

# 2035 Climate Initiative

## Roundtable Three

19 July 2023, 9:30am - 11:30am AEST



# Agenda

Time	Agenda Item
9:30 AM	<b>Welcome and introductions</b> Andrew Hudson (CPD) Anna Skarbek (Climateworks Centre)
9:40 AM	<b>What sort of economy could Australia have in 2035 and what does it mean to become a 'renewable superpower'?</b>
10:30 AM	<b>What would we need to do to achieve the 'superpower' ambition?</b>
11:20 AM	<b>Conclusions</b> Andrew Hudson (CPD) Anna Skarbek (Climateworks Centre)
11:30 AM	<b>Close</b>

# Participant list

Name	Position and Affiliation
Alan Finkel	Former Chief Scientist
Allina Fawcett	Manager, Strategic Research Programs, Clean Energy Finance Corporation
Amy Quinton	Senior Policy Manager, IGCC
Andrew Hudson	CEO, Centre for Policy Development
Andrew Treble	Head of Government Liaison, Sun Cable
Anna Hancock	Executive Director, Pollination
Anna Malos	Australia - Country Lead, Climateworks Centre
Anna Skarbek	CEO, Climateworks Centre
Brad Archer	CEO, Climate Change Authority
Brett Shoemaker	Chief Sustainability Officer, Microsoft ANZ
Casey Milward	General manager, Department of Industry, Science and Resources
Christina Tonkin	Managing Director, Corporate Finance, ANZ
Claire Penrose	Director, Climate Change Policy, VIC Department of Environment, Land, Water and Planning
Dan Sherrell	Senior Climate Advisor, ACTU
Deb Anton	Head of Division for Industry Growth, Department of Industry, Science and Resources
Dennis Venning	Senior Policy Advisor, Centre for Policy Development
Desmond Ko	Director, Department of Finance
Don Russell	Independent Chair, Australian Super
Elizabeth Hickey	Assistant Secretary, Education, Employment & Workplace Relations, Department of Finance
Emily Briggs	Deputy Director General, Climate and Sustainability, WA Department of Water and Environmental Regulation
Emma Herd	Partner, EY Climate Change and Sustainability; Co-Lead, EY Net Zero Centre
Eytan Lenko	CEO, Boundless Earth
Frank Jotzo	Director, Centre for Climate and Energy Policy, ANU

Name	Position and Affiliation
Guy Debelle	Board member, Fortescue Future Industries
James Flick	A/g General Manager for the Industrial Competitiveness and Strategy Branch, Department of Industry, Science and Resources
John Lydon	Co-chair, Australian Climate Leaders Coalition
Jonathon McCarthy	Chief Decarbonisation Officer, Rio Tinto
Julia Pickworth	Deputy Secretary, Department of Industry, Science and Resources
Kevin Pugh	Director, Demographic & Sectoral Analysis, NSW Treasury
Kristy Graham	Executive Officer, Australian Sustainable Finance Institute (ASFI)
Kylie Turner	Systems Lead, Climateworks Centre
Lisa Di Paolo	Climate Manager, WA Treasury
Louise Davidson	CEO, ACSI
Marghanita (Margi) Johnson	CEO, Australian Aluminium Council
Michael Bartlett	A/g Assistant Secretary, Renewable Superpower Taskforce, Department of Climate Change, Energy, the Environment & Water
Michele O'Neil	President, ACTU
Mohita Zaheed	First Assistant Secretary, Treasury
Nadine Williams	Deputy Secretary: Economy, Industry and Resilience, Department of Prime Minister and Cabinet
Paul Boulus	Partner, EY Port Jackson Partners
Richard Yetsenga	Chief Economist, ANZ
Sarah Russell	Director, Climate Change, Renewables Climate and Future Industries Tasmania
Simon Corbell	Board Chair & CEO, Clean Energy Investor Group
Tennant Reed	Head of Climate, Energy and Environment Policy, Ai Group
Tim Nelson	EGM, Energy Markets, Iberdrola Australia
Toby Phillips	Sustainable Economy Program Director, Centre for Policy Development
Zoe Whitton	Managing Director, Pollination Group

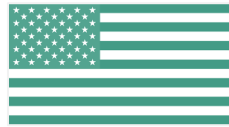
2035 CI 3 - Green Industrial Policy

# The emergence of green industrial policy

- Action on climate change is accelerating globally, driven by a 'green industrial policy' approach
- Such an approach sees governments actively promote the development and deployment of clean technologies and reduce the environmental impact of industrial production
- Key areas include renewable energy deployment and component manufacturing, electric vehicles, electrification technologies such as heat pumps, green materials including steel and cement, green hydrogen and derivatives, and carbon capture and storage
- Australia could attempt to employ green industrial policy to become a 'renewable energy superpower,' deploying an immense amount of renewable energy to power manufacturing of clean exports like green iron, refined lithium, and green hydrogen derivatives



*After years of concerted effort and deep government support via Five Year Plans, around half of the world's renewables were installed in China in 2022, about four-fifths of solar and batteries were made there, and more than half of all the world's EVs are on Chinese roads*



*The US' Inflation Reduction Act could provide as much as \$2 trillion AUD in subsidies for clean energy and related products over the next ten years via uncapped tax credits*



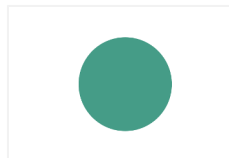
*The EU's Green Deal Industrial Plan could provide over \$1 trillion AUD of investment, alongside robust carbon pricing and streamlining to accelerate green project development*



*The Made in Canada plan provides \$90 billion AUD in tax credits and investment for clean industrial development, complementing carbon pricing*



*Korea's Green New Deal is investing around \$85 billion AUD in decarbonisation and clean industrial development, while Korean firms are making large investments in overseas markets (e.g. battery cathode manufacturing in USA)*



*Japan's Green Transformation Plan aims to catalyse \$1.5 trillion AUD of clean industrial investment over ten years, including through carbon pricing and sovereign bonds, funded by at least \$200 billion AUD government spending*

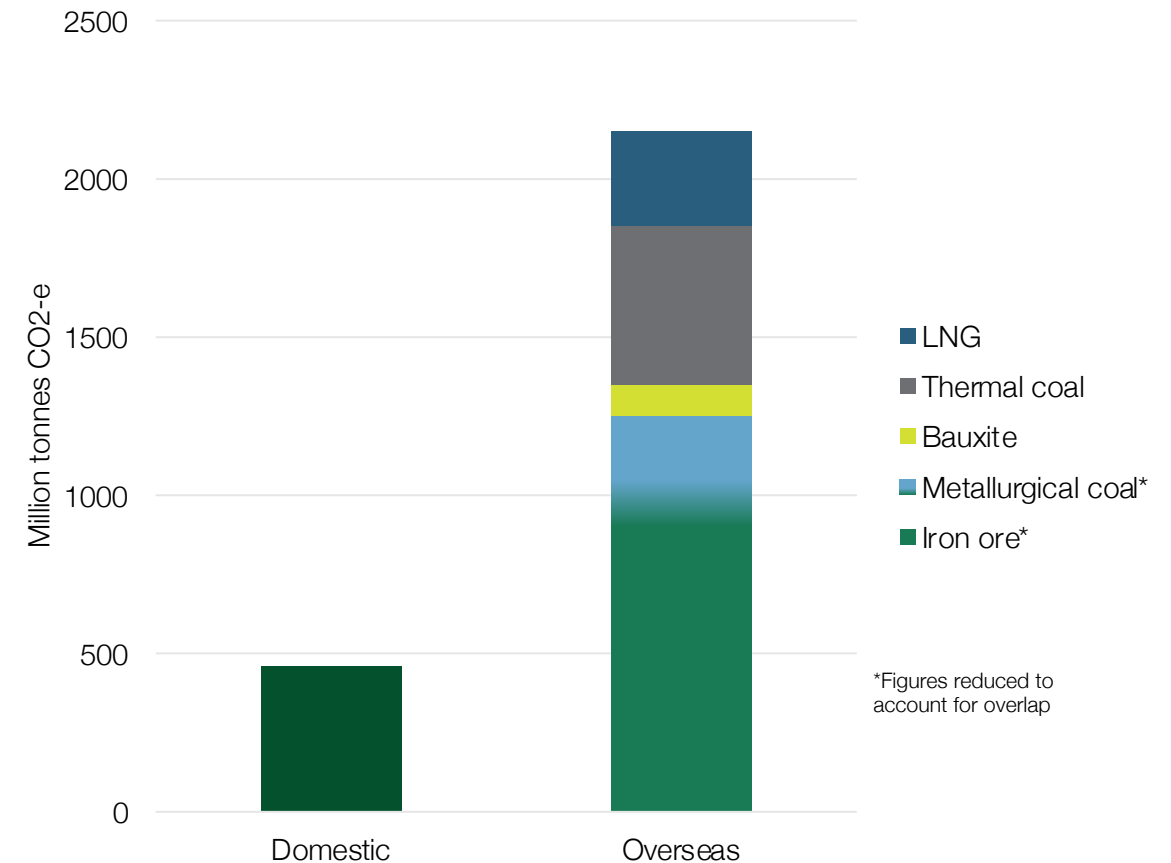
# Australia's exports are a big opportunity to cut emissions

- Emissions from the processing and burning of Australian exports overseas are many times domestic emissions
- Clean onshore processing could dramatically cut emissions across global supply chains if low carbon products displace carbon intensive incumbents
- Substitution of fossil fuel exports for cleaner, high value products (e.g. lithium, green iron, hydrogen-derived fuels) could also dramatically reduce emissions over time
  - The Department of Industry, Science & Resources (DISR) forecast lithium and base metals earnings as exceeding thermal and metallurgical coal revenues by 2028<sup>1</sup>
- Australia could meaningfully contribute to global efforts to reduce costs of clean technologies through large scale deployment.
  - Australia's pipeline of hydrogen electrolysis projects is the world's largest, at around 100 times current globally installed capacity. Building half of these projects could reduce electrolyser costs globally by as much as 70%<sup>2</sup>

<sup>1</sup>DISR, Resources and Energy Quarterly March 2023

<sup>2</sup> Based on a learning rate of 18% from R Detz and M Weeda, Projections of electrolyzer investment cost reduction through learning curve analysis, (2022), and assuming six doublings from 0.5GW to 32GW installed capacity, using capacity estimates from IEA, *Global Hydrogen Review 2022*, and DCCEEW, *State of Hydrogen 2022*.

Domestic emissions and emissions from select exports, 2022



DISR, *Resources and energy quarterly* (March 2023), DCCEEW, *Australian National Greenhouse Accounts Factors* (2023), Rio Tinto, *Scope 1, 2 and 3 Emissions Methodology 2021*, DCCEEW, *Quarterly Update of Australia's National Greenhouse Gas Inventory: December 2022*, BHP, *Annual Report 2022*, and Fortescue, *FY22 Climate Change Report*.

# What could make green industries viable in Australia?

- Minerals, hydrogen, iron and alumina are generally agreed as areas of comparative advantage for Australia in a decarbonised world, while other areas are contested across analyses.
- Australian advantages are underpinned by our natural resource endowment, including solar and wind energy and critical minerals; a stable political system; relative closeness to major Asian markets; low cost of capital; and a high quality education system and skilled workforce.
- International trade patterns may be quite different in a net zero world. Today it is cheap to ship minerals and fossil energy elsewhere for processing. But hydrogen is so much more expensive to transport than coal or LNG that utilisation near the point of production has a great advantage.
- However, policy incentives elsewhere may override these advantages over the next decade - if you can produce hydrogen in the USA for free, why make it in Australia?

- Energy transition materials:** mining and refining of ores such as nickel, lithium, cobalt, copper and rare earth elements.
- Shipping sunshine:** exporting energy carriers such as hydrogen and ammonia, and synthetic fuels.

Dr. Alan Finkel,  
Powering Up (2023)

- Decarbonised products:** green iron, green aluminium and green fertiliser.
- Exportable carbon offsets:** such as direct air capture and storage (DACs).
- Advanced manufacturing:** focused on services and specialised clean energy products, such as electrolysers and DACS devices.

Group	Product	Overall prospect for Australia
Energy dense processed metals	Ironmaking	●
	Steelmaking	▲
	Alumina	●
	Aluminium	■
Refined energy transition metals	Copper	●
	Nickel	●
	Lithium OH/CO3	●
	Critical metals	●
Industrial chemicals and energy vectors	Hydrogen (domestic)	●
	Ammonia (H2 export)	▲
	Methanol	■
	Basic chemicals	■
Atmospheric carbon removals	CO <sub>2</sub> from DAC	●
	CO <sub>2</sub> from BECCS	▲

EY Net Zero Centre, *Seizing Australia's energy superpower opportunities* (2023)

- Good
- ▲ Modest
- Poor

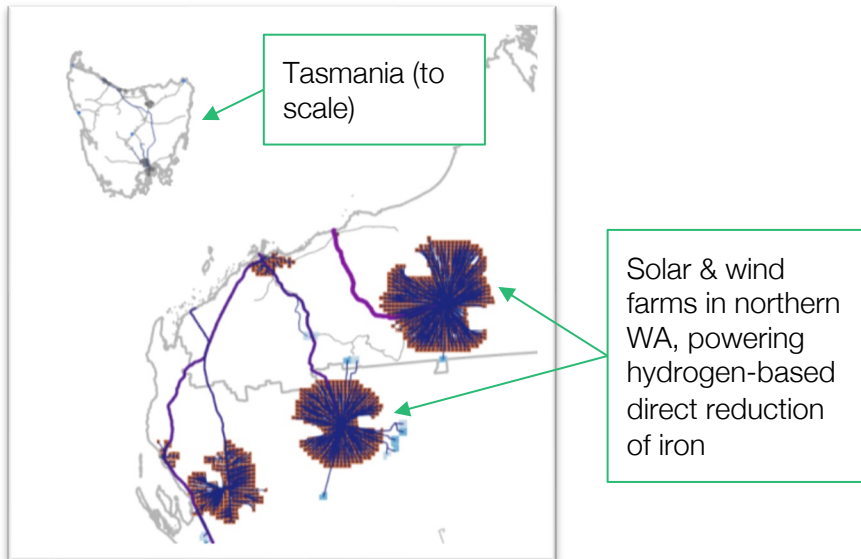
Opportunities	2040 potential GVA, jobs
<b>1 Critical minerals</b> Export of critical minerals in raw or value-added form that are required for renewable energy technologies	\$20-25b 100k jobs
<b>2 Green metals</b> Processing and export of high-value metals (e.g., steel) produced using renewable energy	\$20-25b 100k jobs
<b>3 Batteries</b> Export of batteries or battery components manufactured in Australia	\$20-25b 100k jobs
<b>4 Renewable hydrogen and ammonia</b> Export of hydrogen and ammonia produced with renewable energy	\$20-25b 30-50k jobs
<b>5 Education exports</b> International student enrolments in renewable energy related fields of study at Australian universities	\$10-15b 50-70k jobs
<b>6 Green professional services</b> Export of services required to scale renewable energy projects globally (e.g., engineering, ICT)	\$5-10b 30-50k jobs

These export opportunities are now expected to contribute **\$100B+ in GVA** and support **400k+ jobs** p.a. by 2040.

Accenture for BCA/ACTU/WWF/ACF, *Sunshot in 2023*

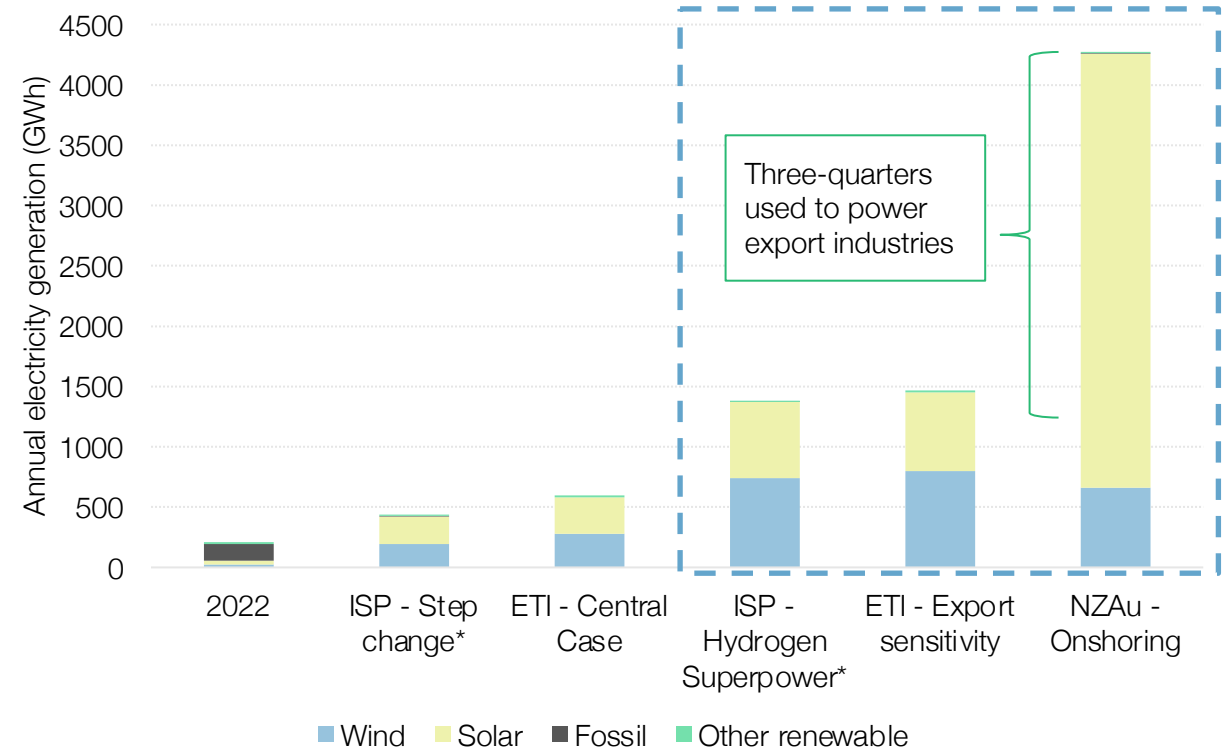
# An Australian 'renewable superpower' would be a monumental step up

- Building a world-leading clean energy exports sector would take many times the electricity generation and investment required to decarbonise Australia's existing economy
- In modelled scenarios with a large clean export sector, annual electricity generation reaches as much as twenty times today's levels by 2050 (see chart, right)
- The scale and pace required to achieve these outcomes in less than three decades requires dramatic and immediate action



Renewable buildout in Net Zero Australia onshoring (ONS) scenario, 2060

Projected electricity generation across scenarios, 2050 (gigawatt hours)



\*Constrained to National Electricity Market

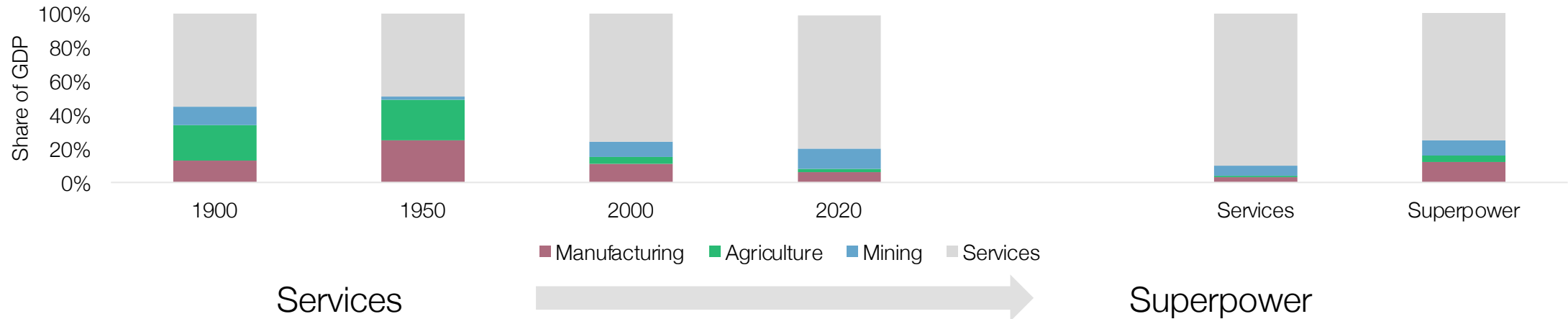
ETI: Energy Transitions Initiative (Climateworks Centre and Climate-KIC Australia), 2023  
 NZAu: Net Zero Australia (University Melbourne, University Queensland, Princeton, Nous Group), 2023  
 ISP: Integrated System Plan (Australian Energy Market Operator), 2022

Scenarios with large clean export sectors



# Services to superpower

- Australian industry has declined significantly as a share of the total economy over the last 60 years, with current trends pointing toward the continued decline of manufacturing relative to services
- Achieving a 'superpower' pathway would reverse this trend, with similar potential trajectories in agriculture and resources

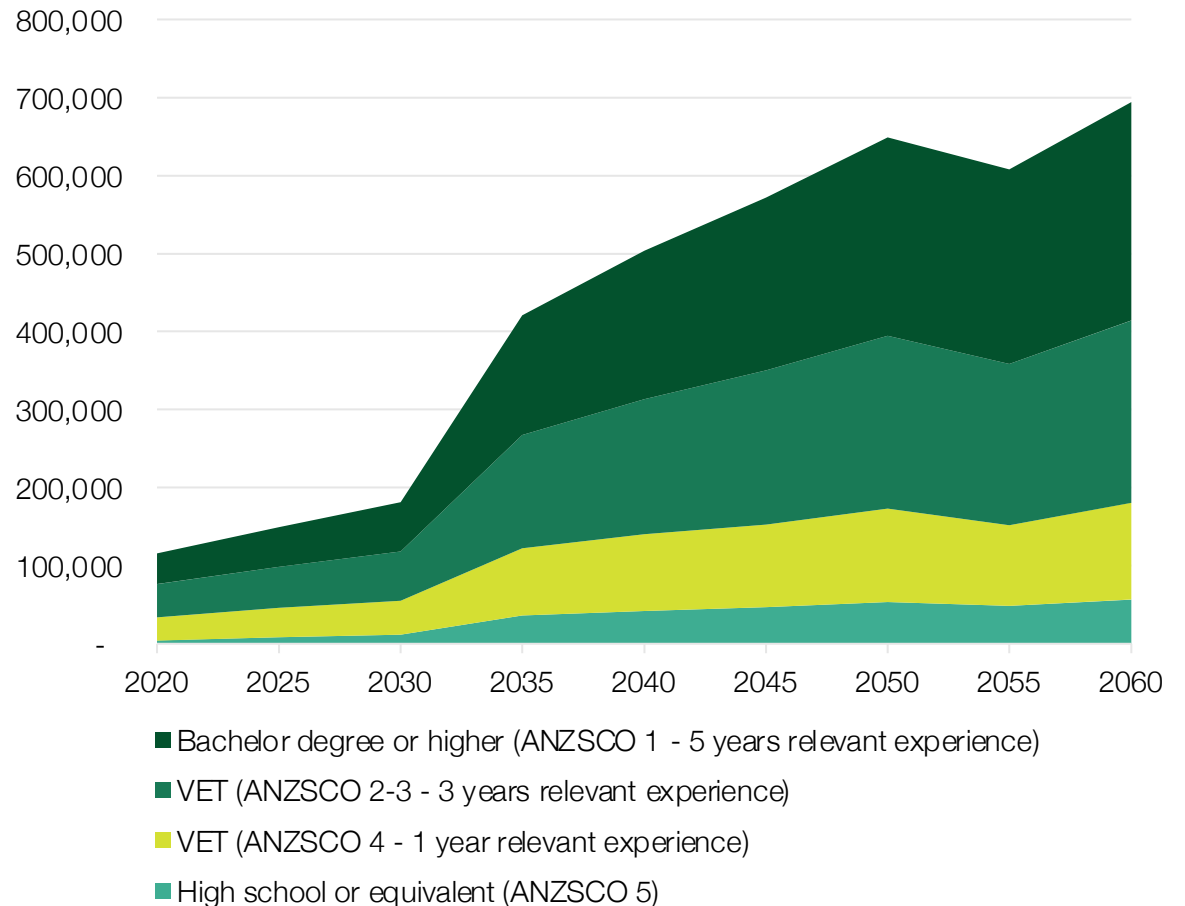


- Decarbonisation achieved as industrial facilities close
- Declining share of GDP in resources as fossil extraction (and potentially iron ore) decline
- Continued relative decline of manufacturing and agriculture
- Decarbonisation achieved through massive deployment of renewables, allowing new green manufacturing
- Resources industry similar size to today (somewhat smaller in relative terms), with changing composition as copper, lithium etc., replace fossil fuels
- Large scale carbon farming grows agricultural sector

# Economic opportunities from green reindustrialisation could be significant

- Jobs growth in clean energy industries could be very substantial (see chart), helping to offset declines in fossil industries, which currently employ around 150,000 people<sup>1</sup>
  - Meeting jobs requirements will likely require dramatic reforms to education and training programs, as well as migration pathways
- Economic benefits (compared to a more services-dominated scenario) are uncertain, but could be sizable
  - EY estimate a \$65bn (2.3%) benefit to GDP in 2050 from an 'Energy Superpower' scenario<sup>2</sup>
  - Accenture find more than \$100bn could be added to Australian gross value added by 2040 through clean export opportunities<sup>3</sup>

Full time-equivalent jobs required for energy transition, by education level, 2020-2060



<sup>1</sup> Australian Bureau of Statistics, *Census of Population and Housing* (2021), TableBuilder.

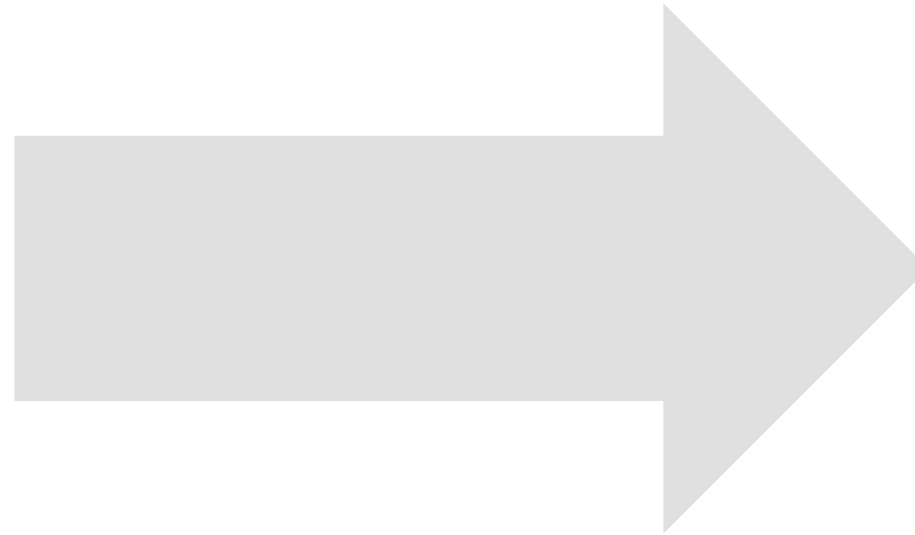
<sup>2</sup> EY Net Zero Centre, *Seizing Australia's energy superpower opportunities* (2023)

<sup>3</sup> Accenture for BCA/ACTU/WWF/ACF, *Sunshot in 2023*

# How do we get there? What's standing in the way?

## Today

- ~0.5 kilotonnes of clean hydrogen produced annually
- Clean energy workforce of less than 100,000
- Lead times of up to 6 years for wind and 3 years for solar; renewable deployment ~3GW/year
- Cost of green products can double or triple that of carbon intensive incumbents
- Limited bankable demand for clean industrial products in Australia and overseas



## 2035 Superpower Pathway

- More than 10,000 kilotonnes of clean hydrogen produced annually
- Clean energy workforce above 300,000
- Renewable deployment at least 50GW/year
- Green products near price-parity or cheaper than carbon-intensive equivalents
- Strong demand for clean products internationally, displacing carbon-intensive industry and bringing down global emissions

# What actions could we take over the next 1-2 years?

## Support

- Government support to equalise the cost of green products vs carbon intensive incumbents (e.g. contracts for difference, tax credits, carbon pricing, clean purchasing standards)
- Blended finance facilities supporting demonstration projects
- Adjusting rates of return and risk appetite for investment bodies (including in the private sector)
- Green procurement to build early demand for clean products
- Diplomatic support to negotiate offtakes overseas
- Coordinated investments in common-use infrastructure (ports, rail etc)

*In the 2023-24 Federal Budget, the Government announced work to develop Australian clean energy industries in response to the US Inflation Reduction Act and other international developments*

- **\$5.6 million in 2023-24 to analyse the implications for Australia of intensifying global competition for clean energy industry, and to identify actions before the end of 2023 to further catalyse clean energy industries, ensure Australian manufacturing competitiveness and attract capital investment**

## Governance

- Overarching green industrial strategy
- Community co-design in renewable energy zones and regional industrial precincts
- Organisational capability development to understand risk and seize opportunities
- Incorporating international contribution to decarbonisation into planning and targets
- Accelerated planning and approvals

## Enablers

- Innovation in key processes (e.g. enabling the use of hematite in green steelmaking)
- Community benefit schemes to build social licence for key projects
- Clean energy immigration pathways
- Large scale-up of education and training
- Building economic diversity and supporting infrastructure in key regions (e.g. early childhood carers, housing)