TOWARDS A RENEWABLE ENERGY SUPERPOWER

Industry opportunities for Australia to embrace the clean energy revolution

Prepared for Climate Action Network Australia and the Australian Manufacturing Workers' Union

SGS Economics & Planning
Certified B Corporation
UTS Institute for Sustainable Futures

Authors: Jeremy Gill, Chris Briggs, Maartje Feenstra, Scott Dwyer, Elsa Dominish, Tuyu Zhou, Rowena Phua, Harvey Davies

SGS Economics and Planning Pty Ltd
ACN 007 437 729
www.sgsep.com.au

OFFICES IN CANBERRA, HOBART, MELBOURNE, AND SYDNEY ON THE COUNTRY OF THE NGAMBRI/NGUNNAWAL/NGARIGO, MUWININA, WURUNDJERI, AND GADIGAL PEOPLES.

TABLE OF CONTENTS

Purpose of this report 4
Opportunities and actions 5
Australia's role in clean energy supply chains 6-7

Mission-oriented industry policy 8-9
Clean energy supply chains 10-11
Threshold considerations 12-13

Australia's clean energy opportunities 14-15
Clean energy compounding value proposition 16-17

Diversified battery supply chain 18-23

Wind tower manufacturing and offshore wind port infrastructure 24-31

Solar supply chain expansion 32-37

High voltage cable manufacturing 38-43

Electric heavy vehicle manufacturing 44-49

The need for government support 51
Summary of policy levers 52-53
Five priority actions for government 54-55

Purpose of this report

This report, commissioned by Climate Action Network Australia (CANA), the Australian Manufacturing Workers' Union (AMWU) and Boundless Earth and undertaken by SGS Economics and Planning and the UTS Institute for Sustainable Futures, brings to light major industry opportunities for Australia in the global clean energy sector.

The work is based on a synthesis of existing studies and targeted interviews.

The report does several things:

- Maps the supply chains of major clean energy technologies and identifies where opportunities for greater investment in Australia lie
- Outlines decision-making criteria to help policymakers prioritise industries for Australia to invest in
- Identifies five key sub-sectors of focus for Australia
- Identifies potential policy levers to accelerate this transition
- Identifies five priority actions for government.

These priorities come from a detailed literature review of publicly available studies and reports and from targeted stakeholder interviews.

Opportunities

Our synthesis of existing studies and targeted interviews to map supply chains identified a range of opportunities for Australia's development as a renewable energy superpower.

Onshore battery cell manufacturing as well as end-of-life management and recycling.

Invest in enabling infrastructure to increase local manufacturing for both onshore and offshore wind power.

Develop domestic production of high voltage cables for renewable energy transmission domestically and to connect Australia to regional neighbours, unlocking our potential as a net exporter of clean energy.

Build solar manufacturing based on Australian innovation to achieve Australia's net zero targets, which could create up to 60,000 jobs in the manufacturing sector.

Support the production of electric heavy vehicles for domestic market and explore the feasibility of developing for export.

Priority actions

This report will also recommend five key initiatives that government can take to realise the opportunities identified.

Develop coherent industry policy platforms for each target sector to provide a clear roadmap for growth.

Establish a fund to target capital to Australian companies, innovations and technologies that can scale into exporters.

Implement a nation-wide approach to local content requirements to maximise impact and enable new production capacity.

Use government procurement to provide market demand through the establishment phase of business or new production capacity.

Use complementary workforce and skill development programs to build the skilled labour required.

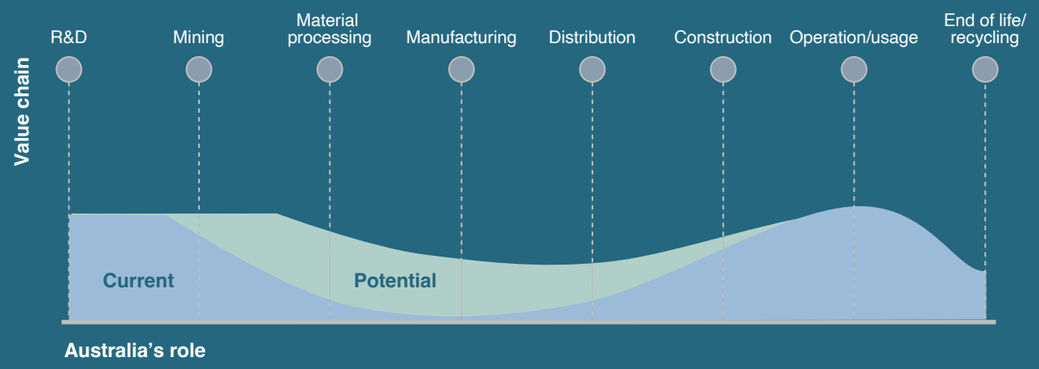
Australia's role in clean energy supply chains

Australia's reputation in the clean energy sector is complex. We are global leaders in the research and development (R&D) of certain technologies, particularly around solar photovoltaic (PV) technologies, we have some of the best renewable energy resources in the world and land mass. Yet much of our contribution to date is bound up in our reputation as a 'dig and ship' economy, where our mineral resources are mined and then sent offshore for processing and manufacturing, before returning as consumer goods.

This is reflected in the significant growth in mining as a share of Australia's economic activity, and a concurrent flatlining of business services and decline in manufacturing over the past decade, reflecting Australia's fall in global economic complexity rankings.

A number of global and regional forces are compelling Australia to re-evaluate our role in the clean energy sector:

- Geopolitical factors are forcing Australia (and other developed economies) to re-evaluate global trade dynamics.
- Global supply chain shocks have reignited the debate about the importance of domestic manufacturing capabilities and capacity and the importance of nearshoring and friendshoring.
- Climate change is necessitating the rapid decarbonisation of global economies.
- Australia's declining economic complexity risks us falling behind.



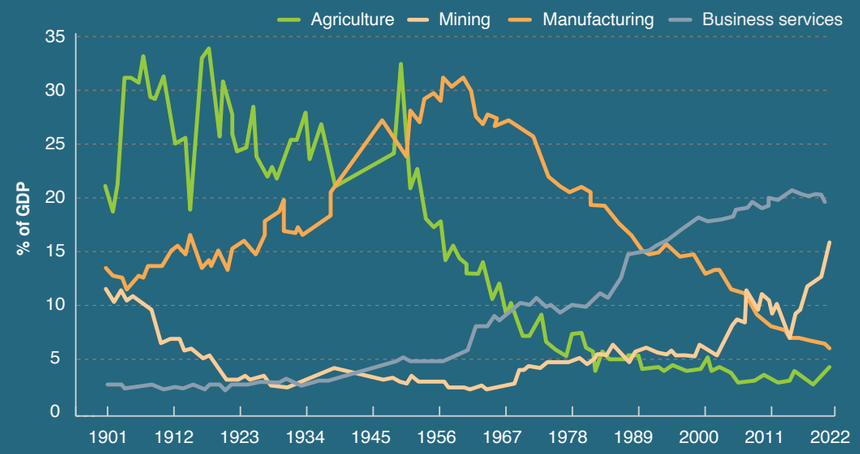
Illustrative purposes only.

Global demand for critical minerals and renewable energy is creating new opportunities for Australia to leverage our inherent comparative advantages as a significant resources region to play a lead role in the clean energy transition.

But there is a need to learn from our past and move away from our dig and ship mindset to one of value-adding if we are to become, in the words of Ross Garnaut, a renewable energy superpower. Australia can, or is already, playing a role in a number of major clean energy technology sectors, including solar, wind, critical minerals, battery energy storage and electric vehicles (EV), although our participation is often thin, with a handful of companies involved.

While there are global supply chains that support these sectors, Australia's comparative advantages in resources, solar and wind and R&D provide a significant opportunity to invest in more downstream value-adding activities.

In the face of significant global investment in the clean energy sector, most notably in the United States' Inflation Reduction Act (US IRA), Australia must identify key areas for investment in order to ensure we do not get left behind in the clean energy transformation.



Changing macroeconomic structure of the Australian economy since Federation.
Source: Compiled by SGS Economics and Planning from Australian Bureau of Statistics data sets.

Mission-oriented industry policy

This study highlights the large number of possible industry and clean energy opportunities available to Australia.

The question is: which ones are the most appropriate for Australia to pursue?

There are many factors that can determine investment direction and industry policy, and a series of questions to help frame this decision-making are made on page 13.

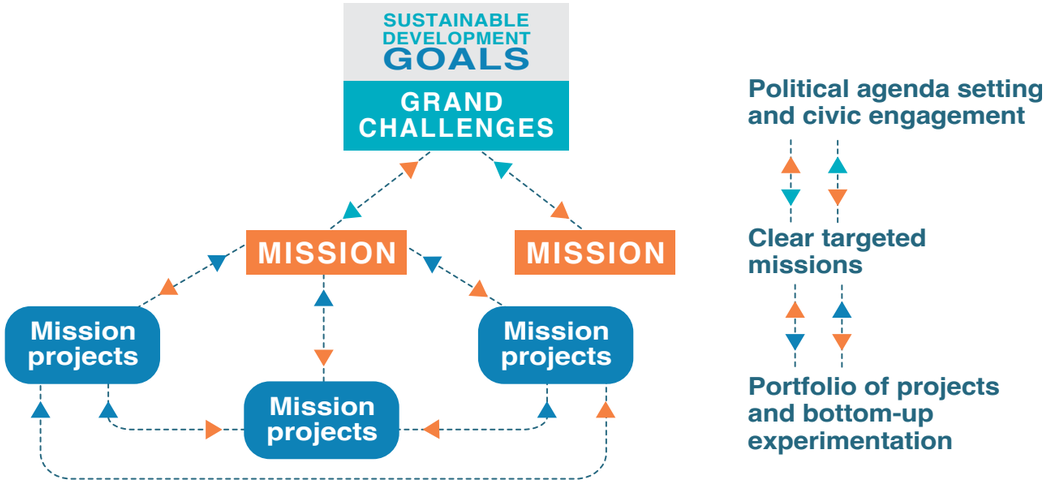
However, this should be predicated on some form of highest order imperative. Mariana Mazzucato's 'mission-oriented approach' to industry development provides a good frame for this by first defining the 'grand challenges' that a country (or the world) needs to address and then defining discrete 'missions' that help to address these grand challenges.

In the example provided, realising the United Nations Sustainable Development Goals (SDG) is seen as the grand challenge, but this could equally be framed as:

- Addressing climate change
- Creating an equitable and generative national economy
- Securing domestic sovereignty in critical industries
- Increasing national economic complexity
- Becoming a renewable energy superpower.

Each of these would be driven by targeted missions and supporting projects that would work towards overcoming the grand challenge.

Identifying the key industries to invest in within the clean energy suite of opportunities is more easily determined when the grand challenge that Australia is seeking to address is clear.



Source: M Mazzucato, *Mission Oriented Innovation: Reframing the direction of economic growth*, N.D, https://www.oecd.org/naec/NAEC_ Mazzucato.pdf, accessed 11 November 2023.

Becoming a renewable energy superpower could be considered the grand challenge for Australia.

It could also be considered a mission to address the higher order grand challenge of global decarbonisation and climate change mitigation. Either way, it presents an important arranging principle for Australia's clean energy industry policy ambitions.

Why is this strategic mission objective important? Because it can send Australia down very distinct paths.

If rapid acceleration of renewable energy generation is the primary driver, it may continue to perpetuate the export of raw materials and the reliance on global supply chains and the continued risks associated with being a small buyer in a larger global market.

If Australia wants to leverage the investment in renewable energy to build capacity in the domestic manufacturing sector, then this may have higher costs and longer delivery times but increases economic and energy resilience as a long-term outcome.

It is important, therefore, to not only understand the *what* and the *how* of Australia's clean energy superpower aspirations but also the *why*.

Clean energy supply chains

Australia plays a key role in the global supply chains of many of the clean energy technologies, however, most of our contribution is in the mining of resources such as iron ore, aluminium and critical minerals.

While there are existing capabilities across other parts of these supply chains, they tend to be relatively thin, sitting with a small handful of companies or in R&D across universities.

Examples include world-leading photovoltaic cell R&D at the University of NSW, wind tower and cage manufacturing, and heavy vehicle manufacturing and assemblage.

When plotted on the supply chains of the various technologies, what is clear is that Australia has not sufficiently captured supply chain adjacencies in any of the technologies.

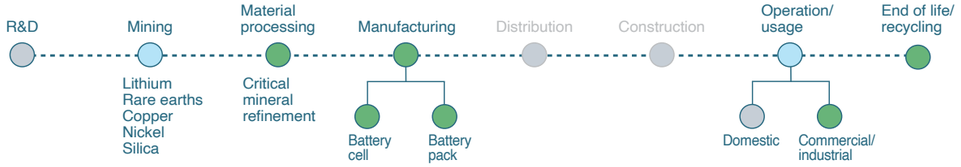
The following diagrammatic illustrations of these major technology supply chains relevant to Australia highlight where gaps in Australia's capability lie that, if addressed, could build on existing core advantages to develop more complex clean energy supply chains.

These supply chain maps, while high level, identify the broad supply chain steps for each technology where Australia has some current capability and where there are opportunities for expansion.

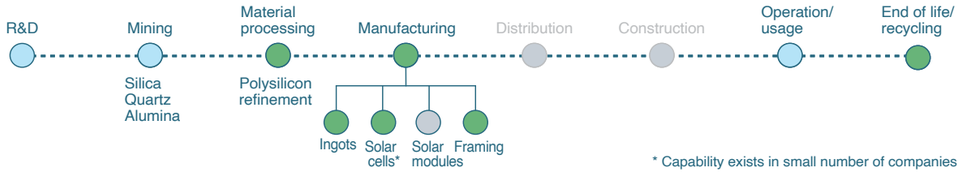
Supply chain activity Existing national capability National opportunity

Note: Distribution and construction are not a focus of this report and have been greyed out to indicate their role in the supply chain but not to draw attention to the opportunities.

Battery energy storage

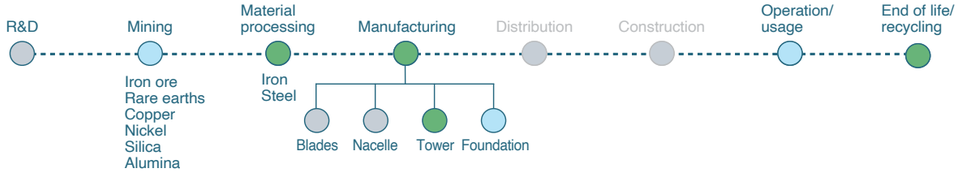


Solar photovoltaics

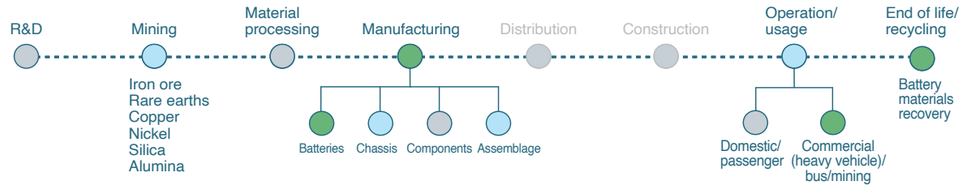


* Capability exists in small number of companies

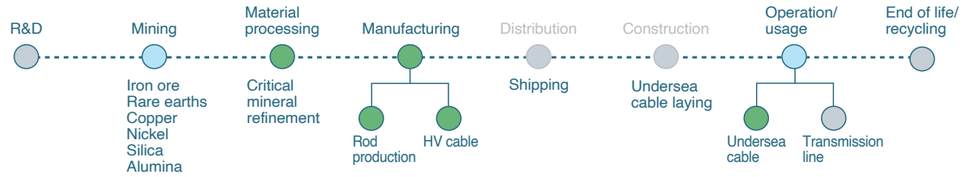
Wind



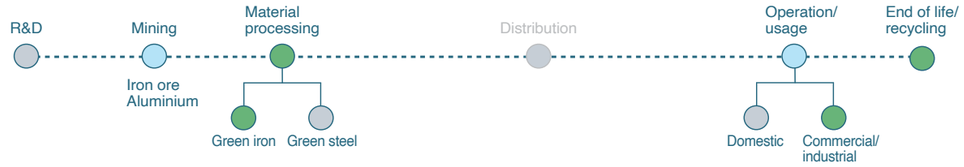
Electric vehicles



High voltage cable manufacturing



Green metal manufacturing



Illustrative purposes only.

Threshold considerations

If we take the overarching ambition for Australia to become a global renewable energy superpower, there are a wide range of opportunities that exist across Australia's economy to realise this.

Some of these are already underway, driven by the private sector. Others are more speculative. They sit across all of the technology types associated with the clean energy sector.

In his keynote address to the Economic and Social Outlook Conference in November 2023, Treasurer Jim Chalmers outlined four priority areas for government focus in the clean energy transition:

- Refining and processing critical minerals
- Supporting manufacturing of generation and storage technologies
- Producing renewable hydrogen and its derivatives
- Forging green metals.

These were defined through a series of five productivity tests that were outlined in his speech.[1]

The second of these – supporting manufacturing of generation and storage technologies – is the focus of this summary report: identifying which sectors may be worth supporting through significant government funding and policy attention to achieve success.

[1] J Chalmers, *Energy, the economy, and this defining decade* [speech transcript], 2 November 2023. https://ministers.treasury.gov.au/ministers/jim-chalmers-2022/speeches/keynote-address-economic-and-social-outlook-conference

To better understand the opportunities that could be prioritised, six threshold questions can be asked:

1. Does the opportunity directly align with existing core capabilities of Australian industry?

Is there an existing industry specialisation or comparative advantage that Australia has that is established in the Australian economy?

2. Does the opportunity meet a significant domestic demand?

Is there a current or future industry within Australia that will create a domestic market for the product being developed?

3. Does the opportunity unlock an export market for Australia or allow the sector to reach a global minimum scale?

Is there a current or future export market that domestic production can tap into?

Does a combination of domestic and export markets allow Australia to compete through sufficient production scale?

4. Does the opportunity reduce supply chain constraints or geo-political risk?

Are there existing supply chain blockages or is the supply chain dominated by a small cohort that risks supply chain delays from high global demand or geo-political trade tensions that domestic manufacturing could take advantage of?

5. Does the opportunity help the Australian economy to deepen its complexity?

Will the industry increase value-adding and create opportunities for more diverse and high-skilled jobs across the economy?

6. Does the opportunity require government intervention to overcome market barriers?

Is direct government intervention required to realise the opportunity due to the need for underwriting, capital certainty, infrastructure or trade agreements?

Is there complexity in the government response through multiple levels of government coordination or where regulatory systems unduly inhibit speed to market?

Australia's clean energy opportunities

A review of available literature and targeted stakeholder engagement has identified several key opportunities for Australian industry to move towards becoming a renewable energy superpower.

Each of these in some way aligns with or leverages existing core industry capabilities, fills in a supply chain gap, shores up domestic demand or unlocks significant export potential for Australia.

They also represent opportunities that, due to the scale of transformation, early mover risk or global competition, require some form of government support, either through direct funding or in-kind support.

Each of these presents as an opportunity in its own right, however, the mapping of these technologies and sectors on the following pages also highlights the possible inter-dependencies that each has that can create a compounding value proposition for Australia to realise its renewable energy superpower ambitions.

Three things stand out from this mapping:

- Critical mineral refinement and green hydrogen are 'keystone' upstream opportunities, as they unlock several downstream sector opportunities.
- A concurrent focus on multiple clean energy sectoral pathways will speed up domestic ability to meet domestic clean energy demand *and* hasten speed to market for key components of the global supply chain, creating significant export potential.
- Rapid development of clean energy increases capacity to create green hydrogen, accelerating decarbonisation efforts in global manufacturing supply chains, with Australia playing a lead role.

Diversified battery supply chain

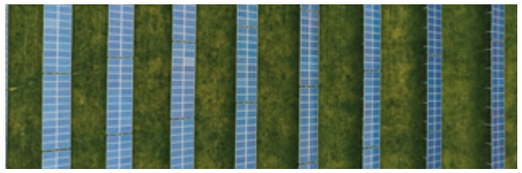
Develop domestic production capability for the manufacturing of battery cells and pack assembly for both domestic and export markets and incorporate recycled materials in a circular supply chain.

Wind tower manufacturing and offshore wind port infrastructure

Develop wind tower manufacturing capacity and the local steel supply chain for the $20 billion-plus domestic on- and offshore market.[2]

High voltage cable manufacturing

Develop domestic production of high voltage cables for renewable energy transmission domestically and to connect Australia to regional neighbours and unlock our potential as a net exporter of clean energy.



Solar supply chain expansion

Building solar manufacturing based on Australian innovation to achieve Australia's net zero targets could create up to 60,000 jobs in the manufacturing sector.[3]

Electric heavy vehicle manufacturing

Support the production of electric heavy vehicles for the domestic market and explore the feasibility of developing for export.

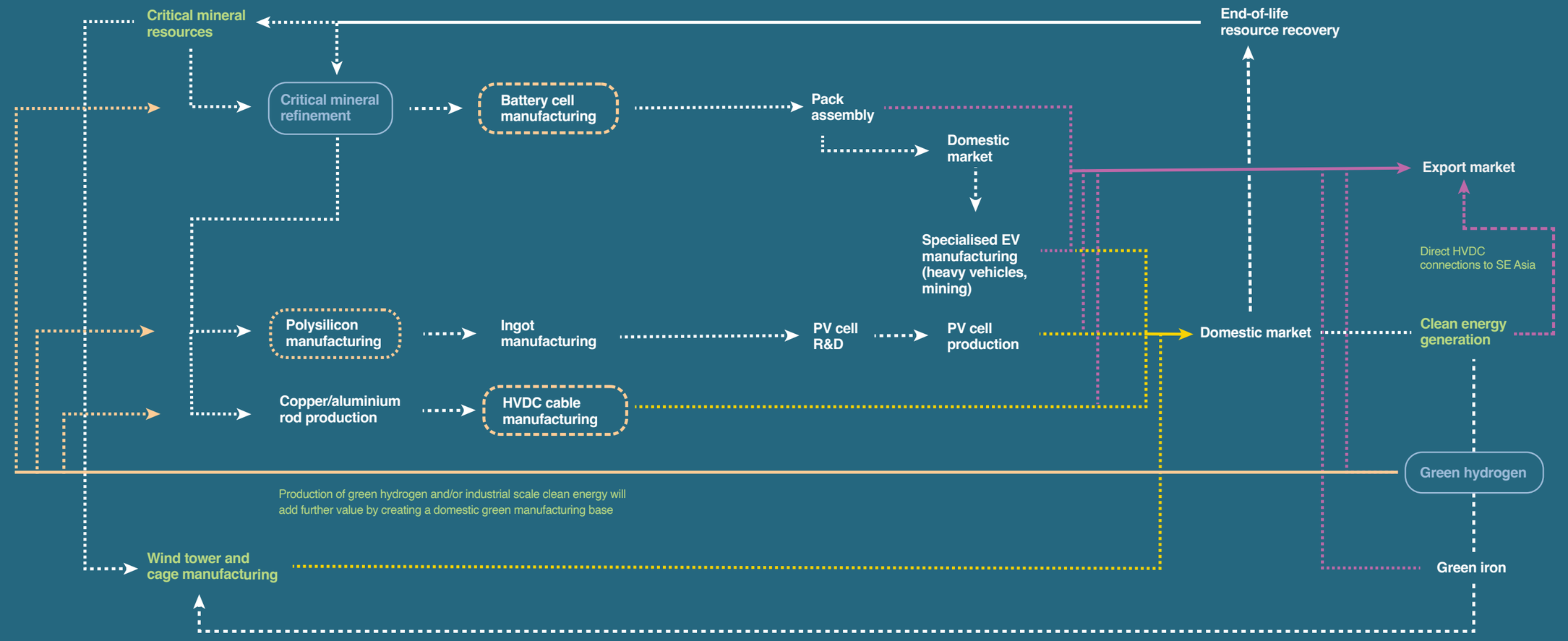
Each of the five priority opportunities are examined in more detail in the following pages.

[2] UTS Institute for Sustainable Futures, 2023.
[3] SunDrive, *Australian Solar Manufacturing Net Zero Industry Policy*, 2023.

Clean energy compounding value proposition

Each opportunity identified holds signficant potential on its own. However, when mapped as a system, the interdependencies between them become clear.

This highlights the scalable opportunity of a multi-technology investment approach to drive Australia towards becoming a renewable energy superpower.



Diversified battery supply chain

Develop domestic production capability for the manufacturing of battery cells and pack assembly for both domestic and export markets and incorporate recycled materials in a circular supply chain that is currently going offshore.

Diversified battery supply chain

Opportunity overview

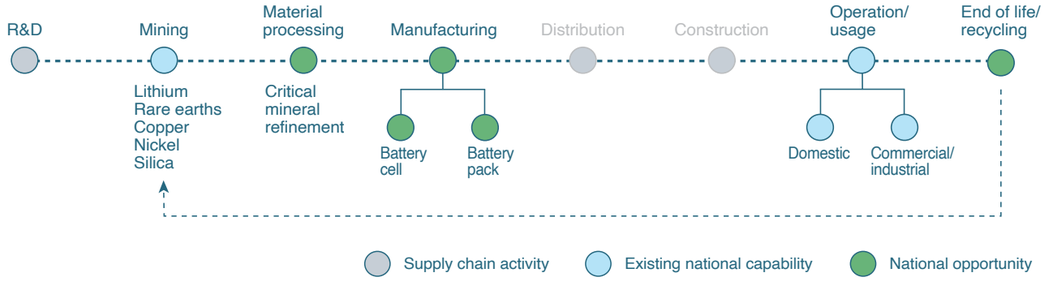
Does the opportunity directly align with existing core capabilities of Australian industry?

- Australia mines 9 of the 10 minerals required for most lithium batteries, including lithium, cobalt, nickel, copper and manganese, which is a major source of comparative advantage that can be leveraged.
- Increasing focus on domestic critical mineral refinement and processing as well as some manufacturing capacity.
- Low-cost renewable energy can also be leveraged.
- Current recycling capabilities only allow for the creation of low-quality battery products or chemicals for cathode manufacturing, and most material streams go overseas for recovery, but they could be extended to convert lithium-ion (Li-ion) batteries to link into emerging material processing.

Does the opportunity meet a significant domestic demand?

- While Australia is not likely to become a mass producer of passenger EVs, there is a strong sub-market in heavy vehicle manufacturing, assemblage and maintenance.
- Growing demand for large scale battery storage solutions.
- There is a large domestic demand for a wide range of battery products, with Australia's very high penetration of solar making it a prime market for battery installations.
- Batteries for recycling are currently exported to Korea, but this could be done locally.

Diversified battery supply chain



Does the opportunity unlock an export market for Australia or allow the sector to reach a global minimum scale?

- A report commissioned by the Future Battery Industries Cooperative Research Centre (FBICRC) and authored by Accenture identifies opportunities to export to trading partners seeking to diversify their supply chains.[4]
- Australia could develop niches such as batteries for high-temperature environments.

Does the opportunity reduce supply chain constraints or geo-political risk?

- Global battery demand is increasing exponentially, creating the risk of global supply chain shortages.
- Battery manufacturing is highly geographically concentrated, creating risks of supply shocks resulting from geopolitical factors.
- The development of local battery supply chain capacity is increasingly viewed as a national security priority given the central role battery storage is going to play.
- Reuse and recycling of battery products can reduce the pressure on importing newly produced batteries.

Does the opportunity help the Australian economy to deepen its complexity?

- There would be significant value-adding beyond our current resource exports. There are also synergies between battery manufacturing and the development of mining and new processing capacity.
- Upstream value-adding will drive demand for high-skilled jobs.
- Manufacturing will drive demand for a range of jobs from semi-skilled to highly skilled.
- Spillover impacts can flow into other associated sectors such as EV and other electronics.
- Opportunity to develop capabilities in emerging battery technology R&D and manufacturing.

Does the opportunity require government intervention to overcome market barriers?

- Significant investment is required to develop industry capability, creating demand and support in establishing facilities.
- Shared infrastructure requirements in key manufacturing precincts (co-located with resource extraction) cannot be done by private enterprise.
- Investment in advanced battery chemical refining industries, battery collection frameworks and formulation of best practice guidelines is required.

[4] Accenture & Future Battery Industries Cooperative Research Centre, *Charging Ahead: Australia's battery-powered future*, FBICRC, 2023.

Diversified battery supply chain

Opportunity detail

Rationale

Cell manufacturing opportunity

Accenture and the FBICRC suggest that building a national diversified battery supply chain that includes processing, manufacturing, services and recycling in Australia could contribute $55.2 billion in additional GDP and $16.9 billion in GVA.

Accenture identifies three strategic benefits for Australia to develop a cell manufacturing industry:

- Facilitates value chain development upstream
- Provides supply chain sovereignty for Australia to meet domestic energy security and defence needs.
- Drives technology improvements and sets upstream standards.

Excepting US IRA subsidies, Accenture also concludes that Australia would be globally cost-competitive in cell manufacturing. Australia's reliability, strong environmental, social and governance (ESG) performance and costs could enable the development of an export sector into countries diversifying supply chains, especially in Asia.[5]

Onshoring battery recycling

Most Li-ion batteries are disposed in landfill. Australian battery recycling is currently limited to disassembly and rendering into a suitable feedstock stream for metal recovery overseas.[6] A local battery recycling industry could be developed if barriers such as collection and processing are overcome.

Competitive advantage drivers

- Australia's key source of competitive advantage is battery mineral wealth and mining capacity. Over half the cost is in material processing, and there is a competitive advantage in co-location because the costs of transporting materials are significant.
- Manufacturing and labour costs are a relatively minor component (10%) and comparable to competitors. The factors that often count against Australia are reversed in this case, and domestic mineral reserves are a key source of competitive advantage.
- There are other sources of competitive advantage in Australia's low-cost renewables, high reliability and security as a trade partner, strategic trading alliances, and strong ESG standards compared with other resource rich countries.
- Global supply chain shortages and a desire by many countries to diversify global supply pathways to minimise geo-political risk associated with concentrated producers.
- Together, these factors create an opportunity to export to trade partners seeking to decarbonise and ensure the ethical certainty of supply chains.
- Domestic demand, from niche markets such as heavy vehicles (mining, trucks and buses) through to advanced development of battery storage systems could also provide a foundation for local industry development.
- Established export infrastructure connecting to countries further along the battery supply chain (e.g. car producing nations of South-East Asia).
- Growth of domestic passenger and commercial vehicle fleets will create a longer term pipeline of old batteries for resource recovery and supply chain reintegration, coupled with forecast global lithium supply shortages by 2030.[7]
- Environmental advantages in redirecting Li-ion battery products from landfill to recycling.

Investment and policy levers

The Accenture/FBICRC report notes that the US IRA creates significant challenges for cell and pack manufacturing. However, it recommends a focus in government policy on developing active mineral processing and cell manufacturing to build a diversified supply chain. A number of key policies and interventions are identified to develop Australia's battery manufacturing capability.

In summary, these include:

- Supporting international alliances to overcome trade protection e.g. direct subsidies and/or tax incentives for domestic producers
- Supporting industry attraction and coordination
  - Strategic targeting of global firms as 'lighthouse tenants'
  - Provide access to capital
  - Direct investment in hub development
- Supporting export partnerships
  - Develop strategic relationships with regional supply chain partners
  - Negotiate or revisit bilateral trade agreements
  - Support Australian businesses entering export markets
- Increasing domestic demand
  - Use progressive procurement policies for Australian-made batteries
  - Incentivise or require businesses to use Australian-made batteries through local content requirements
  - Provide offtake guarantees to give supply certainty
- There is a need for policies, right-to-repair, product stewardship and other initiatives to stimulate battery recycling.

[5] Ibid.
[6] A Best and C Vernon, *State of Play: Australia's Battery Industries*, CSIRO, Australia, 2020.
[7] Accenture & FBICRC, *Charging Ahead: Australia's battery-powered future*, FBICRC, 2023.

Wind tower manufacturing and offshore wind port infrastructure

Develop wind tower manufacturing capacity and the local steel supply chain for the $20 billion-plus Australian market. Port infrastructure for offshore wind could unlock increased local manufacturing.

Wind tower manufacturing and offshore wind port infrastructure

Opportunity overview

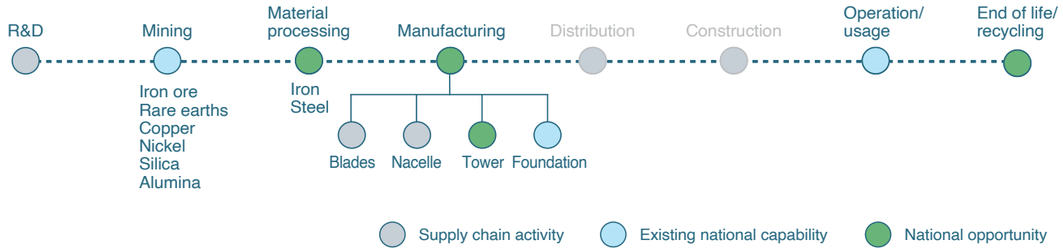
Does the opportunity directly align with existing core capabilities of Australian industry?

- There are two established wind tower manufacturers in Victoria and Tasmania.
- There is steel manufacturing and a supply chain with the capacity to make the rolled plate for onshore wind towers, but investment would be required in new capacity for tower manufacturing production lines.

Does the opportunity meet a significant domestic demand?

- There will be a large domestic demand for wind towers over the coming years and decades. Based on Australian Energy Market Operator (AEMO) scenarios, the market could range from $20 billion (Step Change scenario) to $80 billion (Hydrogen Superpower scenario).
- Offshore wind could also be a source of alternative employment for coal and oil and gas workers as our energy system transitions.

Wind tower manufacturing and offshore wind port infrastructure supply chain



Does the opportunity unlock an export market for Australia or allow the sector to reach a global minimum scale?

- No – the opportunity is to supply domestic demand.

Does the opportunity help the Australian economy to deepen its complexity?

- Modest impact – it would expand the steel manufacturing supply chain.

Does the opportunity reduce supply chain constraints or geo-political risk?

- Wind tower manufacturing is concentrated in China.
- Onshore wind experienced the largest cost increase of all renewable energy technologies due to global supply chain issues arising from Covid – estimated by the CSIRO to be an increase of up to 35%.[8] The CSIRO notes that higher costs will continue until 2027, but could be longer if higher demand arises internationally that continues the extension of tighter supply-demand balance.

Does the opportunity require government intervention to overcome market barriers?

- The key enabler is an offtake agreement or local content rules to create market certainty for investment in new manufacturing facilities.
- Capital grants may be required for investment in new manufacturing facilities.
- Port infrastructure for offshore wind.

[8] P Graham, J Hayward, J Foster, L Havas, *GenCost 2022-23: Final report*, CSIRO, Newcastle, 2023. https://doi.org/10.25919/zmvj-tj87

Wind tower manufacturing and offshore wind port infrastructure

Opportunity detail

Rationale

There is a large forward market in Australia for wind towers as part of the energy transition, both to replace the coal fleet but also potentially to underpin the growth of manufacturing and export of hydrogen.

Based on the AEMO's 2022 Integrated System Plan and current wind tower prices, the value of wind towers required is estimated to be approximately:

- $6 billion (Step Change scenario) to $12 billion (Hydrogen Superpower scenario) to 2030
- $12 billion (Step Change scenario) to $32 billion (Hydrogen Superpower scenario)
- $19 billion (Step Change scenario) to $82 billion (Hydrogen Superpower scenario) by 2050.[9]

Australia has a small existing wind tower manufacturing capacity but strengths in steel manufacturing.

There are key strategic benefits to Australia developing a wind tower manufacturing industry:

- Producing a portion of the wind towers required for Australia's build-out can reduce supply chain risk and exposure to geo-political and market disruptions. The wind supply chain was the most impacted by Covid, with the highest price increase of an estimated 35%. This will be especially important if Australia requires scaling up to power hydrogen and manufacturing exports.
- Development of the local steel supply chain could have flow-on benefits for offshore wind towers and pumped hydro pipes.

Competitive advantage drivers

- The development of wind tower manufacturing would be to supply the domestic market.
- There are cost savings from reduced transport costs, but overall estimates of the cost premium for local wind towers are generally 15-20%, though some developers claim it is 30-35%.
- Wind towers account for around 10% of the cost of wind farms. Consequently, if, for example, half of the wind towers were made locally, it would add around 1-2% to the cost based on pre-Covid prices – less if there are global supply chain price increases.
- The benefits of local production are speed to market and reduced exposure to supply chain risk.
- Whilst Australia has low existing capacity in wind tower manufacturing, there are major steel manufacturers, such as Bluescope, that have expressed interest in wind tower manufacturing and allocated space for a facility.
- There is also a supply chain that can be scaled up to support wind tower manufacturing. A manufacturer interviewed for a study for the NSW Renewable Energy Sector Board quoted a manufacturer stating: 'We know at least four fabricators that have said if they have the funding or investment, they would be able to start production on wind towers as soon as possible.'

Investment and policy levers

There are a number of investment and policy levers to be considered:

- Production subsidies for the establishment of new production facilities.
- Offtake agreements or local content requirements – the major element that is required is the market certainty to enable investment in new production facilities.
- Engagement and coordination between local manufacturers and developers and EPCs who currently prefer to source inputs from established global supply chains.

It's important to note the workforce and skill shortages that are impacting many sectors are relatively weak for wind tower manufacturing. Most of the jobs are semi-skilled – the workforce can be trained through a mix of TAFE and accredited on-the-job training.

[9] Analysis by report authors and P Toner. Estimate is based on current tower prices, as estimated by Australian Welding Institute, of $1.6m per tower and an average of 5 megawatts per tower.

Offshore ports and manufacturing

Opportunity detail

Rationale

Fit-for-purpose port infrastructure is a key enabler for offshore wind developments and local industry development. Offshore wind is proving the catalyst for major port refurbishments in the USA, Scotland and Denmark, and wider modernisations of ports.

Turbine assembly and staging occurs port-side for floating wind and associated upgrades are required for storage, fabrication and assembly of the massive turbines. Manufacturing and fabrication in areas such as towers, secondary steel and substructure fabrication and on-going maintenance develops at and nearby revamped ports.

There are a number of strategic benefits:

- Reduced supply-chain risk and exposure to geo-political and market disruptions – there is a high risk of supply chain constraints as larger Asia-Pacific markets scale up offshore wind.
- Development of the local steel supply chain building upon and transitioning heavy industrial economies.
- Developing offshore wind infrastructure could interlink with the development of green hydrogen production for port-based export facilities and local heavy industry (e.g. green steel) and as a transport fuel.

Competitive advantage drivers

- Australia has internationally competitive offshore wind speeds, which have attracted a large number of global firms.
- The development of offshore wind tower manufacturing could follow the development of onshore wind tower manufacturing. Australia's existing capability is limited to smaller width pieces (i.e. around 5 metres). New capability would need to be developed to roll larger 8-10 metre diameter pieces required for offshore wind farms.
- Some types of manufacturing are not likely to be viable for Australia, such as blades, but Australia could develop local manufacturing capacity in secondary steel (e.g. ladders, internal platforms and ship access platforms) and sub-structure elements either for fixed-bottom turbines. The National Renewable Energy Laboratory has noted most shipyards could be adapted to produce jacket foundations – or floating wind turbines (e.g. spar buoys and tension legs).
- The key enablers for local manufacturing are:
  - Deep water ports with suitable infrastructure
  - Surrounding heavy industry and workforce to support manufacturing and installation
  - Proximity to existing grid infrastructure.
- NSW in particular has many of the pre-conditions, with existing clusters of industries and workforces with skills in steelmaking, power generation, engineering and marine logistics.

Investment and policy levers

Australia will need a robust and nationally coordinated approach to industry development if it is to capture a greater share of the economic benefits in offshore wind. This will require early and ongoing collaboration with windfarm developers, supply chain businesses, international firms, leading R&D businesses and government.

Supply chain confidence will need to be established to enable investment through collaboration between federal and state governments to provide confidence that Australia has a strong pipeline of offshore wind farm developments.

To develop local manufacturing capabilities:

- Develop local content requirements associated with licencing of offshore wind zones
- Investigate joint ventures with other wind farm developers or international manufacturers to develop local manufacturing facilities
- Facilitate loans to fund expansion of facilities, with repayment terms linked to the proponent's production
- Commission detailed feasibility studies for port infrastructure redevelopments and build collaboration between governments and port owners to enable investment
- Conduct an evaluation of specific technology opportunities for offshore wind supply chain development and a detailed gap analysis of prospective supply chain opportunities to understand the requirements for developing the workforce, equipment and facilities for local manufacturing.

Solar supply chain expansion

Building solar manufacturing based on Australian innovation to achieve Australia's net zero targets could create up to 60,000 jobs in the manufacturing sector.

Solar supply chain expansion

Opportunity overview

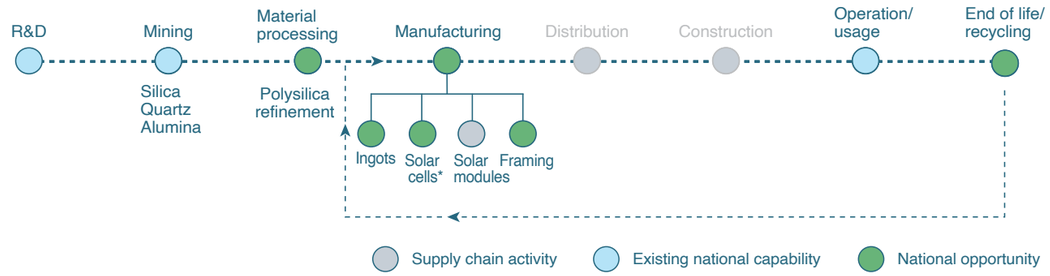
Does the opportunity directly align with existing core capabilities of Australian industry?

- Australia has the raw mineral inputs required for polysilicon manufacturing and globally leading R&D capabilities.
- Rapid acceleration of clean energy production creates a further competitive advantage by creating opportunities for developing a decarbonised domestic manufacturing sector.
- Building solar manufacturing based on Australian innovation.
- The right support – financial and product stewardship – can unlock a local market in reuse and recycling. There is a large local resource of PV panels to be recycled: 30% of decommissioned solar panels are less than 10 years old with high remaining efficiency and other useful components.

Does the opportunity meet a significant domestic demand?

- Australia has the highest per-capita rooftop solar installations in the world, and there continues to be robust growth in the domestic sector. There is significant growth potential in large-scale and commercial and industrial solar PV in AEMO scenarios up to 2050.
- Unlocking a local market for reuse and recycling of PV panels and components could be developed. A fraction of the materials, for instance scrap metal from frames, could go to overseas markets.

Expanded solar supply chain



Does the opportunity unlock an export market for Australia or allow the sector to reach a global minimum scale?

- Domestic demand for solar panels will continue to be significant. However, with access to capital to enable rapid scaling, domestic manufacturers such as 5b and SunDrive can become internationally competitive. There is an opportunity to build global solar businesses upon local innovation.
- Large-scale solar could also develop as part of remote export projects, such as Sun Cable.

Does the opportunity reduce supply chain constraints or geo-political risk?

- Domestic supply of components or full PV panels reduces the risk of global bottlenecks impacting access to product, especially for large-scale export projects, noting there is current excess capacity in the global market.
- End-of-life opportunity will create an additional supply stream of reused and recycled PV panels and parts, thereby decreasing supply chain requirements for new panels.

Does the opportunity help the Australian economy to deepen its complexity?

- Building global manufacturing capabilities on local innovation will create opportunities for jobs from R&D to advanced manufacturing, installation and end-of-life capabilities.
- There will be significant addition of value to a product stream through development of a local circular economy that now ends up in disposal pathways such as landfill.

Does the opportunity require government intervention to overcome market barriers?

- Access to capital is required to enable manufacturers to reach global scale where they can be cost competitive internationally. Government support, through mechanisms such as a production tax credit, co-investment or offtake agreements, are required to enable them to scale rapidly.
- Financial and non-financial incentives and regulatory changes are required to encourage the participation of solar installers in reuse and recycling activities and the creation of a local reuse and recycling industry.

Solar supply chain expansion

Opportunity detail

Rationale

Australia already plays a role in stages of the solar PV supply chain. We are a large driver of demand for PV panels, with over 3 million households installing solar. We also have world-leading research, particularly in solar cell technology. However, we do not have an established manufacturing sector – from polysilicon and ingots to cell manufacturing.[10]

China currently manufactures more than 80% of PV system components and an even higher share of other parts of the supply chain, including 98% of silicon wafers. The lack of supply diversity creates a significant risk of price increases and project delays, which will only increase as global demand grows.[11]

Given the domestic levels of demand for photovoltaics and the potential opportunity for Australia to also become a net exporter of renewable energy, there is merit in having a higher level of domestic self-sufficiency in solar panel manufacturing to safeguard against global supply shortage and sovereign risk issues.

There is an additional resource recovery opportunity to create a new local reuse and recycling market for PV panels and components.

Competitive advantage drivers

- An established domestic aluminium industry has translation opportunities into solar frame manufacturing.
- Strong existing R&D capability in cell efficiency could expand with a manufacturing sector to innovative panel designs that are geared towards Australian conditions that are lighter and more material efficient. The current ubiquitous panel design factors in snow loading in colder climates.[12]
- Polysilicon manufacturing is highly energy intensive, so a move towards industrial levels of domestically produced clean energy opens a pathway to significantly decarbonised PV supply chains
- There is existing steel industry capacity that can be leveraged for some solar components. For example, there are firms with tubular manufacturing capacity, such as AusTube Mills, Liberty Steel and Orrcon Steel, a subsidiary of Bluescope, that could manufacture support structures for solar (and hydrogen).
- Significant amounts of existing PV panels will reach their end of life in coming years and require recycling and materials recovery, presenting a significant opportunity for complementary end-of-life sector development. Currently 30% of decommissioned PV panels are disposed in landfill or stockpiled.[13]
- Growing levels of supply chain automation can enable a global rebalancing of the solar module manufacturing industry towards continents such as Australia where modules are deployed to large-scale solar farms with robotic module assembly and automated inspection technologies. This is expected to shrink worldwide labour costs for solar module manufacturing by 25% across the entire sector, thereby reducing the labour cost advantage of countries like China.[14]

Investment and policy levers

A detailed study is being undertaken by the University of NSW, funded by the Australian Renewable Energy Agency (ARENA), which is examining solar manufacturing opportunities in detail.

There are a number of policy levers that are likely to support the advancement of the PV supply chain:

- A US IRA-style fund to support manufacturing innovators to scale rapidly in order to be competitive on the global export market.
- State and federal government support, planning and infrastructure investment in strategically located industrial eco parks that bring together key manufacturing supply chain partners to leverage shared infrastructure and, ideally, green energy and circular economy networks.
- Skill acquisition programs to entice Australian-trained photovoltaic engineers back to Australia from overseas.
- Government-backed offtake agreements or price floors to give certainty to investors in capital intensive, high risk early stages of polysilicon and ingot manufacturing.
- Incentives must be created to stimulate product stewardship and participation in reuse and recycling activities.
- Solar PV installers need financial support to overcome challenges in participating in reuse and recycling activities.

[10] Australian Trade and Investment Commission (Austrade), *Why Australia – Benchmark Report: A renewable energy superpower*, Austrade, Australian Government, 2023.

[11] Australian Renewable Energy Agency, *The Incredible ULCS: How Ultra Low Cost Solar can Unlock Australia's Renewable Energy Superpower*, ARENA, Australian Government, 2023.

[12] House of Representatives Standing Committee on Industry, Science and Resources, *Sovereign, smart, sustainable: Driving advanced manufacturing in Australia*, Australian Government, 2023.

[13] H Salim, N Florin, B Madden, *Managing end-of-life solar photovoltaic in Australia: Key findings from installer surveys*, Institute for Sustainable Futures, University of Technology Sydney, 2023.

[14] Brinson and Associates, Australian Domestic PV Supply Chain: Giga-scale Green Fab supply chain White Paper, Brinson and Associates, 2023.

High voltage cable manufacturing

Domestic production of high voltage cables for renewable energy transmission domestically and to connect Australia to regional neighbours.

High voltage cable manufacturing

Opportunity overview

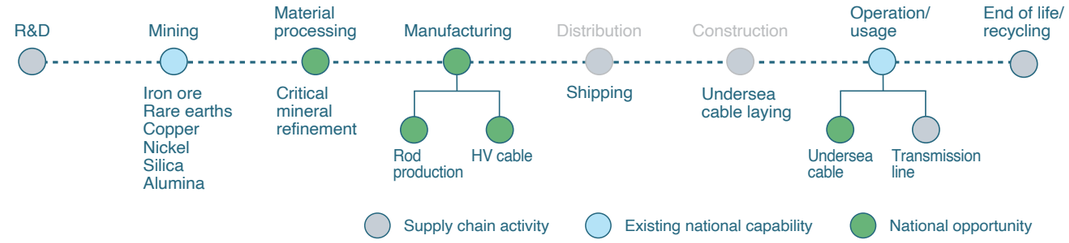
Does the opportunity directly align with existing core capabilities of Australian industry?

- Australia is viewed favourably as a location for large-scale solar and wind generation and is being positioned potentially as an exporter of renewable energy to regional neighbours such as Singapore.
- Australia does not have current capability in high voltage cable manufacturing.

Does the opportunity meet a significant domestic demand?

- Renewable energy export projects, such as Sun Cable, are contingent on having the infrastructure to enable them. The likelihood of these ambitious projects is uncertain, however, if they have the right support, they will generate significant domestic demand for cables.
- The proliferation of onshore and offshore wind will create demand for high voltage cable connections.

High voltage cable manufacturing supply chain



Does the opportunity unlock an export market for Australia or allow the sector to reach a global minimum scale?

- Global delays to supply and continued and growing demand suggest strong export opportunities for Australia.

Does the opportunity reduce supply chain constraints or geo-political risk?

- Global supply chain delays are reported to be up to eight years. This creates a risk to the timely delivery of cables for domestic projects and creates an opportunity for Australia to capitalise on these delays to play an export role.

Does the opportunity help the Australian economy to deepen its complexity?

- The refinement of key metals domestically and the production of cable elements will add value and more complex processes to domestic manufacturing.
- Developing export capability will enable R&D and associated industries to grow around the cable manufacturing sector.

Does the opportunity require government intervention to overcome market barriers?

- Yes – the establishment of factories of appropriate scale require multi-billion dollar investments and would likely need a mix of capital expenditure funding and certainty for offtake of product over several years to give certainty to investors.
- Connections between countries that would lead to demand for trans-national connections require government trade agreements and support by transmission systems operators.

High voltage cable manufacturing

Opportunity detail

Rationale

Australia has aspirations to become a renewable energy superpower and a potential exporter of renewable energy. The scaling of renewable energy generation to realise this aspiration is contingent on the ability to connect new facilities. High voltage cabling is a critical part of this.

There are global supply shortages, however, with stakeholder engagement indicating lead times of up to eight years for high voltage direct current undersea cables.

This supply constraint creates a two-fold opportunity for the establishment of a domestic high voltage cable manufacturing sector: it can provide greater certainty to the long-term roll out of domestic renewable energy projects, and it also creates an opportunity for Australia to develop as an exporter in a supply constrained market. Research by the International Renewable Energy Agency (IRENA) indicates that by 2050, the global installed capacity of high voltage direct current (HVDC) lines will increase to 2,500 gigawatts, up from 200 gigawatts in 2018.[15]

Domestic production also provides the opportunity to support some of the ambitious trans-national renewable energy connection projects, such as the Sun Cable project, that have been proposed, which would need approximately 12,000 km of cabling.

Competitive advantage drivers

- Existing and growing domestic demand across a range of renewable energy projects.
- Potential for signficant offtake through the Sun Cable project.
- Australia's existing trade relationships with regional partners exploring undersea connections.
- Australia has high levels of mineral wealth, with key minerals such as copper and aluminium.
- Aluminium smelting capability, such as Bell Bay, Tasmania, creates co-location opportunities with metal refinement and deepwater port access for direct export or domestic deployment.

Investment and policy levers

- Capital expenditure funding to help in the capital-intensive establishment of factory facilities and to provide confidence to private capital and debt to co-invest.
- Upfront investment in enabling infrastructure such as regional power networks or port infrastructure upgrades.
- Planning and support for clean tech precincts in identified priority locations to co-locate supply chain activities around catalyst infrastructure or business.
- Embed local content requirements into domestic projects to generate demand for local manufacturers.
- Government underwriting of offtake agreements to ensure demand certainty in early years of facility establishment.
- Negotiating trade agreements with trade partners to remove export barriers for domestic producers into global supply chain.
- Investing in supporting clean energy agendas (such as green hydrogen) to decarbonise the manufacturing process to provide a product to trade partners that enables them to meet their decarbonisation efforts.

[15] International Renewable Energy Agency, *Innovation landscape brief: Supergrids*, IRENA, Abu Dhabi, 2019.

Electric heavy vehicle manufacturing

Support the production of electric heavy vehicles for the domestic market and explore the feasibility of developing for export.

Electric heavy vehicle manufacturing

Opportunity overview

Does the opportunity directly align with existing core capabilities of Australian industry?

- Australia has extensive domestic reserves of the minerals needed for EV manufacturing, an advanced industrial base with links to automotive manufacturing, a highly skilled workforce and growing consumer interest.
- The Australian automotive sector still employed over 30,000 people at the start of the decade.[16]
- More than than 90% of buses are assembled in Australia.

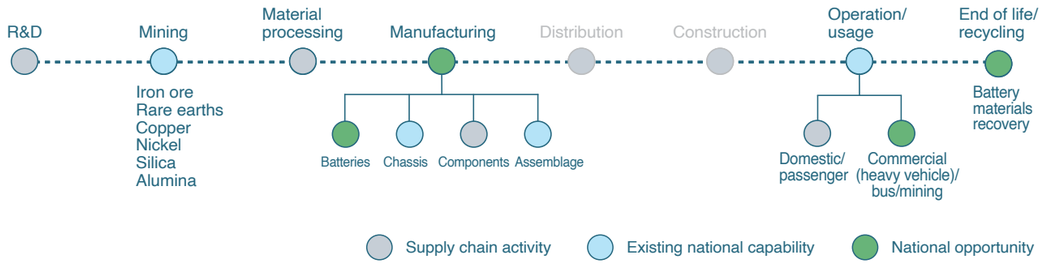
Does the opportunity meet a significant domestic demand?

- While Australia is not likely to become a mass producer of passenger EVs, there is a strong sub-market in heavy vehicle manufacturing, assemblage and maintenance (trucks, buses and mining equipment).
- There is growing demand for zero emission vehicles in the shorter-term, for buses and other heavy vehicles, driven by local, state or corporate targets.
- There is a lack of choice for EV models/classes in Australia and in many markets outside the key ones (Europe, US and China).

Does the opportunity unlock an export market for Australia or allow the sector to reach a global minimum scale?

- Manufacturing and assembling EV batteries, cells and components, and EV assemblage and components (chassis build-ups, motors and power electronics), could be exported to other markets that require heavy vehicles (buses and conversions in the short term, trucks in the longer term).
- Predicting the size and location of the opportunity is challenging to ascertain without further detailed research and analysis.

Electric heavy vehicle manufacturing supply chain



Does the opportunity reduce supply chain constraints or geo-political risk?

- The automotive industry has experienced major supply chain issues, and growing demand for EVs in countries where EV incentives are strongest means Australia lacks the kind of model choice other nations have.
- There is a lack of model choice globally for certain types of more niche vehicles, with auto manufacturers mostly focussing on passenger vehicles.
- Reducing dependence on imported fossil fuels for transport from a small number of producers reduces geopolitical risk.

Does the opportunity help the Australian economy to deepen its complexity?

- Critical minerals such as lithium, nickel and cobalt are essential for EVs, but Australia plays a limited role in the supply chain beyond extraction and export.
- Involvement in EV battery cells and components, EV components and EV assemblage, as well as a variety of niche vehicles and retrofits, would deepen its complexity.

Does the opportunity require government intervention to overcome market barriers?

- Coordinated, overarching, strategic policy for industry development at the national level.[17]
- Industrial transformation plan to help remaining automotive manufacturing assets be redeployed and new assets to be developed.
- Help unlock capital for manufacturing firms to expand capacities and capabilities.
- Enhance access to markets outside Australia, especially in the Asia region, through tackling tariffs and non-tariff barriers.
- Encourage customer demand for heavy EVs.
- Review and revise public procurement rules.
- Fund comprehensive supply chain requirements and analysis for EV manufacturing for domestic and export markets.

[16] The Australia Institute, *Manufacturing the Energy Revolution: Australia's Position in the Global Race for Sustainable Manufacturing*, The Australia Institute, 2023.
[17] M Dean, *Rebuilding Vehicle Manufacturing in Australia: Industrial Opportunities in an Electrified Future*, Centre for Future Work at The Australia Institute, 2022.

Electric heavy vehicle manufacturing

Opportunity detail

Rationale

Like many countries, Australia is rapidly seeking to decarbonise its transport emissions through electrification. The share of new passenger vehicle sales that were EVs increased to 8% recently, but more than 70% of these sales were from three models, either US or Chinese.[18] One of these – Tesla – derives 80% of their feedstock for their EV batteries from Australia.[19]

Despite ceasing mass vehicle manufacturing in Australia in 2017, after 70 years, more than 30,000 people were still employed in automotive manufacturing supply chains in 2020.

When it comes to heavier vehicles, many states and cities are rapidly electrifying their bus fleets, with rolling mandates on diesel/petrol phaseouts. Mining companies are also seeking ways to electrify their vehicles, seeking the benefits of zero tail pipe emissions for both utes and earthmoving equipment.

There are a number of strategic benefits:

- Reduced supply chain risk and exposure to geo-political and market disruptions. Automotive sectors have experienced major supply chain issues following Covid, while the Russia-Ukraine conflict added huge upward pressure on fossil fuel prices.
- Involvement in EV battery cells and components, EV components and EV assemblage, as well as a variety of niche vehicles and retrofits, would deepen its complexity – and help link with the battery industry for stationary applications.
- Critical minerals, such as lithium, nickel and cobalt, are essential for EVs, and Australia could play a larger role in the supply chain beyond extraction and export.

Competitive advantage drivers

- Australia has a highly skilled and educated workforce already working in the automotive supply chains.
- Australia's mining sector and its mining equipment/earthmover manufacturing could be linked for their mutual benefit.
- While Australia is unlikely to become a mass producer of passenger EVs in the near future, there is a strong sub-market in components, heavy vehicle (trucks, buses and mining equipment) manufacturing, assemblage and maintenance.
- The key enablers for local manufacturing are:
  - Coordinated, overarching, strategic policy for industry development is needed at the national level.
  - Industry assistance programs to stimulate EV component manufacturing.
  - Industrial transformation plan to help remaining automotive manufacturing assets be redeployed and new assets to be developed.
  - Help unlock capital for manufacturing firms to expand capacities and capabilities.
  - Workforce training to build and service EVs and their components.
  - Encourage customer demand for electric heavy vehicles, including for conversions in the short term and for helping the trucking industry and others plan for electrification.
  - Fit-for-purpose public procurement rules for electric vehicles with a certain amount of domestic manufacturing.
  - Fund comprehensive supply chain requirements and analysis for EV manufacturing for domestic and export markets.
  - Enhance access to markets outside Australia, especially in the Asia region, through tackling tariffs and non-tariff barriers.
- Locations that were home to previous automotive manufacturing, such as Geelong, and which retain their links to their supply chains, would be excellent candidates for local manufacturing. Other areas previously servicing power generation industries, such as the Latrobe Valley and Hunter Valley, could also be possible locations.

Investment and policy levers

A coordinated, overarching and robust strategic policy for industry development will be needed at the national level if Australia is to capitalise on its existing resources and skills base, as well as rapid electrification of its transport sector.

This will require early and ongoing collaboration with the EV sector, supply chain partners, end user groups, industry associations, academia and government.

Greater clarity is needed on exactly where and how Australia can play in global EV supply chains, as well as which vehicle segments and countries have the best potential for the exported products. The same applies for what can be done to open up access to markets outside Australia, especially the Asia region, to EV-related goods and services.

Action is needed to help unlock capital for manufacturing firms looking to redeploy existing automotive manufacturing assets, develop new ones, and help them expand their capability and capacity for these newly developing markets.

Domestic demand can be encouraged for electric heavy vehicles through policy levers for the phase out of diesel and petrol variants, as well as a review of how procurement rules could both support the domestic industry and increase the share of EVs.

Aside from battery cells and other components, electric buses and electric conversions of internal combustion engine vehicles (such as utes, rigids, mining vehicles, commercial vans and refuse collection trucks) could pose the nearer term opportunity for the domestic market. Trucks – rigid and artic – could pose a medium to longer term opportunity.

[18] Electric Vehicle Council, *State of electric vehicles: July 2023*, EV Council, 2023.

[19] Clean Energy Council, *Power Playbook: Accelerating Australia's Clean Energy Transformation*, Clean Energy Council, Australia, 2023.

The need for support from government

Transformational industry development carries with it inherent risk, upfront investment and market uncertainty. The scale of benefit available to Australia across these and other opportunites in the clean energy sector are evident. However, many need significant upfront investment in order to overcome barriers to market entry or rapid growth to achieve sustainable economies of scale.

These barriers include:

- New or upgraded facilities have high capital expenditure and risk and require demand certainty from customers.
- Opportunities for Australia in the clean energy sector are often regionally isolated and lack the enabling infrastructure such as energy networks, port access and even housing and community infrastructure for a growing labour force.
- The energy system is complex and has significant regulatory oversight and barriers to entry for individual businesses.
- There are established global supply chains in many technologies that make it difficult for domestic businesses to engage.
- Global supply chains are linked with bilateral trade agreements.
- Domestic production capacity and higher manufacturing costs put Australia at a disadvantage compared with other countries.
- Government funding, frequently through grants, is often at levels too small for substantial capital investment in advanced manufacturing facilites.

This is why an Australian equivalent of the US IRA level of funding is essential if Australia is to realise its renewable energy superpower aspirations to ensure that innovative companies and value-adding opportunities that directly align with existing comparative advantages can be realised.

While the technologies, capabilities and markets exist, the upfront capital costs and level of risk will continue to deter signifcant private sector co-investment without clear signals from the Federal Government about their commitment to these opportunities.

In advanced manufacturing economies, or those that have sustained a strong manufacturing base, such as the US, access to funding is more likely to be effective as a means of government intervention. This is because businesses' domestic supply chains and supporting infrastructure are already established.

As a consequence, while access to significant levels of capital is vital in accelerating this transformation, it must occur within in a broader, multi-pronged policy and regulatory response.

What emerged from engagement for this report was that for Australia to be competitive in whatever sub-sector is targeted, we must have scale, and in order to have scale, three things are required:

- Certain and consistent demand for the product
- Underlying capability within organisations and the wider labour market
- A well functioning business ecosystem.

Summary of policy levers

There are a number of policy levers at government's disposal, with the broad levers summarised here. These are adapted from the Accenture/FBICRC report, *Charging Ahead: Australia's battery-powered future*, with further policy levers added based on literature review and stakeholder interviews.

Access to capital and incentives

- Subsidies and/or tax incentives for domestic producers, with local content conditions, such as investment and/or production tax credits
- Access to grant funding programs of sufficient scale to support high capital expenditure investments

Industry attraction

- Identify international producers to attract as lighthouse tenants
- Offer targeted firms a globally competitive and low-risk investment pathway
- Establish syndicated finance facilities with foreign governments in exchange for supply guarantees

Industry coordination

- Develop comprehensive spatial industry policy platforms at a national level to give industry direction and clarity to states and territories about their role
- Establish an industry coordination body that connects supply chain stakeholders
- Develop hubs or precincts to facilitate industry co-location and develop shared infrastructure
- Introduce incentives for producers to trade with domestic supply chain partners

Regional export partnerships

- Establish strategic relationships with key regional trade partners
- Renegotiate bilateral trade agreements with regional trade partners
- Provide support for Australian businesses to enter export markets
- Facilitate partnerships between Australian and foreign companies for project development

Increase domestic demand

- Provide government-supported offtake agreements to key suppliers to create demand certainty in order to provide investment certainty for private capital
- Incentivise or require domestic businesses and consumers to purchase Australian-made products via local content regulations

Specialised infrastructure and institutions

- Develop common use R&D and prototyping facilities
- Develop a training facility to grow specialised workforce capabilities
- Facilitate industry-academia collaboration

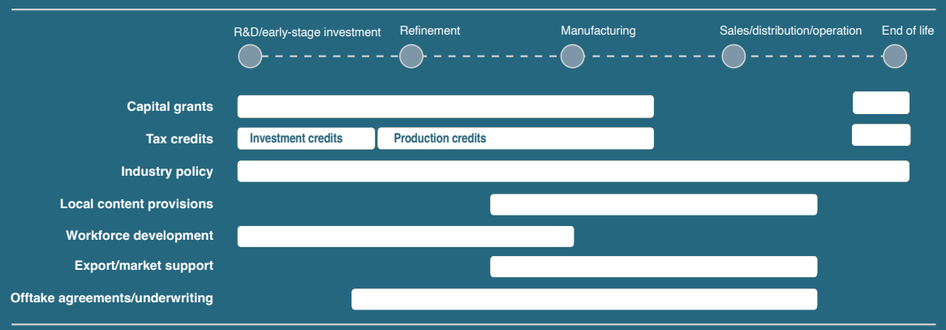
Source: Accenture & FBICRC, *Charging Ahead: Australia's battery-powered future*, FBICRC, 2023.

Aligning policy levers with supply chain

Different policy levers will be more relevant to different parts of the supply chain process.

The following illustration plots the likely coverage that each of the key policy levers will have from R&D and early-stage industry or business establishment right through until end of life.

It does not preclude these levers being used at all stages, but rather provides a snapshot of how different levers could enter and exit the supply chain process.



Five priority actions for government

Different types of policy measures are required to realise the different opportunities identified. This report recommends five key initiatives.

Comprehensive industry policy

Develop coherent industry policy platforms for each target sector to provide a clear roadmap for growth. There should be a spatial dimension to provide states with a clear sense of their roles and reduce excessive competition for investment.[20] This should include updates to the Australian Industry Participation Plans.

Australia needs to build a more comprehensive strategic industry policy framework with sectoral roadmaps, including a range of measures such as partnerships and collaborations with industry.

Finance and incentives

Establish a fund which can provide targeted capital to Australian companies, innovations and technologies that can scale into internationally competitive exporters. Design, which could include production tax credits, grants or co-investment, will be important to enable scaling and certainty for the most prospective opportunities whilst managing budget exposure.

Funds should be strategically targeted towards Australian companies, innovations and technologies where access to capital can enable building to scale to export.

Local content requirements

Work with state and territory governments to implement a nation-wide approach to local content requirements to maximise impact and enable new production capacity, including definition specificity regarding materials and components and registers of business providers and their level of domestic versus foreign ownership.

Current requirements are fragmented across state jurisdictions and often lead to expansions in existing activities rather than new production capacity. Effective local content requirements are more likely to drive a wider range of local development opportunities in areas adjacent to existing capacity or which are less capital intensive to service domestic demand.

The proposed Capacity Investment Scheme provides an opportunity to coordinate local content requirements at scale which will enable greater impact and complement other government initiatives.

Government procurement

Use government procurement to underwrite offtake agreements for producers to provide market demand through the establishment phase of business or new production capacity.

Larger capital investments to service local demand may require greater demand and investment certainty than can be achieved through local content requirements, which can be achieved through the use of offtake agreements via government procurement.

Coordinated workforce development

Work with the state VET sector, universities and industry to embed workforce development and training to build the skilled labour required to develop opportunities.

In the context of global skill shortages and competition for labour, Australia needs to complementary workforce and skill development programs.

[20] J Gill, *Sectoral, Systemic and Spatial: Rethinking Australia's Approach to National Industry Policy*, SGS Economics and Planning, 2023.

TOWARDS A RENEWABLE ENERGY SUPERPOWER

Industry opportunities for Australia to embrace the clean energy revolution

Prepared for Climate Action Network Australia and the Australian Manufacturing Workers' Union, 2023.