BUSINESS ILLAWARRA

Illawarra Clean Energy Industry Roadmap

2025 Report
Executive Summary

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About this Report

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Illawarra Clean Energy Industry Roadmap

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Foreword

The Illawarra Shoalhaven is standing at a crossroads.

As security and affordability of energy becomes one of the nation's most important drivers to industry success, the need to accelerate progress towards the transition to clean energy offers industry in the Illawarra Shoalhaven a once in a generation opportunity to become Australia's clean energy hub.

With energy costs continuing to rate as a top three major business concern next to insurance and red tape, how business upgrade to more high-tech energy efficient equipment and make the right capital investment decision is dependent on the level of sophistication Australia can provide around renewal options.

Illawarra and Shoalhaven businesses need reliable and affordable energy options to sustain and grow their business. Secure accessible supply across the energy mix is dependent on the strength of our energy supply chain, manufacturing capacity and global competition.

In 2024, Business Illawarra alongside its Illawarra First members embarked on a study to explore how Illawarra industry could play a significant role in the transition of our nation to clean energy.

Business Illawarra retained the Energy Futures Network at the University of Wollongong to develop a Clean Energy Roadmap for the Illawarra and Shoalhaven region.

The roadmap focuses on renewal, transition and future industry development across multiple energy sources produced locally and for the benefit of NSW and the nation.

Thirteen leading regional industry innovators contributed to the development of this Clean Energy roadmap and worked with Business Illawarra and the University of Wollongong to understand the economic impact, job creation and international competitiveness of a thriving clean energy industry in the region.

The potential pathway for industry to drive economic return for Illawarra and Shoalhaven cannot be ignored and this roadmap offers government, industry and the community a future where the creation, distribution and storage of clean energy can be produced right here in the Illawarra.

On behalf of Business Illawarra, I would like to thank our valuable contributors: ATCO Australia, Oceanex Energy, BlueScope Steel, NSW Government, BOC Australia, Squadron Energy, KPMG, Hysata, NSW Ports, Wollongong City Council, Endeavour Energy and Business NSW.

I look forward to working with all our regional stakeholders to advance the advocacy needed for industry to realise clean energy solutions and benefit our future generations.

Warm regards

Coralie McCarthy

Director, Business Illawarra

Illawarra Business Awards

About Business Illawarra

For more information please go to

businessillawarra.com

Business Illawarra proudly represents the interests of every business in the Wollongong, Shellharbour, Kiama, Shoalhaven and Wingecarribee local government areas.

Through Illawarra First, our business leadership dialogue, we undertake significant research, policy and advocacy to advance our regional economy and grow local jobs.

Business Illawarra has six key regional priorities including making the Illawarra an energy generation, renewables and clean energy powerhouse.

Supported by a robust transport network, affordable housing, a thriving visitor economy and skills and labour pathways that meet the needs of growing population, access to affordable energy options is the cornerstone to the region's competitiveness and jobs growth.

Business Illawarra actively engages in policy debate on key economic and business issues at all levels of government and aims to foster a business environment conducive to profitable business growth, sustainable job creation and sound economic and social progress.

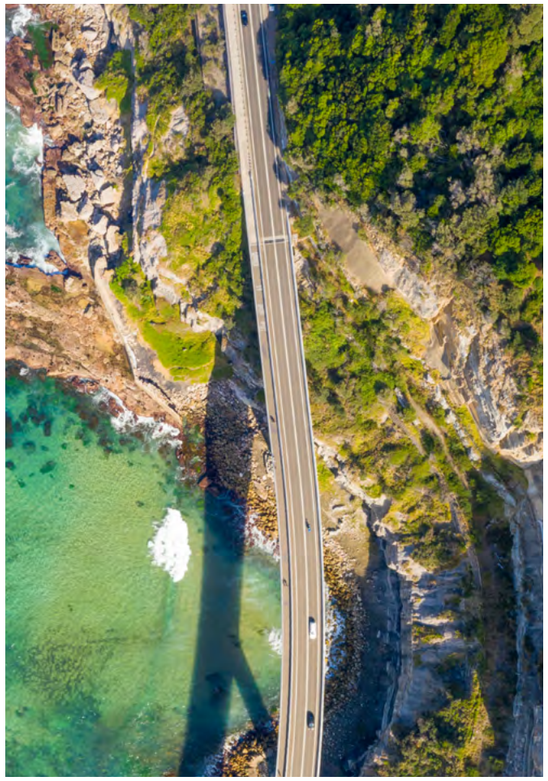
Our policy positions are built on a foundation of solid evidence and first class thought leadership to achieve outcomes that support business growth in our region.

02

Strategic Summary

A Clean Energy Future for Illawarra Shoalhaven

Sea Cliff Bridge



The Illawarra Shoalhaven region has a once-in-a-generation opportunity to become Australia's premier clean energy hub and lead the charge in offshore wind, green hydrogen and advanced manufacturing, positioning itself at the forefront of the national transition to renewables.

With a proud industrial heritage, a Renewable Energy Zone (REZ), and critical port and logistics infrastructure already in place, Illawarra is uniquely positioned to capitalise on the global clean energy revolution.

This opportunity isn't just about clean energy—it's about the creation of thousands of jobs, billions in investment, and securing a future-proofed economy.

Business Illawarra commissioned the University of Wollongong to identify key challenges, opportunities and barriers for regional transformation and worked closely with key industry across the region to identify areas of growth for the region and a roadmap for governments, investors, and industry to unlock this potential, ensuring long-term prosperity and energy security for New South Wales and Australia.

Key Opportunities

01

Hydrogen Hub Development

Port Kembla is poised to become a national and international leader in green hydrogen production and export, tapping into growing demand from Asia and beyond.

02

Grid and Storage Infrastructure Expansion

Strengthening grid capacity, battery storage, and transmission networks is critical to ensuring energy reliability and affordability.

03

Offshore Wind Leadership

The 2.9GW declared offshore wind zone provides a foundation for large-scale, clean energy generation, creating an entire offshore wind industry with supply chain benefits for manufacturing, logistics, and maintenance

04

Green Steel & Advanced Manufacturing

The shift to green steel production will ensure Australia maintains its role as a competitive global steel supplier while dramatically reducing emissions.

05

Job Creation & Workforce Training

Investing in skills development, apprenticeships, and STEM pathways will enable workers to transition from carbon-intensive industries to high-paying, future-focused clean energy jobs. This transformation will not only establish the Illawarra as a global clean energy leader but will secure long-term economic resilience and position Australia as a dominant force in renewable energy exports.

Why the Illawarra?

Despite finite land resources, the Illawarra boasts world-class infrastructure, a skilled workforce, and strong industry demand for hydrogen and renewable energy solutions. These combined assets, when leveraged to facilitate the energy transition, have the potential to transform the local economy.

Illawarra's unique strengths position it as a prime location for clean energy development

These combined strengths position the Illawarra as an ideal location for Australia's clean energy revolution, unlocking new jobs, industries, and investment opportunities.

01 Government-Backed Initiatives

The region has been designated as a Renewable Energy Zone (REZ) and has government support for hydrogen and offshore wind development.

Industrial Legacy & Workforce

A strong industrial base and skilled labour force in manufacturing, mining, and energy, skilled in steel production, metal fabrication, and precision engineering can transition to support clean energy industries.

02 Strategic Location & Infrastructure

Proximity to Sydney, major ports, and a skilled workforce make it ideal for renewable energy production and export.

03 Integrated Transport & Rail Networks

Established rail links connecting Illawarra with Shoalhaven, Sydney, and key inland industrial hubs.

04 Aviation & Logistics Readiness

Close proximity to Sydney, Canberra and Western Sydney airports. Importantly, Shellharbour Airport expansion underway ($20.35M investment) to support commercial and industrial aviation business growth.

05 Research & Education

The University of Wollongong and TAFE Illawarra are well-placed to support workforce transition plus research and development. The region also offered existing industry technology leaders including Sicona (batteries), Hysata (hydrogen tech), and Green Gravity (energy storage).

06 Industrial Land Availability

BlueScope Steel Masterplan outlines 200ha for industrial and innovation precincts, ideal for clean energy projects, with 35ha of port-side land ready for component laydown, storage, and assembly.

Steelmaking Capability & Green Steel Potential

BlueScope produces just over 3 million tonnes of steel annually, employing 3,000 directly and supporting 10,000 jobs locally. The only producer of plate and hot-rolled coil in Australia, the Illawarra can supply the renewable sector with quality steel for hydrogen storage, solar and wind componentry and also recycle decommissioned infrastructure.

Projected Economic Gains

A Game-Changer for NSW & Australia Illawarra's clean energy transition represents a multi-billion dollar economic opportunity, with significant investment and job creation potential. Key economic impacts include:

Job Creation

Over 10,000-15,000 direct and indirect jobs by 2050.

GDP Growth

Injecting $10-15 billion into the NSW economy over the next two decades.

Government Revenue

Estimated $100 million - $200 million annually in tax revenue.

Annual GDP Impact

Expected 1.5%-2% national GDP growth per year due to new industries.

Economic gains can include:

Green Hydrogen Production

- The Port Kembla Hydrogen Hub is poised to become a $1 billion investment magnet, creating 2,000 new jobs and positioning Illawarra as a key hydrogen player.

Offshore Wind Energy

- The Australian government has declared a 2.9GW offshore wind zone in the Illawarra, presenting a transformational economic opportunity. This could power up to 1.8 million homes and inject over $3 billion into the economy. Offshore Wind Operation are estimated to generating $300 million to $500 million annually, supporting long-term regional economic stability.

Advanced Manufacturing

- Green steel and renewable energy component manufacturing could make Illawarra a multi-billion-dollar clean energy powerhouse.

Clean Energy Supply Chain Development

- Illawarra can become a logistics, maintenance, and service hub, ensuring Australia's offshore wind and hydrogen industries have local expertise.

Community Batteries & Storage

- $200 million to $300 million in investment, enhancing energy security and grid resilience.

Solar Generation

- Contributing $71 million per year in economic benefits through large-scale and rooftop solar installations.

The Challenge: Barriers to Success

While the Illawarra has a unique opportunity to lead in clean energy, there are several critical barriers that must be addressed to ensure success:

Supply Chain Bottlenecks

Insufficient local manufacturing capacity means Australia risks importing key infrastructure rather than producing it domestically. The demand for wind turbines, electrolysers, and battery storage is strong, leading to potential delays and cost escalations. Global shortages in critical components (e.g., turbines, electrolysers, rare earth metals) could also lead to supply chain disruptions.

Policy Uncertainty

Inconsistent policies between state and federal governments can create investment hesitancy and delay project approvals

Funding & Investment Risks

Attracting sufficient private and public investment will be crucial for scaling up renewable energy industries. The international political environment is changing quickly and there is a noticeable retreat in investment from the sector on new and emerging technology development. Ongoing advocacy and leadership are critical from Australia and the world to plan for a sustainable future.

Land Use & Environmental Concerns

Careful planning is required to balance renewable energy expansion with conservation and land use priorities.

Workforce Gaps

A shortage of skilled labour in electrical engineering, construction, and renewable energy technology poses a risk to project timelines. Without proactive investment in TAFE and university programs, local workers may miss out on opportunities as the clean energy sector expands. Supply chain and local manufacturing challenges.

Infrastructure Limitations

The need for upgraded transmission lines, port facilities, and hydrogen storage remains a major constraint. Existing grid capacity constraints limit the ability to transmit clean energy production sites to domestic and export markets.

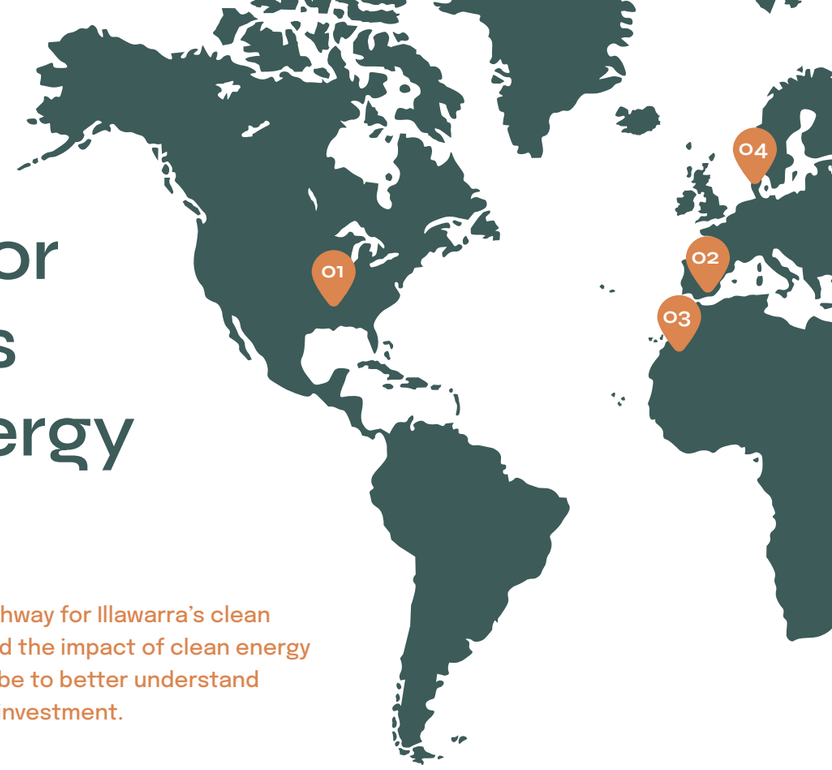
Community Engagement

Ensuring local communities support and benefit from clean energy projects is essential for securing social license.

High cost of living and housing shortages

Pose challenges to attracting and retaining a workforce in the region.

Global Lessons for Illawarra's Clean Energy Future



In determining an appropriate pathway for Illawarra's clean energy future, this study examined the impact of clean energy industry transition across the globe to better understand economic and industry return on investment.

01

United States (Texas & New York)

The U.S. offshore wind industry is booming, with Texas and New York leading the way. Texas, a traditional oil and gas state, has successfully transitioned to become a wind energy leader, generating over 30% of its electricity from wind power. New York's offshore wind projects are expected to create 10,000 jobs and add $12.1 billion in economic activity by 2035. Their success is driven by strong state policies, investment incentives, and public-private partnerships.

01

Spain

Spain has been a pioneer in onshore wind energy, with wind power contributing over 20% of the nation's electricity. Investments in renewable energy have added 1.2% to the national GDP, and the sector now employs more than 30,000 people. Spain's approach combines regulatory support, industry incentives, and a strong focus on R&D, serving as a model for regions seeking rapid clean energy development.

01

Morocco

As part of its ambitious energy strategy, Morocco has established itself as a global leader in solar and wind energy. The Noor Ouarzazate Solar Complex, one of the world's largest solar farms, has helped the country generate over 42% of its energy from renewables. The transition has contributed 2% to GDP growth, created 500,000 new jobs, and attracted billions in foreign investment. Morocco's government-led initiatives, combined with international partnerships, demonstrate how emerging economies can drive clean energy leadership.

01

Denmark

Denmark is a global leader in offshore wind energy, with wind power supplying over 50% of the country's electricity needs. The country's success is built on a comprehensive policy framework, strong investment in local supply chains, and strategic international collaborations. The offshore wind industry has created over 35,000 jobs, with Denmark exporting wind technology expertise worldwide. This model highlights the economic and environmental benefits of a long-term, government-backed approach to clean energy.

The Road Map for Success

The Illawarra Clean Energy Roadmap outlines a five-stage strategy to position the region as Australia's leading hub for Green Advanced Manufacturing and Logistics by 2050. The roadmap leverages Illawarra's industrial strengths, infrastructure, and workforce while addressing critical gaps in policy, investment, and workforce development.

STAGE 1

Policy Development and Community Engagement

Key Actions:

- Align regional, state, and federal policies.
- Engage local communities in clean energy project planning.
- Establish local content policies to ensure regional economic benefits.

Why it Matters:

- Establishing a clear policy framework and gaining community support ensures long-term stability and buy-in for clean energy projects. Without it, investment confidence may wane, and projects could face delays or opposition

STAGE 2

Infrastructure & Workforce Development (2030+)

Key Actions:

- Port Kembla upgrades to support offshore wind, hydrogen, and industrial-scale renewables.
- Improve transport, transmission lines, and hydrogen refuelling networks.
- Invest in vocational and tertiary education to build a clean energy workforce.
- Expansion of educational & workforce training hubs (TAFE & University of Wollongong). An Education & Training Hub.
- Develop a Super TAFE & Clean Energy Skills Centre to train 5,000+ workers in renewables, advanced manufacturing, and maritime skills.
- Upgrading Energy Transmission & Storage – Expand grid infrastructure, community battery networks, development of new solar storage technologies and hydrogen storage capacity.

Why it Matters:

- Building the right infrastructure and upskilling the workforce will be critical for meeting industry demands. Without investment in skills and transport networks, the region risks missing out on economic growth and job creation.

STAGE 3

Industry Enablement & Diversification (2030-2040)

Key Actions:

- Expand manufacturing for renewable energy components.
- Develop an offshore wind industry supply chain and circular green steel hub.
- Establish marine-based industries and aquaculture co-located with offshore wind farms.

Why it Matters:

- A diversified energy sector strengthens economic resilience, reducing dependency on a single industry. This stage ensures that Illawarra maximizes its clean energy potential while fostering new industries.

STAGE 4

Service & Maintenance Hub (2035-2045)

Key Actions:

- Position Illawarra as a leading service centre for hydrogen and offshore wind industries.
- Develop specialized logistics, vessel maintenance, and engineering consultancy services.

Why it Matters:

- Developing a strong maintenance and service industry ensures longevity for clean energy projects. Creating a hub for offshore wind and hydrogen services positions Illawarra as a leader in long-term industry sustainability.

STAGE 5

Advanced Manufacturing & Clean Energy Export Hub (2040-2050)

Key Actions:

- Establish Illawarra as a global leader in green hydrogen and ammonia production.
- Develop export markets and integrate the region into global clean energy supply chains.

Why it Matters:

- Becoming a global clean energy exporter cements Illawarra's reputation as a major economic player. This stage secures long-term prosperity and international trade opportunities for the region.

Leadership and Responsibility for Implementation

The successful execution of Illawarra and Shoalhaven's clean energy transition will require coordinated action across multiple levels of government, industry, and the community.

Government

Federal, state, and local governments must align policies and provide incentives.

Federal Government

- Set national policy direction for clean energy, with diversification and delivery, and long term affordability for business critical considerations.
- Provide investment certainty through long-term clean energy targets and funding incentives.
- Accelerate approvals for large-scale renewable projects and grid infrastructure.

NSW State Government

- Fast-track the Illawarra Renewable Energy Zone (REZ) and align policies with federal initiatives.
- Fund and implement grid transmission upgrades to support new renewable energy capacity.
- Develop training partnerships with TAFE and universities to build the clean energy workforce.

Local Governments & Regional Authorities

- Ensure local planning frameworks support clean energy development.
- Consult communities and First Nations groups to secure social license and benefit-sharing agreements.
- Facilitate regional infrastructure improvements, including roads, ports, and industrial precincts.

Industry & Investors

Private sector investment and engagement in clean energy infrastructure, manufacturing, and R&D.

- AEMO & EnergyCo NSW: Lead grid expansion, transmission investment, and system integration for renewable energy.
- Private Sector & Investors: Drive innovation and capital investment into offshore wind, hydrogen, and storage technologies.
- Industry & Supply Chain Partners: Support local content policies, ensuring Australian-made components are prioritized.

Education & Workforce Development

Universities and TAFE institutions must support skills training and innovation. Including degree, technical training and apprenticeship programs into green industries.

Conclusion: A Defining Moment for Illawarra

The Illawarra's clean energy transition represents a historic economic opportunity.

However, realising this vision requires strong policy leadership, investment certainty, and industry coordination.

Governments, business leaders, and investors must act decisively now to position the region as Australia's premier clean energy hub, ensuring job creation, global competitiveness, and long-term economic resilience.

03

Introduction

A Clean Energy Roadmap for Illawarra Shoalhaven Industry Development

Australia's energy transition is rapidly advancing, with renewable energy now accounting for approximately 40% of the country's electricity use (Clean Energy Council, 2024).

The energy transition poses significant opportunities for the Illawarra regions.

In February 2023, the New South Wales government declared an Illawarra Renewable Energy Zone (REZ). In June 2024, an offshore wind zone with a capacity of 2.9GW was declared by the Australian government.

Business Illawarra commissioned this research with the University of Wollongong and supported by a Steering Committee of Illawarra Shoalhaven Industry to focus on the timely identification of clean energy transition opportunities for the Illawarra region, develop a high-level roadmap to implementation and pose critical recommendations for the successful delivery of a clean energy transition for the region.

The Illawarra region now faces the challenge of harnessing major opportunities in the clean energy transition while addressing current regional capacity and capability gaps, leveraging Government policies, workforce development and supply chain including infrastructure.

To position itself as a leading hub for clean energy technologies such as green hydrogen, offshore wind energy, and green advanced manufacturing and logistics, the region must leverage its existing regional capacities and capabilities and attract targeted investments in key supply chain/ infrastructure areas and identify the critical steps and milestones necessary to drive the region's transformation into a clean energy and manufacturing leader.

This report reviews an appropriate mix of leveraging existing regional capabilities, expanding capabilities into adjacent areas of opportunity, and taking action to develop new renewable energy business opportunities which are a best fit for the region.

United States

Onshore and offshore wind installations between 1995 and 2018 (Brunner and Schwegman, 2022)

- increased GDP per capita by 8.5%
- increase income per capita by 6%
- increase home values by 7%

147 MW onshore wind farm in Oklahoma (Greene and Geisken, 2013)

- 25 million in economic benefits
- 200 jobs (construction and operation phase)

Morocco

Onshore wind and solar over a 30-year period (de Arce et al., 2012)

- Projected contribution of 1.2% - 2% to GDP
- Up to 499,000 FTEs

Spain

Onshore wind (Varela-Vazquez and del Carmen Sanchez-Carreira, 2015)

- Adding 1.2% to the regional GDP
- 0.5% of total employment
- 5.3% increase in indirect employment within R&D

Figure 1. International Clean Energy Transition Impact Studies

Economic Impacts of Clean Energy Transition Globally

Global energy demand has been steadily increasing over the last two decades. The increase in energy consumption has been closely matched by increasing greenhouse gas (GHG) emissions. To meet the agreed climate targets set in the Paris agreement, a large-scale transition is required to a net-zero energy system. In 2022, 82% of all primary energy originated from fossil fuel sources (Energy Institute, 2023). Whilst uptake of renewable energy generation is growing — more than 500 Gigawatts of renewable capacity was added globally in 2022 — its share of overall primary energy consumption was 7.5% in 2022. It is predicted that an 11-fold increase in global wind power capacity and a 20-fold increase in solar photovoltaic (PV) is required to achieve net-zero by 2050 (IEA, 2023). Achieving a clean energy transition requires overcoming various challenges such as substantial investments in renewable infrastructure and supply chain, grid modernisation, workforce transition and robust policy stability.

The economic impact of renewable energy, particularly wind energy, has been significant in various regions, both in terms of GDP growth and shifts in employment patterns. Figure 1 provides a sample overview of established economic impact studies globally. Further global economic impact studies can be found in the Literature Review section of the full report.

Regional clean energy transition caused employment to move from traditional sectors such as farming to higher-paying industries like construction and manufacturing. This highlights the broader economic benefits of transitioning to clean energy, especially for regions that embrace these new technologies and adapt their workforce accordingly (Brunner and Schwegman, 2022).

The International Energy Agency (IEA) projects that global employment in the clean energy sector will continue to grow, with the number of new jobs created expected to surpass those lost in fossil fuel industries (IEA, 2023). The International Renewable Energy Agency (IRENA) (2023) reports significant employment growth in the renewable energy sector over the past decade (2012 to 2022), with 13.7 million people employed by the industry globally, marking an 88% increase over 11 years. The solar industry leads in employment, followed by hydro and biofuel energy. The report by IRENA (2023) aligns with the IEA (2023) in projecting that, if the Intergovernmental Panel on Climate Change targets are met, 139 million jobs in the energy sector will be created by 2030, with renewable energy areas contributing to 80 million jobs.

04

Current State and Future Outlook

Australian Clean Energy Transition

Clean Energy Transition Plan

The Australian Government's Clean Energy Transition Plan aims to achieve net-zero emissions by 2050 while driving economic growth and job creation. The plan focuses on investing in renewable energy sources, reducing reliance on fossil fuels, and fostering innovation in clean technologies.

Key initiatives within the plan include:

01

Powering Australia Plan

This strategy emphasizes expanding solar, wind, and battery storage projects. It sets a target of generating 82% of electricity from renewables by 2030, aiming to reduce energy costs and enhance grid reliability.

02

Rewiring the Nation

A $20 billion initiative to modernize and expand the electricity grid, enabling more renewable energy to be integrated and ensuring a stable energy supply.

03

Hydrogen and Critical Minerals

The government is investing in green hydrogen production and critical minerals, positioning Australia as a global leader in clean energy exports and new technology supply chains.

04

Support for Households and Industry

Incentives are provided for energy efficiency upgrades in homes and businesses, helping reduce emissions and energy bills.

The plan is designed to create over 600,000 jobs, particularly in regional areas, while protecting the environment. By focusing on innovation, clean energy investments, and sustainable growth, Australia aims to secure a cleaner, more resilient energy future.

National Energy Workforce Strategy

Australia's National Energy Workforce Strategy is designed to prepare the country's workforce for the transition to a low-emission, renewable energy future. The strategy focuses on ensuring that Australia has the skilled labour needed to support the rapid expansion of clean energy projects, such as solar, wind, hydrogen, and battery storage.

Key components include:

01

Workforce Development and Skills Training

The plan prioritizes investments in vocational education, apprenticeships, and specialized training to equip workers with skills in emerging energy technologies. This includes reskilling workers from traditional fossil fuel industries to transition into clean energy sectors.

02

Regional Job Creation

As renewable energy projects are often located in regional areas, the strategy aims to create jobs and economic growth outside of major cities. This supports regional communities and ensures a just transition for workers affected by the shift away from coal and gas.

03

Collaboration with Industry and Education Providers

The strategy promotes partnerships between government, industry, and educational institutions to align training programs with industry needs, ensuring a pipeline of skilled workers.

04

Diversity and Inclusion

Encouraging a diverse workforce, including women, First Nations Australians, and young people, is emphasized to address labor shortages and foster inclusive growth.

This strategy aligns with Australia's broader goals of achieving net-zero emissions and ensuring a sustainable, skilled workforce for the future.

Future Made in Australia policy

Overall, these policies are supported by the Future Made in Australia policy, which aims to revitalise and expand the Australian manufacturing sector, focusing on boosting domestic production, creating local jobs, and reducing reliance on imports. Central to this policy is fostering a robust and sustainable manufacturing industry by leveraging Australia's strengths, including its skilled workforce and abundant natural resources.

Key components include:

01

National Reconstruction Fund

A $15 billion investment fund to support priority sectors like clean energy, medical technology, and transport manufacturing. The goal is to spur innovation and local production, particularly in sectors critical to national security and resilience.

02

Buy Australian Plan

This plan focuses on using taxpayer dollars to prioritise Australian-made products and services in government procurement. It aims to strengthen local industries, promote job creation, and ensure the benefits of public spending stay within the country.

03

Support for SMEs

Small and medium-sized enterprises (SMEs) are given special attention, with initiatives to improve their access to finance, technology, and export opportunities. Programs like the Australian Industry Capability (AIC) plan help integrate SMEs into larger supply chains, particularly in defence and infrastructure projects.

04

Clean Energy Transition

Emphasising renewable energy manufacturing, the policy supports investments in green technologies to help Australia become a leader in sustainable production.

The policy aligns with the vision of making Australia a self-reliant, high-tech, and globally competitive manufacturing hub, securing long-term economic resilience and sustainable growth.

Illawarra Clean Energy Transition Action to Date

The Illawarra region has undertaken several significant initiatives to advance its clean energy transition, leveraging both local resources and government support. These efforts are aimed to establish the region as a leading hub for renewable energy and to foster sustainable economic growth.

Coregas H2Station

Port Kembla Energy Terminal, Squadron Energy

Figure 2 highlights significant developments within the Illawarra region established to date, noting however that the list in Figure 2 is a summary of the major initiatives and is not a comprehensive list of all renewable activities underway in the region, nor is Figure 2 intended to be a list of all investments. These initiatives are aiding the Illawarra region in making substantial progress towards its vision of becoming a leader in clean energy and sustainable development.

ILLAWARRA SHOALHAVEN

Renewable Energy Zone (REZ) and Offshore Energy Infrastructure Zone (OEIZ)

- The NSW Government declared the Illawarra as a REZ in February 2023
- The Australian Government declared an Offshore Energy Infrastructure Zone (OEIZ) of 2.9GW in June 2024, recognising the region's high offshore wind potential

Transmission and Distribution Infrastructure

- Integrated System Plan: 10,000 km of new transmission lines needed by 2050, with 2,500 km in development. A relatively minimal volume of this is forecast to occur in the Illawarra region.
- The transmission projects are estimated to (1) save consumers $18.5 billion in avoided energy costs, (2) deliver $3.3 billion in emissions reduction

Advanced Manufacturing and Start-Up Ecosystem

- Leveraging the region's steel manufacturing base to support advanced clean energy infrastructure
- Establishing new clean energy businesses in the Illawarra starting from R&D (Green Gravity) through to commercialisation and scaling (Hysata, Sicona).

Solar and Hydro Projects

- Illawarra has established rooftop solar and hydro projects

Regional Transition to Low Carbon Transport

- Wollongong is being targeted as a priority area within the NSW Government's Electric Vehicle public charging masterplan
- A Hydrogen heavy vehicle refuelling station has been commissioned by Coregas to service local heavy vehicle decarbonisation initiatives

Clean Energy Futures Skill Centre

- AUD 13 million commitment by the Australian government for UOW to establish a clean energy future skills centre jointly by UOW and Wollongong TAFE
- Super TAFE and Clean Energy Skill Centre develop local workforce skills to support transition

Port Kembla Hydrogen Hub

- Committed to green hydrogen leadership, attracting investment, and creating jobs
- The NSW Government awarded $28.5 million to BOC Gases from the Hydrogen Hubs program to establish a 10.5MW hydrogen electrolyser and other hydrogen infrastructure
- The hub supports the production, storage, and export of green hydrogen and ammonia

Gas projects

- Natural Gas upgrade for Tallawarra aims for long-term hydrogen application
- Port Kembla Energy Terminal (PKET) established by Squadron Energy to provide gas based firming capacity in the transition to renewables in NSW. PKET has been designed to allow future fuel uses

Figure 2. Clean Energy Initiatives in the Illawarra Region

Pilor Plant, Sicona

Vision for the Illawarra Shoalhaven

The development of clean energy industries in the Illawarra and Shoalhaven will establish the region as a leading hub for renewable energy innovation, investment, and sustainable economic growth.

By leveraging its strategic geographical position, existing industrial base, and skilled workforce, the Illawarra is well placed to attract significant investment, and the further development of robust enabling infrastructure will support various established and emerging clean energy technologies. A summary of key elements of the vision is presented on the next page.

Leadership in Renewable Energy

Illawarra is leading policy reform and hence becomes a leading destination for clean energy projects, including offshore wind, solar, hydro, and biogas.

Economic Growth and Job Creation

Foster economic growth through energy job creation over the next 20 years and develop an advanced manufacturing hub to produce components for clean energy providers.

Innovation and Investment

Attract global private and public (green) investment by capitalising on Illawarra's strategic assets, policies, and incentives.

Sustainable Infrastructure Development

Expand transmission lines and energy storage facilities to support renewable energy integration, whilst implementing systems for potential regional opportunities for recycling and managing the end-of-life phase of renewable infrastructure to create a circular economy.

Community and Environmental Stewardhip

Engage local communities in the planning and implementation of clean energy projects (community co-design). Promote Indigenous business development and participation, fostering inclusivity and equitable growth.

Education and Skill Development

Establish worldclass centres for clean energy skill development, like the Super TAFE and the Clean Energy Skill Centre.

A roadmap for the implementation of the vision depicted above is presented in Figure 8, later in this report. The next section of this report takes a deep dive into specific opportunities for the region focusing on the overall desirability of engaging with an opportunity area as well as the current regional capability and capacity. The capability and capacity analysis provides qualitative guidance on potential investment areas which may have the highest potential returns.

05

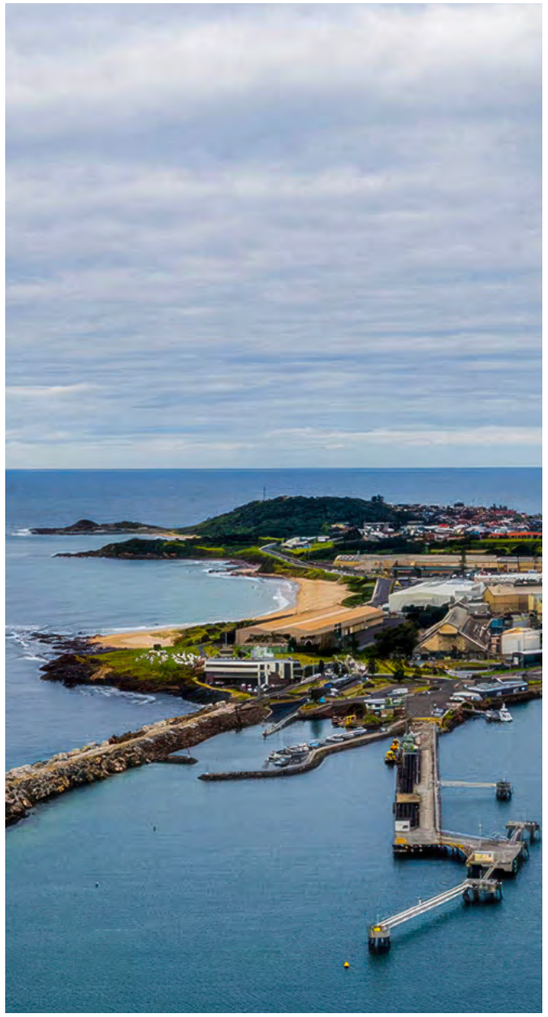
Opportunities and Gaps

CAPABILITY AND CAPACITY

Illawarra Shoalhaven Heat Map

Despite finite land resources, the region boasts major energy, port, and transport infrastructure, a skilled workforce with experience in heavy manufacturing, oxygen and hydrogen production, storage and use, and a strong local demand for hydrogen projects, including future green steel production. These combined assets, when leveraged to facilitate the energy transition, have the potential to transform the local economy. Figure II highlights a summary of the region's unique capability and capacity.

Port Kembla, NSW Ports

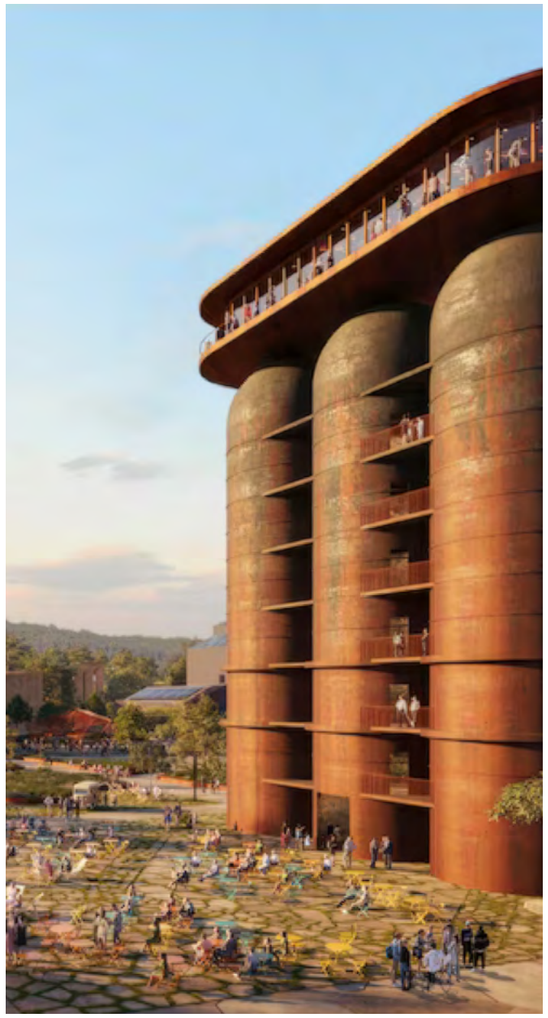


Port Kembla Deep Sea Port

- Port Kembla's strategic location — adjacent to the Illawarra offshore wind zone and the between Hunter and Gippsland offshore wind zones
- Approved DA for Outer Harbour Development — fast to activate to meet the needs of the offshore wind industry

Industrial Land Availability

- 35ha of port side land can be developed and made available for component laydown, storage, and assembly
- Additional land in close proximity to the port available for clean energy transition
- BlueScope Steel Masterplan for 200Ha industrial land development including industrial and innovation precinct



BlueScope Steel Masterplan

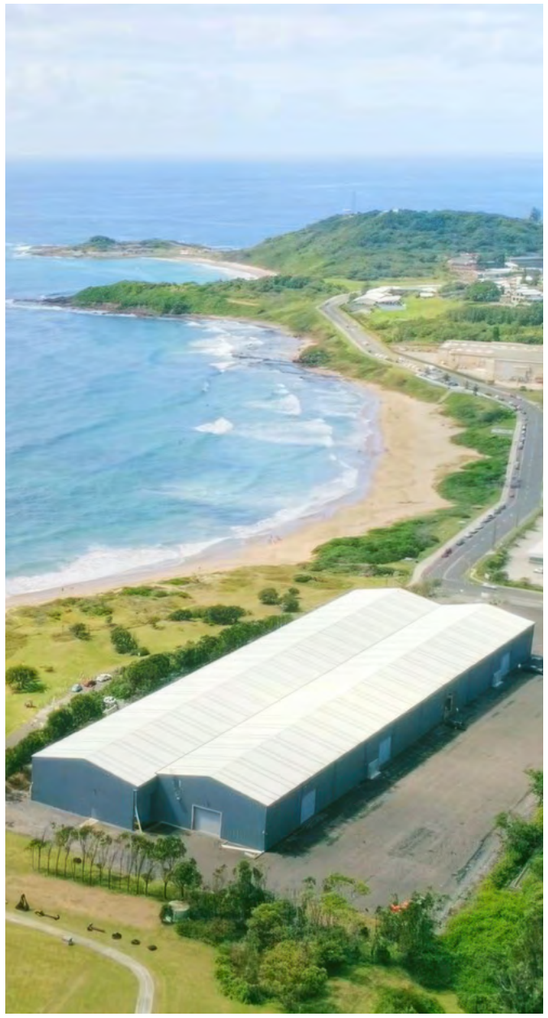
BlueScope blast furnace in Port Kembla, ABC Illawarra

Steel Making Capability

- BlueScope produces approximately 3 million tonnes of steel per annum, employs around 3000 people directly in the Illawarra and supports about 10000 jobs locally.
- Australia's only producer of plate and hot rolled coil, the Illawarra region is well placed to become the local supplier of quality steel products for the fabrication of renewable energy componentry, offshore wind assembly and decommissioning work.

Innovation, commercialisation and scale-ups

- Technology spin-outs e.g., Sicona, Hysata from UOW (unique capability in tech transfer)
- Other non-UOW led innovations such as Green Gravity (energy storage), CST composites (hydrogen fuel tanks)



Hysata Factory in Port Kembla

South Coast Railway Line

Rail Connection

- Established rail links connecting the Illawarra with the Shoalhaven and Sydney
- Maldon-Dombarton railway is a partially-completed 35 kilometre line linking the south-western suburbs of Sydney, the Southern Highlands and southern and western NSW with Port Kembla.

Shellharbour Airport

- Domestic flights
- Total investment volume of $20.35 million for airport expansion including an aviation business park.

Shellharbour Airport, Shellharbour City Council

Workers in steel mill

Skills and Expertise

- Significant population of professional, skilled and semi-skilled labour with expertise in manufacturing, particularly with respect to steel production, metal fabrication and mining.
- Historical experience in large scale maritime construction, including offshore oil and gas platform fabrication and prefabricated tunnel section manufacture

Bells Point, Austinmer

The region is uniquely placed to become a leader in clean energy transition.

One key aspect that sets the Illawarra REZ apart from other REZ regions is the significance of having an existing, considerable load geographically close to a potential source of generation. Considering the Illawarra's unique capabilities, the next section of this report explores and identifies opportunities for the region associated with the clean energy transition.

The clean energy transition presents significant employment opportunities for the Illawarra region, which is poised to become a major hub for renewable energy industries. The region's strategic position, existing industrial base, and government-backed initiatives such as the Illawarra Renewable Energy Zone (REZ) and offshore wind projects make it well-positioned to support the rapid growth of green energy jobs.

The International Renewable Energy Agency (IRENA) estimates that the global renewable energy sector will generate 80 million jobs by 2030. In Australia, the clean energy sector is expected to create up to 50,000 new jobs by 2035, with the offshore wind and hydrogen industries being key drivers. The Illawarra region, with its infrastructure, skilled workforce, and educational institutions, could attract a substantial share of these opportunities. With the establishment of a 2.9 GW offshore wind zone, the Illawarra region could see the creation of approximately 4,000 to 6,000 jobs over the next decade, focusing on areas such as turbine manufacturing, assembly, installation, and maintenance. The Port Kembla Hydrogen Hub aims to create around 2,000 direct and indirect jobs, particularly in hydrogen production, storage, and export logistics. Battery and Storage Technologies: Community battery installations and microgrid projects could generate approximately 500 new jobs focused on installation, operation, and maintenance.

However, considerable gaps currently exist in regard to workforce, leveraging policy initiatives and clean energy supply chain that can position the Illawarra as a leading destination for clean energy transitions. The Illawarra has identified shortages in specific/specialised skills or talent such as electrical engineering, electrical trades, fabrication and mechanical trades, project management, WH&S and other skilled workers). The supply chain requires investment in critical infrastructure. However, uncertainty in demand due to a lack of an approved project pipeline (e.g., offshore wind projects) stalls investment. Further the electricity network infrastructure is insufficient to support electrification and decarbonisation (e.g. electric vehicle and hydrogen recharging infrastructure) including the transmission and distribution network capacity.

Finally, some lack of alignment and coordination between local, state and federal government has been identified as a gap to attract clean energy businesses to the region. Coordinated energy policy implementation is required at the local, state, and federal levels to fully unlock the regional benefits and opportunities. International policy best practice studies can be found in the Literature Review section of the full report.

Opportunities for the Illawarra Shoalhaven

The Illawarra region's unique capabilities and strategic positioning enable it to seize various clean energy opportunities, driving the local economy towards a sustainable and clean energy future.

Research conducted through a comprehensive series of interviews and national and international literature searches have been distilled into a combined qualitative and quantitative summary. This qualitative and quantitative research created Heat Maps, which are communicated in this report in the form of Venn diagrams.

The diagrams summarise the analysis of the data by focusing on the three factors of industry desirability, regional capability and regional capacity, whilst also factoring in time to implement. The intersection of all three factors (circles) in the Venn diagrams identify the elements that the research has identified as most implementable with the highest likelihood of success as they meet all three criteria, namely:

Industry desirability

Captures the attractiveness of a particular region, sector, or project for industrial development. It reflects the advantages that can be leveraged to make clean energy projects successful.

Regional capability

Includes the combined strengths, resources, and expertise within a region that enable it to effectively contribute to and benefit from the clean energy transition.

Regional capacity

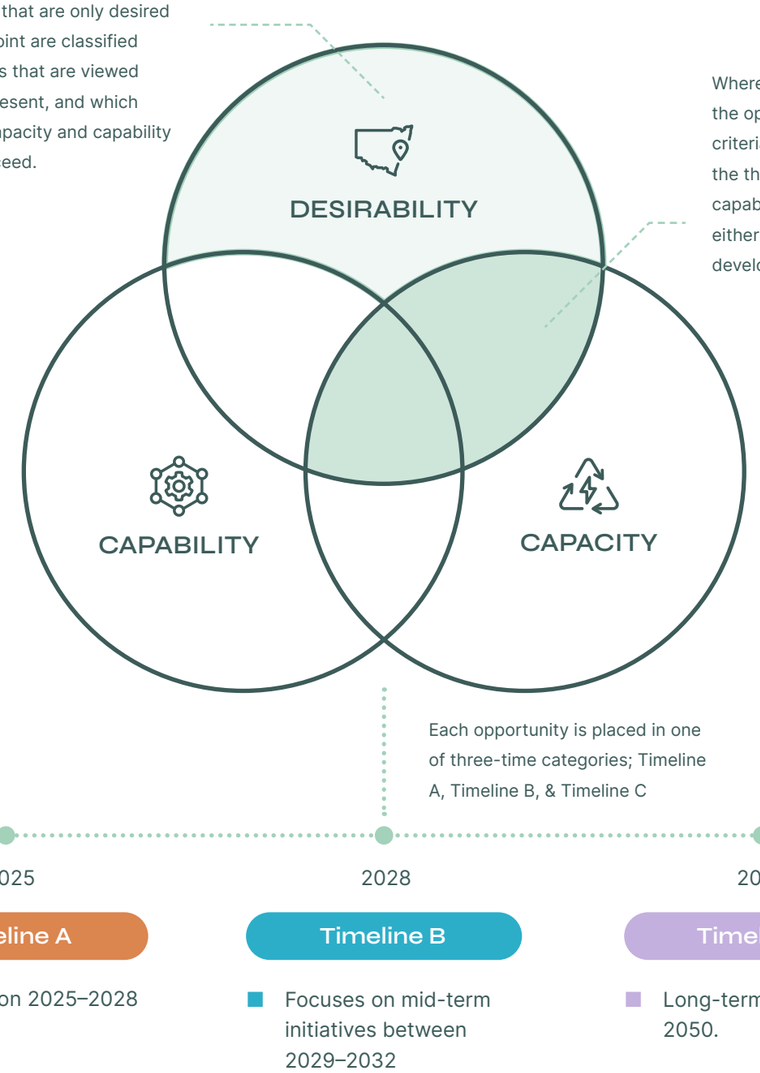
Refers to the ability of the region to support, manage, implement, and sustain the clean energy transition.

The following page provides a detailed explanation of the Venn diagram heat map framework

Opportunity Venn Diagram Heat Maps

Opportunities presented in the venn diagram are those identified by key industry stakeholders.

Those opportunities that are only desired by industry at this point are classified as long-term projects that are viewed as less feasible at present, and which require significant capacity and capability development to proceed.



Where two circles overlap, the opportunities meet the criteria of two sets but lack the third (either capacity or capability) requiring time for either capacity or capability development.

Figure 3. Opportunity Venn Diagram Heat Map Framework

The research has been grouped into the categories of enabling infrastructure, clean energy generation, clean energy storage, and new or alternative industries. Thus, there are four Venn diagram heat maps, one for each of these categories.

Enabling Infrastructure

Figure 4 presents the analysis of enabling infrastructural opportunities in the Illawarra including energy distribution infrastructure.

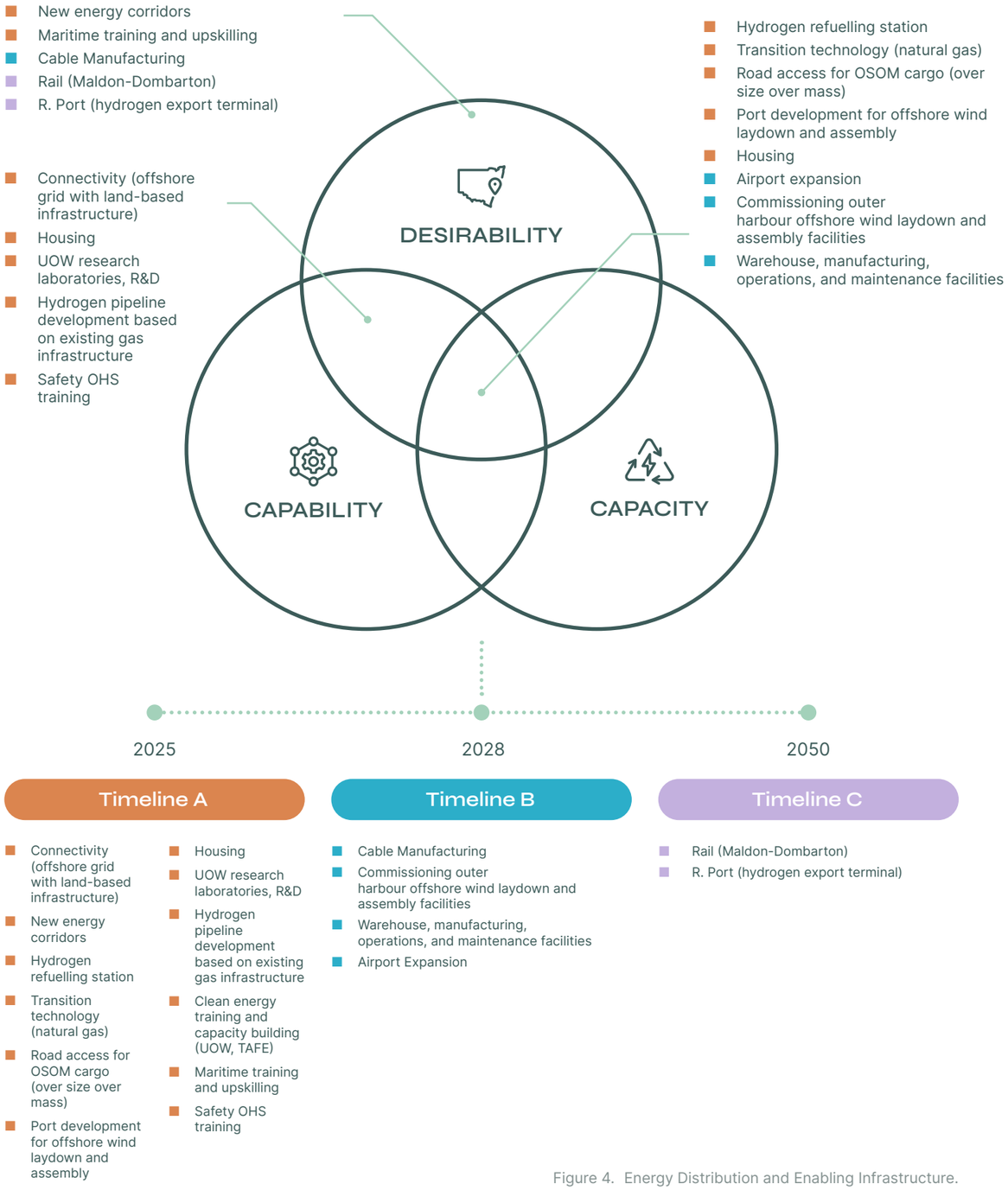


Figure 4. Energy Distribution and Enabling Infrastructure.

Industry desirability with existing regional capacity and existing regional capability

Developing Port Kembla to enable it to support the offshore wind industry in the Illawarra, Hunter, and Gippsland regions is critical and is an immediate priority to commence within Timeline A. In relation to onshore wind and other renewables projects, enhanced road access for Over Size/ Over Mass (OSOM) components will also enable the Illawarra to supply imported and locally produced componentry to regions within the state. The Illawarra has a history of coke oven gas production (60% of which is hydrogen) as part of making high value coke. The region has a familiarity of using hydrogen rich gases in steelmaking. Additionally, local established gas producers such as Coregas and BOC bring expertise in hydrogen production, storage, transport and liquefaction that can be leveraged to further develop hydrogen supply chains. Finally, in the medium-term airport infrastructure upgrades have also been identified.

Industry desirability that requires regional capacity development

Capability gaps currently exist to tackle desired opportunities regarding grid connectivity (offshore to onshore), worker shortages worsened by housing development challenges, UOW R&D due to funding and budget constraints and human resource training and development for the clean energy transition industry.

Industry desirability that requires regional capacity and regional capability development

The development of new transmission corridors, the establishment of a maritime skills centre, cable manufacturing (bringing back a previously established industry), rail infrastructure development and a port hydrogen export terminal have all been identified as desirable for the Illawarra but with limited capacity and capability available now.

Clean Energy Generation

Figure 5 provides an overview of the identified opportunities in clean energy generation with most opportunities stemming from the emerging offshore wind industry.

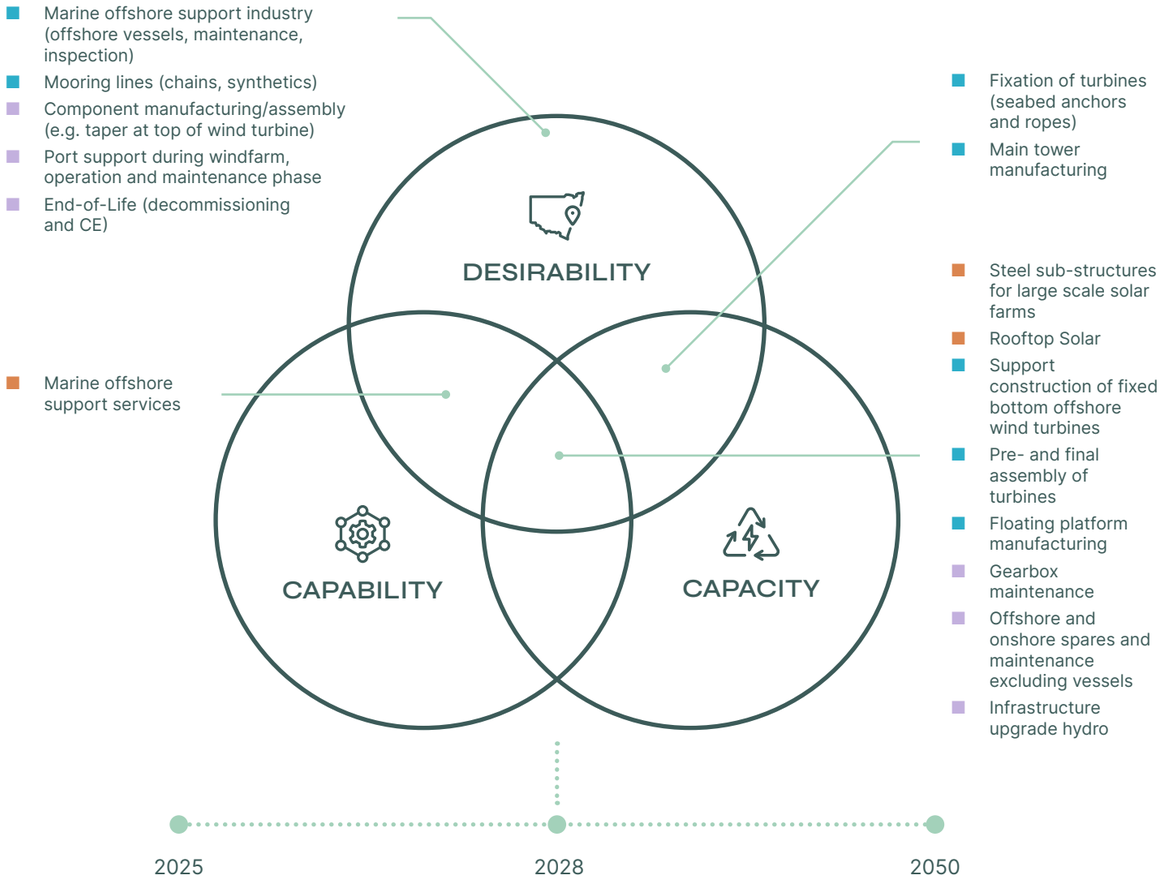


Figure 5. Energy Generation: Offshore Wind, Solar, Hydro, and Biogas.

Industry desirability with existing regional capacity and existing regional capability

The existing heavy construction industry in the Illawarra has demonstrable capabilities and capacities in manufacturing of large infrastructure components such as offshore oil rigs. These capacities and capabilities are transferrable to the manufacturing of the sub-structures (e.g., floating windfarm components or solar farm support structures) for as well as the assembly and decommissioning (de-assembly) work.

In the long-term, turbine maintenance as well as wind energy maintenance opportunities are highly desirable.

The further extension of rooftop solar and the Kangaroo Valley pumped-hydro energy storage scheme have been identified as desirable opportunities long-term that can proceed with existing capability and capacity.

Industry desirability that requires regional capacity development

The Illawarra region has existing capability in the provision of maritime services. An investment in capacity is required to unlock the opportunity to establish the region as a maritime service centre for offshore windfarm deployment and maintenance services. Here services range from marine certifications, seabed surveys and telemetry, engineering design services and environmental services, geophysical services but also vessel maintenance and offshore inspections.

Industry desirability that requires regional capability development

Two desired opportunities have been identified for the region to participate in fixation technology for floating offshore wind infrastructure such as seabed anchors and ropes as well as the manufacturing of wind towers.

Industry desirability that requires regional capacity and regional capability development

Larger investments are required to unlock opportunities as regards the establishment of a marine offshore supplier industry including the provision of vessels, inspection, and maintenance. In addition, manufacturing of mooring lines such as chains and synthetics would complement this emerging marine industry. Finally, long-term capabilities in taper manufacturing are desirable but lack regional capacity and capability.

Noteworthy is the opportunity for capacity and capability development around decommissioning. Here, BlueScope has steel scrap recycling capability to unlock this circular economy infrastructure opportunity.

Clean Energy Storage

Figure 6 provides an overview of the identified opportunities in clean energy storage with most opportunities stemming from emerging start-up companies.

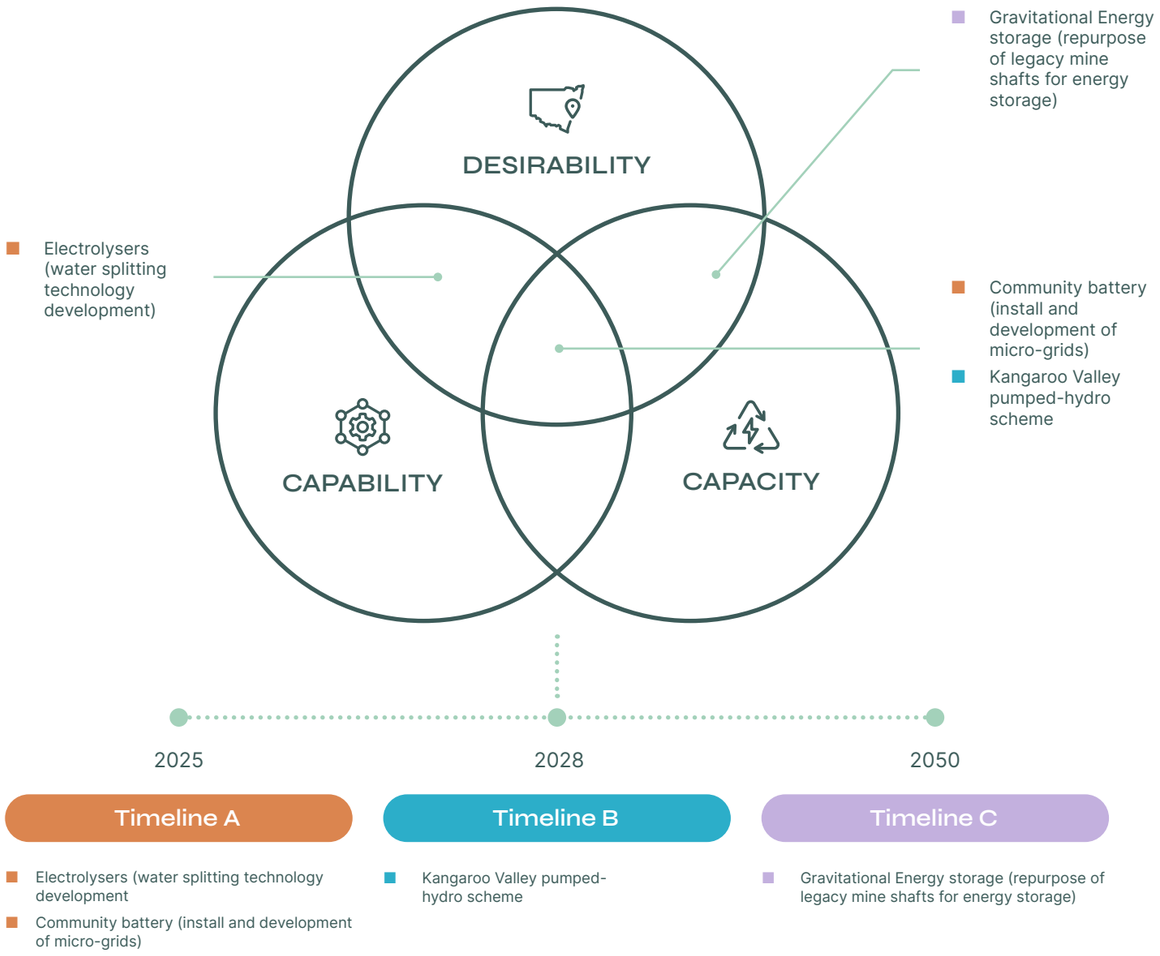


Figure 6. Energy Storage: Battery, Gravity, Green Hydrogen/Ammonia.

Industry desirability with existing regional capacity and existing regional capability

An opportunity within existing capacities and capabilities is the roll out of more community batteries and the establishment of micro-grids. Here, excess rooftop solar energy charges the community battery during daytime to be released during night-time. Leveraging community focussed initiatives such as Electrify 2515 into an overall regional clean energy industry for households could significantly increase local economic activity for locally based installers.

Industry desirability that requires regional capacity development

The Illawarra is already producing high-efficiency electrolysers at a commercial scale for domestic and export markets.

Industry desirability that requires regional capability development

This is an emerging technology with the objective to reactivate retired mineshafts and ventilation shafts for gravitational energy storage. The technology is currently being developed, simulated, and trialled. A deployment at scale is likely to occur later in this decade.

Alternative Industries

The clean energy transition in the Illawarra region also creates innovation spillover into alternative industries. Figure 7 presents these opportunities. Interestingly, no opportunities have been identified that can be tackled with existing capacity and capability.

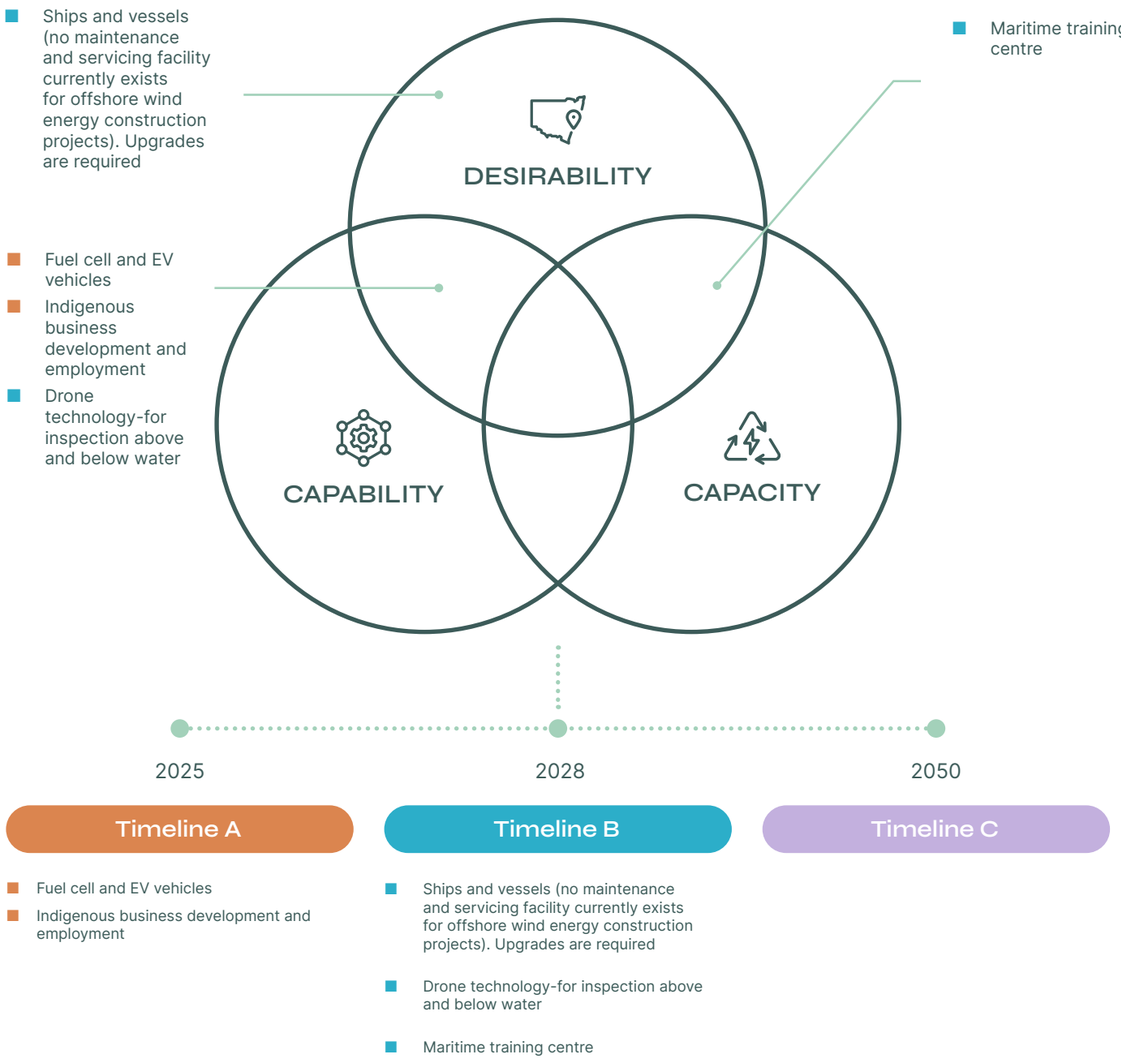


Figure 7. Spillover and Alternative Opportunities in Clean Energy Industries.

Industry desirability that requires regional capacity development

Capacity development is required to enable the manufacturing of fuel cell and EV vehicles, in particular trucks, buses, planes, and ships. The same holds true for the development of various drone technology required for inspection (above and below water). Further, capacity development is required to unlock the potential amongst First Nations people. Opportunities that are ocean based are highly desired amongst First Nation people.

Industry desirability that requires regional capability development

A maritime training centre is highly desirable in the medium term, with the roll-out of a striving wind industry and the associated offshore maritime support industry.

Industry desirability that requires regional capacity and regional capability development

Upgrading Ships and Vessels: Necessary for offshore wind energy construction, requiring public approval, and capacity investment for successful implementation.

After unpacking and examining the significant opportunities available to the Illawarra region, the report now focuses on the next section, which outlines a strategic roadmap for guiding the region's development and realising these opportunities.

06

Strategic Path Forward

Green Gravity test lab, Port Kembla

Regional Roadmap

The roadmap for implementing the identified opportunities in the clean energy sector is built upon several existing and ongoing initiatives underway in Illawarra Shoalhaven.

Five distinct stages have been identified that will position the Illawarra as Australia's leading centre in Green Advanced Manufacturing and Logistics by 2050.

Incorporating social licensing practices that engage local communities and stakeholders — giving importance to social investment and cultural sensitivity — is central to achieving long-term success and fostering sustainable, inclusive development.

Stage 1 therefore focuses on policy clarity and obtaining a social license from community to embark on the clean energy transition journey collectively.

Stage 2 puts the enabling infrastructure in place that supports the clean energy transition and the diversification of the regional economy (Stage 3).

Stage 4 focuses on the implementation of the ongoing service provision, whilst Stage 5 establishes the region as Australia's centre for a green advanced manufacturing and logistics.

Roadmap for the Illawarra Shoalhaven

Figure 8. Roadmap for the Illawarra Shoalhaven

STAGE 1

Policy Development and Community Engagement

STAGE 2

Supply Chain Infrastructure and Skill Development

- Port Capacity
- Grid
- Road access for OSOM
- Rail Network (including Maldon-Dombarton)
- Refuelling Network
- Education Precinct
- Housing

STAGE 3A

Offshore Wind and Green Circular Steel Hub for the Wind Industry

STAGE 3B

Diversification of Economy Including Blue Economy Exploitation

- Hydrogen Transport
- First Nation Business
- Advanced Manufacturing
- Aquaculture

STAGE 4

Service Provision to Offshore Activities

- Hydrogen Hub
- Innovation in Storage
- Technology (UOW, Start-Ups)
- Maritime Services

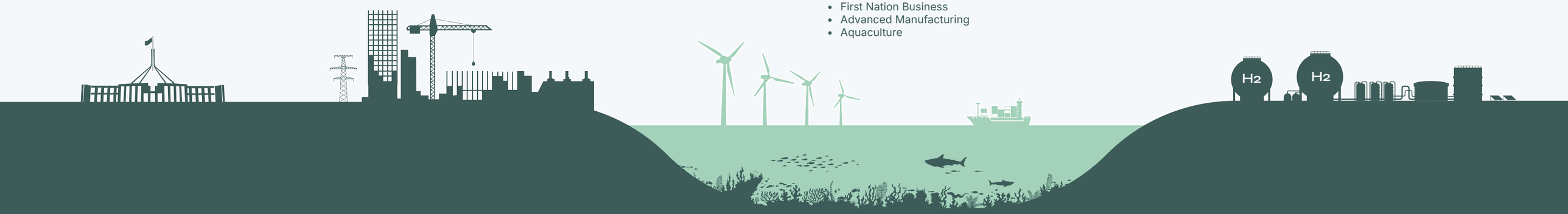
STAGE 5

Green Advanced Manufacturing and Clean Energy Hub

- Green Steel
- Hydrogen/ Ammonia Export Terminal
- Steel Circular Economy Hub

Enabling

Pre-requisite



2025

2028

2050

Timeline A

Timeline B

Timeline C

STAGE 1

Policy Development and Community Engagement

- Co-designing the clean energy transition with the local community
- Align the narrative amongst critical government and industry stakeholders
- Establishing a robust policy framework that supports long-term emissions reduction goals
- Develop predictable and credible policies, support specific technology areas, and create enabling conditions for successful implementation

STAGE 2

Supply Chain Infrastructure and Skill Development (2030+)

- Key infrastructure upgrades, particularly at Port Kembla, are necessary to support the development of offshore wind and hydrogen projects
- Educational precinct development to enable workforce development and workforce transition

STAGE 3A

Offshore Wind Enabler and Green Circular Steel Hub for the Wind Industry (2030+)

- The region a major player in offshore wind energy and hydrogen production
- Manufacturing of components for offshore wind turbines, producing green hydrogen for domestic use and export, developing a green steel industry powered by renewable energy, and recycling clean energy infrastructure

STAGE 3B

Diversification of Economy including Blue Economy Exploitation (2030+)

- The port and the offshore wind industry enable the Illawarra to diversify its economy through mixed-use of spatial marine zoning
- Aquaculture industries co-located with the offshore wind parks including post-harvest processing facilities
- An opportunity to strengthen the economic self-determination of Aboriginal communities.
- Connectivity to export markets by air via the Western Sydney Airport and the Maldon to Dombarton rail link are critical for the industry to take off.

STAGE 4

Service Provision to Offshore Activities (2030+)

- Offshore wind industry and the aquaculture industry require marine-based maintenance and service provision.
- Positioning the Illawarra as a maintenance hub for the offshore wind industry with land available to host warehouses for spare parts (e.g. engineering consultancy, education, skill development, R&D, divers, logistics, vessel maintenance).

STAGE 5

Advanced Manufacturing and Clean Energy Hub (2050+)

- Illawarra and Shoalhaven region is Australia's future hub for sustainable industries in green steel and hydrogen/ ammonia.
- Illawarra and Shoalhaven region as a producer and exporter for clean hydrogen/ammonia to international markets.

Port Kembla

Critical Success Factors Needed for a Successful Transition

By focusing on local content, infrastructure upgrades, and targeted financing, the region can attract investment, create jobs, and drive sustainable economic growth.

Economic Benefits of Clean Energy Growth in the Illawarra Region

The Illawarra region stands to gain substantial economic benefits from investments in clean energy, particularly through the development of offshore wind, hydrogen production, and advanced energy storage solutions. These sectors are poised to transform the region into a clean energy hub, driving job creation, GDP growth, and infrastructure development.

01

Offshore Wind: A Catalyst for Regional Economic Growth

The declaration of a 2.9 GW offshore wind zone in Illawarra is projected to bring significant economic gains. Based on studies from similar offshore wind developments globally, the economic benefits can be quantified as follows:

Job Creation

- **Construction Phase (2025-2030):** Approximately 4,000 to 6,000 direct jobs are expected during the construction phase, including roles in turbine assembly, installation, cabling, and port upgrades.
- **Operations and Maintenance (2030 onwards):** Around 500 to 1,000 permanent jobs could be generated in long-term operations, maintenance, and logistics support for offshore wind farms.
- **Supply Chain and Indirect Jobs:** For every direct job in offshore wind, studies indicate there are typically 1.5 to 2 indirect jobs created in supporting industries (manufacturing, logistics, and professional services). This could result in an additional 6,000 to 8,000 jobs over the lifespan of the projects.

Economic Output

- The construction of offshore wind farms could inject AUD 2.5 billion to 3 billion into the regional economy, based on investments in infrastructure, local procurement, and workforce salaries.
- Once operational, offshore wind farms are estimated to contribute AUD 300 million to 500 million annually to the Illawarra economy through ongoing operations, maintenance, and local spending.

Regional GDP Impact

- Offshore wind developments could increase the Illawarra region's GDP by an estimated 1.5% to 2% annually over the next decade.
- Drawing parallels from similar projects in Europe, such as the UK's Dogger Bank Wind Farm, regions with significant offshore wind investments have experienced GDP growth of up to 2.5%.

02

Hydrogen Production and Clean Energy Storage:

In addition to offshore wind, the Port Kembla Hydrogen Hub and associated green hydrogen projects are set to boost the Illawarra region's economic landscape.

Hydrogen Hub Economic Benefits

- The development of hydrogen production facilities at Port Kembla is expected to attract $1 billion in investments over the next ten years.
- This initiative is projected to generate 2,000 direct and indirect jobs, particularly in high-skilled areas such as chemical engineering, plant operations, and logistics.
- Hydrogen exports could bring in $250 million to $400 million annually by 2030, as Australia positions itself as a key player in the global hydrogen market.

Community Battery and Storage Solutions

- Deployment of community batteries and microgrids could result in $200 million to $300 million in economic activity, with jobs focused on electrical engineering, installation, and maintenance.
- These initiatives are also expected to reduce energy costs for local communities, freeing up consumer spending and driving regional economic growth.

03

Electricity Generation from Solar:

Large and small scale opportunities

Solar panel adoption in the Illawarra continues to grow rapidly. As of December 2024, the region has approximately 25% of households with solar panels. The research conducted as part of this report indicated strong support for the region to continue to adopt household and business solar generation.

Additionally, opportunities were identified for regional businesses to manufacture and fabricate the structural steelwork required for large scale land based solar generation facilities.

The regional economic opportunities possible from small and large scale solar are materially less than the other clean energy opportunities identified in this report, but are quantified for completeness:

Skill Development and Workforce Transition

Training to upskill existing and train new workers for solar installation is required. The economic benefits of this training are captured in the broader economic and social benefits quantified below.

Economic benefits from household solar

- Reduction in electricity bills are estimated to save on average $1,500 of savings per household. These savings could, presumably, be circulated into the local economy resulting in gross annual economic benefits of approximately $71 million per annum.
- Job creation for solar installation by local contractors. The employment benefits of local solar installation are captured int eh broader employment benefits quantified below

04

Broader Economic and Social Benefits:

Beyond direct economic impacts, the growth of the clean energy sector in Illawarra will have broader social and environmental benefits.

Skill Development and Workforce Transition

- The establishment of training centres, such as the Clean Energy Futures Skills Centre, is expected to upskill **3,000 to 5,000 workers** over the next decade, ensuring a sustainable workforce transition from traditional industries to clean energy sectors.
- Investment in education and training will attract younger generations to STEM fields, boosting long-term employment rates and regional talent retention.

Infrastructure Upgrades and Regional Revitalisation

- Investment in grid connections, transmission lines, and port upgrades will have spillover effects, enhancing the region's attractiveness for other industries, including advanced manufacturing, logistics, and export services.
- The enhancement of infrastructure could increase property values and generate **$100 million to $200 million** in additional tax revenues for local governments.

Summary of Economic Impact Projections:

Category	Economic Impact
Offshore Wind Construction	$2.5 billion to $3 billion (initial investment)
Hydrogen Production & Exports	$1 billion (initial investment) + $250 million annually
Offshore Wind Operations	$300 million to $500 million annually
Community Batteries & Storage	$200 million to $300 million (initial investment)
Solar generation	$71 million per annum (gross benefits)
Total Job Creation	10,000 to 15,000 jobs (direct, indirect, and induced)
Regional GDP Growth	1.5% to 2% increase annually over the next decade
Tax Revenue Generation	$100 million to $200 million annually

Clean energy infrastructure and workforce development enablers

By strategically investing in clean energy infrastructure and workforce development, the Illawarra region can position itself as a leader in Australia's energy transition. This approach not only supports sustainable economic growth but also drives social and environmental benefits for local communities. For South Coast and Highlands industries to fully realise this potential, three key areas of support are needed for success:

01

Policy and regulatory support:

A robust policy framework is important to drive investment and ensure long-term project security. Policy measures should focus on incentivising renewable energy investments, ensuring local content requirements in energy projects, and providing certainty for investors. Regulatory clarity, especially in areas such as offshore wind, hydrogen, and energy storage, is critical for attracting investment and fostering growth in the clean energy sector. Government incentives, such as tax breaks and grants, are also necessary to reduce the risk profiles of new clean energy ventures and encourage innovation. A stable policy environment that aligns state and federal regulations will help mitigate investor concerns and accelerate project timelines. Supportive policies are essential to create a conducive environment for clean energy investments and ensure long-term project viability.

Key Policy Recommendations:

Long-term Clean Energy Targets:

Set clear and ambitious regional clean energy targets aligned with national net-zero goals to provide certainty for investors and project developers.

Renewable Energy Purchase Agreements (REPA):

Encourage the adoption of REPAs by local industries, enabling them to source a significant portion of their energy from renewable sources, thus driving demand for clean energy projects.

Carbon Pricing and Emissions Trading Schemes:

Advocate for the introduction of carbon pricing or emissions trading schemes to incentivise the transition away from fossil fuels and promote investments in low-carbon technologies.

Local Procurement Policies:

Implement policies that prioritize local suppliers and contractors for clean energy projects to maximize economic benefits for the Illawarra community.

Research and Development Incentives:

Increase funding for R&D in clean energy technologies through grants, tax credits, and partnerships with universities and industry.

02

Workforce development:

Developing a skilled workforce capable of managing and operating advanced clean energy technologies is essential for the region's transition. Collaboration between educational institutions, government bodies, and private industry will be crucial to upskilling the current workforce and training the next generation of workers in clean energy technologies. The roadmap calls for the establishment of educational programs and training centres that focus on renewable energy, advanced manufacturing, and hydrogen technologies. This roadmap aims to implement Australia's National Energy Workforce Strategy within the region. Illawarra's workforce has a strong foundation in heavy industry, which can be leveraged for the clean energy sector. However, retraining programs and skills development will be required to equip workers with the technical expertise needed for new roles in offshore wind, hydrogen production, and advanced manufacturing. The transition to a clean energy economy requires targeted workforce development initiatives to upskill existing workers and prepare new entrants for roles in emerging industries. The Illawarra region, with its established educational institutions such as the University of Wollongong (UOW) and TAFE Illawarra, is well-positioned to deliver specialised training programs in renewable energy technologies.

Key Policy Recommendations:

Clean Energy Futures Skills Centre:

The establishment of a skills centre dedicated to training in offshore wind, hydrogen, and battery technologies is crucial. This centre could train up to 1,000 new workers annually in critical areas like electrical engineering, fabrication, project management, and environmental services.

Super TAFE Facility:

Expanding the capabilities of the TAFE system to include certifications and apprenticeships in renewable energy technologies. Courses could cover fields such as marine engineering, subsea cabling, and offshore platform maintenance, aligning with industry needs.

STEM Education Initiatives:

Investing in STEM education for younger students is vital to ensure a future pipeline of skilled workers. Partnerships with local schools and community organizations can promote careers in clean energy.

02

The clean energy transition will create jobs across a range of skill levels, from entry-level positions to highly specialised technical roles. Below is an overview of the types of jobs expected to be in demand.

Tertiary Qualified Jobs:

- **Electrical Engineers:** Responsible for designing and maintaining electrical systems for offshore wind turbines, hydrogen electrolysers, and battery storage systems.
- **Marine and Environmental Engineers:** Specializing in offshore wind infrastructure, these roles focus on the sustainable design, deployment, and maintenance of marine-based energy systems.
- **Project Managers:** Overseeing the planning, execution, and commissioning of large-scale renewable projects, ensuring timelines and budgets are met.

Vocational Qualified Jobs:

- **Fabrication and Mechanical Trades:** Involved in manufacturing components for turbines, solar panels, and hydrogen storage systems.
- **Technicians:** Skilled in installing, operating, and maintaining energy storage systems like community batteries and electrolysers.
- **Vessel Operators and Maritime Support:** Required for offshore wind farm maintenance and logistics.

Key Support Jobs:

- **Construction Workers:** Supporting the installation of renewable energy infrastructure, particularly in offshore wind projects.
- **Logistics and Supply Chain Coordinators:** Managing the transportation of components and materials for project construction.
- **Administrative and Support Staff:** Providing necessary back-office support for project planning and execution.

Regional Support for Workforce Development:

To support the anticipated growth in clean energy jobs, the Illawarra region can leverage several strategic initiatives:

- **Public-Private Partnerships:** Collaboration between government, industry, and educational institutions to fund and develop targeted training programs. These partnerships can focus on filling skills gaps, particularly in offshore wind and hydrogen sectors.
- **Investment in Housing and Infrastructure:** Addressing housing shortages and improving transport infrastructure will be crucial to attract talent to the region. This includes affordable housing projects and enhanced road and rail connectivity.
- **Community Engagement:** Building social license through community co-design initiatives ensures that local populations are engaged and benefit from clean energy projects. This approach promotes inclusivity and enhances community support for new developments.

03

Supply chain solutions:

Energy storage is essential for ensuring grid stability and managing fluctuations in renewable energy generation. There is a need for large-scale battery installations, hydrogen storage solutions, and innovative gravity storage systems that can store energy for use during periods of low renewable generation. Additionally, the development of a robust supply chain including enabling infrastructure for renewable energy components is necessary to overcome potential bottlenecks and delays in project implementation. Local manufacturing capabilities, particularly in steel production and advanced manufacturing, offer an opportunity to produce key components for the clean energy industry. Developing these capabilities will reduce reliance on imported components and create jobs within the region.

To fully leverage the significant opportunities in the Illawarra region's clean energy sector, it is crucial to establish robust governance structures, develop necessary infrastructure, and implement strategic financing mechanisms. These enablers will provide the foundation for successful project development, attract investment, and ensure community and industry stakeholders are aligned in their efforts to drive the region's clean energy transition.

Key Policy Recommendations:

Infrastructure Development:

Developing the right infrastructure is crucial to support the Illawarra region's transition into a clean energy hub. This includes upgrading existing assets, creating new facilities, and ensuring integration with the national energy grid.

Key Infrastructure Recommendations:

Grid Connection Points and Transmission Lines:

Invest in expanding grid infrastructure to connect offshore wind farms, hydrogen production facilities, and community batteries to the national electricity grid. Priority should be given to establishing new grid connection points in the Illawarra REZ to support offshore wind and green hydrogen projects.

Port and Logistics Infrastructure:

Upgrade Port Kembla to accommodate large-scale offshore wind installations, hydrogen export, and green steel manufacturing. This includes improving OSOM (Over Size Over Mass) transport routes for wind turbine components and investing in specialized maritime facilities for maintenance and decommissioning.

Hydrogen Refuelling Stations:

Develop a network of hydrogen refuelling stations to support the region's transition to low-carbon transport, particularly for heavy vehicles and public transport systems.

Energy Storage Facilities:

Support the rollout of community batteries, gravity storage solutions, and green hydrogen storage to enhance grid stability and maximize the use of locally generated renewable energy. These initiatives will reduce reliance on fossil fuel-based power during peak demand periods.

Super TAFE and Clean Energy Skill Centres:

Invest in developing world-class education and training facilities, focusing on offshore wind, hydrogen technologies, and renewable energy integration. Expanding the capabilities of TAFE and UOW to offer specialized courses will ensure a pipeline of skilled workers.

Financing Mechanisms:

Access to capital and effective financing models are essential to attract investment in large-scale clean energy projects. The Illawarra region can benefit from a mix of public and private financing to unlock its potential as a clean energy leader.

Key Financing Recommendations:

Green Bonds and Public-Private Partnerships (PPPs):

Establish green bonds and PPPs to fund critical infrastructure projects, such as offshore wind farms, hydrogen production facilities, and grid upgrades. Green bonds can attract sustainable finance from institutional investors focused on ESG (Environmental, Social, Governance) criteria.

Clean Energy Investment Fund:

Offer tax incentives and grants for companies that establish manufacturing operations in the region, particularly those focused on producing components for wind turbines, electrolysers, and battery systems. This can boost job creation and enhance local supply chains.

Benefit-Sharing Agreements:

Structure financing models that include benefit-sharing clauses, where a percentage of revenue from projects is allocated to local community development funds. These funds can be used for social programs, skills training, and infrastructure improvements.

Government Subsidies for Early-Stage Technologies:

Provide subsidies and rebates for early-stage technologies, such as electrolyser manufacturing, gravitational energy storage, and offshore wind maintenance. These subsidies can reduce the financial risks for new entrants and attract international firms to the Illawarra.

Governance Mechanisms:

Effective governance is vital to streamline project approvals, coordinate efforts across different government levels, and engage with stakeholders, ensuring that clean energy initiatives align with local priorities.

Key Governance Recommendations:

Local Content Rules:

Implement regulations that require a minimum percentage of local content for renewable energy projects. This approach will ensure that local businesses and suppliers benefit directly from investments in the sector. For example, offshore wind projects can include requirements for local fabrication, assembly, and maintenance.

Benefit Sharing Agreements with Developers:

Establish agreements with developers that ensure a portion of the profits or benefits from projects is reinvested into the local community. This can include funding for community programs, training initiatives, and infrastructure development.

Streamlined Approvals Process:

Consider creating a centralised “Clean Energy Development Office” in the Illawarra to fast-track approvals for clean energy projects, reducing bureaucratic delays. This office can coordinate with state and federal agencies to streamline processes for permits, environmental assessments, and grid connections

First Nations Co-Design Engagement:

Engage with Indigenous communities through co-designed strategies that respect traditional knowledge and provide opportunities for direct participation in projects. Establishing a clear and transparent process for Indigenous consultation will support the social license for clean energy projects.

Regional Clean Energy Task Force:

Form a task force comprising representatives from government, industry, educational institutions, and community groups to oversee the implementation of the Illawarra Clean Energy Roadmap. This body can help align strategic initiatives, monitor progress, and adapt plans as needed.

06

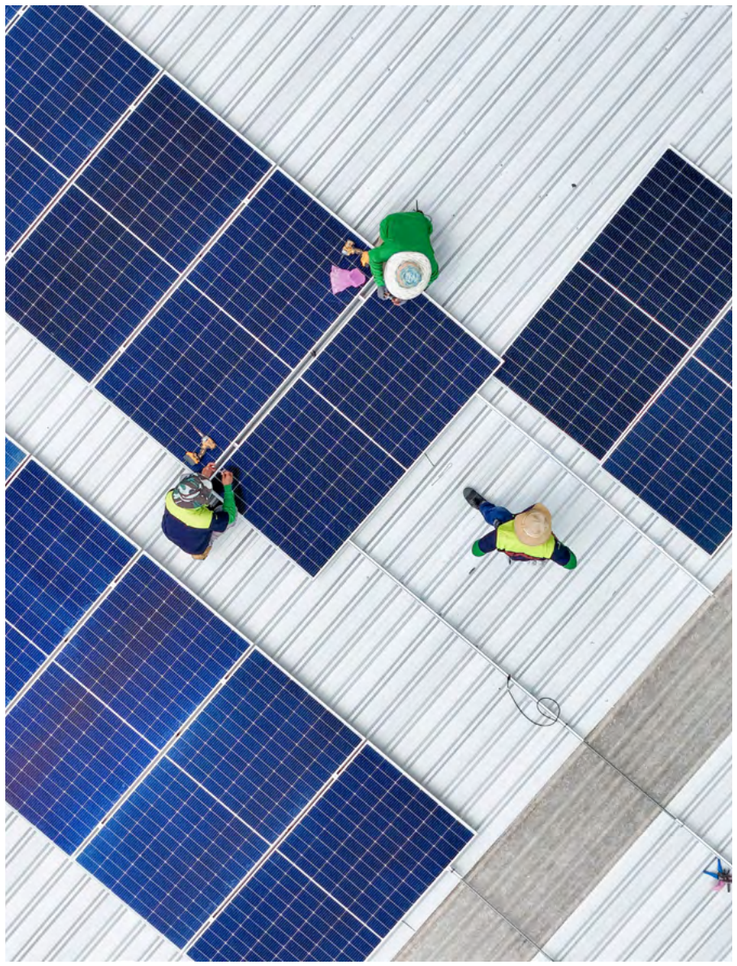
Challenges and Proposed Solution

Challenges facing the transition

The clean energy transition presents significant challenges in terms of supply chain, skills and policy uncertainty.

These challenges are impediments to the clean energy transition, hindering progress, and reducing the potential impact of this crucial initiative in the region. The identified challenges highlight the critical areas that must be addressed to achieve the region's clean energy goals.

Technicians inspecting solar panels on rooftop



Barriers	Details
Supply Chain	Bottlenecks in global critical component and equipment supply chains for clean energy transition.
Skills	Shortages in specific/specialised skills or talent (e.g., electrical engineering, WH&S and other skilled workers).
Demand	Uncertainty in demand due to a lack of an approved project pipeline (e.g., offshore wind projects). This stalls investment in critical infrastructure.
Cost of living	High cost of living in Australia/Illawarra (i.e., unaffordable and unattractive). Attracting international talent becomes increasingly difficult.
Housing	Housing and accommodation shortages.
Government	Red tape, lack of alignment and coordination between local, state and federal government.
Commercial land	Commercial lands are too expensive.
Supply Chain Infrastructure	Lack of electricity network infrastructure to support electrification and decarbonisation (e.g. electric vehicle and hydrogen recharging infrastructure). Lack of transmission and distribution network capacity.
Social licence	Inadequate early education and empowerment initiatives, leading to slower community acceptance of renewable energy projects.
Lack of awareness	Lack of Federal Hydrogen Hub coverage in the region.
First Nations	A clear, co-designed First Nations engagement strategy is lacking that is respective of key knowledge holders from the Illawarra.
Policy uncertainty	Uncertainty surrounding state and federal policies related to clean energy presents risks for investors and project developers.
End of life considerations	De-commissioning and end-of-life demands currently not considered as part of the planning and roll-out process.

By understanding these challenges, the region can develop targeted strategies to overcome them, thereby ensuring a more successful and impactful transition.

Recommendations

Drawing from the challenges identified in the previous section, these recommendations are specifically designed to address and overcome the challenges to implementing the vision and roadmap for the Illawarra Shoalhaven region.

It establishes a roadmap for clean energy transition regarding supply chain, workforce and policy development over time. Local content is of critical importance for regional clean energy transition and it requires strong government and local business support.

Each recommendation is crafted with the intent to mitigate the obstacles that currently impede the region's clean energy transition. By directly targeting these challenges, the recommendations aim to facilitate a more seamless and accelerated shift to clean energy, ensuring that the Illawarra region can fully realise its potential and position itself as a leader in the clean energy sector.

This section provides a comprehensive overview of the five-stage approach highlighted in Figure 8 and complements it with more detailed descriptions and recommendations.

STAGE 1

Policy Development and Community Engagement

Description

Establishing clear policies and securing community buy-in are essential for advancing the region's clean energy ambitions. This includes engaging local stakeholders, fostering partnerships between government, industry, and community organisations, and ensuring that projects address the needs and concerns of the local population.

Recommendations

- Promote social license — achieving community buy-in through a collaborative co-design process.
- Develop a robust local content policy by incorporating international best practices.
- Align regional, state, and federal governments to attract industry by developing a cohesive cluster strategy — create industry cluster development.

STAGE 2

Supply Chain Infrastructure and Skill Development

Description

The establishment of port infrastructure is necessary to realise the significant growth in the renewable energy sector locally and in the Hunter and Gippsland regions. The Gippsland offshore wind zone will likely be developed ahead of projects in the Hunter and Illawarra zones. While several ports may be developed over time to support offshore wind project developments, Port Kembla, with its existing planning approval for outer harbour development (requiring only minor modification), is well-positioned to be the first port with facilities available to fully support the construction of offshore wind projects. Port Kembla can be developed sooner than alternative East Coast ports to support the advance.

Other enabling infrastructure projects are road infrastructure for OSOM transport, housing, grid, hydrogen refuelling networks, rail networks and education precincts.

Leverage and expand existing vocational and tertiary skills and education capabilities through educational precinct development to enable workforce development and workforce transition.

Recommendations

- Government to support the development of Port Kembla as the first port on the East Coast to provide facilities enabling offshore wind project construction.
- Enhance road infrastructure access for over-sized cargo between the Illawarra and other regions.
- Develop policies and incentives that attract complementary clean energy businesses to the Illawarra including housing.
- REZ – Asset/Transmission Corridors: The NSW Government, through EnergyCo, should expedite progress to unlock and accelerate the development of Renewable Energy Zones (REZ).
- Promote green financing (i.e., government to attract investment).
- Accelerate establishment of the UOW/TAFE Energy Futures Skills Centre
- Accelerate establishment of the enhanced TAFE facility located within the BlueScope redevelopment
- Invest in workforce transition training programs for existing workers in traditional industries
- Invest in STEM education programs for school students to build a pipeline of STEM capable and engaged young people.

STAGE 3A

Offshore Wind Enabler and Green Circular Steel Hub for the Wind Industry

Description

The enabling infrastructure allows for the establishment of an offshore wind industry.

The Illawarra is a critical hub for offshore wind floating platform manufacturing and tower assembly. The Illawarra's positioning to port, road, rail, and airport infrastructure offers the opportunity to activate assembly and end-of-life treatment.

Decommissioning and recycling work should also include onshore windfarms. The geographical reach for the decommissioning work can be extended to Southeast Asia to meet scrap metal demands. The Port Kembla Steelworks provides the opportunity to establish an 'Illawarra Green Circular Steel Hub' around the wind industry powered by green hydrogen beyond 2030.

This offers opportunity to use existing and rehabilitated industrial sites in and around the Port Kembla area such as the BlueScope Master Plan to develop 200 Hectares (Ha) of non-steelmaking, excess landholdings adjacent to the Port Kembla Steelworks to host energy infrastructure whilst leveraging the regions highly skilled workforce and experience in manufacturing.

Recommendations

- Immediate initiation of decommissioning efforts — establish a centre for circularity.

STAGE 3B

Diversification of Economy Including Blue Economy Exploitation

Description

The port and the offshore wind industry enable the Illawarra to diversify its economy through mixed-use of spatial marine zoning. Aquaculture industries can be co-located with the offshore wind parks. It presents an opportunity to strengthen the economic self-determination of Aboriginal communities. The aquaculture industry would require post-harvest processing facilities and a more diverse skill set strengthening economic resilience. Connectivity to export markets by air via the Western Sydney Airport and the Maldon to Dombarton rail link are critical for the industry to take off.

Recommendations

- First Nations communities are both critical stakeholders and essential members of the workforce. To unlock their potential, it is vital to invest in capacity and capability development, with a particular emphasis on ocean-based opportunities.

STAGE 4

Service Provision to Offshore Activities

Description

Both the offshore wind industry and the aquaculture industry require marine-based maintenance and service provision. The Illawarra is ideally located as a maintenance hub for the offshore wind industry with land available to host warehouses for spare parts. The service provision includes engineering consultancy, education, skill development, R&D, divers, logistics, vessel maintenance to name a few.

Recommendations

- Promote advanced training and skills development to prepare for future needs.
- Encourage/ increase spinouts by investing in R&D within tertiary education and streamlining the process.
- Establish a R&D Centre of Excellence for Clean Energy Storage (Gravity, Hydrogen, Ammonia, and others).

STAGE 5

Green Advanced Manufacturing and Clean Energy Hub

Description

Illawarra and Shoalhaven region is designated as Australia's future hub for sustainable industries in green steel and hydrogen/ ammonia production. The region boasts proximity to major ports and transport infrastructure, positioning it ideally for export of hydrogen/ammonia to international markets which is further enabled by the second rail link connected to the Western Sydney cargo corridor, including inland ports. This will enable the Illawarra/ Shoalhaven region to become a critical logistical node in Australia's distribution network that simultaneously unlocks the commercial potential of the NSW South Coast.

Recommendations

- Increase incentives to retain and attract relevant clean energy technology providers that supports the Illawarra in becoming a leading destination for clean energy.
- Establish policies that will attract high-skilled individuals through migration of global talent into the Illawarra region.

Illawarra Clean Energy Industry Roadmap 2025 Report

Executive Summary

BUSINESS ILLAWARRA