipment and upgrades to existing facilities in Port Kembla, New South Wales, including modernising the plate mill, to meet future demand in renewable energy, infrastructure and defence (BlueScope 2023b).

As part of the precinct, BlueScope also investigated the feasibility of Port Kembla as a location for a wind tower fabrication facility. This proved unworkable due to logistical restrictions, including road bridges being too low to allow transportation of wind tower sections. However, BlueScope is committed to working with fabrication partners to develop a local supply chain, with an inland regional location likely to be more suitable for the development of an onshore wind tower fabrication facility (Langford 2023).

4.3 Change in renewable energy and storage technologies

Our plan set out local content minimum requirements for established technologies: solar, wind, battery storage, pumped hydro and network projects. As New South Wales transitions to decarbonise its economy, including its electricity grid, new technologies are emerging for generation, storage and firming.

[12] Torque tubes provide support and stability to solar panels. They need to be precisely designed and sufficiently robust to maintain accurate panel alignment regardless of wind, rain, temperature changes and other factors.

[13] Information provided by BlueScope and Orrcon Steel to the Renewable Energy Sector Board.

Informed by applications for its tenders so far, AEMO Services has identified green hydrogen, bioelectricity, and compressed air energy storage as emerging technologies for which we should also develop minimum requirements. Noting the rapid pace of technology development, the Board will continue to monitor these technologies and we will recommend minimum requirements for these technologies as soon as practicable.

4.3.1 Green hydrogen

Hydrogen is a versatile feedstock and energy carrier. When produced using renewable energy sources, it is considered 'green hydrogen' and can support decarbonisation across hard-to-abate sectors such as heavy vehicle and industrial sectors (NSW Government 2021, p. 15).

Hydrogen can support the transformation of our electricity system by providing firming services, flexible loads and long-term energy storage. Other applications include (NSW Government 2021, p. 29, pp. 16–17):

- as an industrial feedstock for creating products like ammonia and green steel
- in transport, including aircraft, ships, trains, trucks and buses.

Under the NSW Hydrogen Strategy, the NSW Government has set a stretch target for the cost of hydrogen of under $2.80 per kg by 2030 (NSW Government 2021, p. 7). The Government has also announced $109 million in funding for 3 hydrogen hub projects in New South Wales, located in the Illawarra, the Hunter region and in Moree Plains (NSW Government 2023a).

4.3.2 Bioenergy

Bioenergy is renewable energy derived from the conversion of biomass into heat, electricity, liquid fuels and biogas. Biomass is organic matter sourced from forestry, agriculture or waste (ARENA 2021, p. 4).

Bioelectricity, an end-use for bioenergy, can support the energy transition by providing dispatchable and synchronous electricity generation in both grid-connected and off-grid areas. It has similar costs to other low emissions, dispatchable alternatives such as wind and solar combined with battery storage (ARENA 2021, p. 22).

While the penetration of bioelectricity has been limited so far, by the 2050s it could account for 9% of grid electricity generation and 11% of off-grid generation. Other uses for bioenergy include hard-to-abate sectors such as renewable industrial heat generation and aviation (ARENA 2021, p. 22, p. 19).

While Australia's bioenergy potential is significant, realising this potential will require careful consideration of the environmental sustainability of each bioenergy resource (ARENA 2021, p. 24). Under the Electricity Infrastructure Investment Regulation 2021, LTESAs cannot be made if the:

- generation infrastructure involves generation from wood waste from timber native to Australia
- firming infrastructure involves electricity generated from biomass from timber native to Australia.

4.3.3 Compressed air energy storage

Compressed-air energy storage is a form of energy storage that can complement battery and pumped hydro storage. It can provide storage over a medium duration, from 4–12 hours (CSIRO 2023).

In 2022 ARENA approved $45 million in funding to support the development of Hydrostor's advanced compressed air energy storage (A-CAES) project in Broken Hill, New South Wales. Repurposing a disused mine, the project will develop a subsurface air storage cavity that will be used to store compressed air. The project will compress air during times of low electricity prices, store it and release it during times of high demand and high energy prices to generate electricity (ARENA 2022).

In December 2023, AEMO Services announced it had awarded an LTESA to the project as part of Tender 3 (AEMO Services 2023b).

4.4 Local content outcomes in generation, storage and network projects

Overall, AEMO Services and EnergyCo have reported that successful project proponents have made genuine efforts towards meeting the LCRs. However, they and we note some of the requirements have been challenging for project proponents to meet.

This section sets out our analysis of the local content outcomes in AEMO Services and EnergyCo's tenders, respectively, highlighting areas of good performance as well as areas where improvements can be made over time.

4.4.1 AEMO Services tenders

Projects awarded LTESAs in Tender 1, Tender 2 and Tender 3

As part of Tender 1, AEMO Services shortlisted 16 projects representing more than 4.3 GW of generation and long-duration storage (AEMO Services 2023c). These were invited to the financial value bid stage of the tender, and 4 projects secured an LTESA. These were (AEMO Services 2023a):

- 3 renewable generation projects (2 solar farms and 1 wind farm) with total capacity of 1,395 MW
- 1 long-duration storage project with a continuous discharge capacity 50 MW over at least 8 hours (or more than 400 MWh of electricity).

Tender 2 received bids representing a combined firming capacity of more than 3,300 MW, against a target of 930 MW (AEMO Services 2023d). Of these, AEMO Services selected 6 projects representing 1,075 MW of firming infrastructure with almost 3 GWh of energy storage. The projects comprise (AEMO Services 2023e):

- 3 battery energy storage system (BESS) projects

- 3 demand response virtual power plant (VPP) projects.[14]

For Tender 3, AEMO Services received bids for generation representing a total capacity of 3.1 GW, against an indicative target of 950 MW. Bids for long-duration storage represented a total capacity of 1.6 GW, against a target of up to 550 MW (AEMO Services 2023f). The successful bids represent $4.2 billion in private sector investment and comprise (NSW Government 2023d):

- 2 renewable energy generation projects (1 wind farm and 1 solar farm)
- 3 long-duration storage projects (2 battery projects and 1 advanced compressed air energy storage system).

The outcomes of the 3 first tenders add up to 5.79 GW in renewable generation, which is almost half of the legislated 12 GW generation target for the Roadmap. The 3 tenders have also secured 574 MW of the legislated 2 GW long-duration storage target. The total private investment secured in the 3 tenders is $8.5 billion.

Local content outcomes of the tenders

Together, the LTESA contracts awarded across Tenders 1, 2 and 3 are anticipated to source $3.5 billion from local supply chains. This equals around 40% of the $8.5 billion in TPCV awarded in the 3 tender rounds. The computation of the $3.5 billion investment covers 'local content' as previously defined and includes small and medium enterprises (SMEs) classified as companies with up to 200 employees.

Supply chain inputs

Our plan recommended minimum requirements for use of local content for the:

- development phase
- operations and maintenance phase.

The development phase includes all costs from project inception to completion of project commissioning. The operations and maintenance phase commences once the project is fully commissioned (OECC 2022a, p. 32).[15]

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[14] A note on local content outcomes of the 3 VPP projects:

The VPP projects will be operated by Enel X Australia, a demand response provider. Enel X will enrol commercial and industrial energy users in its demand response program. Participating companies will agree to reduce their energy consumption or switch to backup supply when needed. This will make more energy available when the grid is under stress (Enel X 2023).

Demand response can come in many different forms, including via small-scale batteries, electric vehicle batteries, commercial refrigeration and cold storage, smart thermostats, and use of backup generators. In many cases, VPPs tap into existing facilities and systems and do not require large-scale capital investments. Further, due to the heterogeneity of the possible technologies that can comprise a VPP, it would be challenging to set LCRs for these projects. Our analysis in the following sections therefore excludes the 3 VPP projects.

[15] In its tender documentation, AEMO Services refers to these as pre-commercial operations date (pre-COD) and post-COD.

Of the 11 generation, storage and firming projects awarded to date, AEMO Services reports that 7 made substantial progress towards the minimum requirement for the development phase.

Where proponents were unable to meet the minimum requirements, AEMO Services reports this was due to justifiable reasons. For example, battery storage projects found the minimum requirement challenging, as batteries and their associated control systems, inverters and other high voltage electrical components cannot be sourced locally.

The minimum requirement for the operations and maintenance phase was more challenging, with AEMO Services reporting that only 3 out of 11 projects exceeded or made substantial progress towards the requirement. Wind projects noted the shortage of local specialist skills created difficulties for meeting the minimum requirement. Skills shortages are prevalent for the sector as a whole, and likely contributed to underperformance against the minimum requirements for solar and battery storage as well. To some extent, skill shortages could result from lower wages being offered in regional areas in comparison to the higher paying jobs in metropolitan areas in industries such as construction.

Locally milled steel products and components

AEMO Services reports that the minimum requirement for the use of locally milled steel proved the most challenging, with a significant majority of project proponents unable to meet it. This is due to the current limited capability and capacity to produce local steel products and components for wind towers. While there is local capability and capacity for steel components for solar farm projects, uptake of steel for these projects may be limited due to contractual arrangements and other barriers. The local steel industry also faces further challenges from lower cost imports.

The minimum requirement for local steel products and components in our plan was based on an estimate of steel components and products that SMEs and First Nations businesses in the local industry have the capacity to produce.[16] This was to ensure consistency of our plan with Australia's international trade obligations (OECC 2022a, p. 32).

Steel products and components integral to a component or product not available locally at the time of bidding are not included in this definition (OECC 2022a, p. 32).

We note the absence of a precise definition for 'local steel products and components' has created uncertainty for determining when a steel component could be considered 'locally available.' This has led to proponents making their own assumptions and, as a result, the treatment of steel supply chain inputs is not strictly comparable across different project bids.

We will work with AEMO Services and the industry to clarify the definition of 'local steel products and components' and develop a register or database of locally available suppliers, manufacturers and steel components.

Learning workers and apprentices

AEMO Services reports progress towards the requirements for learning workers and apprentices was mixed, with less than half of the projects being able to meet or exceed the requirements.

[16] During merit assessment, 'local' refers to Australia and New Zealand.

Several proponents noted that, given record-low unemployment rates, securing and training the workforce needed for projects has been challenging.[17] Proponents for wind projects noted to AEMO Services safety concerns with using apprentices, given the high skill levels required for these projects.

While noting the concerns raised by some project proponents, we believe the minimum requirements for learning workers and apprentices will, over time, help address the current skills gaps. By taking action to attract and train workers, proponents can help ensure New South Wales and Australia have the skilled workforce needed for the energy transformation during the second half of the 2020s and in the 2030s.

In our plan, we highlighted the risks associated with labour and skills shortages (OECC 2022a, p. 63). In section 5 of this document, we reiterate our recommendation for the NSW Government to develop a NSW Renewable Energy Sector Skills and Training Strategy.

First Nations outcomes

Proponents also found the minimum requirement for First Nations participation challenging, with only 4 of 11 projects exceeding, meeting or coming close to meeting the requirement. AEMO Services has indicated the minimum requirement was particularly challenging for battery storage projects. This is due to the relatively high proportion of components only available from overseas suppliers, as well as a lack of First Nations businesses and workers with the required skills and capabilities.

While the minimum requirement was challenging to meet, many project proponents were able to offer other meaningful contributions to support First Nations people's participation. These include:

- supporting work readiness via, for example, pre-apprenticeship training, attainment of a driver's licence and securing accommodation
- establishing TAFE scholarships to support individuals transitioning from agricultural and mining sectors to renewable energy
- partnerships with existing Aboriginal foundations and establishment of local community committees.

We welcome publication of the updated First Nations guidelines for the CWO REZ as a significant step in encouraging greater First Nations participation in the opportunities created by the Roadmap (OECC 2023a).

We welcome the introduction of a First Nations outcomes team within EnergyCo. The team will support the REZ First Nations working groups by acting as the first contact point for project proponents prior to and during engagement with local Aboriginal communities. We also welcome the team's role in coordinating consultation, engagement and implementation of programs and initiatives that deliver outcomes to local Aboriginal communities (OECC 2023a).

[17] Statewide, the unemployment rate stood at 3.4% as at November 2023, substantially below historical averages of around 5.0% (ABS 2023, Table 4).

Underrepresented groups

Underrepresented groups are an untapped talent pool and improving their ability to take up employment in the renewable energy sector can help alleviate projected labour and skills shortages.[18]

AEMO Services reports most proponents were only able to make minimal commitments towards the underrepresented worker requirement. However, noting initiatives such as the CEC's Women in Renewables initiative, and Careers for Net Zero initiative by the CEC and Energy Efficiency Council (EEC), we hope to see greater diversity in the renewable energy sector workforce in the coming years.

4.4.2 EnergyCo tenders

CWO REZ network operator tender

As part of the CWO REZ network operator tender, proponents prepared a draft IAPP, outlining how they will meet all legislative requirements and the requirements set out in our plan and the First Nations guidelines. ACEREZ will now consult community and stakeholders on the IAPP, before a summary is released to the public later in 2024.

Waratah Super Battery (WSB) project

The WSB project is a SIPS that stabilises the provision of electricity, absorbing variations from power surge events such as bushfires or lightning strikes. The WSB will be capable of providing continuous active power capacity of at least 700 MW and a guaranteed useable energy storage capacity of at least 1,400 MW.

The infrastructure planner EnergyCo appointed Akaysha Energy as the SIPS service provider following a competitive procurement process. Construction of the WSB commenced early in 2023 on the site of the former Munmorah Power Station in Colongra and is expected to conclude in 2025.

It is expected that the WSB project will generate up to $1 billion in private investment into new energy storage and associated network improvements and will support over 100 jobs in the region during the construction period.

Local content outcomes of the Waratah Super Battery project

EnergyCo has compiled estimates as at the March quarter 2024 of local content and social license requirements achieved to date in the development phase of the Waratah Super Battery (WSB) project. EnergyCo reports that approximately 77% of the supply chain inputs have been sourced locally for the development phase, which exceeds the minimum requirement of 68% in the Board's plan. The WSB project has also allocated 3.6% of contract value to First Nations businesses to date which exceeds the minimum target of 1.5%. The requirement for the employment of

[18] In our plan, underrepresented groups included women, young people, the long-term unemployed and people with characteristics defined in the *NSW Anti-Discrimination Act 1977*. However, the addendum to our plan provides a clarification of this definition, as we recognise the anti-discrimination Act includes characteristics that may not be disclosed to employers, and which it may not be appropriate to request to be disclosed. These include sexual orientation, race, marital or domestic status, or carer responsibilities.

underrepresented groups has also been exceeded. Minimum requirements of 20% for employment, skills and knowledge transfer have proven more challenging to meet with approximately 4.5% achieved to date.

Box 2. Uncaging local potential

Allthread Industries is a NSW-based engineering company that manufactures anchor cages for wind turbine towers. The company has developed an innovative solution to make installation easier, quicker and cheaper when shipping and transportation costs are considered (Allthread 2023a, 2023b).

Anchor cages are steel reinforcement structures that are a key component of the foundations supporting wind turbine towers. They are subject to intense stresses throughout the tower's useful life. To cope with the stress, cages need to be both robust and precisely assembled. Allthread also produces a range of other precision parts for the mining, marine transport, oil and gas industries.

Allthread has developed a solution that allows anchor cages to be assembled in the factory, saving on both cost and time on site. Traditionally, anchor cages are supplied as flat packs, with significant manual handling required on site. As well as saving on labour cost, Allthread's pre-assembled anchor cages help improve worker safety by reducing time on site – including in adverse conditions such as hot weather, rain or wind (Allthread 2021).

Allthread reports its solution can deliver (Allthread 2023a):

- 7% cost savings for anchor cages (for a 460 MW project with 96 anchor cages)
- 75% reduction in labour time (installation of each cage takes only 4 hours, compared to 16 hours for imported cages)
- 48% reduction in carbon emissions (based on an independent lifecycle assessment, including transport and use of renewables during manufacturing)
- 50% use of recycled materials
- 98% use of Australian materials.

Allthread was already an established supplier, having supplied anchor cages to wind farms such as the Goyder Wind Farm and the Golden Plains Wind Farm. However, the requirement to use local steel set out in our plan has led OEMs that previously preferred their own global supply chains to consider Allthread as a partner.

The LCR has levelled the playing field, creating the opportunity for an established and competitive local supplier to quote for projects where previously it did not even get a look-in.

The projects Allthread won prior to the introduction of the LCR have helped the company create skilled jobs at its facility in western Sydney, with the potential for more. The use of local steel has also increased demand for products further upstream at the steel mills.

4.5 Changes to the policy or regulatory frameworks applying to the renewable energy sector

Several new developments have occurred in the policy and regulatory frameworks governing the renewable energy sector since publication of our plan. These highlight areas where further investment in the energy transition will be needed during the second half of the 2020s and in the 2030s.

This increased need for investment in our electricity system highlights both the need and opportunity to continue strengthening our local supply chains. This will help ensure the energy transition benefits New South Wales and maintains social licence.

4.5.1 State Infrastructure Strategy 2022-2042

The State Infrastructure Strategy (SIS) is an infrastructure investment plan for the NSW Government to grow the state's economy, enhance productivity and improve living standards. It highlights the importance of diversifying the infrastructure investment pipeline, maintaining service reliability in the existing asset base, embedding resilience and fostering partnerships with the private sector.

One of the SIS objectives is to achieve an orderly and efficient transition to Net Zero in the state, through among other things, the unswerving implementation of the NSW Electricity Infrastructure Roadmap. The work performed by the Renewable Energy Sector Board aligns with the SIS objectives and recommendations, by seeking to improve the resilience of the renewable energy supply chain through increasing localisation and greater focus on social licensing.

4.5.2 2023 Infrastructure Investment Objectives report

AEMO Services has released the 2023 Infrastructure Investment Objectives (IIO) report. The IIO report sets out a development pathway for the next 20 years and a tender plan for the next decade (AEMO Services 2023g).

With the four LTESA tenders to date, New South Wales has secured 2.5 GW of generation capacity and 1.6 GW in storage capacity. The volume of new generation constructed or contracted so far is broadly aligned with the development pathway, which provides a projection of new generation capacity needed for New South Wales (AEMO Services 2023g).

The 2023 IIO report pathway assumes a broadly balanced mix of wind and solar. However, the report also considers a scenario where solar projects are delivered sooner than previously anticipated. This reflects market information suggesting that project proponents have limited ability to develop wind generation in the near term (AEMO Services 2023g).

The report highlights the need for substantial additional investment in long-duration storage. New South Wales has a legislated minimum target for the construction of 2 GW of long-duration storage by 2030. Recent tenders have secured around 30% of the target (less than 0.6 GW). Substantial long-duration storage capacity is unlikely to be delivered before the late 2020s, reflecting long lead times for pumped hydro and the still-high cost of battery storage.

Further, from 2030 onwards, AEMO Services estimates that significantly more renewable generation will be needed to maintain downward pressure on prices for NSW electricity customers than was forecast in previous IIO reports.

4.5.3 NSW Network Infrastructure Strategy

EnergyCo released its first 20-year Network Infrastructure Strategy (NIS) in May 2023. The NIS sets out a pathway to develop and secure the electricity network for New South Wales (EnergyCo 2023). The NIS complements and informs the IIO report, which considers renewable energy generation, storage and firming infrastructure.

The NIS proposes 3 options:

- 'Deliver Now' sets out network options required in the near term to support grid-scale generation and storage in REZs and maintain supply of electricity as coal fired plants close. They are 'no regret' options as they benefit electricity consumers under all modelled scenarios, and should progress as quickly as possible for delivery by 2033 at the latest.
- 'Secure now' sets out additional network options that are likely be required over the next 2 decades. They would add resilience in the event of further early coal closures or transmission project delays. Although these projects would not be proposed until future updates to the NIS, actions should be taken now to secure the ability to deliver these options, if needed, in a timely and cost-effective way.
- 'Plan for the future' sets out network options that may be needed in the 2030s to support electrification. These options may be required if there is accelerated electrification of the economy and/or a large-scale hydrogen industry develops in New South Wales.

4.5.4 NSW Energy Security Corporation

The NSW Government has announced the Energy Security Corporation (ESC). The ESC will make investments in transmission and storage projects in New South Wales, improving the reliability of the electricity network and supporting the transition to renewables. The establishment of the ESC is an opportunity to promote the use of local manufacturing capabilities in the state's renewable supply chain, in a manner akin to the new CEFC mandate.

4.5.5 Offshore wind

The Commonwealth is making progress in renewable energy generation and creating opportunities for new projects in the sector. Recently, the Australian Minister for Climate Change and Energy declared an 1,800 km^2 area off the coast of the Hunter region in New South Wales suitable for offshore wind farms (Australian Government 2023b). The declaration followed consultation with local communities, state and local government representatives, First Nations people and industries operating in the area.

4.6 Costs to electricity customers

The Roadmap results in the following costs for electricity customers:[19]

- payments for generation, firming and long-duration storage LTESAs
- costs associated with building and operation of electricity network infrastructure projects
- administrative costs of Roadmap entities such as AEMO Services and the scheme regulators.

These costs are recovered from electricity customers as part of the network charge on their bills. Network costs are expected to account for more than half of the total Roadmap cost and are expected to be greater than LTESA costs until the late 2030s (AEMO Services 2023g, p. 37).

[19] See more information on the Roadmap cost recovery process on the *What the Roadmap means for you* webpage (NSW Government 2023f).

Importantly, the costs associated with the Roadmap must be compared with the costs that would have been borne by customers in the absence of the Roadmap. Modelling results indicate the (NSW Government 2024b):

- Roadmap will provide a net benefit of $25.5 billion to NSW electricity customers over 20 years
- cost of meeting projected electricity demand without the Roadmap would be $88.6 billion over 20 years.

The remainder of this section sets out our assessment of the impact our plan has had on electricity customers.

4.6.1 Impact of local content requirements on the Roadmap

The design of our local content framework is intended to protect NSW electricity consumers' financial interests. However, we recognise that greater use of local content can result in higher costs in the development, operation and maintenance phases of network, generation and storage infrastructure. These costs are passed through to consumers in their electricity bills. For generation, storage and firming projects this can be:

- higher LTESA strike prices, meaning that LTESA payments are triggered more frequently and/or are higher than would otherwise be the case
- an overall higher wholesale cost of electricity.

Any additional costs incurred by network projects are also recovered from customers via the Roadmap cost recovery process.[20]

In our plan, we estimated that the minimum requirements for local content would add up to 0.4% to retail electricity bills, while our stretch targets would add up to 1.9% to consumer bills (OECC 2023a, p. 19).

As part of the contextual information provided to support IPART's consideration of our plan, we also assessed NSW households' and businesses' willingness to pay for greater use of local content in the delivery of the Roadmap. The survey was conducted in late 2021, and at that time participants indicated they were willing to pay more for local content than the estimated increases in electricity bills. Consumers have consistently shown a willingness to pay more for electricity in order to support greater use of local content. However, the quantum of this acceptable price difference will depend on the circumstances.

Electricity prices have increased by 18% since the survey was conducted (ABS 2024). This has largely been driven by surges in international coal and gas prices following the ongoing war in Ukraine, unplanned coal fired generator outages and constraints created by limited transmission capacity (AEMO 2022).

Local content is one of several criteria in the merit assessment. Bids not meeting the minimum requirement for a particular technology are awarded a lower score on that criterion but not

[20] Under the current cost recovery arrangements, households and other retail customers pay for a greater share of Roadmap costs than wholesale consumers. To fully realise the positive impacts of our plan for the NSW economy, this issue would have to be mitigated.

excluded from consideration. However, proponents are required to provide a justification for why they cannot meet the minimum requirements (OECC 2022a, p. 31).

In this way, the local content framework ensures consumer interests remain at the forefront of AEMO Services' tender processes.

Finally, we also believe the local renewable manufacturing sector will achieve greater economies of scale, narrowing any cost differential relative to overseas suppliers. This, coupled with the strategic benefits of local content set out in section 3.2, will over time put further downward pressure on renewable energy project costs, and consequently electricity prices.

4.6.2 Impact of our local content requirements on AEMO Services' tenders

According to AEMO Services, tender outcomes have been competitive, suggesting that LCRs have not compromised the financial interests of electricity consumers.

In the 3 tenders to date, AEMO Services has both received bids and awarded contracts significantly above the indicative tender sizes (see section 4.4.1 for more detail). Tender 1 secured strike prices below $50/MWh for wind and below $35/MWh for solar (AEMO Services 2023a).

The solar and wind projects in Tender 3 secured strike prices below $55/MWh. Both bidders chose to exclude swap options from the contract, reducing the size of the subsidy they can receive and providing better value for NSW consumers. The long-duration storage costs in Tender 3 were more competitive than in Tender 1, and AEMO Services anticipates further improvements in future tenders (AEMO Services 2023h, 2023j).

Under an LTESA, consumers only pay if wholesale spot market prices fall below the strike price. For comparison, the average wholesale cost of electricity in New South Wales was $81/MWh in Q3 2023 (AEMO 2023b) so the LTESA executed to date offer consumer value for money. Box 3 provides more detail on how LTESAs work.[21]

[21] Electricity retailers set the retail price to cover the costs of providing energy services, which includes wholesale costs, the costs of transporting energy through the networks, retail costs and margin, and any environmental costs (IPART 2023a). Wholesale electricity costs make up about 35–45% of the retail bill and network costs make up around 30–40% of the bill (IPART 2023b).

Box 3. An overview of LTESAs

Long Term Energy Service Agreements (LTESAs) are innovative options contracts designed to improve certainty for investors and provide value to energy consumers. They are designed to:

- reduce risk for investors from unexpectedly low wholesale electricity prices, while maintaining their ability to benefit when prices are higher
- bring forward investment in new sources of renewable generation and storage
- support more affordable energy for consumers.

The LTESA achieves this by providing projects with a series of options to access cash flows for distinct periods, over a long contract term. These cash flows are called a 'strike price', and projects compete on these through the tender process.

Under an LTESA, consumers only subsidise a project when wholesale electricity market spot prices fall below the strike price.

Suppose an LTESA has been agreed with a strike price of $50/MWh – the LTESA results in a cost to consumers only when the wholesale price falls below the strike price, i.e. below $50/MWh. At all other times, consumers pay for the wholesale cost, as they would do in the absence of an LTESA.

LTESAs provide investors certainty by setting a minimum or floor price as a protection for when wholesale prices are very low, while the tenders ensure strike prices are competed to the lowest levels possible.

Find more information on AEMO Services *Long-Term Energy Service Agreements* webpage (AEMO Services 2024).

4.7 Changes to Australia's international trade obligations

This section discusses relevant changes in international trade laws that have taken place since May 2022.

In May 2023, the Australia–UK Free Trade Agreement (A–UKFTA) entered into force. The agreement covers various aspects of trade and investment, including government procurement. Government procurement obligations in the A–UKFTA can apply to procurements of goods and services (including construction services) by specific NSW Government entities listed in the agreement. This includes the NSW Department of Climate Change, Energy, the Environment and Water, among other entities.

The A–UKFTA establishes obligations relating to government procurement. Some of these are:

- non-discrimination against UK suppliers relative to local suppliers
- prohibition of conditions or undertakings that encourage local development or improve Australia's balance of payments
- transparency of the procurement process.

However, the government procurement chapter of the agreement includes exceptions, some of which are measures:

- to benefit SMEs
- for the health, welfare and economic and social advancement of indigenous people
- necessary to protect public morals, order or safety.

The Second Protocol to Amend the Agreement Establishing the ASEAN–Australia–New Zealand Free Trade Area (the AANZFTA Upgrade) was signed in August 2023. The AANZFTA Upgrade contains a government procurement chapter that covers obligations to promote transparency, facilitate the participation of micro, small and medium-sized enterprises (MSMEs) in government procurement, endeavouring to incorporate environmentally sustainable procurement policies, among others.

No WTO disputes or requests for consultations have been raised under the WTO Agreement on Government Procurement (GPA) since May 2022. In November 2023, WTO Member States (including the EU, Australia, Canada and others) raised concerns in the WTO Committee on Government Procurement (WTO GP Committee) regarding the USA's implementation of the 'Build America, Buy America' (BABA) provisions in the Infrastructure Investment and Jobs Act (IIJ Act).

5 Actions to accelerate implementation of our plan

In addition to recommendations to AEMO Services and EnergyCo on how to maximise local content in Roadmap projects, our plan provided advice to the NSW Government on how to build up the capacity and capability of the NSW renewable energy sector.

Our advice was organised under the following themes:

1. Long-term planning for local content, jobs and skills
2. Supply chain development
3. Skills and training.

In particular, our advice recognised that realising the opportunities for the NSW renewable energy sector requires collaboration both between and within government, industry and community. In its response, the NSW Government supported or supported in principle all 15 of our recommendations (OECC 2022b).

The transition to renewable energy in New South Wales must occur faster than elsewhere in Australia, as our coal fired power generators will reach the end of their lives sooner than those in other jurisdictions. Consequently, the NSW Government has announced implementation of the Roadmap as a Strategic Priority for the State (OECC 2023b). Coordination across multiple government portfolios will be required to achieve this transition.

An inter-agency steering committee, chaired by the Premier's department, will coordinate whole-of-government implementation responsibility for the Roadmap. The steering committee will include representatives of critical agencies such as Planning and Housing, Education, Transport, Treasury, Regional NSW, Infrastructure NSW and Aboriginal Affairs, in addition to the Roadmap delivery entities (OECC 2023b).

5.1 Whole-of-government approach to local content

In our advice to the NSW Government, we proposed the development of a NSW Government policy for local content, jobs and skills in the renewable energy sector. This would create a comprehensive approach to local procurement and build on the suite of policies that support local content, jobs and skills. These include the:

- Small to Medium Enterprise and Regional Procurement Policy
- Aboriginal Procurement Policy
- Infrastructure Skills Legacy Program.

Our local content framework for the Roadmap should be extended to apply to the NSW ESC and government procurement and grants in areas such as rooftop solar for schools. Leveraging our framework, the NSW Government should develop sector and technology specific minimum requirements in collaboration with industry and unions.

A local content policy for the renewable energy sector would align with the NSW Government's intent to prioritise local content in New South Wales and support stronger manufacturing capacity (see section 2.3.1 for more information on work underway). The Board recommends the policy be a standalone section in the NSW Government Local Content and Manufacturing Policy. The policy would include a local content procurement strategy and local industry participation plans, underpinned by legislation.

Other options the NSW Government should consider include:

- investigating innovative or alternative financial incentives for local content, such as a payroll tax rebate
- explore the extension of LCRs to all renewable energy projects in New South Wales, either via voluntary adoption or via planning approvals.

To further strengthen the use of local content under the Roadmap, the NSW Government should also consider amendments to section 8 of the Act to:

- assess the plan based on protecting the financial interests of New South Wales or NSW residents, rather than NSW electricity consumers
- allow the Minister to consider the regulator's recommendation before approving a plan, rather than approving only on the regulator's recommendation.

To enable management of Work Health and Safety risk to community standards, the NSW Government should:

- develop a code of practice for the Construction and Operation of Renewable Energy Infrastructure based on the code developed by Workplace Health and Safety Queensland for Solar farms
- establish a standalone unit within SafeWork NSW to monitor the Renewable Energy sector and ensure compliance with all relevant legislation

5.2 Supporting supply chain development and industry participation

Our advice also advocated for actions to reduce barriers for SMEs and First Nations businesses, particularly in regional areas, and to build the capacity of the local manufacturing sector.

We welcome the introduction of the $150 million Renewable Manufacturing Fund to support growth of the NSW renewable energy supply chain (see section 2.3.1). Grant funding is essential to support capital intensive investments in new and expanded renewable energy infrastructure manufacturing capacity.

We also note the role of the Industry Capability Network (ICN) in connecting suppliers and project owners (see Box 4 for more information).

BOX 4: The Industry Capability Network

The Industry Capability Network (ICN) brings together suppliers – including SMEs – and project owners in Australia and New Zealand. Established in the 1980s, it has contributed to businesses securing $30 billion worth of contracts across a range of industrial sectors including clean energy, steel, construction and engineering.

The ICN Gateway allows government and private sector project owners to list their projects with ICN, and for potential suppliers to search for work in the project database. Suppliers can also use the gateways to develop capability statements.

ICN consultants work with project owners and suppliers to build the right procurement partnerships. ICN also runs and promotes industry events, such as the ICN Clean Energy and Manufacturing Summit and the Australian Manufacturing Week 2024.

ICN is funded by member businesses and contributing governments. The NSW branch is funded by the NSW Government, and has helped businesses participate in projects such as:

- Snowy 2.0
- Wellington North Solar Farm Stage 2
- Newcastle Offshore Wind Project
- South Pacific Offshore Wind Project.

See the *ICN NSW* webpage for more information (ICN 2024).

However, further action is needed to tackle non-financial barriers for smaller companies to supply Roadmap projects. For example, SMEs can find procurement processes for large projects challenging due to lack of expertise and the inability to access project information (ISF and SGS 2022).

Box 5 provides an example of how the UK Government and industry collaborate to strengthen the capacity and capability of the local offshore wind supply chain.

To strengthen the opportunities and capability of local suppliers to participate in the Roadmap buildout and the energy transition more broadly, the NSW Government should:

- build on and promote the ICN's supply chain directory of local manufacturers, enabling renewable energy developers and OEMs to source local goods and services
- support capability development for SMEs, including tender readiness training and productivity improvement programs
- establish a framework for proponents to provide quarterly reports to the Scheme Financial Vehicle on the compliance with minimum content requirements in projects being developed and operating under LTESAs
- establish industry forums to bring together local suppliers, developers and OEMs to help identify areas for collaboration and partnership
- publish regular reports on the status of local industry's ability to meet the renewable energy industry demand for content, with specific information about new local industry development as well as new and ongoing challenges local industry faces in providing content to renewable

projects. The report should highlight success stories and serve as a record of and basis for industry forums. The report should also be provided to project developers to help them understand local industry and how they can best engage.

BOX 5: Favourable winds for the UK offshore wind supply chain

The Offshore Wind Sector Deal was launched in 2019 to maximise the advantages for UK industry from the global energy transition (UK Government 2020). It complements the Contracts for Difference (CfD) scheme, which is the UK Government's mechanism to support investment in renewable energy.

A government and industry forum established in May 2013, the Offshore Wind Industry Council (OWIC), oversees and drives the implementation of the Offshore Wind Sector Deal. OWIC members are drawn from the leading UK and global firms in the offshore wind industry, including developers and OEMs, and is co-chaired by an industry representative and the UK Minister of State for Energy Security and Net Zero (OWIC 2024).

Commitments include:

- increasing the representation of women in the offshore wind workforce to at least a third by 2030
- setting an ambition of increasing exports of renewable energy technology, turbines or components fivefold to £2.6 billion by 2030
- investing up to £250 million in building a stronger UK supply chain.

Several targeted programs, set out in Figure 5, support development of the UK offshore wind supply chain (ORE Catapult 2023). The Offshore Renewable Energy Catapult, which delivers the programs, is the UK's leading technology innovation and research centre for offshore renewable energy. It is part of a network of technology and innovation centres established by Innovate UK.

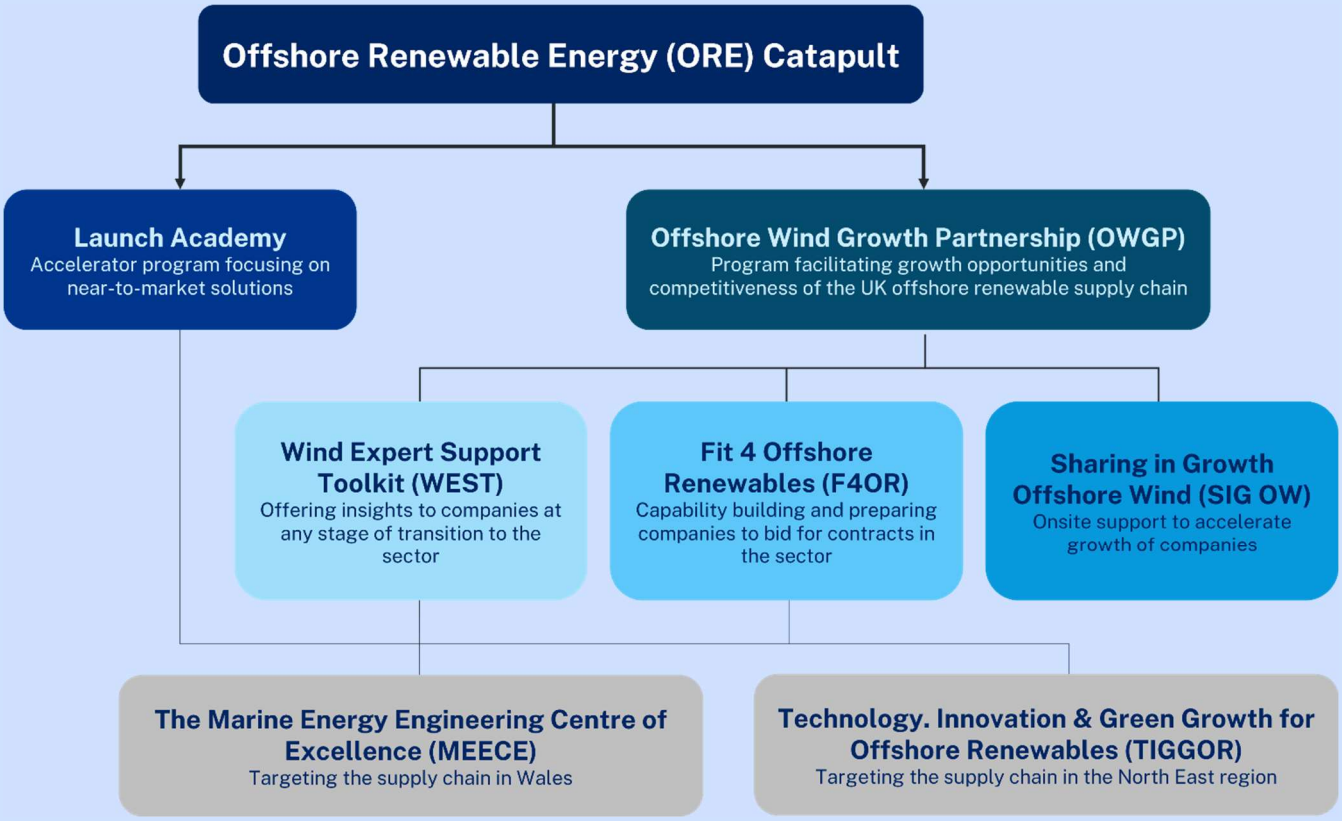

Figure 5: Programs supporting the UK offshore wind supply chain

5.3 Workforce development, skills and training strategy

Workforce availability and skills gaps are emerging as significant risks to infrastructure delivery, including for renewable energy projects (Infrastructure Australia 2023). A survey by the CEC found the sector faces issues with (CEC 2020):

- the recruitment of skilled and semi-skilled workers to meet the needs of a growing industry
- retention of the workforce in the context of challenging policy and regulatory environments
- aligning industry opportunities with approaches to regional development.

To address the growing skills gaps, Victoria and Queensland have released new plans and strategies for workforce development and skills (see Box 6 for detail). The Australian Government is also developing a National Energy Workforce Strategy as part of the National Energy Transformation Partnership.

BOX 6: Workforce and skills strategies in Queensland and Victoria

The Queensland Energy and Jobs Plan will support workers with a $150 million Job Security Guarantee, backed by an Energy Workers' Charter, to ensure workers in publicly owned coal fired power stations can continue their careers within these energy businesses or pursue other career pathways.

The Energy (Renewable Transformation and Jobs) Act 2024 outlines commitments to establish a Job Security Guarantee and Job Security Guarantee Fund in legislation.

Additionally, the plan commits to appointing a Renewable Energy Jobs Advocate, establishing an Energy Industry Council, developing a Future Energy Workforce Roadmap and investing $90 million to establish 2 new regional transmission and training hubs.

The Queensland Government has announced a $17 million grant to establish a renewable energy training facility focusing on apprentices.

In Victoria, the Clean Economy Workforce Development Strategy 2023–2033 provides a planning and investment framework to support the workforce and create training pathways to meet the industry's growing demand for skills.

The Victorian Government is bringing together 200 experts for an energy jobs and skills forum to shape its Victorian Energy Jobs Plan.

The Victorian Government's energy and training package aims to deliver 6,000 apprentices, trainees and skilled renewable energy workers.

The energy and training package includes establishing the SEC Centre of Training Excellence to work with the Victorian Registration and Qualifications Authority to accredit courses in renewable energy.

In our advice to NSW Government, we advocated for a NSW Renewable Energy Sector Skills and Training Strategy to address key short-term and long-term skills and labour gaps in the market. Actions under the strategy should include:

- ensuring availability of relevant training opportunities, including in regional locations

- addressing critical skills shortages, including for electricians, grid connection workers, wind farm maintenance technicians and engineers
- promoting career pathways into the sector, including at university and in the vocational education and training (VET) sector.

Where possible, training should support transferrable skills and allow trainees to work for multiple employers and on non-proprietary equipment. To ensure availability of training opportunities, the Government should fund the establishment of industry-run Renewable Energy training centres located within or near the REZs and in major metropolitan areas.

The NSW Electricity Infrastructure Jobs Advocate has been reporting on progress of implementing our recommendations which has informed the Jobs Advocate's recommendations to NSW Government which we support as follows:

1. Establish a body to assist with achieving the minimum requirements in the Renewable Energy Sector Board's plan for all renewable energy projects in New South Wales in relation to skills, training and jobs.
2. Create REZ Local Jobs Coordinator roles to maximise opportunities for local workers for skills, training and jobs.
3. Appoint REZ Jobs Coaches focused solely on helping unemployed, underemployed and underrepresented workers in each REZ to gain employment on REZ projects.
4. Sponsor a campaign, starting in the REZs and then expanding state-wide, to increase awareness amongst school students and the general public of the many and varied careers in renewable energy.
5. Institute a TAFE Roadmap Support Initiative to improve workers' ability to gain necessary qualifications for careers in the clean energy industry.
6. Implement a Group Training Organisation model in REZs to provide ongoing employment across a range of REZ projects while participants complete training.

5.4 Developing First Nations capabilities

To support the development of First Nations businesses and workers, the Board recommends the following initiatives:

1. Increase procurement of Indigenous businesses in renewable energy projects by developing capability and expertise supported by initiatives identified in the NSW Implementation Plan for Closing the Gap.
2. Support equity or revenue sharing models to generate tangible economic benefits for First Peoples from renewable energy assets.
3. Ensure that reviews of the Board's Plan and First Nations Guidelines assess the implementation of opportunities and identify improvements for the social and economic wellbeing of Aboriginal people including increasing the First Nations participation rate.

4. Development and implementation of a First Nations Clean Energy Strategy for NSW building upon the First Nations Guidelines to meet local needs and priorities, best practice for engaging with clean energy operators and broad principles and aspirations for working together.
5. Increase participation in workshops for Local Aboriginal Land Councils and other First Nations organisations to build awareness and literacy to participate in the energy transition and decarbonisation.
6. Pilot an Aboriginal renewable energy training program in parallel with the REZs as a capacity building exercise and employment opportunity guided by the Aboriginal Enterprise Strategy.

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