

## Identifying the Net Zero Economy Authority's regions of focus

Net Zero

**Economy** Authority

FEBRUARY 2025



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The Net Zero Economy Authority developed a statistical framework which helped identify its regions of focus. The intent was not to develop a linear ranking, but to inform advice to the Australian Government.

Regional identification was completed in two phases:

- **Phase 1 (May 2023)** was focused on the identification of regions based on their exposure to downside risks from decarbonisation
- **Phase 2 (December 2023)** strengthened the Authority's understanding of the regions with the most potential to harness possible economic opportunities from decarbonisation.

The framework has been underpinned by literature, data, and evidence from academia, researchers, and government policy settings (see <u>References</u>).

Regional boundaries are based on state government definitions and are an aggregation of the Department of Infrastructure, Transport, Regional Development, Communications and the Arts's working zones – a geographic standard reflecting the commuting patterns of workers (see <u>Annex A</u>).

The analysis presented is a point in time assessment by the Net Zero Economy Authority and does not represent an Australian Government decision. All data used in the analysis is publicly available.

### PHASE 1

Phase 1 quantified each region's **exposure** to decarbonisation and **capacity to adapt** to economic shocks and qualitatively assessed the urgency for support and each region's **readiness** to engage with change.

Each of these variables is detailed below. Table 1 presents a high-level summary of results.

#### Exposure

Exposure seeks to estimate the proportion of each region's existing workforce employed in carbonvulnerable industries using 2021 Census data.

Industries were identified based on their aggregate emissions (level and intensity), concentration of carbon-intensive facilities, and future demand prospects using data from the Australian Energy Market Operator, Clean Energy Regulator, International Energy Agency, and Wood MacKenzie (see <u>Annex B</u>). This approach captured high-emitting sectors and sectors facing reduced demand due to decarbonisation.

#### Adaptive capacity

Adaptive capacity seeks to estimate a region's ability to adjust to shocks – taking advantage of opportunities and limiting potential fallout. It is often estimated alongside exposure in assessments of community vulnerability to a certain risk and has been used in relation to structural change, climate change discourse, and other environmental impacts.

To gauge adaptive capacity, the Authority constructed an index using principal component analysis (PCA), a technique used to reduce 26 social and economic indicators into a single score out of 10 (see <u>Annex C</u>). PCA is an approach commonly used by the Australian Government, including by the Productivity Commission.

#### Urgency

Urgency considers the likely timing of transition for carbon-intensive industries in the region. <u>Annex D</u> prioritises industries based on the urgency of transition. Coal-fired power generation is the most urgent industry given the immediacy of announced facility closures across the sector, while coal exports, oil and gas, and heavy manufacturing industries have longer lead times.

#### Readiness

Readiness considers a region's preparedness to engage with decarbonisation, informed by the Authority's visits, consultations, and ongoing engagement with regional stakeholders, research on community attitudes and sentiment, regional development plans, and budgets at all levels of government. Regions were assessed against a rubric (see <u>Annex E</u>) that included the extent to which the region recognises the need for change, plans and governance arrangements are in place, and resources are allocated to support actions.

#### TABLE 1: PHASE 1 RESULTS

	REGION	EXPOSURE (% of workers)	CARBON- INTENSIVE FACILITIES	ADAPTIVE CAPACITY (1-10, 10 is high)*	URGENCY	READINESS
HIGH EXPOSURE	Central QLD South	13%	18	3-6	Moderate	Low
URGENCY	Collie	42%	5	2	High	High
	Gladstone	17%	8	6	High	High
	Hunter Valley	5%	20	4-9	High	Moderate
	Latrobe Valley	5%	3	6	High	High
MODERATE EXPOSURE	Central QLD North	21%	23	3-7	Moderate	Very Low
URGENCY	Darling Downs (coal)	6%	3	2-3	Moderate	Low
	Darling Downs (oil & gas)	10%	6	5-7	Moderate	Low
	Gunnedah & Narrabri	15%	3	4	Moderate	Very Low
	Lithgow & Mudgee	16%	3	3-7	Moderate	Low
SITE	Mount Isa	5%	2	2	Watch	Low
SPECIFIC RISKS	Portland	10%	1	4	Watch	Moderate

\* Adaptive Capacity cannot be aggregated above the Working Zone level. These values show the range of adaptive capacity ranks present in the region.



## PHASE 2

To complement the analysis on regions exposed to decarbonisation, the Authority undertook systematic consideration of potential economic opportunities emerging from the net zero transition.

This framework quantified each region's 'natural capital' (**renewable energy resources** and **key mineral deposits**) as well as the 'catalytic variables' that could help unlock potential (**existing industry, major investments**, **enabling infrastructure**, and a **compatible workforce**).

**Table 2** presents a high-level summary of results. It summarises the regions with the highest natural capital and their supporting catalytic variables, which read alongside the phase 1 analysis, provides a complementary understanding of both the risks and opportunities for regions in the net zero transition.

		NATURAL	. CAPITAL			CATALY	TIC VARIABLES	
Region			OFFSHORE WIND POTENTIAL	KEY MINERALS POTENTIAL		MAJOR INVESTMENTS		
	(Scaled capacity factor)	(Scaled capacity factor)	(Scaled capacity factor)	(Cumulative mineral demand to 2050)	(location quotient)	(number of projects)	(airport, port, and 5G)	(% of workers)
Bell Bay	0.2	0.8	0.8	0.2%	0.3	5	High	Medium
Gladstone	0.8	0.5	0.7	0.1%	0.6	5	High	High
Goldfields	0.8	0.7	0	26.4%	0.0	3	Very Low	High
Hunter	0.5	0.5	0.7	0.0%	0.6	3	High	Medium
Kwinana	0.6	0.7	0.9	0.1%	0.4	4	Medium	Medium
Pilbara	1.0	0.4	0.5	15.4%	0.2	1	Medium	High
Upper Spencer Gulf	0.6	0.6	0.6	0.0%	1.0	2	High	Medium
Yeppoon	0.8	0.5	0.7	2.1%	0.0	0	High	Medium

#### TABLE 2: UPSIDE ANALYSIS RESULTS

#### **Renewable energy resources**

Renewable energy resources seeks to measure the quality of solar and onshore and offshore wind resources in each region. Quality is assessed using Geoscience Australia's 'capacity factors' - the amount of energy produced by an energy generating unit in a location as a percent of the maximum energy production potential of the generation unit. For example, the amount of solar energy that would be produced in a given region as a proportion of the maximum energy that can be produced by a solar cell at full capacity.

#### **Key mineral deposits**

Key mineral potential seeks to measure the size of each region's deposits for four minerals, using Geoscience Australia data. Copper, cobalt, lithium, and nickel were identified due to their applications in clean energy technologies (see <u>Table 3</u>) and abundance in Australia.

To make comparative assessments of the value of deposits, the analysis measured mineral deposits as a proportion of global demand projections to 2050 by the International Energy Agency.

TABLE 3: MINERAL USES IN CLEAN ENERGY TECHNOLOGIES (Energy Transitions Commission, 2023)



#### Importance to clean energy technology:



#### **Existing industry**

The presence of existing industrial facilities may help some regions to foster low-emissions industries, such as green steel, iron, aluminium, or alumina production.

The size of a cluster can be gauged using 'location quotients', a measure of regional industrial employment concentration commonly used in literature. Location quotients measure the relative regional distribution of an industry against Australia as a whole.

A location quotient is a ratio of ratios:

No. workers in a given industry and region	÷	No. workers in the region
No. workers in the industry (nationally)		No. workers (nationally)

A quotient greater than one indicates the industry's concentration in the region is larger than the national average. Regions were only considered for the analysis if they were home to two or more facilities in captured industries. The analysis was adjusted by geographic size so as not to penalise regions with small footprints.

### **Major investments**

Major investments is the number of sizeable clean energy, industry, and resource investments in the region that will help support the local economy's transition. The Authority compiled a list of more than 700 projects using published data from the Department of Industry, Science and Resources, the Australian Renewable Energy Agency, and the Commonwealth Scientific and Industrial Research Organisation. Major investments are those that met at least two of three criteria:

- 1. the project's value exceeds \$100 million
- 2. the project is under construction and/or
- З. the project will help demonstrate a new technology or establish a large industrial centre in a region.



#### **Enabling infrastructure**

Enabling infrastructure considers the presence of telecommunication and transport infrastructure, which are important enablers of economic opportunities, estimated through the presence of a 5G network, an operating airport and/or a hydrogen port. The Authority used hydrogen port infrastructure projections from Geoscience Australia, telecommunications infrastructure data from the Australian Competition and Consumer Commission, and airport infrastructure data from the Bureau of Infrastructure and Transport Research Economics.

The presence of:

- all three was considered high
- two was considered medium
- one was considered low and
- none was considered very low.

#### **Existing workforce**

Existing workforce measures the compatibility of each region's existing workforce to occupations central to a clean energy economy.

Jobs and Skills Australia (JSA) has identified 38 occupations critical to the clean energy economy, such as engineers, electricians, and fitters (see <u>Annex F</u>). Using JSA's similarity tool, the analysis identified occupations highly compatibility with the 38 critical to the clean energy economy. Census data from 2021 was used to calculate the proportion of each region's labour force employed in one of these occupations.

### REFERENCES

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## ANNEX A: REGIONAL DEFINITIONS

Regional boundaries are based on state government definitions and are an aggregation of working zones – a geographic standard reflecting the commuting patterns of workers.

STATE	REGION	WORKING ZONE
NSW	Hunter Valley	Central Coast and surrounds
		Muswellbrook, Scone and surrounds
		Newcastle, Lower Hunter and surrounds
	Lithgow & Mudgee	Lithgow and region
		Mudgee and surrounds
	Gunnedah & Narrabri	Gunnedah and region
		Narrabri and region
QLD	Central QLD North	Bowen and Collinsville
		Clermont
		Mackay and surrounds
		Moranbah
	Central QLD South	Banana
		Biloela
		Central Highlands-East (Qld.)
		Emerald and Central Highlands-West
		Rockhampton and surrounds
	Darling Downs (coal)	Kingaroy, Nanango and surrounds
		Millmerran
	Darling Downs (oil & gas)	Chinchilla
		Miles-Wandoan
		Roma and region
	Gladstone	Gladstone and surrounds
	Mount Isa	Cloncurry-Camooweal (Mount Isa Region)
		Mount Isa
	Yeppoon	Yeppoon and surrounds
SA	Upper Spencer Gulf	Port Pirie and region
		Whyalla and Whyalla North
TAS	Bell Bay	Launceston and surrounds
VIC	Latrobe Valley	Latrobe Valley
	Portland	Portland
WA	Collie	Collie
	Goldfields	Leinster-Leonora
	Kwinana	Perth and surrounds
	Pilbara	Ashburton (WA)
		East Pilbara
		Karratha and Roebourne

## ANNEX B: IN-SCOPE INDUSTRIES

INDUSTRY	SCOPE
Agriculture, forestry and fishing	<b>Excluded</b> . While agriculture comprises 17% of Australian emissions, demand for food and fibre is unlikely to fall as Australia's population continues to grow and due to limited substitutable goods. Agriculture emissions are also excluded from the Safeguard Mechanism.
Mining	Mining contributes to around 20% of Australia's emissions. Coal mining and oil and gas extraction and exploration are <b>included</b> due to their carbon-intensity and expected reductions in demand by 2050. Metal ore and mineral mining and exploration are <b>excluded</b> as these sectors are far less emissions-intensive and demand is expected to remain stable or grow due to their applications in clean energy technologies, for example, lithium.
Manufacturing	Manufacturing contributes about 11% to Australia's emissions. Manufacturing of paper, chemicals, rubber and polymers as well as petrol, coal, mineral and metal products is <b>included</b> due to their high emissions and inclusion in the Safeguard Mechanism. Other manufacturing industries such as food and beverages, textiles, machinery, and furniture are <b>excluded</b> due to expected demand stability and exclusion from the Safeguard Mechanism.
Electricity, gas, water and waste	Fossil fuel electricity generation and gas supply are <b>included</b> , with the former contributing 36% to Australia's emissions and the latter encompassing a large number of Safeguard Mechanism facilities. Other forms of electricity generation are <b>excluded</b> , along with water and waste management as they are essential services with no substitutes.
Construction	<b>Excluded.</b> Construction contributes just 2% to Australian emissions and demand is unlikely to reduce in the future.
Transport, postal and warehousing	<b>Excluded.</b> While transport, postal and warehousing contribute 6% to Australia's emissions, the geographical diffusion of these industries makes it difficult to assign to a particular region.



## ANNEX C: VARIABLES USED IN THE ADAPTIVE CAPACITY INDEX

VARIABLE		SOURCE
Human capital	<b>Educational attainment</b> Proportion of population aged 15 years or above who have completed Year 12	2021 Census
	Workforce skill level Proportion of employed persons working in occupation ANZSCO Skill Level 3+	<u>2021 Census</u>
	Unemployment rate Proportion of the labour force who are unemployed	2021 Census
	<b>Participation rate</b> Proportion of population aged 15-64 years who are working or looking for work	<u>2021 Census</u>
	Working age population Proportion of population aged 15-64 years	2021 Census
	<b>Working age population growth</b> Percent change in population aged 15-64 years in regions between 2016 and 2021	<u>2021 Census</u>
	<b>Youth engagement rate</b> Proportion of people aged 15-24 years fully engaged in work or study, in full-time study or work or in part-time work and part-time study	2021 Census
	<b>People with disability</b> Proportion of population aged 15-64 years requiring assistance with core activities	2021 Census
	<b>Caring responsibilities</b> Proportion of population aged 15 years and over who provided unpaid assistance to a person with a disability, a health condition or due to old age	<u>2021 Census</u>
	<b>Labour mobility</b> Proportion of population that lived at a different address one year ago	2021 Census
	<b>First Nations population</b> Proportion of population that is Aboriginal and/or Torres Strait Islander	2021 Census

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VARIABLE		SOURCE
Financial capital	<b>Receiving income support</b> Proportion of population receiving a government income support payment	2021 Census
	<b>Above median income</b> Proportion of population aged 15 years and over with a weekly income of \$1,500 and above	2021 Census
	Investment income Total investment income (\$mil) per capita	ABS Personal Income in Australia, 2019-20.
	<b>Housing stress</b> Proportion of households with less than \$800 of household income per week, where rent or mortgage payments are more than 30% of household income	<u>2021 Census</u>
	<b>Business exit rate</b> Businesses that exited between 2021-22 as a proportion of total businesses in 2020-21	ABS Counts of Australian Businesses, including Entries and Exits, 2021-22
	<b>Business entry rate</b> Businesses that entered between 2021-22 as a proportion of total businesses in 2020-21	ABS Counts of Australian Businesses, including Entries and Exits, 2021-22
	<b>Rental tenure</b> Proportion of households that rent their home	2021 Census
Social capital	<b>Volunteering</b> Proportion of people who engaged in volunteer work in the past 12 months	2021 Census
	Homelessness Proportion of population who are homeless	2021 Census
	<b>Commuting flows</b> Proportion of population travelling out of their region for work	2021 Census
Physical capital	<b>Remoteness</b> Australian Statistical Geography Standard remoteness area of a region	<u>ABS Australian</u> <u>Statistical Geography</u> <u>Standard, 2021</u>
	<b>New housing</b> Total new dwellings approved per capita	ABS, Building Approvals Australia, 2020-21
	<b>Non-residential building</b> Value of non-residential building approved per capita	ABS, Building Approvals Australia, 2020-21
Natural capital	<b>Nature reserves</b> Proportion of land determined to be national parks or nature reserves	ABS, National Land Account, Experimental Estimates, 2016 (accessed via Data By Region)
Other	Economic diversity Hachman Index, a measure of employment diversification across	2021 Census

## ANNEX D: URGENCY ASSESSMENT RUBRIC

Industries have been ranked based on the urgency of transition.

INDUSTRY	URGENCY
(1) Thermal coal generators and associated mines	• An observed trend is already underway and there are known closure dates. Around 10 coal-fired power stations (CFPSs) have closed over the last decade and 11 of the 19 remaining facilities have announced closures over the next 12 years.
	<ul> <li>Projections by the Australian Energy Market Operator suggest coal-fired power generation could be virtually gone from Australia's energy mix by the 2040s.</li> </ul>
	• Given the observed trend of recent closures, planned closures, and Government's commitment to renewable energy generation (82% by 2030), the domestic coal mining and thermal coal energy generation industry is the most urgent.
(2) Thermal coal mining for export	• IEA suggests the world's thermal coal demand will peak over the next few years then steadily decline. Global demand for thermal coal could be as low as 10% of current levels by 2050 if all countries achieve their ambitious targets.
	• Thermal coal exports have been split out from domestic consumption, as Australia's energy sector is already declining, while slower transition is expected for some trading partners, particularly China with its net zero commitment for 2060.
(3) Gas mining and production, gas supply, petrol refining and production, and metallurgical coal	<ul> <li>Projections by AEMO indicate that demand for gas in the east coast is likely to fall in the medium term as gas substitutes are adopted under current policy settings. In contrast, demand on the west coast is likely to rise in the medium term due to increased use of gas in power generation and the minerals processing sector. Together with international demand projections there is expected to be a role for gas into 2050, particularly in providing firming services for renewable energy generation and the transition to hydrogen in manufacturing.</li> <li>Oil and petroleum production and refining is likely to see a significant decline in net zero 2050 scenarios. Like gas, the exact timing is uncertain but the general trend is clear.</li> <li>Metallurgical coal is likely to see a significant decline from 2030. Views on the size of this decline differ though and are reliant on the future of steelmaking and the potential for technological innovation to reduce the quantity of coal needed in the stoelmaking process.</li> </ul>
	<ul> <li>The timing and scale of reductions in demand for oil production, and metallurgical coal are expected to come later and be smaller than those for thermal coal.</li> </ul>
(4) Iron and steel production, metal refining and production, fertilizer manufacturing, cement and lime manufacturing, alumina production, and aluminium	<ul> <li>Products made by these industries are not easily substituted and are strongly tied to economic development. Significant changes in global demand over the shortand medium-term is unlikely based on predictions in continued global economic growth.</li> <li>Emissions reductions are more likely to emerge later alongside technological innovations and fuel switching. Impacts may be seen sooner at the facility level with increased competitive pressure on emissions reduction. There is a risk of carbon leakage if policies are not designed appropriately.</li> <li>These carbon-intensive manufacturing industries are ranked fourth with steady levels of demand (subject to normal commodity and economic cycles) expected to continue. However, pressure to decrease emissions will grow and individual manufacturing facilities may face even greater pressure to transition. These risks</li> </ul>
	need to be considered at a facility level and may impact some regions more than others.

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#### CRITERIA **PRE-CONTEMPLATION** CONTEMPLATION PREPARATION ACTION Recognition No recognition of net Potential change Potential extent Potential extent zero transition effects recognised and and impacts of and impacts acknowledged of exposure exposure fully scoped analysed Leadership and No commitment Commitment Commitment Strong and commitment to nor local leadership from change from key widespread act demonstrating any champions leaders and community capability to drive commitment. stakeholders community action to collaborate coordinated and coordinate by inclusive action local leaders to implement required action **Planning to act** No regional plans Focused Established Recognition of net zero transition in community plans that regional plans economic and exhibit strong socioeconomic economic and planning has socioeconomic commenced, planning including in to manage relation to net transition zero transitions Formal and/ Governance No governance Formal Formal or informal arrangements governance governance to support discussions arrangements in arrangements action between key place to support in place for stakeholders implementation planning Action Action has not Action focused Action focused Action commenced commenced on testing and on developing progressing garnering broad regional planning in accordance support to arrangements, with regional acknowledge, development engaging define and stakeholders plans address change and industry Resources No resources Incidental/ Dedicated Dedicated allocated opportunistic resourcing for and targeted resourcing as engagement resourcing to a part of other and plan implement, functions and development. monitor, manage plans. Some Opportunistic and evaluate potential specific and targeted regional action resourcing for plans resourcing as a research, scoping part of existing state and and engagement Commonwealth

programs

## ANNEX E: READINESS ASSESSMENT RUBRIC

# ANNEX F: CLEAN ENERGY OCCUPATIONS IDENTIFIED BY JOB SKILLS AUSTRALIA

Occupations
Agricultural and Forestry Scientists
Airconditioning and Refrigeration Mechanics
Aircraft Maintenance Engineers
Architects and Landscape Architects
Architectural, Building and Surveying Technicians
Automotive Electricians
Chemical and Materials Engineers
Chemical, Gas, Petroleum and Power Generation Plant Operators
Chemists, and Food and Wine Scientists
Civil Engineering Draftspersons and Technicians
Civil Engineering Professionals
Construction Managers
Electrical Distribution Trades Workers
Electrical Engineering Draftspersons and Technicians
Electrical Engineers
Electricians
Electronics Trades Workers
Engineering Managers
Environmental Scientists
Geologists, Geophysicists and Hydrogeologists
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals Metal Fitters and Machinists
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals Metal Fitters and Machinists Mining Engineers
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals Metal Fitters and Machinists Mining Engineers Motor Mechanics
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals Metal Fitters and Machinists Mining Engineers Motor Mechanics Occupational and Environmental Health Professionals
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals Metal Fitters and Machinists Mining Engineers Motor Mechanics Occupational and Environmental Health Professionals Other Building and Engineering Technicians
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals Metal Fitters and Machinists Mining Engineers Motor Mechanics Occupational and Environmental Health Professionals Other Building and Engineering Technicians Other Engineering Professionals
Geologists, Geophysicists and Hydrogeologists Industrial, Mechanical and Production Engineers Marine Transport Professionals Metal Fitters and Machinists Motor Mechanics Occupational and Environmental Health Professionals Other Building and Engineering Technicians Other Engineering Professionals Plumbers

**Production Managers** 

#### Occupations

Research and Development Managers

Structural Steel and Welding Trades Workers

Structural Steel Construction Workers

**Telecommunications Trades Workers** 

University Lecturers and Tutors

Urban and Regional Planners

Vocational Education Teachers

