OXFORD ECONOMICS AUSTRALIA

Regional Economic Transition Analysis – Regional Investment in the Hunter

Final report

December 2025

Disclaimer

The modelling and results presented here are based on information provided by third parties, upon which Oxford Economics Australia has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

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EXECUTIVE SUMMARY

KEY FINDINGS

The Hunter's resource base and energy infrastructure give it a unique advantage

- Mining (11% of value added), health care, accommodation, and tourism anchor the Hunter's economy, supported by strong infrastructure (ports, freight, skilled workforce).
- Energy services (16% of economy) plus the REZ, Hunter Hydrogen Hub, and Newcastle Clean Energy Precinct position the region as a hub for hydrogen, ammonia, and clean exports, leveraging Orica and Tomago.
- Despite manufacturing and mining decline, the Hunter's skilled workers, defence manufacturing track record, and aerospace/defence assets (RAAF Williamtown, precision SMEs, University of Newcastle R&D) provide a pathway into emerging high-value industries.

New opportunities are emerging, but must build on the existing workforce and industry base

- The Hunter holds ~13.5% of Australia's black coal reserves, historically underpinning exports and freight infrastructure, but is now shifting toward circular economy strategies such as reusing coal combustion products (e.g. fly ash in cement and road base).
- The Tomago Aluminium smelter is a major electricity consumer and economic anchor, supporting downstream manufacturing and exports while pursuing decarbonisation.
- The Kooragang Island precinct hosts Orica's ammonium nitrate plant, supplying mining and agriculture while positioning the region as a prospective hub for low-emissions ammonia production.

Major projects are underway or planned in energy, infrastructure, and regional innovation

- Over a dozen major projects are underway or planned in the Hunter, spanning clean energy, hydrogen, circular economy, and defence manufacturing. Flagship initiatives include the Hunter Hydrogen Hub, Tomago's approval as an EfW precinct, Kongsberg Missile Facility, AGL Liddell Redevelopment,and the Port of Newcastle Clean Energy Precinct.
- Anchor projects like the Hunter Hydrogen Hub and Tomago's approval as an EfW precinct will deliver thousands of construction and ongoing jobs, cementing the Hunter's role as a national leader in energy transition infrastructure and advanced industrial precincts.

Defence, hydrogen, ammonia, energy to waste and biofuels present key opportunities

- **Hydrogen and Ammonia**: Leveraging Orica's Kooragang plant, the Hunter Hydrogen Hub, and port access, the region is set to lead in low-carbon hydrogen and ammonia production for domestic use and export
- **Defence Manufacturing and Sustainment**: With RAAF Base Williamtown, Astra Aerolab, and the Kongsberg missile facility, the Hunter is expanding guided weapons and sustainment manufacturing
- **Biofuels and Energy from Waste**: Tomago EfW, and Ethtec pilot projects position the Hunter as a biofuels and circular economy hub

Barriers to investment remain, particularly in workforce transition and commercial risk

- Investment confidence hinges on reducing market risk through clear demand signals, long-term offtake agreements, and streamlined approval processes.
- Upgrades in energy, water, transport, and port/logistics are required to support new industries. Repurposing existing industrial sites and sequencing priority infrastructure investments can strengthen the Hunter's comparative advantage.
- Specialist technical and trade skills remain in short supply, but the Hunter's strong industrial workforce, transferable skills, and research partnerships (e.g. CSIRO, universities) provide a base to adapt, reskill, and meet future industry demand.

The Hunter's strategic plans show ambition, but need stronger alignment across government

- Local strategies clearly define advantages and investment-ready opportunities, but gaps remain in governance, infrastructure planning, and cross-tier coordination, limiting investment readiness.
- NSW approvals follow a staged pathway, inc. strategic planning, environmental assessment, commercial/network arrangements, and construction, yet timelines vary widely by technology (from ~3 years for ammonia plants to 10+ years for offshore wind).
- Early alignment with REZs, ARENA/CEFC programs, and national net zero strategies is critical, but reducing duplication across jurisdictions and sequencing enabling infrastructure can expedite project delivery.

INTRODUCTION

NZEA has engaged Oxford Economics to support evidence-based action in transition-affected regions.

Project Overview

The Net Zero Economy Authority (NZEA) commissioned this project to understand opportunities presented by the net zero transition for regional communities. There are a number of regions central to Australia's energy system and industrial base that face disproportionate exposure to structural shifts as emissions-intensive activities decline. The Hunter, Central Queensland and Latrobe Valley were prioritised for this project due to the size and complexity of their region and economies, but the analytical framework can be deployed in other regions.

Oxford Economics was engaged to deliver a structured, scenario-led analysis across three core domains. These include forward-looking forecasts of industry and labour market change, an assessment of each region's comparative advantages and investment potential, and a detailed examination of transition pathways for fossil fuel and related workers. The analytical framework integrates AEMO's 2025 transition scenarios with regional planning assumptions, closure timelines, and infrastructure settings to ensure alignment with real-world transition drivers. Regional priorities and economic exposures have been informed by the NZEA's own statistical framework, which identifies both downside risks and economic opportunities across Australia's key regions.[1] The analytical framework used within this project can be deployed across other NZEA priority regions beyond the Hunter, Central Queensland and Latrobe Valley.

The project aims to generate region-specific insights that can support practical decision-making across multiple levels of government. By quantifying the scale and timing of industrial change, identifying investment barriers, and mapping reskilling needs, the work creates an evidence base that links long-term economic modelling with near-term policy and program levers. This enables a more coordinated approach to managing transition risk while positioning each region to attract and retain high-value activity.

This work provides a foundation for coordinated, place-based action across governments, industry and communities. Outputs will support the NZEA's role in shaping policy, allocating resources, and engaging stakeholders on transition risks and opportunities. By identifying emerging demand for labour and skills, sectoral growth trajectories, and enablers of investment readiness, the project aims to assist in sequencing investment, workforce support and infrastructure development. Ultimately, the analysis will help ensure that transition efforts are locally grounded, forward-looking, and capable of delivering resilient and inclusive economic outcomes.

Project Components

The project was structured into three core analytical components to align with NZEA's transition objectives. Each stream was applied consistently across the Hunter, Central Queensland, and Latrobe Valley regions. Separate reports were developed for each component in each region to ensure depth, comparability, and regional specificity. In addition, a summary report has been developed synthesizing the key insights across all three project components.

Regional Economic Forecasts

This stream provides scenario-based projections of industry composition, employment, and skills demand across 5, 10, and 25 years. These forecasts are based on AEMO's 2025 transition scenarios and represent regional futures based on current trends and industrial structures within the region. Outputs include identification of sectors likely to decline, grow, or emerge, the timing of major structural shifts, and profiles of key workforce cohorts.

Regional Investment Analysis

Focusing on each region's strategic position, this stream identifies comparative economic advantages, evaluates barriers to investment, and highlights opportunities to attract net zero aligned industries. It also outlines region-specific enablers such as infrastructure, workforce capability, and resource availability that could support long-term industrial development beyond what is identified in the *Regional Economic Forecasts* report.

Worker Transition Analysis

Centred on transition-affected workers, this stream delivers occupational pathway mapping, retraining requirements, and an assessment of local training system capacity. It also provides targeted support strategies to address cohort-specific barriers and enable workforce mobility within the regional economy. The analysis considers both the likely future economic structure of the region as identified in the *Regional Economic Forecasts* report and opportunities identified in the *Regional Investment Analysis* report.

This report identifies region-specific investment opportunities and delivery conditions to guide NZEA's coordinated transition response.

Purpose of this Report

This report provides an integrated assessment of net zero investment opportunities and enabling conditions in a priority region. It forms part of the regional investment analysisstream of the project and supports the Net Zero Economy Authority's (NZEA) broader mandateto coordinate transition-aligned investment across Australia. The focus is on identifying the most viable and impactful opportunities for regional net zero transformation, and the institutional, workforce and infrastructure conditions required to deliver them.

The report draws on a wide range of data to build a detailed picture of regional comparative advantage and investment readiness. This includes analysis of natural and industrial assets, infrastructure availability, workforce capabilities, and policy alignment. It also reviews and expands the regional project pipeline, assesses shortlisting criteria, and examines region- and sector-specific barriers that may delay or limit project delivery. Where applicable, regional economic impacts are estimated using input-output modelling.

Findings from this report will guide investment prioritisation and coordination across government and industry. The outputs are designed to help NZEA and its partners understand which opportunities are most aligned with regional strengths, where delivery gaps exist, and what enabling actions, such as funding, approvals or reskilling, are needed to accelerate progress. The report also supports more targeted public strategy and policy development. . These findings are intended to be validated by NZEA with regional stakeholders.

The structure and methodology are consistent across all NZEA priority regions. While data availability and project pipelines vary, each report follows a shared framework to ensure comparability and provides a basis for validation with local communities. The analysis is forward-looking and focuses on a medium-term investment horizon.

Report Structure

The report is structured around five core analytical components: comparative advantage, project pipeline, investment prioritisation, barriers and enablers, and gaps in public strategy. Each stream builds on the previous to form an integrated view of regional investment potential and delivery readiness.

COMPARATIVE ADVANTAGE: This section assesses each region's underlying strengths across natural resources, workforce, infrastructure, industry base, and policy settings. It provides the foundation for identifying which types of investments the region is best positioned to attract and scale.

INVESTMENT OPPORTUNITIES: A long list of ~20 net zero-aligned project types per region is compiled and validated using public and internal sources. This includes tagging by sector, technology, project status, and expected job and investment outcomes.

INVESTMENT BARRIERS AND ENABLERS: This section identifies the conditions that may support or constrain project delivery, including infrastructure readiness, market viability, workforce alignment, governance and regulatory processes. A regional barrier and enabler profile is produced to inform investment facilitation.

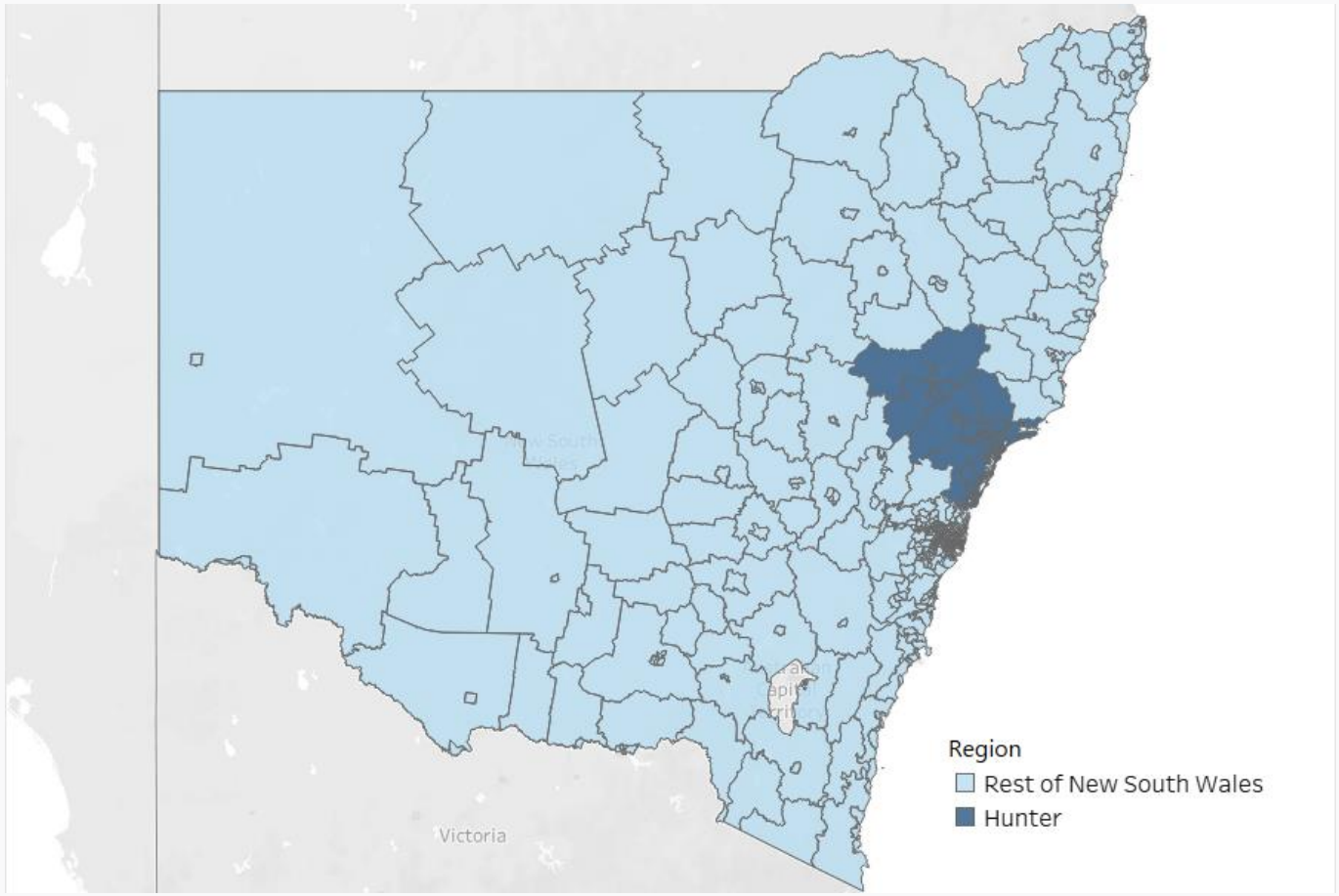
PUBLIC STRATEGY GAPS: Regional strategies and policy documents are reviewed to assess alignment with the identified opportunities and enabling conditions. A standardised scorecard highlights strengths, gaps and recommendations for improved strategic coordination and delivery.

APPROVALS: Analysis of typical and specialist approvals required across key stages of net zero projects.

APPENDICES: This section provides technical detail on the definitions, approaches and data sources used within the analysis of this report. We also provide supplementary methodological descriptions, maps, and scorecards.

The analysis in this report is focused on the Hunter which is defined as the combination of four working zones which cover a total of 85 SA2 regions.

Hunter region map



Hunter Region Working Zone Listing

State	Working Zone Name
NSW	Central Coast and surrounds
NSW	Muswellbrook, Scone and surrounds
NSW	Newcastle, Lower Hunter and surrounds
NSW	Nelson Bay Peninsula and Anna Bay

Source: Net Zero Economy Authority, Australian Bureau of Statistics

Hunter Region SA2 listing

Central Coast and surrounds

SA2 NAME	SA2 CODE
Avoca Beach - Copacabana	102011028
Bateau Bay - Killarney Vale	102021044
Blue Haven - San Remo	102021045
Box Head - MacMasters Beach	102011029
Budgewoi - Buff Point - Halekulani	102021046
Calga - Kulnura	102011030
Chittaway Bay - Tumbi Umbi	102021047
Erina - Green Point	102011031
Gorokan - Kanwal - Charmhaven	102021048
Gosford - Springfield	102011032
Jilliby - Yarramalong	102021049
Kariong	102011033
Kincumber - Picketts Valley	102011034
Lake Munmorah - Mannering Park	102021050
Narara	102011035
Niagara Park - Lisarow	102011036
Ourimbah - Fountaindale	102021051
Point Clare - Koolewong	102011037
Saratoga - Davistown	102011038
Summerland Point - Gwandalan	102021052
Terrigal - North Avoca	102011039
The Entrance	102021053
Toukley - Norah Head	102021054
Tuggerah - Kangy Angy	102021055
Umina - Booker Bay - Patonga	102011040
Wamberal - Forresters Beach	102011041
Warnervale - Wadalba	102021056
Woy Woy - Blackwall	102011042
Wyoming	102011043
Wyong	102021057

Muswellbrook, Scone and surrounds

SA2 NAME	SA2 CODE
Muswellbrook	106041126
Muswellbrook Surrounds	106041127
Scone	106041128
Scone Surrounds	106041129
Muswellbrook	106041126

Nelson Bay Peninsula and Anna Bay

SA2 NAME	SA2 CODE
Anna Bay	106031119
Nelson Bay Peninsula	106031121

Newcastle, Lower Hunter and surrounds

SA2 NAME	SA2 CODE
Adamstown - Kotara	111031222
Belmont - Bennetts Green	111011206
Belmont South - Blacksmiths	111011207
Beresfield - Hexham	111031223
Bolton Point - Teralba	111021215
Bonnells Bay - Silverwater	111021216
Branxton - Greta - Pokolbin	106011107
Cessnock	106011108
Cessnock Surrounds	106011109
Charlestown - Dudley	111011208
Dungog	106011110
East Maitland - Metford	106021614
Edgeworth - Cameron Park	111021217
Glendale - Cardiff - Hillsborough	111011209
Hamilton - Broadmeadow	111031224
Kurri Kurri - Abermain	106011111
Lambton - New Lambton	111031225
Lemon Tree Passage - Tanilba Bay	106031120
Maitland	106021114
Maitland - North	106021116
Maryland - Fletcher - Minmi	111031226
Mayfield - Warabrook	111031227
Merewether - The Junction	111031228
Morisset - Cooranbong	111021218
Mount Hutton - Windale	111011210
Newcastle - Cooks Hill	111031229
Newcastle Port - Kooragang	111031230
Raymond Terrace	106031122
Redhead	111011211
Rutherford (North) - Aberglasslyn	106021615

Newcastle, Lower Hunter and surrounds

SA2 NAME	SA2 CODE
Rutherford (South) - Telarah	106021616
Seaham - Woodville	106031123
Shortland - Jesmond	111031231
Singleton	106011112
Singleton Surrounds	106011113
Stockton - Fullerton Cove	111031232
Swansea - Caves Beach	111011212
Tea Gardens - Hawks Nest	106031124
Tenambit - East Maitland	106021617
Thornton - Millers Forest	106021618
Toronto - Awaba	111021219
Valentine - Eleebana	111011213
Wallsend - Elermore Vale	111031233
Wangi Wangi - Rathmines	111021220
Waratah - North Lambton	111031234
Warners Bay - Boolaroo	111011214
West Wallsend - Barnsley - Killingworth	111021221
Wickham - Carrington - Tighes Hill	111031235
Williamtown - Medowie - Karuah	106031125

COMPARATIVE ADVANTAGE

Hunter's industrial heritage and strategic assets position it to lead Australia's energy transition and pivot into advanced manufacturing and renewables.

Comparative advantage summary

Segment	Industry	LQ*	Growth**	Skilled labour***	% of economy ****	Infrastructure and endowments
Established advantage	Mining	1.67	-9.1%	9,026	11%	• 13% of Australia's black coal
	Accommodation and Food Services	1.21	1.1%	12,978	2%	• Tourism hubs, Hunter Valley
	Health Care and Social Assistance	1.14	1.5%	59,909	11%	• John Hunter Health Precinct • Hunter-Central Coast REZ (10 GW) • Hunter Hydrogen Hub
Net zero opps.	Electricity, Gas, Water and Waste	0.90	-2.8%	3,864	16%	• Tomago Aluminium smelter, Kurri Kurri industrial precinct
Latent potential	Manufacturing	1.00	-1.6%	18,105	5%	• Orica Kooragang Island ammonia/nitrate complex
	Professional, Scientific and Technical	0.70	2.0%	30,542	3%	• UoN (engineering R&D), Astra Aerolab
	Other Services	1.40	1.3%	20,075	2%	• Newcastle Clean Energy Precinct
	Construction	1.03	0.6%	35,439	9%	
	Rental, Hiring and Real Estate	1.02	1.1%	7,153	12%	• Strong population growth
	Administrative and Support	0.98	1.3%	5,634	1%	
	Education and Training	0.97	2.1%	36,116	5%	• University of Newcastle, Hunter TAFE
	Public Administration and Safety	0.92	2.4%	20,347	8%	• RAAF Base Williamtown
	Wholesale Trade	0.89	1.0%	6,477	2%	• Deep-water port, freight and logistics
	Financial and Insurance Services	0.82	1.1%	11,778	4%	
	Transport, Postal and Warehousing	0.76	0.7%	5,435	2%	• Intermodal terminals, airport links
Enabling industries	Information, Media and Teleco	0.51	1.0%	2,688	2%	• Fibre and broadband infrastructure
	Agriculture, Forestry and Fishing	0.16	-0.2%	1,080	3%	• Fertile land, viticulture
Population serving	Retail Trade	1.24	1.0%	15,737	4%	
	Arts and Recreation Services	0.69	2.1%	4,401	0%	• Newcastle cultural precincts

Source: ABS; REMPLAN; Oxford Economics Analysis

Description

The Hunter region is one of Australia's leading industrial centres. Mining remains core, contributing around 11% of regional value added supported by large coal reserves. Health care and accommodation are also major employers, underpinned by the John Hunter Health Precinct and strong tourism. These sectors are reinforced by deep-water ports, freight terminals, and a skilled workforce in mining and health, with population growth reinforcing demand.

The region's energy and infrastructure profile makes it a strong candidate for net zero transformation. Electricity, gas, water, and waste services contribute 16% of value added, with the Hunter-Central Coast Renewable Energy Zone, Hunter Hydrogen Hub, and Newcastle Clean Energy Precinct enabling clean industry investment. Anchored by Tomago Aluminium Smelter and Orica's ammonia/nitrate facility, the region is positioned to lead in green hydrogen, green ammonia, and energy-intensive industrial decarbonisation.

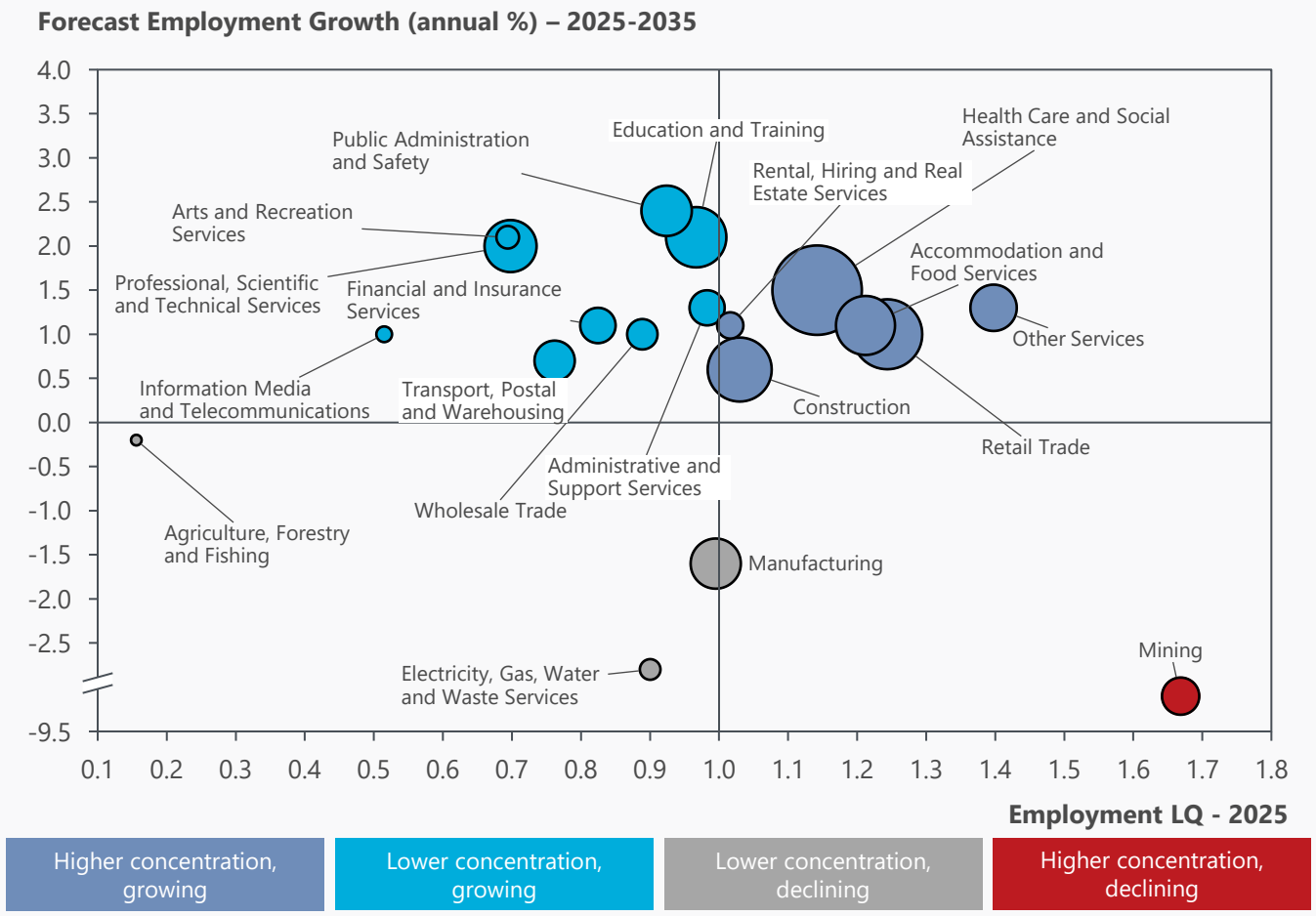
While employment in traditional manufacturing is forecast to decline (–1.6%/year) by 2035, the Hunter retains over 18,000 skilled workers and scope to pivot into advanced manufacturing. Institutions such as The Net Zero Manufacturing TAFE Centre of Excellence[2] will support this shift, partnering with TAFE NSW, universities, and industry to pilot qualification models. The region also has a strong base in defence manufacturing, delivering components for the Hunter-class frigates and supporting SMEs in global supply chains. RAAF Base Williamtown enhances aerospace and Defence opportunities, while the University of Newcastle and regional TAFE provide robust R&D and engineering pipelines. Together, these assets position the Hunter to evolve into a hub for advanced manufacturing.

Within this broader picture, the Upper and Lower Hunter play distinct roles. The Lower Hunter is shaped by its urban concentration around Newcastle, with strong logistics and civil assets underpinning its industrial and service economy. In contrast, the Upper Hunter retains a more resource and land-intensive profile, but also holds comparative advantage in emerging opportunities in large-scale renewables, supported by land availability and grid infrastructure.

** Location quotient of employment in 2025 relative to national levels; **Employment growth forecast 2025-2035 - step change scenario; *** Defined as workers in industry with skill level 3 and above; ****Defined as the percentage of regional GVA*

Hunter has existing advantages in mining, tourism and healthcare with growth in professional services, defence and education.

Regional employment – Location Quotients, Forecast Growth, [Bubble size = 2025 Employment]



Source: ABS; Oxford Economics Analysis

Occupation trends in the Hunter region

The Hunter Region's labour market reflects both enduring strengths and emerging opportunities. With a workforce of 540,000, it accounts for a significant share of New South Wales' regional workforce.

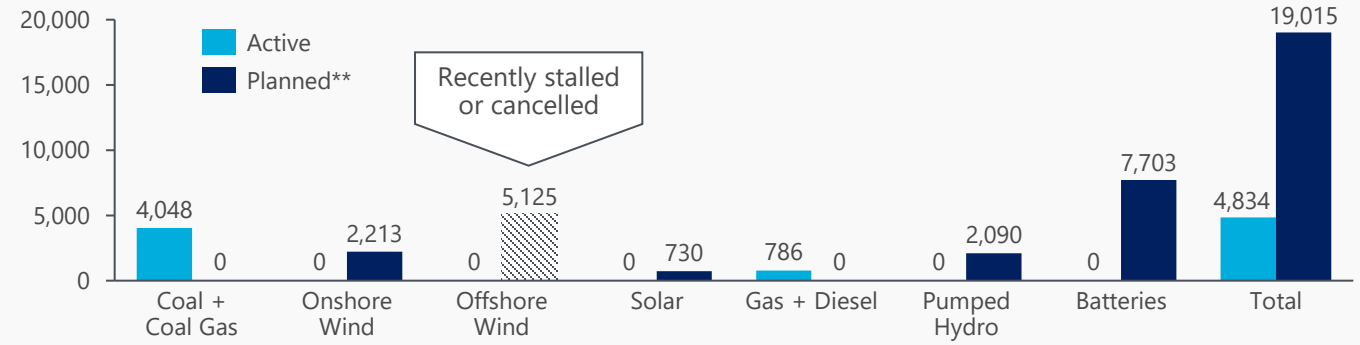
Employment in the Hunter is highly specialised in mining (LQ = 1.7), supported by large-scale coal reserves and associated supply chains. Mining remains the region's most established sector, with a very high concentration of employment and ongoing export importance, though job growth is expected to decline with the shift away from coal. At the same time, healthcare, accommodation, and education are forecast to deliver the strongest employment growth, driven by institutions such as the John Hunter Health Precinct and a growing demand for aged care and professional services. Together, these sectors illustrate the region's dual strengths: resource-based industries alongside people-based services, offering a foundation for long-term resilience.

Other entrenched strengths include accommodation and food services, construction, and retail trade, which combine above-average concentrations with steady growth prospects, reflecting the region's tourism, hospitality, and urban development strengths. Smaller but fast-growing sectors such as public administration, safety, and arts and recreation services will also contribute to diversification.

Electricity, gas, water and waste services shows employment decline, reflecting structural changes despite the importance of energy transition projects. Agriculture, forestry, and fishing, while historically important, is also expected to shrink in employment, reflecting competitive and structural pressures. Manufacturing holds moderate employment shares but faces weak growth prospects due to automation, global competition, and restructuring pressures. Overall, the Hunter's competitive strengths lie in its established heavy industries, construction, hospitality, health, and education sectors, while long-term challenges persist in utilities, primary industries, and trade-exposed sectors.

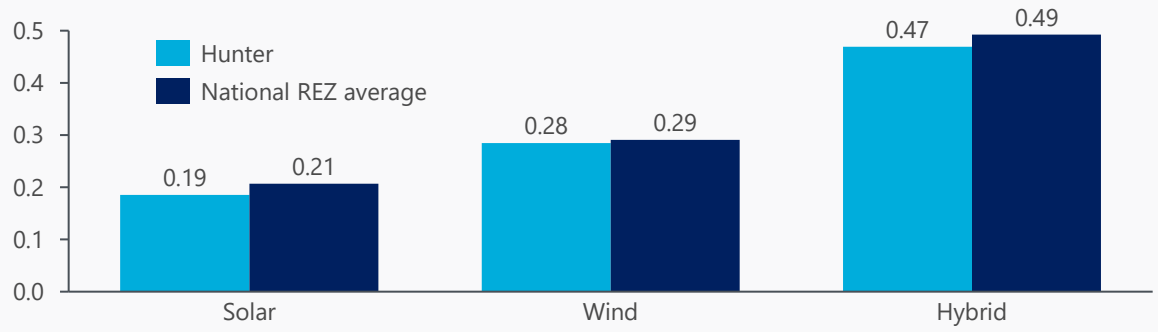
Hunter has significant renewables capacity factors on par with national REZ averages, and 19GW of planned renewables projects.

Total Generation by fuel type (MW) – Nameplate capacity – Active and planned



Source: AEMO Generation Information

Renewable energy capacity factors* – Hunter region



Source: Geoscience Australia

Energy and renewables profile of the Hunter region

The Hunter region has historically focused its energy generation to reflect the abundance of black coal deposits, with key generation projects in Bayswater, Colongra, Eraring and Vales Point currently contributing to over 80% of the region's generation.

As these stations are phased out to 2033-2035, renewables projects are planned to replace generation in the region. While some solar projects are progressing, such as the Stratford Renewable Energy Hub (230MW), offshore and onshore wind developments have dominated the outlook for the region's generation. The long term outlook for offshore wind remains uncertain given recent challenges facing current projects.

Generation projects will be supplemented through investment in pumped hydro and battery projects to smooth variability and provide firming capacity as coal generation retires. Over 2GW in pumped hydro nameplate capacity is anticipated, committed or proposed, including the Glennies Creek Pumped Hydro (700MW) and Glenbawn Dam (700MW) projects.

The Hunter region fully overlaps the Hunter Central Coast Renewable Energy Zone (REZ), which will be the first REZ in Australia to upgrade existing distribution infrastructure to reduce impacts on local communities and the environment[3]. These upgrades are expected to enable the integration of more than 1 gigawatt of renewable energy into the grid, supporting greater system capacity and accelerating the region's energy transition.

Along with legacy transmission infrastructure, these projects position the region as a prospective green hydrogen producer. The Hunter is the site of a designated hydrogen hub, anchored by a $70 million Commonwealth investment and led by Orica[4]. The initial phase involves a 55MW electrolyser at Kooragang Island to produce green hydrogen for industrial use, including decarbonisation of Orica's ammonia manufacturing. The hub will also support uptake in transport and heavy industry and is expected to scale over time to enable hydrogen export through the Port of Newcastle's Clean Energy Precinct.

** Estimated as the average capacity factor across areas of region overlapping designated REZ areas. National average measured across average of all designated REZ areas; ** Includes upcoming projects tagged by AEMO as anticipated, committed or proposed (note only proposed generation projects greater than 1000MW and proposed storage projects greater than 1500MW are included here); ***Note the Liverpool Range Windfarm is mostly outside of the Hunter region, located approximately two hours from Muswellbrook and Scone.*

The Hunter is transitioning from coal dominance to a diversified, low-carbon industrial base anchored by aluminium, chemicals, and circular economy initiatives.

Summary of mineral deposits and mines – Hunter region

Mineral	EDR + SR + IR*		Total Producing Mines	Total Unutilised Deposits	Forecast Real Price Growth
Name	Mass	% Aus Total	Number	Number	CAGR 2024-2027
Black Coal	26,500 Mt	13.45%	23	27	-8.51% (Met. Coal**) -8.41% (Thermal Coal***)

Source: Geoscience Australia AIMR, DISR Resources and Energy Quarterly

Summary of selected commodity production – Hunter region

Product	Total Regional Production	Total Production - National	% Of Australian Production
Name	Ktpa	ktpa	%
Aluminium	585	1,580	37%
Ammonia	360	1,400	26%

Source: Tomago Aluminium, Australian Aluminium Council, Orica, CSIRO

Minerals profile of the Hunter region

The Hunter region's minerals profile is dominated by the presence of black coal deposits, representing approximately 13.5% of Australia's total deposits. The region has a long history in coal mining, being the site of the nation's first commercial exports in the 1800s. Coal continues to underpin the local economy and has driven the development of freight and port infrastructure.

While historically defined by coal, the region is now pursuing a more sustainable industrial base through circular economy strategies. Central to this shift is the Hunter and Central Coast Circular Economy Roadmap[5], which outlines interventions to retain value from minerals processing by diverting waste streams into productive uses. In the Upper Hunter, coal combustion products such as fly ash are already being repurposed in cement and road base production, supported by research from the Ash Development Association of Australia[6] and studies by the CRC for Low Carbon Living[7] and MECLA[8] (Materials & Embodied Carbon Leaders' Alliance). The Upper Hunter's agricultural base also positions it as a potential feedstock source for Energy from Waste industries.

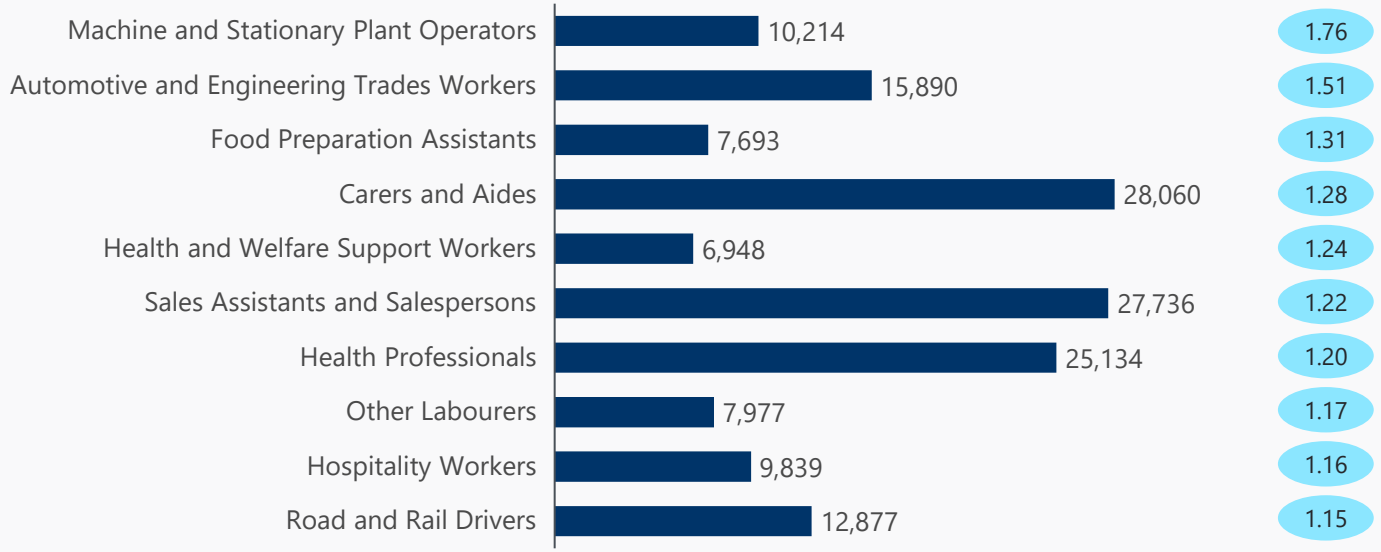
The region also hosts significant aluminium operations, anchored by the Tomago Aluminium Smelter near Newcastle. As a major consumer of electricity, Tomago is central to the regional economy, supporting downstream manufacturing and exports. The facility sources alumina from Queensland and processes it into primary aluminium, much of which is exported or used in domestic fabrication. Decarbonisation efforts are underway, with the smelter participating in national energy efficiency and emissions reduction programs[9].

The region also has established capabilities in industrial chemical production, particularly at the Kooragang Island industrial precinct,[10,] adjacent to the Port of Newcastle. The precinct is home to Orica's ammonium nitrate plant, which supplies mining and agricultural sectors. Ammonia produced onsite underpins fertiliser and explosives manufacturing, while the facility's scale and port access position it as a prospective hub for low-emissions ammonia.

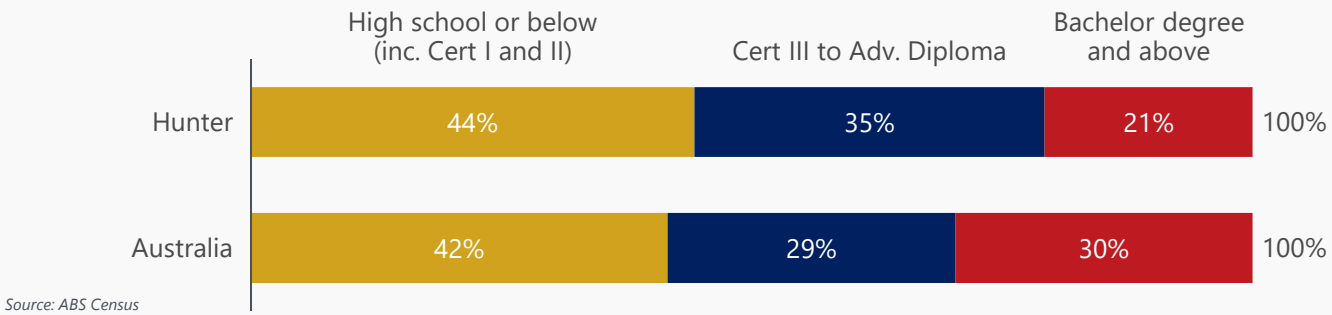
** Economic Demonstrated Resources + Subeconomic Demonstrated Resources + Inferred Resources; ** Hard coking coal FOB Australia east coast ports; ***FOB Newcastle 6000Kcal*

The Hunter has a more vocationally trained workforce with strong representation in trades, technicians, healthcare and social support.

Top ten occupations by location quotient (employment and LQ)



Educational attainment (% highest level attainment)



Source: ABS Census

Skills trends in the Hunter region

The Hunter region's labour market shows strong specialisation in trades, plant operations and support services, reflecting its industrial and regional-service economy. Machine and stationary plant operators (LQ 1.76), machinery drivers (LQ 1.62) and automotive and engineering trades workers (LQ 1.51) total over 25 000 jobs, highlighting capabilities in heavy industry, mining support and logistics. The health and social care sector employs more than 35 000, carers and aides (LQ 1.28) and health and welfare support workers (LQ 1.24) are over-represented, while sales assistants (LQ 1.22) and hospitality workers (LQ 1.16) reinforce the region's service economy.

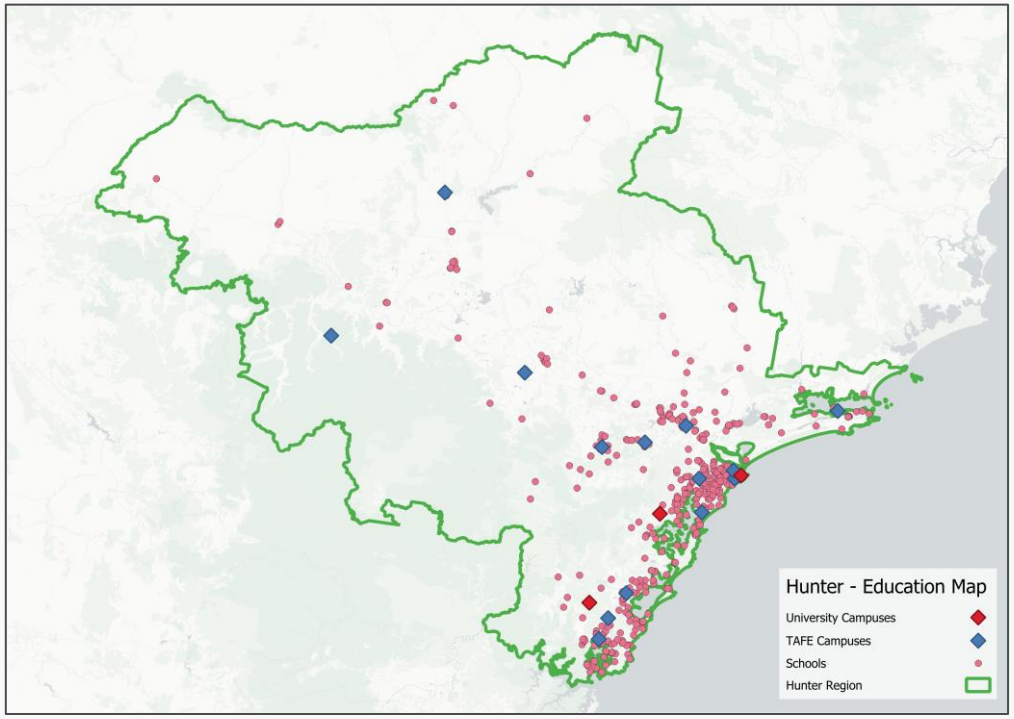
Many high-skill professional and knowledge-intensive roles lag below national levels. ICT professionals (LQ 0.39), business and marketing professionals (LQ 0.60) and specialist managers (LQ 0.75) are under-represented, indicating local shortfalls in digital, corporate and leadership skills. Creative and media roles (LQ 0.70) and senior executives (LQ 0.77) also trail, suggesting challenges in attracting and retaining degree-qualified talent.

Educational attainment mirrors this vocational emphasis: 44 % of workers hold only a high-school certificate, 35 % a Certificate III–Advanced Diploma, both above national averages, while only 21 % have a bachelor's degree or higher (versus 30 % nationally). This supports core industrial and care sectors but may limit diversification into knowledge-intensive fields.

To enhance resilience, the Hunter should both fortify its core trades and care pipelines, via apprenticeships, on-the-job training and expanded health-care programs, and bolster professional and digital skills through TAFE and university partnerships, remote-capable roles and up-skilling initiatives. Facilitating pathways from vocational to degree qualifications, especially in STEM and business, will position the region for growth in high-value, technology-driven industries while sustaining its industrial backbone.

Hunter is building future skills through strong university–TAFE partnerships, healthcare and defence training, and a growing focus on clean energy and advanced manufacturing.

Education facility map – Hunter region



3
University Campuses

15
TAFE Campuses

439
Schools

Source: TAFE NSW 2025; Study Australia 2025; ACARA 2024

Education trends in the Hunter region

The Hunter region is home to a growing tertiary education ecosystem that supports skills in industries critical to its future. Key university campuses include the University of Newcastle's Central Coast and Newcastle campuses, and Avondale University's Lake Macquarie campus. Notable industry partnerships include the TRaCE program[11] at the University of Newcastle. The Newcastle campus is also engaged in the Circular Economy Grand Challenge[12] and excels in chemical processing and materials innovation, including through its Integrated Innovation Network (I2N)[13.] The Newcastle Institute for Energy and Resources and CSIRO Energy Centre further support the education ecosystem in the region

Educational attainment in the region reflects both opportunity and need. 46% of residents have completed Year 12 (59% nationally), while 61% hold a non-school qualification (59% nationally).

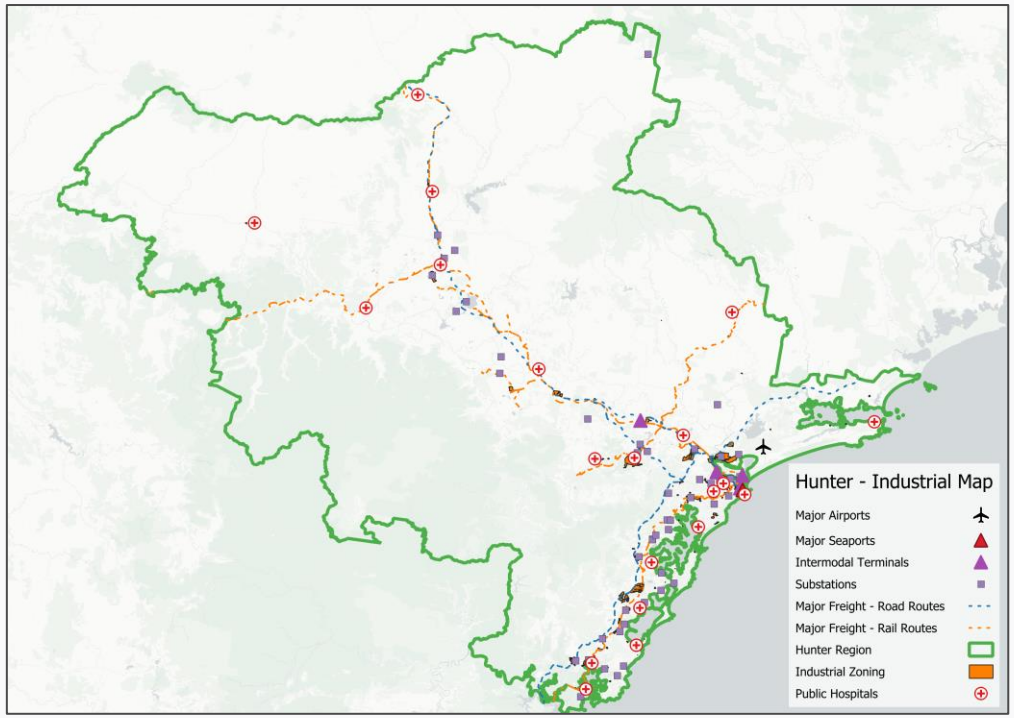
Healthcare and aged care training is a major regional strength, with programs delivered by the University of Newcastle, TAFE NSW, and Avondale University. Avondale specialises in nursing and aged care education, supported by strong clinical placement networks. The recent $470 million investment in the new Maitland Hospital[14], has further expanded local training and infrastructure.

TAFE NSW complements university offerings through vocational and micro-credential programs, notable at the Net Zero Manufacturing Centre of Excellence in Newcastle, which delivers practical training in clean energy systems, hydrogen technologies, electrotechnology, and mechatronics. The Centre is supported by over $60 million in Commonwealth and state funding.

Under the NSW Government's energy and construction skills program[15], TAFE NSW also offers free short courses and micro-credentials in solar PV, battery storage, and electric vehicle infrastructure. These are designed to rapidly upskill workers for transmission and renewable energy projects in the Hunter-Central Coast Renewable Energy Zone. The Defence sector is also a major focus, with TAFE campuses offering programs in mechanical engineering, welding, avionics, and logistics. These are aligned with local industry needs, including support for sustainment activities at RAAF Base Williamtown.

The Hunter has world-class port, freight, and energy infrastructure while diversifying into clean energy and advanced industries, with growing health and aged care capacity.

Infrastructure map – Hunter region



7320 Ha. industrially zoned land

1 Major Airport

1 Major Maritime Port

20 Public Hospitals

4 Intermodal Terminals

Source: Geoscience Australia, Digital Atlas of Australia

Infrastructure trends in the Hunter region

The Hunter region's legacy of heavy industry has created a strong infrastructure. Past investment in coal mining and freight logistics established rail corridors, high-capacity port infrastructure and transmission assets that now underpin growth in emerging industries.

The Port of Newcastle handles 4,600 vessel movements and over 150 million tonnes of cargo annually[16]. While historically focused on bulk commodities, the port is pursuing diversification through a planned deepwater container terminal and Clean Energy Precinct[17]. The proposed Logistics Precinct is also expected to bolster these capabilities.

The region is also serviced by high-voltage substations and transmission lines, particularly in the Upper Hunter, intersecting with the Hunter-Central Coast REZ. The Tomago and Liddell substations are central to managing grid load and enabling large-scale renewables and electrified industrial precincts.

Intermodal terminals at sites such as Carrington, Rutherford, and broader freight nodes near Newcastle Airport and the M1 corridor support defence logistics, inbound raw materials, and outbound manufactured goods. These terminals connect to the Hunter Valley rail network and major freight corridors, facilitating efficient transport to Sydney, Brisbane and the Inland Rail system.

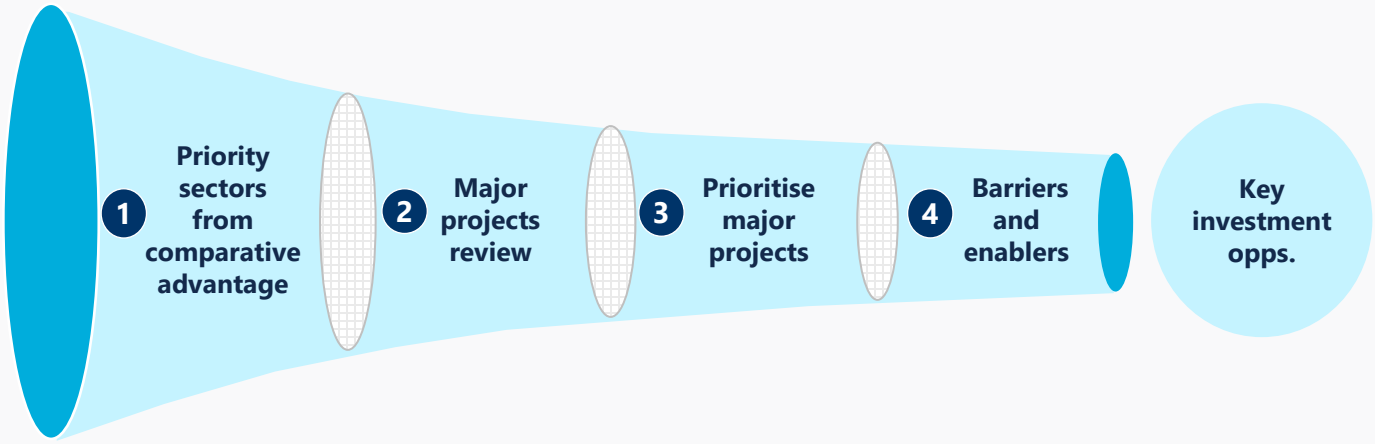
Water infrastructure remains a constraint. While there is no operational desalination plant in the region, Hunter Water[18] holds approval for a 30 megalitre-per-day facility at Belmont, to be activated during drought conditions. As demand grows from water intensive industries, the viability of permanent or scaled-up desalination options may increase.

The region hosts one of NSW's largest health and aged care networks, anchored by major facilities such as the John Hunter Hospital and a growing cluster in Cessnock and Maitland. Proximity to regional centres and strong transport links enable efficient service delivery across urban and rural areas. Recent investment includes $470m for the new Maitland Hospital, supporting expanded capacity and training.

INVESTMENT OPPORTUNITIES

A four step process was used for identifying and prioritising opportunities.

Investment opportunities methodology



Output

Priority sectors
- Renewable Energy and Storage
- Low-Emissions Manufacturing and Circular Economy
- CCUS
- Advanced Agribusiness and Food

20 opportunities identified by
- Value
- Likelihood of realisation
- Job creation potential

Top 3 opportunities ranked by
- Economic impact
- Jobs
- Comparative advantage
- Lead times
- Policy alignment

Top 3 opportunities
- Barriers
- Enablers
- Constraints
- Key actions to unlock investment

Key investment opportunities for NZEA to focus on and prioritise in each region

Description

The methodology for identifying investment opportunities in the Hunter builds on the region's comparative advantages while aligning with national net zero objectives. It begins by identifying priority sectors where the Hunter has structural strengths and growth potential. These sectors reflect both the region's established industrial base and its capacity to transition into globally competitive industries.

The next step is a review of the Hunter's major projects pipeline to develop a long list of 20 opportunities. Each is assessed against economic value, likelihood of realisation, and job creation potential, ensuring the pipeline captures projects that can deliver economic transformation and are commercially and technically feasible.

This is then narrowed to the top three opportunities with the greatest impact. Selection is based on economic contribution, alignment with the Hunter's comparative advantage, job creation potential, lead times, and policy consistency. This ensures the region focuses on opportunities that are both ambitious and achievable.

Finally, the methodology considers the barriers and enablers shaping delivery. These include demand signals and offtake agreements, access to enabling infrastructure such as energy, water, and ports, policy and regulatory clarity, and availability of specialist workforce skills. Understanding these factors highlights the key actions required to unlock investment and accelerate delivery.

The outcome is a focused set of three priority opportunities for the Hunter, supported by evidence of their economic potential, enabling requirements, and policy alignment. These opportunities form the basis for targeted investment attraction and coordinated delivery across government, industry, and the community.

Project types have been prioritised based on multi-domain criteria, tailored to the specific conditions of the Hunter region.

Comparative advantage alignment

Denoted by a qualitatively derived comparative advantage score out of 5:

1. No alignment with regional strengths or capabilities
2. Minimal alignment; limited local advantages
3. Moderate alignment with some key strengths (e.g. workforce or land)
4. Strong alignment with multiple comparative advantages
5. Excellent alignment; leverages core regional assets and priorities

Project lead times*

Based on a region-specific rank of project types by expected lead time (defined as the time between project inception and construction commencement):

Short Term: Lead time of less than 3 years

Medium Term: Lead time of between 3 and 5 years

Long Term: Lead time of greater than 5 years

Typical job contributions

Based on a quintile rank of project types by expected job-year contribution within 10 years of construction starting:

1. Fewer than 600 job years; short-term or low-quality employment
2. 600–1,600 job years; limited regional employment impact
3. 1,600–2,800 job years; moderate and/or specialised workforce impact
4. 2,800–4,400 jobs; strong job creation with varied roles
5. 4,400+ jobs; transformative workforce impact across skill levels

Government policy alignment

Derived from a review of government documents, as well as a review of the Major Projects Listing.

1. Not mentioned at local, state or commonwealth level; no relevant projects identified in region
2. Mentioned once at a local, state or commonwealth level; or projects identified in region
3. Mentioned twice at a local, state or commonwealth level; or projects identified in region
4. Mentioned three times at a local, state or commonwealth level; or projects identified in region
5. Mentioned at local, state and commonwealth level; and projects identified in region.

Methodology

Project types were prioritised using an equally weighted average of three index scores: comparative advantage, job contribution, and government policy alignment. Each index was scored out of 5 using a tailored methodology. The final score provides a comparative view across project types for the Hunter region.

Comparative advantage was assessed qualitatively, based on factors such as resource endowment, industrial base, infrastructure readiness, workforce availability, and regulatory context. Given the variability across project types, no single indicator set was universally applicable. The assessment relied on structured expert judgement, informed by the most relevant metrics for each case.

Job contribution scores were based on estimated job years, combining construction and ongoing employment over a 10-year operational period. Estimates were drawn from project-level data, supplemented with desktop research where necessary. Final scores were assigned by ranking each project type into quintiles.

Policy alignment scores reflected the presence of each project type in local, state, and federal policy documents, and in the Hunter's major project pipeline.

A separate **lead time analysis** was conducted to support the evidence base. Lead times (from inception to construction) were estimated using proprietary modelling for energy projects and desktop research for others. While not included in scoring, these estimates informed comparative advantage assessments and delivery timelines.

**Note that lead times are not considered when deriving a project type's rating or subsequent prioritisation. Details and categorisation are retained here for illustrative purposes.*

The Hunter has a range of growth opportunities based on job potential, policy alignment and comparative advantage.

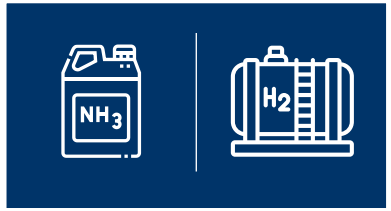
Project type	Lead Times*	Job Contribution	Policy	Comparative Advantage	Average Rating**	Description
Defence maintenance/sustainment	Short	5.00	4.00	5.00	4.67	Williamtown Defence cluster and MRO capability. Strong policy support, job contribution potential.
Hydrogen	Medium	5.00	4.00	5.00	4.67	Strong local interest and infrastructure through Hydrogen Hub.
Energy from waste facilities	Long	4.00	5.00	4.00	4.33	Leverages industrial waste streams and energy infrastructure.
LCLFs, biofuels and biochemicals from waste streams	Medium	3.00	5.00	5.00	4.33	Good match with industrial ecology and bioresource availability.
Defence manufacturing	Short	3.00	4.00	5.00	4.00	RAAF Williamtown and Aerolab precinct provides a strong foundation.
Urea and ammonia production	Short	4.00	3.00	5.00	4.00	High potential due to existing ammonia plant and hydrogen development.
Onshore wind farms	Long	1.00	5.00	5.00	3.67	Strong resource potential but limited local manufacturing/jobs.
Green metals	Medium	3.00	4.00	4.00	3.67	Potential to leverage existing metal processing and manufacturing capabilities.
Renewables component manufacturing	Short	5.00	5.00	1.00	3.67	Implied policy alignment through state and major projects but limited comparative advantage.
Transport and logistics	Medium	4.00	4.00	3.00	3.67	Moderate potential, reliant on targeted infrastructure investment.
Circular economy manufacturing	Short	1.00	5.00	4.00	3.33	Strong fit due to local industrial base, workforce, and strategic state support.
Offshore wind farms	Long	4.00	4.00	2.00	3.33	Strong resource and policy alignment; limited job scale short-term. Several projects have stalled.
Battery energy storage systems (BESS)	Medium	1.00	4.00	5.00	3.33	High infrastructure pipeline; limited ongoing employment.
Carbon capture and storage (CCS)	Long	5.00	2.00	3.00	3.33	Policy interest and early-stage potential but limited current project activity.
Pumped hydro energy storage	Long	2.00	4.00	4.00	3.33	Lacks optimal topography and water availability.
Solar farms	Medium	1.00	5.00	3.00	3.00	Moderate growth potential, contingent on grid upgrades.
Food and fibre product manufacturing	Short	2.00	4.00	2.00	2.67	Some potential - building on local agriculture base.
Data centres	Short	1.00	4.00	1.00	2.00	Limited tech clusters and latency/resource constraints.
Minerals processing	Short	2.00	3.00	1.00	2.00	Limited resources and minimal industrial use cases in the Hunter.
Geothermal heating and power	Long	2.00	1.00	1.00	1.33	Limited policy alignment and comparative advantage

**Note that lead times are not considered when deriving a project type's rating or the subsequent prioritisation. Details and categorisation are retained here for illustrative purposes.*
***Additional detail on methodology to derive scores is present in report appendices.*

Key opportunities Weakest 1 2 3 4 5 Strongest

Hydrogen and ammonia are creating new investment pathways that strengthen the Hunter's industrial base, research capacity, and export potential.

Summary of opportunity – Hydrogen and ammonia manufacturing



Ammonia and hydrogen production in the Hunter region is emerging as a key pillar of NSW's low-emissions industrial strategy. The region's existing industrial base, port infrastructure, and access to renewable energy make it well-placed to produce low-carbon hydrogen and ammonia for domestic use and export. Firms such as LAVO[23] are also exploring hydrogen component manufacturing and energy storage technology. These sectors are central to decarbonising heavy industry, supporting energy security, and maintaining the Hunter's role as a major industrial hub.

Hunter advantages

- Established ammonia production and related industrial operations at Kooragang Island
- Direct access to the Port of Newcastle for distribution and export
- Expanding hydrogen sector, with strong academic, local government and commonwealth support
- Strong potential to harness local renewable energy resources for green hydrogen production

Actions to realise opportunity

- Hydrogen/ammonia pipelines connecting production sites to the Port of Newcastle and industrial users and port upgrades for storage/handling/export of hydrogen
- Renewable energy and transmission capacity to power electrolysers and ammonia plants
- Environmental and planning approvals, including an Environmental Impact Statement (EIS), State Significant Development/Infrastructure (SSD/SSI) and heritage approvals
- Safety, environmental, and operational licences such as Major Hazard Facility (MHF), EPL, and Grid Connection Agreements

Estimated economic impacts per project*

	Hydrogen		Ammonia	
	Constr-uction	Ongoing	Construc-tion	Ongoing
Investment	$1400m	$420m p.a.	$2,900m	$464m p.a.
GVA	$248m	$136m p.a.	$394m	$282m p.a.
Employment	790 jobs	383 jobs p.a.	1,359 jobs	300 jobs p.a.

Key project examples

- **Kooragang Island Industrial Precinct**
  - Hosts the Hunter's only large-scale ammonia production facility, operated by Orica
- **Hunter Valley Hydrogen Hub**
  - Proposed 50MW electrolyser to supply renewable hydrogen to Orica's ammonia plant
- **LAVO Hydrogen Storage**
  - R&D and manufacturing of green hydrogen storage

Key opportunity areas

Immediate priorities (2025-2030)

1. Build on existing Hunter Valley Hub and Orica projects to scale green hydrogen output using renewable power and recycled water. Explore industrial fuel substitution.
2. Leverage Orica's existing ammonia and ammonium nitrate plants to integrate hydrogen directly into established chemical value chains.

Medium-term opportunities (2030-2035)

3. Develop bulk ammonia storage, loading and shipping facilities at the Port of Newcastle Clean Energy Precinct for global exports.
4. Attract advanced manufacturers in components for electrolysers, hydrogen refueling systems, storage vessels and hydrogen equipment assemblies.
5. Deploy hydrogen for buses, trucks, mining haulage and nearby industrial loads to build reliable domestic demand alongside exports.
6. Establish national service and maintenance hubs for electrolysers and hydrogen equipment, modelled on mining equipment service hubs.

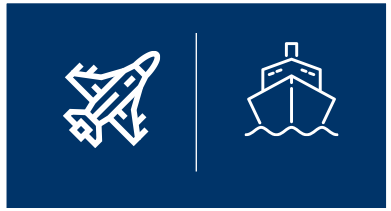
Longer-term opportunities (post-2035)

7. Invest in R&D and demonstration of technologies to convert imported ammonia back into hydrogen, positioning Newcastle as a two-way energy hub.
8. Explore ammonia as a shipping fuel and as a low-carbon option in regional energy generation.
9. Scale CSIRO and University of Newcastle's role in workforce training, certification, and testing services to support exports and domestic scaling.

** Expected investment CAPEX, and Construction and Ongoing employment impacts are taken as averages from publicly available project information. Expected Ongoing investment and GVA impacts are inferred using ratios. See more details in the Appendix.*

Defence infrastructure and market demand are unlocking major investment opportunities for the Hunter in manufacturing, sustainment, and exports.

Summary of opportunity – Defence manufacturing and sustainment



Defence activities in the Hunter are a core part of NSW's strategic industrial capability. The region's manufacturing, maintenance, and training facilities, combined with port and transport infrastructure, position it as a hub for naval, aerospace, and land-based operations. Key opportunities include ongoing sustainment through RAAF Base Williamtown, cutting-edge guided weapons manufacturing anchored by the new Kongsberg[24] facility, and a coordinated industry ecosystem linking SMEs and primes through networks, simulation, and integration platforms. Together, these assets support national security and enhance the resilience of Australia's defence supply chains.

Hunter advantages

- Central role of RAAF Base Williamtown in Defence ecosystem
- Astra Aerolab precinct attracting primes such as BAE, Kongsberg and Boeing and supported by coordinated investment in defence infrastructure
- Active industry networks (Hunter Defence, HunterNet) integrating SMEs into defence supply chains
- Strong workforce pipeline backed by regional skills initiatives and aligned government–industry programs

Actions to realise opportunity

- Expansion of operational facilities at RAAF Base Williamtown, including hangars, maintenance bays, training simulators and improving grid and water connectivity
- Secure transport, logistics and other airport infrastructure for classified or hazardous defence material
- Defence-specific planning and environmental approvals, including EIS and Estate Works Program (EWP)[25] processes
- Security and accreditation requirements such as DISP membership, site security accreditation and explosives handling licences

Estimated economic impacts per project*

	Defence Manufact.		Defence Sustainment	
	Constr-uction	Ongoing	Construc-tion	Ongoing
Investment	$400m	$295m p.a.	$680m	$612m p.a.
GVA	$87m	$58m p.a.	$148m	$120m p.a.
Employment	148 jobs	263 jobs p.a.	367 jobs	600 jobs p.a.

Key project examples

- **RAAF Base Williamtown**
  - Australia's primary fighter, surveillance, and training base, home to the F-35A fleet sustainment program.
- **Astra Aerolab Precinct**
  - Defence, manufacturing and aerospace business park that hosts multiple defence primes.
- **Kongsberg Defence Australia Missile Facility**
  - Under construction at Astra Aerolab to produce Naval Strike Missiles and Joint Strike Missiles.

Key opportunity areas

Immediate priorities (2025-2030)

1. Build on sustainment contracts tied to the F-35A fleet at Williamtown, including maintenance, upgrades and operational support.
2. Support primes at Astra Aerolab with workforce pipelines, streamlined approvals, and industry certification programs.
3. Strengthen the integration of Hunter SMEs into defence supply chains via DISP membership and accreditation.

Medium-term opportunities (2030-2035)

4. Expand defence-specific infrastructure, including new hangars, training simulators, hardened logistics and secure transport facilities at Williamtown and surrounding bases.
5. Establish a regional defence sustainment services hub (e.g. avionics, electronics, advanced composites, and maritime sustainment), extending beyond aerospace into naval and land platforms.
6. Localise some advanced defence manufacturing (e.g. robotics integration, precision engineering) by looking to local SMEs to reduce reliance on overseas supply chains.

Longer-term opportunities (post-2035)

7. Position the Hunter as a centre for guided weapons and explosive ordinance (GWEO) manufacturing and sustainment, leveraging national investment in sovereign capability.
8. Develop a comprehensive export market capability, enabling Hunter firms to supply into allied defence programs (AUKUS, US/UK aerospace and naval projects).
9. Scale CSIRO and University of Newcastle's role in workforce training, certification, and testing services to support exports and domestic scaling.

** Expected investment CAPEX, and Construction and Ongoing employment impacts are taken as averages from publicly available project information. Expected Ongoing investment and GVA impacts are inferred using ratios. See more details in the Appendix.*

The Hunter is positioned to become a national leader in biofuels and EfW, with infrastructure and feedstock advantages attracting long-term investment.

Summary of opportunity – Biofuels and energy from waste

Biofuels and energy from waste (EfW) are emerging pillars of the Hunter's clean energy and circular economy capability. With its strong agricultural, forestry, and industrial base, the region is well-suited to these industries. In NSW, thermal waste treatment with energy recovery is banned unless excepted under the Protection of the Environment Operations (General) Regulation 2022, which permits it in four designated precincts - Parkes, Richmond Valley, Southern Goulburn Mulwaree, and West Lithgow, with Tomago proposed as a priority infrastructure area.

Hunter advantages

- A strong local agricultural and forestry base supporting feedstock and an existing industrial, chemical processing and manufacturing base are attractive for proponents of EfW projects
- Some transferrable skillsets from coal to EfW (e.g. engineering and fitter roles) and existing advanced skillsets in ammonia production
- Direct access to the Port of Newcastle for distribution, import and export
- Expanding sectors, with strong R&D investment and private sector interest

Actions to realise opportunity

- Secure EIS, SSD/SSI, biodiversity, and Aboriginal heritage approvals, while ratifying Tomago as an EfW precinct to give investors certainty
- Progress grid connections, recycled water access, transport/logistics upgrades and long-term feedstock supply contracts needed for EfW and biofuels projects
- State and Commonwealth approvals including EIS, SSD/SSI consent, biodiversity offset approvals, and Aboriginal Heritage Impact Permits (AHIPs)

Estimated economic impacts per project*

	Biofuels		Energy from Waste	
	Constr-uction	Ongoing	Construc-tion	Ongoing
Investment	$600m	$60m p.a.	$600m	$240m p.a.
GVA	$78m	$20m p.a.	$86m	$62m p.a.
Employment	733 jobs	103 jobs p.a.	539 jobs	385 jobs p.a.

Key project examples

- **Remondis EfW at its Tomago resource recovery facility**[27]
  - Proposed EfW facility that has now triggered an inquiry into Tomago as a potential priority infrastructure area
- **Ethtec Cellulosic Ethanol Pilot Plant**[28]
  - Developing new technology for environmentally sustainable production of ethanol biofuel

Key opportunity areas

Immediate priorities (2025-2030)

1. Anchor EfW development at Tomago by establishing it as NSW's designated EfW precinct and priority infrastructure area, creating certainty for long-term private investment.
2. Unlock scalable EfW projects and biofuel pilots (e.g. Ethtec) that demonstrate commercial pathways and attract early capital.
3. Strengthen biomass supply chains by creating opportunities for local growers, forestry operators and councils to participate in long-term contracts.

Medium-term opportunities (2030-2035)

4. Develop shared precinct infrastructure (logistics hubs, grid interconnections, waste aggregation points) that enable economies of scale and reduce project costs.
5. Support facilities like the Ethtec Cellulosic Ethanol Pilot Plant and other SMEs to move from pilot to commercial scale, focusing on SAF and renewable diesel.
6. Attract international partners to co-invest in EfW boilers, turbines, and bio-refinery technologies while embedding local manufacturing of components and maintenance capabilities.

Longer-term opportunities (post-2035)

7. Position Newcastle as an export hub for sustainable biofuels and renewable energy credits, aligned with global SAF and low-carbon shipping fuel demand.
8. Link EfW facilities with district heating, industrial steam users, and carbon capture technologies.
9. Scale CSIRO and University of Newcastle research on feedstock pre-treatment, gasification, and next-gen bio-refinery processes.

** Expected investment CAPEX, and Construction and Ongoing employment impacts are taken as averages from publicly available project information. Expected Ongoing investment and GVA impacts are inferred using ratios. See more details in the Appendix.*

INVESTMENT BARRIERS AND ENABLERS

The Hunter region's industrial transition depends on reducing commercial risk, strengthening infrastructure, aligning skills, and providing clear regulatory certainty.

Key barriers

Commercial and market risk

Investors remain cautious due to uncertain demand signals, global competition, and fluctuating commodity/energy prices.

Policy and regulatory uncertainty

Complex approval pathways, overlapping responsibilities, and shifting policy priorities create uncertainty for proponents.

Infrastructure gaps and constraints

Energy, water, transport and port/logistics infrastructure require significant upgrades to support emerging industries.

Specialist skills in short supply

Specialist technical and trade skills are in short supply, while competition for labour across sectors creates retention challenges.

Key enablers

Commercial certainty

Clear demand signals and long-term offtake arrangements can anchor investment.

Governance and regulatory certainty

Streamlined approvals and coordinated policies at federal, state, and local levels provide confidence.

Infrastructure and utilities access

Repurposing existing industrial assets and strategic new investment strengthen the Hunter's comparative advantage.

Workforce transition and R&D potential

A strong existing industrial base, transferable trade skills, and local research partnerships position the region to adapt and innovate.

Description

The Hunter region has strong foundations for industrial transition, but progress depends on overcoming barriers in commercial certainty, infrastructure, skills, and regulation. Growth across hydrogen, ammonia, defence, biofuels, and energy-from-waste requires reducing risk through clear demand signals, regulatory clarity, upgraded infrastructure, and aligned skills pipelines.

For hydrogen, high input costs, slow market development and the risks associated with developing capital-intensive projects of this nature, have led to increased market uncertainty and firms such as Origin withdrawing from the region.[29]. Early opportunities lie in decarbonising existing ammonia production, but scaling requires offtake contracts and shared infrastructure.

In defence, the loss of Williamtown's priority precinct status[30] has added planning uncertainty, while long contracting cycles, clearance delays, and regulatory complexity raise entry costs. Defence sustainment remains strong, anchored by BAE's F-35 program and national assets at Williamtown, Astra Aerolab, and Newcastle Port, but investment hinges on streamlined funding coordination, training expansion, and precinct upgrades[31].

Biofuels and EfW face slow licensing, fragmented feedstock chains[32], and community concerns[33]. Formalising Tomago as an EfW precinct, expanding tonnage allowances, clarifying waste rules, and carbon credit eligibility would cut risk. Co-location with biofuels and heavy industry can improve feedstock use and provide industrial by-products like heat and steam, as seen in global cases such as the Alholmens Kraft Biomass Station in Finland[34].

Region-wide, barriers include grid congestion, water security[35], skills shortages, and fragmented governance[36]. Enablers include port access, industrial assets, transferable workforce, and strong research institutions[37]. Policy signals such as hydrogen hubs, circular economy strategies, and defence prioritisation are building confidence. Clearer NSW alignment with national transition goals will be critical to securing the Hunter's leadership in clean energy and defence.

The Hunter region can leverage brownfield decarbonisation and shared infrastructure to build a globally competitive hydrogen and ammonia export hub.

Key barriers

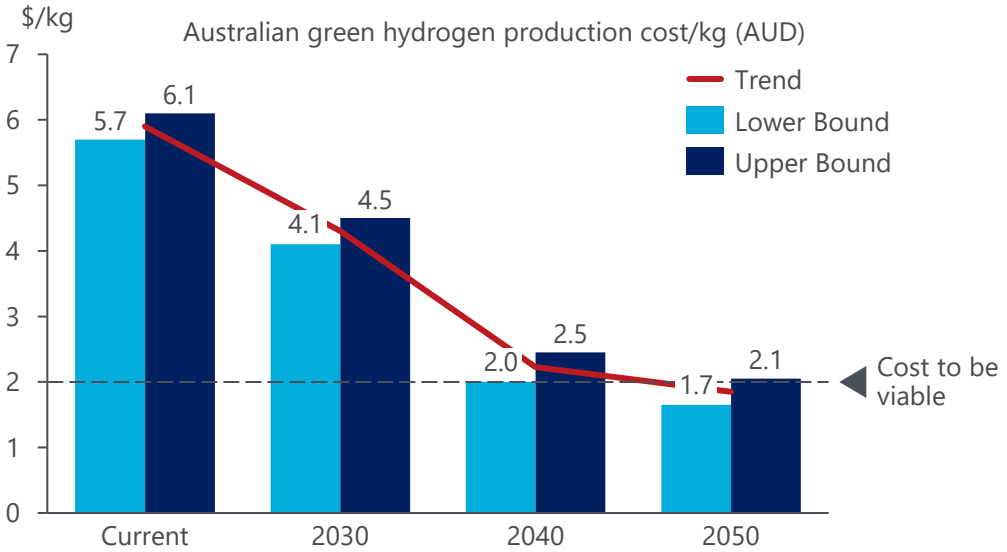
- Hydrogen momentum in the Hunter has been primarily slowed due to high production costs, weak early-stage demand, and infrastructure and planning delays that have eroded investor confidence. The CSIRO outlines that to be commercially viable against fossil fuels, production costs need to fall below AUD $2 per kg[38].
- Newcastle and Kooragang currently lack large-scale hydrogen liquefaction, storage, and pipeline integration. However, the proposed Port of Newcastle Clean Energy Precinct is intended to address these gaps[39].
- Origin's 2024 exit from the Hunter Valley Hydrogen Hub[40] illustrate how projects have shifted focus as subsidies and demand remain uncertain. Projects are still working to rebuild investor and customer confidence.
- Significant grid upgrades, including adding 1 GW of transfer capacity, building new substations and reinforcing transmission lines are in early stages of development[41], delaying the ability of electrolysers to connect to the network, while long-term water availability remains a critical challenge.
- Current offtake is reliant on export demand, as domestic adoption remains unclear.

Key enablers

- Kooragang Island and Newcastle Port provide a base for hydrogen and ammonia exports that can be scaled with targeted investment and supported by an experienced manufacturing workforce.
- Local industrial expertise is reinforced by University of Newcastle and CSIRO, offering energy and materials science capabilities.
- The Hunter-Central Coast REZ delivers staged grid upgrades, supporting long-term PPAs and flexible demand for electrolysers, while Federal and state initiatives, including hydrogen hubs, subsidies and precinct funding provide signals and support for first movers.
- Federal and international demand, especially from Japan and South Korea[42], coupled with increased domestic renewable energy supply, leading to lower production costs, strengthens the Hunter's positioning.

Opportunities

- Early hydrogen production can be integrated into Orica's ammonia and nitric acid assets[43], delivering decarbonisation value while avoiding greenfield build risk.
- Government has an opportunity to assist with offtake and private sector uncertainty through targeted policy interventions.
- Position the Hunter as an export hub by using ammonia as a carrier, underpinned by the Port of Newcastle masterplan to transition from domestic substitution to international markets.
- Shared infrastructure and anchor demand can establish the Hunter as a leading hydrogen and ammonia hub, improving economies of scale and investor confidence.



Source: PwC 2025

Costs trending toward global competitiveness by 2040

The Hunter can build on its defence industry base by leveraging skills, facilities, and supply chain depth to secure national and export opportunities.

Key barriers

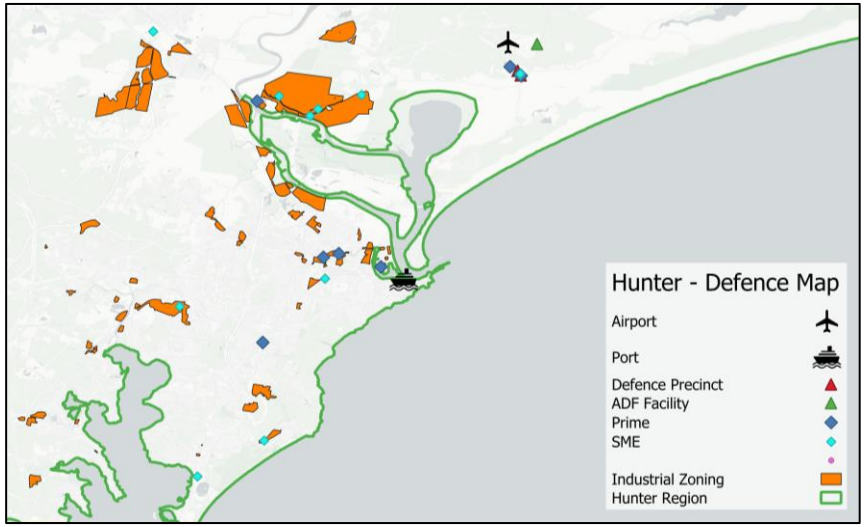
- The withdrawal of the Williamtown Special Activation Precinct (SAP) has removed streamlined approvals and funding certainty, while strict noise, height and airspace controls limit permissible uses and narrow the pool of viable sites[44]. Despite defence being a national priority, procurement cycles in defence can be slow[45]. This creates uncertainty for local businesses seeking to invest in defence supply chains and infrastructure, undermining momentum at the regional level.
- Ongoing PFAS remediation around RAAF Base Williamtown adds complexity to due diligence, stakeholder management and project costings[46].
- Long contracting cycles, DISP/AGSVA clearance delays stemming from mandatory facility certification and accreditation, personnel clearance requirements and physical security clearances, raise entry costs and risks for defence firms, with reforms still bedding in[47].
- A tight national defence labour market and sequencing of Newcastle Airport upgrades create challenges in securing skilled staff and reliable transport links in the near term[48].

Key enablers

- The Hunter is home to over 100 defence-capable firms across advanced manufacturing, aerospace, maritime, and cybersecurity, with more than 600 additional firms expressing interest in the region[49]. It also plays a vital role in defence sustainment, with BAE Systems maintaining the F-35 program, a capability that contributes more than $57 million in direct GDP to NSW each year[50].
- The Hunter benefits from nationally significant infrastructure, including Newcastle Airport (which has scheduled upgrades), RAAF Base Williamtown, Astra Aerolab and Newcastle Port. These assets underpin aviation, naval, aerospace and logistics capabilities and offer clear expansion potential.
- Defence's recognition as a priority sector at both national and state levels provides long-term certainty that projects will eventually proceed. This alignment opens the door for future investment in infrastructure and workforce initiatives and positions the Hunter as a natural complement to other state-based hubs.
- Proximity to University of Newcastle, TAFE and specialist defence training SMEs (e.g. AVS) supports workforce scaling, skilling and retention to meet growing industry demand.

Opportunities

- Reinstate or replicate SAP-style "single-front-door" approvals and provide clarity on noise/height constraints to give investors certainty around compliant sites near Williamtown.
- Expand defence-focused training pipelines through TAFE NSW, the University of Newcastle, and apprenticeships in MRO, avionics and systems engineering to ease labour shortages and wage pressures.
- Support diversification of the Hunter's defence supply chain into emerging areas such as guided weapons, space, and cyber, building resilience and capturing growth markets.
- Ensure timely completion of Newcastle Airport's runway and terminal upgrades and co-invest in shared precinct infrastructure (e.g. Astra Aerolab, DAREZ utilities) to strengthen connectivity and precinct attractiveness.



Source: OEA Analysis, Hunter Defence 2025

The Hunter can position itself as a national leader in EfW and biofuels by aligning industrial capability with circular economy demand.

Key barriers

- EfW investment in NSW is constrained by tight limitations for thermal EfW activity and strict zoning requirements[51]. Approvals remain slow-moving and complex (EIS, safety, community consultation), creating planning and delivery risk for proponents. The designation of Tomago as an EfW precinct is unresolved, delaying confidence for anchor projects.
- EfW feedstock and logistics remain an emerging challenge. Unlike established EfW regions such as Parkes and West Lithgow, where projects can leverage industrial land, rail, and processing infrastructure, the Hunter lacks integrated bio-hub facilities, with Tomago's priority status still unresolved. This raises project costs and reduces competitiveness.
- Community concerns over emissions, waste importation, and facility placement can slow approvals and increase compliance costs. Without strong evidence of environmental safeguards and benefits (e.g. circular economy impact), EfW projects may face reputational challenges, given widespread skepticism[52].

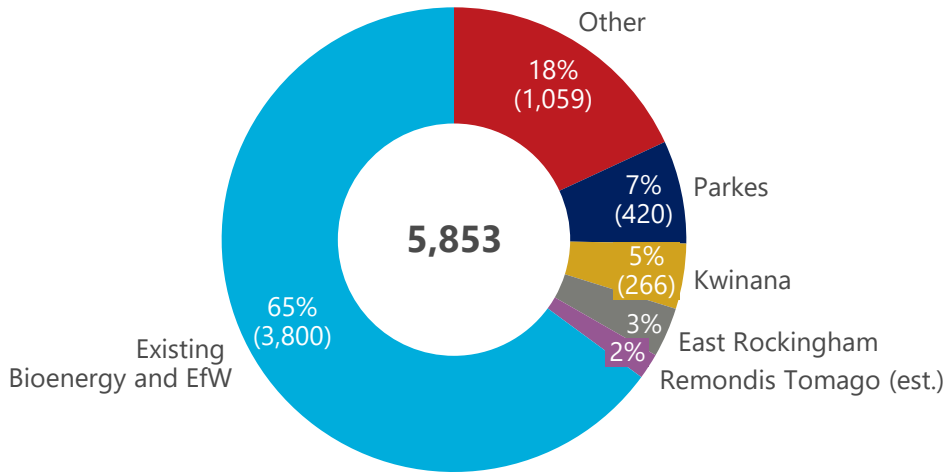
Key enablers

- Tomago's industrial estate provides a natural anchor for EfW, with strong grid connections and complementary heavy industry. Northern Hunter agricultural capacity can also provide consistent biomass inputs, linking EfW with local feedstock pathways, leading to increased local economic growth.
- NSW and Commonwealth circular economy strategies, including waste reduction and renewable fuels targets, create long-term market demand for EfW. Biofuels innovation (e.g. Ethtec's sustainable ethanol) signals growing investor interest and technology spillovers that complement EfW[53].
- EfW projects could leverage the shared logistics, transport, export, and energy infrastructure planned for Newcastle's Clean Energy Precinct, established to support hydrogen, ammonia, and other clean energy industries[54], helping to avoid capital duplication and strengthen regional competitiveness.
- The Hunter's existing industrial workforce, including transferable skills from power generation, chemical processing and manufacturing (including of ammonia and nitrate) and process engineering, provides a talent base for EfW operations and technology adaptation.

Opportunities

- Formalising Tomago as a priority infrastructure area and EfW precinct is critical for expanding EfW opportunities in the Hunter.
- Expanding the EfW tonnage allowance and streamlining waste classification would directly reduce project risk. Clarifying eligibility for carbon credits would further strengthen the business case and attract international capital.
- Co-location of EfW with biofuels plants (e.g. using biomass residues) can diversify revenue streams, maximise feedstock efficiency, and support scaling of next-generation fuels.
- EfW projects offer co-products such as process heat and steam, which can support adjacent heavy industry, improving economics and supporting regional decarbonisation.

Projected Bioenergy & EfW Generation in Australia (GWh/Year)*



**Existing Bioenergy and EfW generation is estimated as 3.7% of Australia's clean electricity in 2024, based on the Clean Energy Australia Report (2025). This includes generation from bagasse, landfill gas, wood and wood waste, sludge biogas, and municipal waste. Where annual generation (GWh) data was unavailable, values were calculated as net capacity (MW) × 0.8 capacity factor × 8,760 hours. Bioelectricity splits were derived from ratios in ARENA's Australia's Bioenergy Roadmap (2021, p.6).*

PUBLIC STRATEGY GAPS

The Hunter is unlocking opportunities across clean energy, manufacturing, and emerging industries through immediate, medium, and long-term actions.

Public-facing investment strategies at Commonwealth, State, and Local levels were assessed against five key criteria : (1) strategic priorities and comparative advantage; (2) priority investment opportunities; (3) funding, infrastructure and enabling conditions; (4) coordination across government; and (5) governance and monitoring. Each was rated on a 1–5 scale, with higher scores indicating greater clarity, specificity, and alignment (see Rating Criteria Interpretation in Appendix). The assessment highlights strong alignment in strategic priorities and opportunities, but material gaps in governance and coordination.

Most strategies recognise the Hunter's comparative advantages in clean energy, advanced manufacturing, and defence. Local-level documents such as *The Hunter Advantage*, *RDA Smart Specialisation Strategy*, and *Powering Up the Hunter* rate highly, as they define regional strengths with evidence and sectoral detail. Broader frameworks, including the *NSW Intergenerational Report* and *Upper Hunter Economic Diversification Plan*, reference macroeconomic shifts but lack place-specific analysis. Under the rating criteria, strategies articulating advantage with data and positioning score 4-5, while those mentioning strengths without justification fall in the 2-3 range. This explains the stronger ratings of local documents relative to State and Commonwealth strategies.

Performance was also strong in identifying high-priority investment opportunities, particularly where strategies outlined investment-ready projects tied to the net zero economy. Several strategies, particularly *Powering Up the Hunter*, the *Smart Specialisation Strategy*, and the INZEA ROF, provided detailed and prioritised opportunities in hydrogen, renewables, sustainable aviation fuel, or defence sustainment. By contrast, some State-level strategies described broader diversification goals but did not specify projects. In the rating framework, top scores of 5 require a well-developed list of prioritised, investment-ready opportunities; lower scores reflect general or vague opportunity statements. Again, local strategies scored higher for specificity and alignment with NZEA focus areas.

Funding, Infrastructure and Enabling conditions was the weakest performing criterion across the suite of documents. While some strategies, such as the *Hunter Hydrogen Infrastructure Masterplan* and *Hunter Regional Plan 2041*, identified enabling needs around ports, pipelines, and transmission, few contained sequenced or costed delivery plans. References to CEFC and ARENA were indicative rather than tied to committed funding. According to the rating framework, a top score requires sequenced, costed, and planned enabling investment. Most documents landed at 2-3, reflecting general recognition of needs without credible delivery pathways. This gap in infrastructure planning and financing remains a major constraint on investment readiness.

Coordination across tiers of government was inconsistent. The INZEA ROF and REDS 2023 demonstrated strong alignment with national and State policy, explicitly linking regional opportunities to higher-level strategies. Many local strategies, however, stood alone, with limited reference to Commonwealth or State frameworks. The rating criteria require clearly aligned priorities across tiers for a top score of 5. While some strategies approached this standard, others implied coordination only through passing references. This inconsistency risks duplication of effort and weakens overall coherence.

Governance and monitoring mechanisms were the least developed. REDS 2023 and *Hunter Regional Plan 2041* included implementation and monitoring frameworks, but most strategies did not specify roles, sequencing, or accountability. References to governance were typically general (e.g., "taskforces" or "partnerships") rather than detailed structures. Under the criteria, robust governance requires defined councils, partnerships, or taskforces. Most documents therefore scored only 2-3, reflecting limited attention to delivery oversight and monitoring.

Overall, the assessment reveals that several NSW strategies, particularly *Powering Up the Hunter*, *The Hunter Advantage*, and the *Smart Specialisation Strategy*, demonstrate strong alignment with the NZEA's place-based approach to net zero transition. These documents were proactive in identifying comparative advantages, specifying high-priority opportunities, and recognising enabling infrastructure needs. However, persistent weaknesses in governance and coordination undermine investment readiness. Addressing these gaps, by embedding formalised governance structures, developing sequenced infrastructure investment plans, and ensuring consistent cross-tier coordination will be critical if strategic priorities are to translate into delivered projects. In short, while the Hunter region's policy landscape is strong on vision and opportunity identification, it remains underpowered on the enabling conditions that will ultimately determine delivery.

Key public facing investment strategies were assessed against five criteria.

Criteria	Sub-criteria	Cth	State			Local						Commentary
		INZEA ROF	REDS 2023	HRP 2041	NSW IR 2021	UHEDAP	UHFR 2021	RDA SSS	The HA	PUTH	HHIM	
Strategic priorities and comparative advantage	Identifies and targets comparative advantage	5	4	4	3	4	3	5	5	4	4	Most documents articulate regional advantages (e.g. energy hubs, port infrastructure, skilled workforce). Stronger in local-level strategies like The Hunter Advantage, RDA SSS, and HHIM, which focus on industry-specific niches. Less developed in broader policy documents like NSW IR 2021.
	Targets high growth/high employment sectors	3	4	3	4	4	3	4	4	5	4	Clear targeting in REDS, HRP2041 and local docs like Powering Up the Hunter and The Hunter Advantage. Sectors include clean energy, advanced manufacturing, and defence. Upper Hunter Futures Report and UHEDAP mention employment but with less sector-specific depth.
Priority investment opportunities	High priority investment opportunities are identified	4	4	3	2	4	3	4	4	5	4	Strongest alignment in INZEA ROF, REDS, and local economic development plans (SSS, PUTH). They list defined opportunities. The NSW IR 2021 remains high level. Some local docs identify focus areas, but stop short of clearly prioritising specific investment-ready projects.
	Opportunities align with NZEA projects/sectors focus	5	3	3	2	3	3	3	3	5	5	Alignment is strongest in INZEA ROF, HHIM, and Powering Up the Hunter, which explicitly target hydrogen, clean industry, and regional transition. Several local strategies (e.g. SSS, Hunter Advantage) mention aligned sectors but lack NZEA framing.
Funding, infrastructure and enabling conditions	Infrastructure and enabling conditions identified	3	4	4	2	3	2	3	4	3	5	Infrastructure needs (e.g. ports, energy, skills) are outlined in detail in HHIM, Hunter Advantage and HRP2041. NSW IR 2021 and UHFR are less specific. Others (e.g. SSS) reference enabling conditions but don't identify concrete infrastructure requirements.
Coordination	Priorities shared across Cth, State and Region	4	3	4	2	3	2	4	3	3	4	Coordination is emerging but uneven. NZEA and REDS lead with clear vertical alignment. Some local docs (e.g. SSS, HHIM) show strong connections to higher-level strategies. Others (e.g. UHFR) are more localised and siloed.
Governance and monitoring	Governance and coordinating mechanisms in place	3	3	4	2	3	2	3	2	2	3	Limited across all tiers. INZEA ROF outlines collaborative governance intent. Local-level governance (e.g. Hunter JO, HDC, RDA) appears across documents, but mechanisms are often implied rather than formalised.

Weakest 1 2 3 4 5 **Strongest**

MAJOR APPROVALS

Navigating approvals effectively is critical to accelerating the Hunter's investment pipeline across multiple sectors.

Delivering large-scale net zero projects in New South Wales requires navigating a structured but complex approvals pathway. Approvals are staged across four broad phases. (1) Early development, (2) Environmental planning and development approvals, (3) Financial and network arrangements, and (4) Construction and commissioning. Timelines vary significantly depending on project type, from around three years for a green ammonia plant to more than a decade for offshore wind.

In the initial stage, developers focus on strategic planning and policy alignment. Projects must demonstrate consistency with national and state net zero strategies, as well as NSW Government initiatives such as Renewable Energy Zones (REZs). Early engagement with Commonwealth programs, such as ARENA, CEFC, and the National Hydrogen Strategy, can also be critical for feasibility funding. Equally important is site identification and tenure, which involves securing land access agreements, addressing native title and Aboriginal cultural heritage considerations, and in some cases negotiating mining leases or exploration licences. Specialist approvals may also be triggered, including initial Defence clearances where projects are proximate to military zones, aviation reviews under CASA for tall structures like wind turbines, and preliminary licences for offshore wind feasibility. This early stage often determines whether a project can proceed to detailed environmental assessment.

The bulk of regulatory assessment occurs in the Environmental Planning & Development Approvals phase, typically under the NSW Planning System (EP&A Act) as either State Significant Development (SSD) or State Significant Infrastructure (SSI). Proponents must submit a Scoping Report, after which the Department of Planning, Housing and Infrastructure (DPHI) issues Secretary's Environmental Assessment Requirements (SEARs). A comprehensive Environmental Impact Statement (EIS) is then prepared and publicly exhibited. At the Commonwealth level, referral under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) may be required if the project risks impacting matters of national environmental significance. Outcomes range from "not a controlled action" (no further approvals needed) to full EPBC assessment, which can extend timelines by 6-12 months. Specialist approvals include the Aboriginal Heritage Impact Permit (AHIP), biodiversity offset approvals, and water access or use licences. Projects in offshore areas must also obtain a Commonwealth Offshore Infrastructure Licence under the Offshore Electricity Infrastructure Act 2021. Further, formal Defence clearances, aviation obstacle assessments, and industrial relations management plans may apply depending on the project's footprint.

Once environmental approvals are secured, projects move to the commercial and technical integration stage. A critical milestone is securing a grid connection agreement with Transgrid or a local Distribution Network Service Provider (DNSP), governed by the National Electricity Rules.

Registration with AEMO as a generator or market participant is also mandatory. In parallel, developers must establish a revenue model, typically through long-term power purchase agreements (PPAs), offtake contracts, or government underwriting. Project-specific licences may also apply, including pipeline licences for hydrogen and CCS projects, or electricity generator and retail licences under the NSW Electricity Supply Act. For some projects, final ARENA or CEFC investment approvals are contingent on these commercial arrangements. Offshore wind developments must also progress from feasibility to a commercial licence before construction.

The final phase involves site works, construction, and operational commissioning. Proponents must submit a Construction Environmental Management Plan (CEMP) in accordance with SSD/SSI approval conditions. Operational licences, such as the Environmental Protection Licence (EPL) under the Protection of the Environment Operations Act are required for premises carrying out scheduled activities. At this stage, strict safety and technical approvals also apply, including compliance with Work Health and Safety (WHS) legislation and dangerous goods regulations governing the storage and transport of hazardous materials. Occupational health and safety clearances round out the approvals process prior to commercial operation.

While the staged framework is consistent, total lead times vary markedly by technology. Offshore wind projects are the most protracted, with offshore feasibility licences, seabed leases, and multiple marine and aviation assessments extending total approvals to an average of 136 months. By contrast, green ammonia plants have a comparatively shorter approvals horizon of 36 months, while solar farms (45 months) and hydrogen electrolysers (43 months) fall in between. Transmission lines (51 months), hydrogen/ammonia pipelines (48 months), and battery storage (42 months) reflect mid-range timelines. Onshore wind projects average around 72 months due to land access, biodiversity, and aviation constraints.

The NSW approvals landscape for net zero projects is layered and multi-jurisdictional, with distinct Commonwealth and State triggers. Early strategic alignment and stakeholder engagement are essential, but the most resource-intensive stage is environmental assessment, often spanning two years. Subsequent commercial, network, and construction approvals build on this foundation, with total lead times shaped by technology type and site context. Importantly, although certain project types mandate specific approvals, each project needs to be considered independently. While complex, this structured framework provides a clear roadmap for proponents to plan investments and manage risk across the full project lifecycle.

Major approvals are required across four key stages of net zero projects.

	3 – 6 months	12 – 24 months		6 – 12 months	12 - 36 months
	Early development phase	**Environmental planning & development approvals**		**Financial & network**	**Construction & commissioning**
Typical approvals	▪ Strategic Planning and Policy Alignment ○ NSW Government strategic support (e.g. REZ) ○ Commonwealth programs (e.g. ARENA, CEFC, National Hydrogen Strategy) ○ Preliminary stakeholder engagement ▪ Site Identification and Tenure ○ Land access agreements Native title/Aboriginal cultural heritage ○ Mining lease or exploration license considerations	▪ NSW Planning System (EP&A Act) SSD or SSI[1]: ○ Scoping Report submitted to DPHI. ○ Secretary's Environmental Assessment Requirements (SEARs) issued. ○ Environmental Impact Statement (EIS) [4] prepared and publicly exhibited. ○ Assessment and Determination by DPHI or NSW Independent Planning Commission (IPC) if contentious.	▪ Commonwealth Environmental Approval – EPBC Act[2]. May result in: ○ Not a controlled action – no further approval needed. ○ Controlled action – requires Environment Protection and Biodiversity Conservation (EPBC) approval, often assessed jointly with NSW EIS. ○ Extending timelines by 6-12 months, depending on the decision.	▪ Grid connection agreement with Transgrid or local DNSP. ▪ Registration with AEMO as market participant or generator. ▪ Revenue model or offtake arrangements (e.g. long-term contracts, government underwriting).	▪ Construction Environmental Management Plan (CEMP). ▪ Environmental Protection Licence (EPL) under the Protection of the Environment Operations Act. ▪ Occupational Health and Safety clearances.
Specialist approvals	▪ Initial Defence clearance ▪ Commonwealth aviation review (CASA) ▪ Strategic land access constraints ▪ Funding Pre-Approvals (ARENA/CEFC) – Early Feasibility Stage ▪ Offshore Wind Pre-Licensing	▪ Aboriginal Heritage Impact Permit (AHIP) ▪ Biodiversity offset approvals ▪ Water Access Licences or Water Use Approvals ▪ Commonwealth Offshore Infrastructure Licence (Offshore Electricity Infrastructure Act 2021)[3]	▪ Development Consent for Infrastructure/Works (EP&A Act or Local Government Act) ▪ Formal Defence clearance ▪ Aviation obstacle assessment ▪ Discharge / effluent approvals ▪ Expanded stakeholder engagement obligations ▪ Industrial Relations Management Plan (IRMP)	▪ Pipeline Licence (for hydrogen or CCS) ▪ Electricity Generator Licence / Retail Licence (NSW IPART) ▪ Final Future Made in Australia/National Reconstruction Fund/ARENA/CEFC investment approval ▪ Offshore Wind Commercial Licence (Post-Feasibility)	▪ Safety and technical approvals (WHS Regulations, Dangerous Goods (Road and Rail Transport)

Notes: (1) State Significant Development (SSD) or State Significant Infrastructure (SSI) pathway applies to most major net zero projects. Triggered by investment size, energy capacity, or location in REZ. (2) Required if project has a significant impact on Matters of National Environmental Significance (MNES). Referral to Department of Climate Change, Energy, the Environment and Water (DCCEEW). Noting this does not take into account amendments to the EPBC Act made by the Parliament in November 2025 (3) Offshore wind projects can involve significantly longer timeframes of 7-10 years before operational (4) This includes design and engineering reports, transport, grid and geotechnical assessments and typically an Aboriginal Heritage Impact Permit.

TECHNICAL APPENDICES

A range of opportunities was considered, resulting in a long list of 20 major opportunities for shortlisting.

Major project types for consideration

1 Circular economy manufacturing	8 Solar farms	15 Data centres
2 Energy from waste facilities	9 Renewables component manufacturing	16 Green metals
3 Food and fibre product manufacturing	10 Urea and ammonia production	17 Geothermal heating and power
4 Hydrogen	11 Onshore wind farms	18 Minerals processing
5 LCLFs, biofuels and biochemicals from waste streams	12 Battery energy storage systems (BESS)	19 Pumped hydro energy storage
6 Defence maintenance/sustainment	13 Carbon capture and storage (CCS)	20 Offshore wind farms
7 Aerospace and defence manufacturing	14 Transport and logistics	

Prioritisation criteria

The Hunter's investment assessment spans clean energy, advanced manufacturing, defence, and enabling industries. Clean energy and storage dominate, with opportunities in green hydrogen and ammonia to decarbonise heavy industry, support fertiliser and explosives production, and open export markets. Renewable generation in onshore and offshore wind, solar farms, and geothermal power is supported by strong transmission links and Renewable Energy Zones. Energy storage through pumped hydro and batteries (BESS) will underpin grid reliability, while carbon capture and storage (CCS) offers a pathway to repurpose legacy industrial assets and reduce emissions.

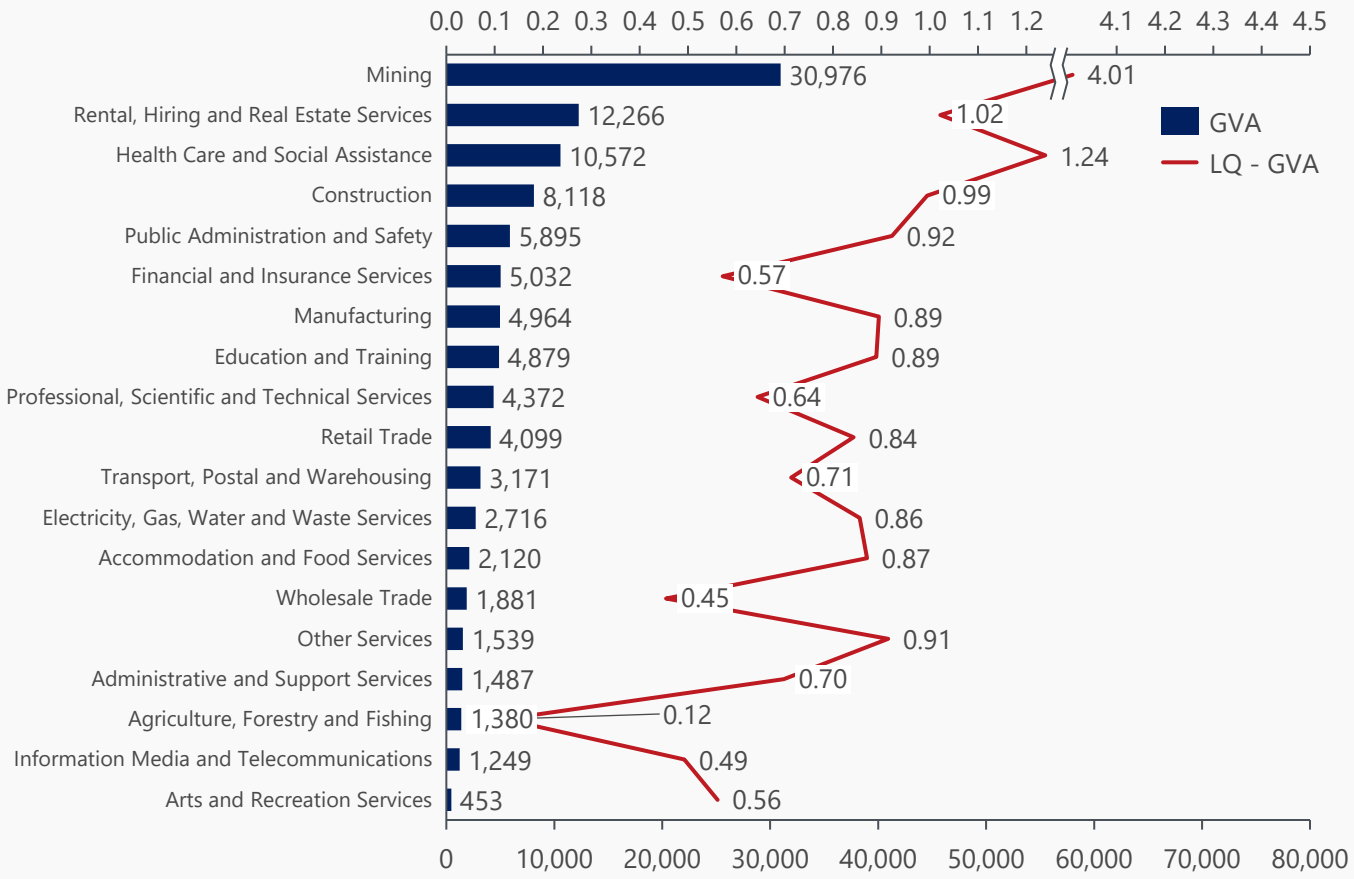
Manufacturing and industrial projects present major growth avenues. Circular economy manufacturing opportunities include projects connected to the AGL Hunter Energy Hub, while renewables component manufacturing can strengthen domestic supply chains. The Hunter is also positioned to lead in green metals and minerals processing, leveraging its industrial base to produce low-emissions steel, aluminium, and critical minerals. In agribusiness, food and fibre manufacturing can expand value-added processing for domestic and export markets.

Circular economy and defence sectors further diversify the pipeline. Energy-from-waste facilities reduce landfill while generating power, and low-carbon fuels, biofuels, and biochemicals can convert waste into new industrial inputs. Defence and aerospace growth is anchored by RAAF Base Williamtown and Astra Aerolab, with guided weapons manufacturing and sustainment creating global supply chain opportunities. Finally, data centres represent a key enabling industry, meeting rising demand for digital infrastructure powered by the Hunter's energy and connectivity advantages.

Together, these 20 project types provide a portfolio of opportunities across energy, industry, and services, offering pathways to diversify the economy, create long-term jobs, and attract private capital while positioning the Hunter as a leader in Australia's net zero transition.

Mining and healthcare are the two key sectors where Hunter has an outsized industry in terms of economic output.

GVA – 2024 GVA, Location quotients – Hunter region



Source: REMPLAN 2024

Industry trends in the Hunter Region

Mirroring employment trends, industrial output in the Hunter region has historically been overwhelmingly focused in mining, which contributed an estimated Gross Value Added (GVA) of $31b - approximately one third of the region's total GVA ($107b) in 2024.

Likewise, a substantial share of the region's GVA is reflected in the health care and social assistance (LQ=1.24) and rental, hiring and real estate services (LQ=1.02) sectors, reflecting demographic trends of the region.

Beyond these sectors, the Hunter region maintains advantages across a number of industrial domains. The region is home to well-established heavy manufacturing and engineering capabilities, particularly in Newcastle and the Lower Hunter.

The region also plays a central role in Australia's defence ecosystem, combining major military installations with a growing private-sector defence industry. Organisations like Hunter defence and HunterNet facilitate industry engagement in the region[19], including skills development and supply chain integration.

At the core is RAAF Base Williamtown, which hosts the F-35A Joint Strike Fighter fleet. The base supports around 4,500 personnel and focuses on sustainment, logistics and advanced training[20]. Adjacent to the base, the Astra Aerolab precinct[21] is being developed as a defence and aerospace innovation zone, attracting tenants such as BAE Systems and Kongsberg Defence.

Further inland, Lone Pine Barracks in Singleton is home to the School of Infantry and the Special Forces Training Centre, which recently underwent a $42 million infrastructure upgrade[22] to support training, accommodation and logistics functions.

Public facing documents and strategies were assessed against key criteria.

Criteria	Sub-criteria	1	2	3	4	5
Strategic priorities and comparative advantage	Identifies and targets comparative advantage	No reference to regional strengths or comparative positioning.	Mentions potential strengths but lacks clear targeting or rationale.	Identifies broad regional strengths, but limited justification.	Clearly articulates regional advantages with industry/economic basis.	Defines regional advantage with data, sectors, and strategic positioning.
	Targets high growth/high employment sectors	Does not mention target sectors or employment outcomes.	Mentions sectors broadly but lacks analysis or specificity.	Identifies sectors with some justification; lacks detail on employment impact.	Targets growth/employment sectors with some supporting evidence.	Targets high-employment, high-growth sectors with supporting analysis.
Priority investment opportunities	High priority investment opportunities are identified	No prioritisation of opportunities or vague general goals.	Some opportunities mentioned but not prioritised or scoped.	Identifies key sectors or industries but lacks project specificity.	Prioritised opportunities clearly identified, but detail varies.	Well-developed list of prioritised, investment-ready opportunities.
	Opportunities align with NZEA projects/sectors focus	No alignment or relevance to NZEA sectors/projects.	Vague mention of sectors that may overlap with NZEA.	General alignment to NZEA sectors, with implied relevance.	Strong alignment with NZEA sectors but not core framing.	Direct and deliberate alignment to NZEA focus areas and technologies.
Funding, infrastructure and enabling conditions	Infrastructure and enabling conditions identified	No enabling infrastructure mentioned or completely absent.	Lists general needs but does not connect to delivery or sequencing.	Enabling infrastructure needs listed with some planning detail, but limited costing or delivery information.	Infrastructure detail strong; partially integrated with development plans.	Sequenced, costed, and planned infrastructure enabling investment.
Coordination	Priorities shared across Cth, State and Region	No indication of shared priorities or integrated planning.	Minimal reference to inter-government coordination.	Coordination is implied through planning references.	Cross-government links or shared actions referenced.	Clearly aligned state/federal/regional priorities across tiers.
Governance and monitoring	Governance and coordinating mechanisms in place	No governance frameworks or partnerships described.	Limited or high-level governance references.	Outlines governance structure or local partnerships.	Governance structures defined with roles across levels.	Robust governance, including partnerships, councils, taskforces.

Lead times for each project were quantified and categorised as short, medium and long term.

Lead time classification by project type – Hunter region

Project Type	Months*	Term
Defence maintenance/sustainment	36	Short
Hydrogen	43	Medium
Energy from waste facilities	84	Long
LCLFs, biofuels and biochemicals from waste streams	48	Medium
Defence manufacturing	36	Short
Urea and ammonia production	36	Short
Onshore wind farms	72	Long
Green metals	48	Medium
Renewables component manufacturing	30	Short
Transport and logistics	48	Medium
Circular economy manufacturing	24	Short
Offshore wind farms	136	Long
Battery energy storage systems (BESS)	42	Medium
Carbon capture and storage (CCS)	72	Long
Solar farms	45	Medium
Pumped hydro energy storage	71	Long
Food and fibre product manufacturing	24	Short
Data centres	18	Short
Minerals processing	36	Short
Geothermal heating and power	84	Long

Lead times by project type and region were compiled using a range of sources. Lead time is defined as the period between project inception and the commencement of construction.

For energy-related project types (solar farms, onshore wind, offshore wind, BESS, pumped hydro, and hydrogen), estimates were derived from a proprietary econometric model developed by Oxford Economics for AEMO. This model draws on a national dataset of approximately 600 energy projects and provides state-specific estimates.

For non-energy project types, lead times were estimated by reviewing press releases and other public communications to identify the date of project inception and construction start. Australian examples were prioritised, though international sources were used where local precedents were unavailable (e.g. geothermal energy).

Lead times were then categorised as short, medium, or long by dividing the estimates into terciles.

**Note these lead times include pre-construction approvals*

Construction and ongoing jobs have been quantified for each project based on the major project database and converted to a score.

Job contribution classification by project type – Hunter region

Project Type	Average construction jobs	Average ongoing jobs p.a.	Job contribution score
Defence maintenance/sustainment	367	600	5.00
Hydrogen	790	383	5.00
Energy from waste facilities	539	385	4.00
LCLFs, biofuels and biochemicals from waste streams	733	103	3.00
Defence manufacturing	148	263	3.00
Urea and ammonia production	1359	300	4.00
Onshore wind farms	286	19	1.00
Green metals	700	200	3.00
Renewables component manufacturing	820	702	5.00
Transport and logistics	312	266	4.00
Circular economy manufacturing	132	36	1.00
Offshore wind farms	1466	198	4.00
Battery energy storage systems (BESS)	148	7	1.00
Carbon capture and storage (CCS)	1504	683	5.00
Solar farms	249	18	1.00
Pumped hydro energy storage	600	39	2.00
Food and fibre product manufacturing	528	110	2.00
Data centres	217	40	1.00
Minerals processing	206	138	2.00
Geothermal heating and power	358	68	2.00

Estimates of average employment (by headcount) for each project type were sourced from a range of materials.

For roughly half of the project types, average construction and ongoing job estimates were calculated by taking the mean of reported figures for projects listed in the Major Projects database. To address incomplete data and preserve available information, missing construction or ongoing job counts were imputed using a ratio between construction and ongoing employment derived from entries with complete data.

Where fewer than three projects had available job data for a given type, additional desktop research was undertaken to identify comparable projects domestically and internationally. In all cases, a minimum of three projects with relevant construction and ongoing job estimates were identified to support the averaging process.

To calculate a job contribution score, estimated “job years” were derived for each project type. This assumed a project operational life of 10 years, beyond which ongoing jobs were not counted. The resulting job years were then ranked into quintiles to generate the contribution score.

Projects were scored based on their importance and prevalence across local, state and commonwealth strategies and polices.

Policy alignment classification by project type – Hunter region

Project Type	Local Alignment	State Alignment	Cth Alignment	Major Project Alignment	Policy Rating
Defence maintenance/sustainment	1	1	1	0	4.00
Hydrogen	1	0	1	1	4.00
Energy from waste facilities	1	1	1	1	5.00
LCLFs, biofuels and biochemicals from waste streams	1	1	1	1	5.00
Defence manufacturing	1	1	1	0	4.00
Urea and ammonia production	1	0	1	0	3.00
Onshore wind farms	1	1	1	1	5.00
Green metals	1	0	1	1	4.00
Renewables component manufacturing	1	1	1	1	5.00
Transport and logistics	1	1	0	1	4.00
Circular economy manufacturing	1	1	1	1	5.00
Offshore wind farms	1	1	1	0	4.00
Battery energy storage systems (BESS)	1	0	1	1	4.00
Carbon capture and storage (CCS)	0	0	1	0	2.00
Solar farms	1	1	1	1	5.00
Pumped hydro energy storage	1	0	1	1	4.00
Food and fibre product manufacturing	1	1	1	0	4.00
Data centres	1	1	1	0	4.00
Minerals processing	1	0	1	0	3.00
Geothermal heating and power	0	0	0	0	1.00

To determine a policy alignment rating for each project type, we reviewed key local, state, and Commonwealth policy documents. Where a document explicitly identifies a project type, we increase its policy alignment score by one. A further point is added if a project of that type appears in the region's Major Project listing.

This results in a score ranging from 1 to 5. A score of 5 indicates strong policy alignment (i.e. the project type is prioritised across multiple levels of government and is present in the regional project pipeline), while a score of 1 reflects minimal alignment (i.e. the project type is not mentioned in local, state, or federal policy, and no related projects are identified as upcoming in the region).

The policy documents reviewed include those nominated by NZEA, as well as additional sources identified by Oxford Economics.

At the state level for NSW, these included:

- *New South Wales 2025-2026 State Budget*
- *Our Plan for Regional NSW*
- *NSW Industry Policy Summary*
- *NSW Trade and Investment Strategy 2035*
- *Energy From Waste Options Paper - December 2024*
- *NSW Net Zero Plan + Net Zero Manufacturing Initiative*

At the regional level, documents included:

- *Hunter Economic Diversification Strategy*
- *Hunter Regional Plan 2041*
- *Upper Hunter Futures Report 2020*
- *RDA Hunter Smart Specialisation Report*
- *The Hunter Advantage*

Comparative advantage scores were informed through an assessment of industry, workforce, endowments and infrastructure.

Comparative advantage scoring system

Each project type was assigned a comparative advantage score on a five-point scale:

1. No alignment with regional strengths or capabilities
2. Minimal alignment; limited local advantages
3. Moderate alignment with some key strengths (e.g. workforce or land)
4. Strong alignment with multiple comparative advantages
5. Excellent alignment; leverages core regional assets and priorities

Comparative advantage factors considered

The assessment considered the following dimensions of regional advantage:

- **Natural resources** – availability of physical assets such as land, water, raw materials, critical minerals and renewables potential (MW), that provide a foundation for economic activity.
- **Industrial base** – industrial advantages (LQs, GVA) and growth rates (% CAGR), and related supply chains, with potential for growth, diversification, and value-adding.
- **Infrastructure readiness** – deepwater ports, rail networks, highways, intermodal hubs, water and energy infrastructure, higher education and training facilities, and health and community infrastructure
- **Workforce and skills** – concentrations of skilled trades, specialisations, R&D and knowledge workers, and vocational training, with assessment of educational institutions.
- **Precincts and clusters** – established and emerging hubs of economic activity, supported by co-located businesses, infrastructure, training facilities, and supply chains.

The comparative advantage scores assigned to different project types in the Hunter region were designed to capture the degree to which each opportunity leverages the region's industrial base, workforce, infrastructure and natural endowments. This assessment provides a foundation for identifying the projects most likely to deliver new, sustainable economic opportunities during the transition to net zero. Because the factors underpinning comparative advantage vary across project types, the scoring relied on structured qualitative assessment informed by the most relevant indicators for each industry.

This approach highlighted the strongest alignment for industries such as defence sustainment and manufacturing, hydrogen, ammonia and urea production, energy from waste, and biofuels from waste streams, which build directly on the Hunter's established industrial ecosystem, port infrastructure and skilled workforce. Defence-related activities benefit from nationally significant facilities, established supply chains, and advanced engineering and fabrication skills. Hydrogen and ammonia opportunities reflect the presence of existing chemical facilities, strong export potential through the Port of Newcastle, and transferable expertise from the energy and resources sectors. Energy from waste and biofuels align with the region's industrial ecology, leveraging available waste streams and existing processing capacity.

Moderate alignment was identified for industries such as green metals, circular economy manufacturing, CCS, BESS and minerals processing. These sectors draw on the Hunter's industrial base and emerging clean technology ecosystem, but their potential is more contingent on enabling infrastructure and investment readiness. For example, CCS builds on local geology and industrial emissions sources, while green metals and minerals processing could leverage existing facilities but face scale and capital intensity challenges.

By contrast, offshore wind, solar, pumped hydro, ICT/digital services and data centres displayed weaker alignment. Offshore wind benefits from strong coastal resources but has limited immediate connections to existing industrial capabilities. Solar and pumped hydro face constraints around land suitability and water availability, while ICT and data centres are limited by ecosystem depth, infrastructure, and latency challenges relative to metropolitan centres.

In summary, the comparative advantage framework highlights that the Hunter region's strongest platform for investment lies in industries where existing industrial strengths, infrastructure and workforce capabilities can be directly leveraged. Other opportunities present potential with the right enablers, while weaker-aligned sectors will depend on significant ecosystem and infrastructure development to become competitive.

NSW State Significant Development or State Significant Infrastructure is required for most net zero projects while others depend on project context.

Phase	Approval	Relevant Legislation	When It's Required
Early Development	Strategic Planning and Policy Alignment	N/A (strategic/policy context)	• Initial internal planning and alignment with national/state net zero or energy transition strategies.
	NSW Govt strategic support (e.g. REZ)	Electricity Infrastructure Investment Act 2020 (NSW)	• Required if project is located within a Renewable Energy Zone or seeking support from NSW EnergyCo.
	Commonwealth programs (e.g. ARENA, CEFC)	ARENA Act 2011, Clean Energy Finance Corporation Act 2012	• Applies when seeking Commonwealth funding or concessional finance for feasibility or project development.
	Preliminary stakeholder engagement	N/A	• Undertaken for all projects to manage social licence, Indigenous engagement, and community support.
	Land access agreements	Crown Land Management Act 2016 (NSW), Native Title Act 1993 (Cth)	• Needed if accessing Crown land, native title land, or private land requiring easements or tenure.
	Initial Defence clearance	Defence Act 1903 (Cth)	• Applies if the project is located near military zones or may interfere with defence operations or radar.
	Commonwealth aviation review (CASA)	Airspace Protection Regulations under the Civil Aviation Act 1988 (Cth)	• Required for tall structures (e.g., wind turbines) near flight paths or controlled airspace.
	ARENA/CEFC early feasibility stage	ARENA Act 2011, CEFC Act 2012	• Optional but common if applying for early-stage grant funding or concessional finance.
	Offshore Wind Pre-Licensing	Offshore Electricity Infrastructure Act 2021 (Cth)	• Required for feasibility rights within a declared offshore wind zone under the Offshore Electricity infrastructure Act (2021).
Environmental Planning & Development Approvals	NSW SSD/SSI Approval	Environmental Planning and Assessment Act 1979 (NSW)	• Required for large-scale energy, infrastructure or industrial projects based on investment size or REZ location.
	EPBC Act Referral & Approval	Environment Protection and Biodiversity Conservation Act 1999 (Cth)	• Mandatory if the project is likely to impact Matters of National Environmental Significance (MNES).
	AHIP (Aboriginal Heritage Impact Permit)	National Parks and Wildlife Act 1974 (NSW)	• Applies if development impacts Aboriginal objects or places of cultural significance.
	Biodiversity Offset Approvals	Biodiversity Conservation Act 2016 (NSW)	• Required where project impacts mapped biodiversity or threatened species habitat.
	Water Access or Use Approvals	Water Management Act 2000 (NSW)	• Needed for water extraction, groundwater interference, or discharge into waterways.
	Offshore Infrastructure Licence	Offshore Electricity Infrastructure Act 2021 (Cth)	• Needed to progress feasibility studies in declared offshore wind zones.
	Formal Defence Clearance	Defence Act 1903 (Cth)	• Applies if Defence identifies unacceptable risks after initial consultation.

Typical later stage approvals include grid connection agreements, registration with AEMO, electricity generator licence and CEMP.

Typical Timing	Approval	Relevant Legislation	When It's Required
Environmental Planning & Development Approvals (continued)	Aviation Obstacle Assessment	Civil Aviation Act 1988 (Cth)	• Required for formal confirmation that the structure does not pose aviation risks.
	Discharge / Effluent Approvals	Protection of the Environment Operations Act 1997 (NSW)	• Applies if the project involves wastewater discharge or industrial runoff.
	IRMP (Industrial Relations Management Plan)	Varies (often required under project-specific agreements)	• Applies to government-backed or labour-intensive projects to ensure fair workforce practices.
	Development Consent for Works	EP&A Act 1979 or Local Government Act 1993 (NSW)	• Applies to physical works not already covered by SSD/SSI approvals.
Financial & Network	Grid connection agreement	National Electricity Law / Rules	• Required to connect to the transmission or distribution network (e.g. Transgrid, DNSP).
	Registration with AEMO	National Electricity Rules (NER)	• Applies to market participants such as generators, retailers, or scheduled loads.
	Revenue model / offtake arrangements	Varies (e.g., contract law, underwriting guidelines)	• Required to underpin investment through PPAs, long-term contracts, or government underwriting.
	Pipeline Licence (Hydrogen or CCS)	Pipelines Act 1967 (NSW)	• Needed for the transport of hydrogen, CO2, or other products via pipeline.
	Electricity Generator / Retail Licence	Electricity Supply Act 1995 (NSW)	• Applies to parties generating or retailing electricity above licensing thresholds.
	Final Future Made in Australia/National Reconstruction Fund/ARENA/CEFC Investment Approval	ARENA Act 2011, CEFC Act 2012, Future Made in Australia Bill (2024), National Reconstruction Fund Corporation Act (2023)	• Applies where earlier feasibility support progresses to full funding or co-investment.
	Offshore Wind Commercial Licence	Offshore Electricity Infrastructure Act 2021 (Cth)	• Required to construct and operate offshore generation assets post-feasibility.
Construction	Construction Environmental Management Plan (CEMP)	Condition of SSD/SSI approval under EP&A Act 1979 (NSW)	• Must be submitted prior to construction under SSD/SSI approval conditions.
	Environmental Protection Licence (EPL)	Protection of the Environment Operations Act 1997 (NSW)	• Applies to premises carrying out scheduled development work or activities.
	Safety and technical approvals	Work Health and Safety Act 2011 (NSW), Dangerous Goods legislation	• Applies where high-risk construction or dangerous goods storage/transport is involved.

The approvals process timeline ranges from 36 months for green ammonia plants to 136 months for offshore wind.

Project Type	Early Development	Environmental Planning & Development Approvals	Financial & Legal Approvals	Construction & Commissioning	Typical Lead Time to Construction
Offshore Wind	Offshore feasibility licence, seabed lease, Defence clearance	EIS (marine, fisheries, aviation, noise), EPBC, Offshore Infrastructure Licence, Marine Park Permits, CASA, Defence Clearance	Crown Land Lease, Grid Connection Agreement, Commercial Licence	CEMP, Commercial Licence	**136 months**
Onshore Wind	REZ support, land access, aviation review	EIS (BDAR, visual, noise, aviation), SSD Consent, EPBC (if triggered), AHIP, Biodiversity Offset, CASA, Defence Clearance	Aboriginal Heritage Permit, Grid Connection Agreement	CEMP, Easement Acquisition	**72 months**
Transmission Line	Critical infrastructure declaration, land access	EIS (visual, noise, biodiversity), SSI Consent, EPBC (if needed), Water Access Licence, AHIP	Landowner Consent, Grid Connection Agreement	Utilities Impact Plan, CEMP	**51 months**
Hydrogen/Ammonia Pipeline	Land corridor selection, cross-border engagement	EIS (groundwater, flora/fauna, risk), Pipeline Licence, EPBC (if triggered), AHIP, CASA (if height threshold)	Cross-border Permit, Landowner Consent	Pipeline Management Plan, CEMP	**48 months**
Solar Farm	REZ support, land access, ARENA/CEFC	EIS (BDAR, noise, visual, heritage), SSD Consent, EPBC (if triggered), AHIP, Biodiversity Offset	Aboriginal Heritage Permit, Grid Connection Agreement	CEMP, Construction Approvals	**45 months**
Hydrogen Electrolyser	ARENA/CEFC support, land access	EIS (water, noise, risk, waste), SSD Consent, EPBC (if triggered), AHIP, Water Access Licence, Effluent Licence, IRMP	MHF Licence, EPL, Grid Connection Agreement	CEMP, Delivery Management Plan	**43 months**
Battery (BESS)	Land access, local council engagement	EIS (risk, noise, safety), SSD Consent, EPBC (if needed), Development Consent (for works), IRMP	EPL, MHF Licence, Grid Connection Agreement	Emergency Plan, CEMP	**42 months**
Green Ammonia Plant	ARENA/CEFC support, land access	EIS (emissions, risk, heritage), SSD Consent, EPBC, AHIP, Water Access Licence, Effluent Licence, IRMP	MHF Licence, EPL, Grid Connection Agreement	CEMP, Safety Risk Plan	**36 months**

We have estimated GVA and employment effects based on construction and operational spend, employment and local content proportions.

Estimating GVA and employment effects

As indicated in the investment opportunity section of this report, for each project type, estimates of the construction and annual ongoing spend, employment contribution, and GVA contribution were derived.

Average construction spend, and direct construction and annual ongoing employment impacts are taken as averages from publicly available project information. Where possible, this was sourced from the major project list (that is, the estimates derived reflect the averages of proposed and upcoming projects across the Hunter Region, Latrobe Valley and Central Queensland region). Ongoing spend was not sourced from projects due to a lack of data. In cases where a low number of projects were identified across these regions, desktop analysis was undertaken to identify comparable projects from either outside these regions domestically, or where this was not possible, internationally. To estimate the construction and ongoing GVA and ongoing Spend, several data were acquired, including:

- An estimate of the construction spend.
  This was sourced using averages from the major project list. In cases where there were not enough projects on the major project list, estimates of construction spend were sourced from other projects domestically.

- An estimate of the ratio between construction and ongoing spend.
  Desktop research was undertaken for each project type to identify the approximate ratio between construction and ongoing spend using exemplar projects. Once again, domestic projects were prioritised, but where data was not available, international projects were used in their place.

- Estimated profiles on the proportional distribution of construction and ongoing spend (note: separate profiles for construction and ongoing) across 1-digit ANZSIC industries for each project type.
  For each prioritised project type, this was inferred using a combination of: 1) detailed cost breakdowns and technical documentation on construction and ongoing spend where available, and; 2) professional judgement based on available documentation where quantitative estimates were not readily available.

- Estimated local content proportions assumptions at a 1-digit ANZSIC industry level for each prioritised project type
  Likewise, for each prioritised project type, the proportion of local content in the estimated spend in each ANZSIC industry was derived. That is, the proportion of spend that was not spent on sourcing inputs from overseas.

- Ratios between the gross output and GVA of 1-digit ANZSIC industries at a national level
  These were sourced using industry value-added coefficients (GVA per dollar of output), applied with the domestic A-matrix (direct allocation of imports).

Using these data, we first estimated for each prioritised project type the average annual ongoing spend. Then, construction and ongoing spend was decomposed into ANZSIC 1-digit industries, and local content proportion assumptions were made. Finally, gross output to GVA ratios were used to infer GVA contribution. We further note that we have not considered either indirect (supply chain) or induced (employee spending-driven) GVA or employment effects due to the small regions under consideration.

We have defined the following project types to guide our analysis.

Project type definitions – Hunter region

Project Type	Definition
Offshore wind farms	Large-scale wind turbines located offshore to generate electricity from wind resources. Does not include any infrastructure beyond landfall.
Hydrogen	Production, storage, or distribution of green hydrogen (hydrogen produced using renewable energy).
Transport and logistics	Facilities or terminals focused on the moving of goods and materials efficiently between locations. Does not include roads or rail.
Food and fibre product manufacturing	Processing agricultural outputs into food, textiles or related products.
Energy from waste facilities	Plants that convert waste materials into usable energy.
Carbon capture and storage (CCS)	Technology capturing and storing CO2 emission, or otherwise reusing CO2 emissions before, or instead of, storage.
Renewables component manufacturing	Production of parts and equipment for renewable energy systems. This includes parts for renewable-facilitating technologies, such as batteries.
Circular economy manufacturing	Manufacturing using recycled inputs or designed for reuse and minimal waste.
Defence maintenance/sustainment	Ongoing repair, servicing and support for defence assets and equipment.
Urea and ammonia production	Facilities producing ammonia or urea, and associated chemicals (e.g. nitric acid, ammonium nitrate).
LCLFs, biofuels and biochemicals from waste streams	Production of fuels and chemicals from waste materials.
Defence manufacturing	Fabrication of weapons, vehicles and equipment for defence forces.
Solar farms	Large-scale installations generating electricity from photovoltaic solar panels.
Battery energy storage systems (BESS)	Facilities storing electricity in batteries for later use.
Green metals	Low-carbon production and processing of metals.
Geothermal heating and power	Energy generation or heating using underground geothermal heat.
Onshore wind farms	Land-based wind turbines generating electricity from wind resources.
Minerals processing	Refining and transforming raw minerals into usable materials or products.
Data centres	Facilities housing computer systems for data storage, processing, and management.
Pumped hydro energy storage	Facilities storing electricity by pumping water uphill and releasing downhill.

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