



Department of  
Jobs, Tourism, Science  
and Innovation

# The Western Trade Coast A Western Australian Global Advanced Industries Hub





# Partners



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We drive economic and employment growth, demonstrate innovation and champion sustainability as we shape our State's future.

Our diversified portfolio has the scale, scope and strength to work towards zero carbon communities and deliver better social and economic outcomes for all.

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*As part of the RCSA ACIL Allen observed and measured the economy of the Western Trade Coast. Confidential operational data, received at varying levels of depth from 19 tenants operating within the Western Trade Coast, was critical but insufficient to reflect the full scope of the economic activities of the region. To address the gaps in information ACIL Allen made use of a combination of publicly available data and a series of informed assumptions developed utilising in-house economic modelling tools. These data sets were predominately used to characterise the local spending, profits and taxes, and indirect employment which is required to support the industries within the Western Trade Coast. Information sources used to determine the industrial synergies in this report and the interactive online tool include tenants, Kwinana Industries Council (KIC) and Government agencies.*

## ACIL ALLEN

ACIL Allen is a leading independent economics, policy and strategy advisory firm, dedicated to helping clients solve complex issues.

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Our vision is to be Australia's most trusted economics, policy and strategy advisory firm. We are committed and passionate about providing rigorous independent advice that contributes to a better world.

## WESTPORT

Westport is the WA Government's long-term initiative to plan for a new container terminal in the Kwinana Outer Harbour, as well as the road and rail networks servicing the terminal. Our vision is for a world-class container port and trade network, built with nature in mind, that unlocks Western Australia's future economic prosperity.

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### Acknowledgment of Country

The Department of Jobs, Tourism, Science and Innovation acknowledges the Traditional Custodians throughout Western Australia and their continuing connection to the land, waters and community. We pay our respects to all members of Aboriginal and Torres Strait Islander communities and their cultures, and to Elders past, present, and emerging.

Image source: Tianqi Lithium

Photo credit: Gary Peters



## Minister's forward

The Western Trade Coast is a major industrial precinct located in Perth, Western Australia. Covering 3,900 hectares, the region is home to a range of strategic and advanced industries, including future facing minerals processing, chemical manufacturing, and energy generation, as well as advanced fabrication, manufacturing, defence and shipbuilding capabilities in the Australian Marine Complex.

The Western Australian Government is committed to positioning the Western Trade Coast as a Global Advanced Industries Hub, and an investment and trade destination for new and emerging industries. This vision will be realised as the State facilitates transformational projects in renewable hydrogen, future facing minerals processing, and shipbuilding and sustainment, as well as the potential establishment of Western Australia's new container port at Kwinana.

In support of this vision, the Western Australian Government established a Ministerial Taskforce to oversee the development of an economic framework for the region with a focus on industry development and attraction, land and infrastructure, and skills and workforce development.

This study is a current state assessment of the Western Trade Coast, providing a contemporary profile of industry and the critical success factors that have supported the long-term growth and development of this nationally significant industrial precinct. The study highlights the enormous contribution that industries operating in the Western Trade Coast collectively make to the wealth of the State and its citizens, and the critical link of industry in global supply chains operating within Western Australia, and across the globe.

Importantly, this study also highlights the opportunities for further economic development, diversification and decarbonisation of the Western Trade Coast, and its transformation into a Global Advanced Industries Hub.

### Roger Cook MLA

Deputy Premier

Minister for State Development, Jobs and Trade; Hydrogen Industry; Tourism; Science



## The Western Trade Coast: Home to the global leaders in industry processing and manufacturing

The Western Trade Coast is Western Australia's premier strategic industrial area located within the Perth Metropolitan Area. The precinct was established in the middle of the last century, providing the catalyst for the development of BP's Kwinana oil refinery and Cockburn Cement's cement and lime plant in 1955.

Since that time, a number of global leaders in industry processing and manufacturing have set up operations in the Western Trade Coast, building strong industrial synergies with other operations that has become a unique feature of the precinct compared to other industrial precincts around the world. The Western Trade Coast continues to attract global interest, reflecting the provision of essential infrastructure, the availability of industrial land that is within an industrial buffer and supportive environmental regulations, and the region's proximity to a skilled and available workforce.

### A strategic heavy industrial area within the Perth Metropolitan Area

The Western Trade Coast is a major industrial precinct in Perth's south metropolitan area. Covering 3,900 hectares between Munster and Rockingham, the Western Trade Coast includes the Australian Marine, Kwinana Industrial Area, Rockingham Industry Zone and Latitude 32.

- » The **Kwinana Industrial Area** services traditional heavy industrial activities including petroleum and mineral refineries, power stations, chemical plants, cement works, and a range of supporting industries. It also supports general industrial activities including fabrication, construction, engineering and maintenance service providers.
- » The **Rockingham Industry Zone** services heavy industrial activities such as chemical, fertiliser and bitumen manufacturing, fuel and grain terminals, and mineral refineries, as well as general industrial land for transport, logistics and freight activities. In its inception, it acted as an overflow to the Kwinana Industrial Area.

- » The **Australian Marine Complex** services the defence, resources and marine industries. The Australian Marine Complex supports both heavy and general industrial activities in shipbuilding, manufacturing, fabrication and general engineering. The Australian Marine Complex is split over five precincts: shipbuilding, fabrication, support, technology and recreational boating.
- » The **Latitude 32 Industry Zone** has been established to provide a flexible and adaptable industrial area to support the development in the Kwinana Industrial Area, Rockingham Industry Zone and Australian Marine Complex precincts. The industrial land in Latitude 32 will supply more than 1,400 hectares of land, which by itself will make it one of the largest industrial zones in Australia.

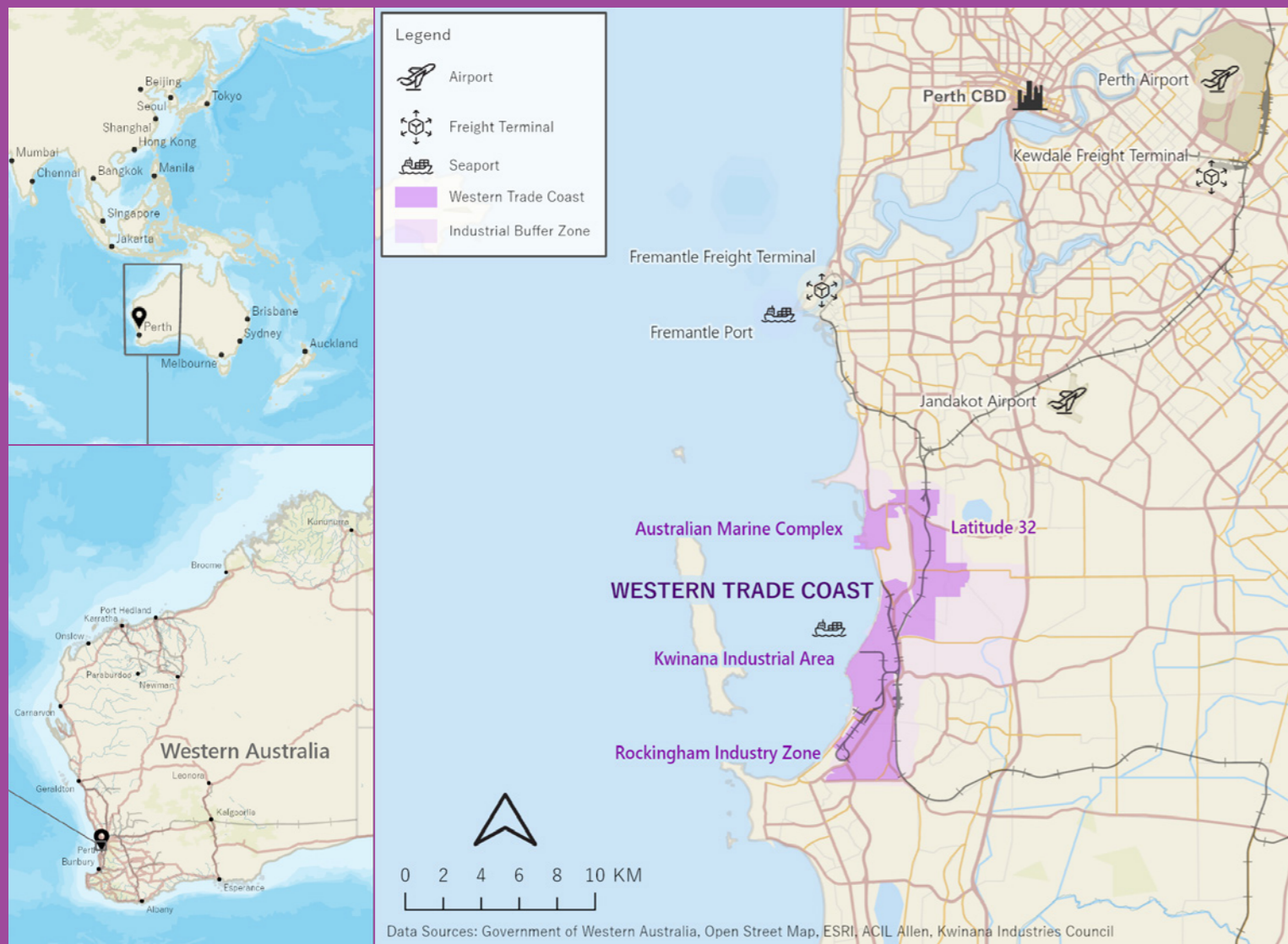


The evolution of the Western Trade Coast into a major industrial precinct and a significant driver of economic activity in Western Australia, reflects the early planning in establishing a heavy industrial precinct in Kwinana. Chief amongst the early planning decisions was the development of an industrial buffer, which exists to the north, east and south of the Western Trade Coast, and has been essential in reducing the risk of conflicting land use within the southern Perth Metropolitan Area region generally. The industrial buffer, along with a stable set

of environmental regulations, contribute to regulatory certainty for a number of anchor tenants in the precinct to establish themselves in the precinct, the establishment of a range of supporting industries, and the development of key industrial synergies between tenants.

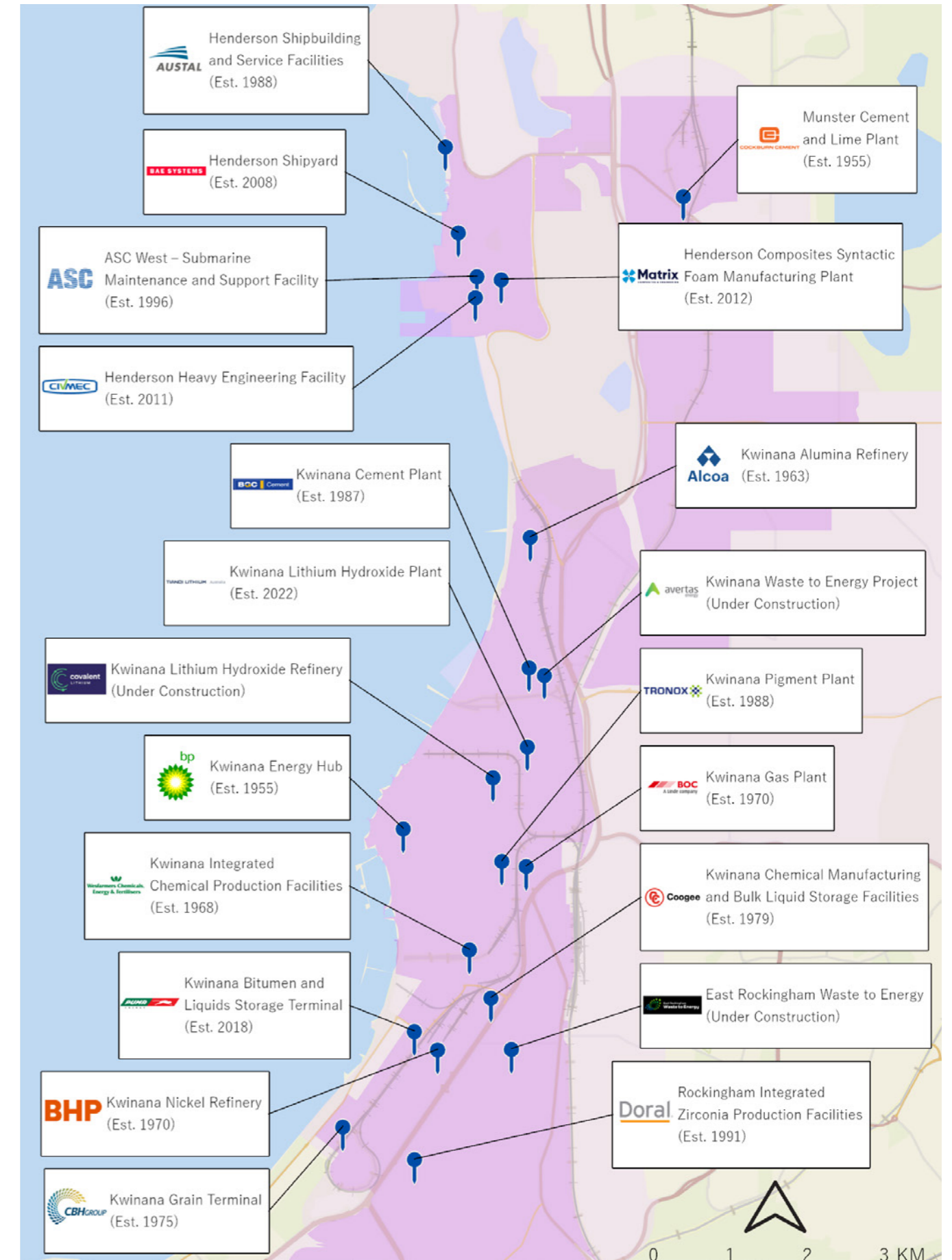
The organisations operating in the Western Trade Coast are global leaders in industry processing and manufacturing. A brief summary of the key organisations operating in the Western Trade Coast is provided in **Figure 1.2**

**Figure 1.1 The Western Trade Coast**



Source: ACIL Allen, AECOM

**Figure 1.2 The Western Trade Coast – Key Operations**









## Industry profile of the Western Trade Coast

The Western Trade Coast is home to some of the global leaders in industrial processing and manufacturing. These global companies have established operations in the Western Trade Coast over several decades, producing a wide range of high value products to markets in Australia and around the world. A brief profile of the key tenants with significant operations in the Western Trade Coast is presented below.

Table 1.1 Major tenants on the Western Trade Coast

Tenant	Description
<b>Kwinana Energy Hub (Est. 1955)</b>	
	BP's Kwinana refinery was established in 1955 and operated as a fuel refinery until early 2021. The Kwinana refinery was the foundation industrial project in the Kwinana Industrial Area and occupies an area of 250 hectares. In October 2020, BP announced it would cease fuel production at the Kwinana Refinery, due to regional oversupply and sustained low refining margins, and convert the refinery to an import terminal. In addition to the import terminal, BP is exploring future options for the site including an energy hub for renewable fuel and green hydrogen production.
<b>Munster Cement and Lime Plant (Est. 1955)</b>	
	The construction of the Munster plant commenced in 1953 and manufacturing commenced in August 1955. Cockburn Cement is consolidating its two existing cement production sites into a single facility at Kwinana. The project is expected to increase annual production capacity by 35 per cent to 1.5 million tonnes per annum. Cockburn Cement supply the mining, agriculture and construction industries, and in particular are a major supplier of lime for alumina, gold and mineral sands processing operations.
<b>Kwinana Alumina Refinery (Est. 1963)</b>	
	The Kwinana Alumina Refinery has an annual nameplate production capacity of 2.2 million metric tonnes and produces non-metallurgical alumina (15 per cent of production) and smelter-grade alumina (85 per cent of production). The Kwinana Alumina Refinery is one of Alcoa's three alumina refineries located in Western Australia, alongside Pinjarra and Wagerup. The refinery receives its bauxite ore from the Huntly Bauxite Mine located in the Darling Range south of Perth. Bauxite is transferred via the Kwinana freight railway system, using the Kwinana-Mundijong line. Approximately 95 per cent of the refinery's total alumina production is exported to overseas markets.
<b>Kwinana Gas Plant (Est. 1970)</b>	
	BOC is one of two distributors of carbon dioxide in Western Australia, alongside Air Liquide who also have operations located on the Western Trade Coast. BOC receive carbon dioxide from CSBP who produce it as a by-product when making fertiliser at the Kwinana ammonia plant. Carbon dioxide is distributed by BOC to a major industrial tenant on the Western Trade Coast. Carbon dioxide has a wide range of uses, including in brewing, medical procedures, fire extinguishers and desalination plants. BOC are also a supplier of liquid nitrogen and nitrogen gas to various major industrial tenants located on the Western Trade Coast.

Tenant	Description
<b>Kwinana Integrated Chemical Production Facilities (Est. 1968)</b>	
	CSBP Chemicals, CSBP Fertilisers, EVOL LNG, Kleenheat, Australian Gold Reagents and Covalent Lithium have operations on the Western Trade Coast. CSBP Chemicals manufactures and supplies ammonia, AN and industrial chemicals. CSBP Fertilisers manufactures, imports and distributes nitrogen, phosphate and potassium-based fertilisers. EVOL LNG distributes bulk LNG primarily to the remote power generation market. Kleenheat extracts LPG from natural gas and distributes bulk and bottled LPG to the residential and commercial markets in Western Australia and the Northern Territory. It is also a retailer of natural gas to residential and commercial markets, and electricity to businesses in Western Australia. Australian Gold Reagents manufactures and supplies sodium cyanide to the Western Australian and international gold mining sectors. Covalent Lithium is progressing the Mt Holland lithium project, which includes the construction of a lithium hydroxide refinery in Kwinana.
<b>Kwinana Nickel Refinery (Est. 1970)</b>	
	Nickel West Kwinana refines granulated nickel matte from the Kalgoorlie Nickel Smelter into premium-grade nickel powder and briquettes containing 99.8 per cent nickel. Nickel powder is further processed at the nickel sulphate plant, co-located at the Kwinana Nickel Refinery and the first nickel sulphate plant in Australia. The nickel sulphate plant is expected to produce approximately 100 kilotonnes per annum of nickel sulphate for the lithium-ion battery industry. The Kwinana Refinery also produces intermediate products including copper sulphide, cobalt-nickel-sulphide and ammonium-sulphate.
<b>Kwinana Grain Terminal (Est. 1975)</b>	
	The Kwinana Grain Terminal is one of CBH's four export terminals in Western Australia, along with Albany, Esperance and Geraldton. The facility has a total storage capacity of 1,001,942 tonnes and consists of a 752m shipping transfer gallery, 74m-high working house, 72 conveyor belts, four shipping conveyors, 18km of dust-control ductwork, 14 elevators, 144 key storage cells, 104 star cells, two horizontal storage units and four bulkheads. Grain is accumulated at receipt points and transported in bulk to the Kwinana Grain Terminal, primarily by rail.
<b>Kwinana Chemical Manufacturing and Bulk Liquid Storage Facilities (Est. 1979)</b>	
	Operations on the Western Trade Coast consist of various sites including Kwinana Chlor Alkali, Kwinana Manufacturing Facility, Kwinana Terminal, Kwinana Dangerous Good Storage Facility, Kwinana Titanium and an administration office. A Sodium Cyanide plant located at CSBP's complex in Kwinana is a joint venture between Coogee (25 per cent) and CSBP (75 per cent). It is managed by Australian Gold Reagents.  Coogee produces a range of chemical products including aluminium sulphate (liquid and solid), alumina (calcined), alumina (hydrated), caustic soda, chlorine, ferric sulphate, hydrochloric acid, sodium silicate, sodium aluminate, sodium hydrochlorite, sulphur (pastille), sulphur (molten), sulphuric acid, titanium alloy powder and xanthates.



Tenant	Description
<b>Kwinana Cement Plant (Est. 1987)</b>	
	BGC Cement are located in Naval Base and supply bulk cement and slag for construction, mining, manufacturing, and civil and road stabilisation. BGC Cement are also a supplier of bulk quicklime and hydrated lime. Cement products span from General Purpose, General Blend, High Early Strength, Low Heat, Sulphate Resistant, and blended cements. The cement products provided by BGC Cement are suitable for a wide range of applications including cemented aggregate fill, cemented paste fill, shotcrete, general pre-mixed concrete applications, concrete precast products manufacture, controlled low-strength material, road stabilization and culvert backfill purposes. The BGC Cement Naval Base site has a production capacity of 1.2 million tonnes per annum.
<b>Kwinana Pigment Plant (Est. 1988)</b>	
	Tronox operate the Kwinana Pigment Plant which has a production capacity of 150,000 metric tonnes per year, which makes it Tronox's fourth largest pigment production facility. Titanium dioxide is a white pigment with excellent brightness and high opacity. Its reflective properties add richness and brightness to colours, and it provides UV protection. It is used in paints (replacing the use of lead), lacquers, paper, plastics, ink, rubber, textiles, cosmetics, sunscreens, leather, food colouring, and ceramics.
<b>Henderson Shipbuilding and Service Facilities (Est. 1988)</b>	
	Austal were initially focused on servicing the international high-speed aluminium ferry market. Austal has been the sole supplier of border control capability to the Commonwealth through the delivery of vessels for the Royal Australian Navy and Australian Border Force. In 2021-22, Austal delivered four Guardian-class Patrol Boats to the Commonwealth of Australia. As at 30 June 2022, Austal had delivered 15 of the 21 Guardian-class Patrol Boats contracted, to be gifted by the Australian Government to 12 Pacific Island nations and Timor-Leste under the Pacific Maritime Security Program. In February 2023, Austal delivered the fourth of eight Evolved Cape-class Patrol Boats to the Royal Australian Navy.
<b>Rockingham Integrated Zirconia Production Facilities (Est. 1991)</b>	
	The Rockingham site is an integrated zirconia producer with downstream processing operations, transforming zircon sand to high value zirconia products utilised in ceramics, colours and industrial refractories. Fused zirconia minerals are generated in electric arc furnaces by heating high purity raw materials to their fusion point. Once the fused products are cooled, they are crushed, milled, sized and packaged according to customer requirements.
<b>ASC West – Submarine Maintenance and Support Facility (Est. 1996)</b>	
	ASC commenced operations at Henderson in 1996. Prior to this, ASC had commenced providing services to the RAN's Submarine School at HMAS Stirling in 1992. There is a dedicated transfer path from the floating dock to the ASC facility. Mid and short-term maintenance work, as well as upgrades, on the Collins Class submarines are undertaken at the Henderson site.

Tenant	Description
<b>Henderson Shipyard (Est. 2008)</b>	
	At the Henderson site, BAE Systems offer high-quality local fabrication and maritime services to both commercial vessel and resource sectors, as well as design, construction and delivery of small to medium paramilitary and patrol vessels. The Henderson site is able to provide complete design and construction services for new vessels as well as the refit, conversion and repair of existing vessels. Facilities at the Henderson site include a Roll on/Roll off wharf, 8,065 tonne Syncro-lift, fabrication and construction halls, mechanical, pipe-spooling, welding and electrical workshops, five vessel repair dry berths, wharfage and outdoor lay down areas, cranes, warehousing and engineering design services. The ship lift can lift vessels up to 150 metres in length and 24.5 metres beam, and is connected to a turntable and rail system.
<b>Henderson Heavy Engineering Facility (Est. 2011)</b>	
	Civmec acquired leases to land at the Australian Marine Complex in 2009, with the new fabrication hall officially opened in 2011. The assembly hall stands 70 metres high and has 53,000 sqm of usable floor space. It contains 20 overhead cranes and can accommodate modules up to 187 metres in length. The fabrication hall has 29,300 sqm of usable undercover area and can produce up to 80,000 tonnes of steel per annum. The site also contains two dedicated surface treatment (blast and paint) facilities and two exotic metals facilities supporting the specialised welding of exotic materials such as titanium, stainless steel, duplex steel and copper alloys.
<b>Henderson Composites Syntactic Foam Manufacturing Plant (Est. 2012)</b>	
	The head office for Matrix Composites & Engineering opened in 2012 and is located in Henderson. It is Australia's largest composite manufacturing facility with capabilities in epoxies, polyurethanes, and a wide range of engineering thermoplastics. The Henderson site also has the largest hyperbaric test facility in the Southern Hemisphere. Matrix have identified key growth drivers for the business include Core Traditional Subsea, Emerging Corrosion Technologies and Emerging Advanced Materials, including high-tech composite material solutions for renewables / defence / resources.
<b>Kwinana Bitumen and Liquids Storage Terminal (Est. 2018)</b>	
	Construction of the Kwinana Bitumen Terminal was completed in 2018. The terminal stores and supplies multiple grades of bitumen for the road construction and maintenance industry across Western Australia. In 2020-21, Puma Energy Bitumen upgraded the existing infrastructure at the Kwinana Bitumen Terminal facility to enable mixing of bitumen at the site. These works included repurposing of the existing storage tanks to allow for in-tank mixing of different grades of bitumen and installation of new mixing units to produced modified bitumen products. Puma Energy sold its fuel terminal at Kwinana to Impala Terminals Group in 2022.
<b>Kwinana Lithium Hydroxide Plant (Est. 2022)</b>	
	Commercial production of Train 1 was declared in November 2022, with ramp-up to nameplate capacity expected over 2023. The facility has a second production train that is currently under construction which is likely to be commissioned in 2024. The two production trains will have a combined nameplate capacity of 48,000 tonnes per annum of premium battery-grade lithium hydroxide. Train 1 production is fully committed under offtake agreements with leading cathode and battery manufacturers.



# The critical success factors supporting industry development

The Western Trade Coast possesses the critical success factors that industry needs to operate successfully longer term. These success factors include established infrastructure that provides efficient pathways to market and access to the critical energy and water requirements of industry; the availability of buffered industrial land and supportive environmental regulations, and the proximity to a skilled and available workforce. These success factors, combined with the unique ecosystem of industry relationships which provide a source of supply for key inputs, products and by-products, has made the Western Trade Coast one of the most desirable heavy industrial precincts globally.

The Western Australian Government is focused on ensuring that the competitive advantage of industries operating in the Western Trade Coast is maintained longer term. Established industries are looking to expand their operations, and there are transformational opportunities that will be central to the Government's economic development, diversification and decarbonisation agenda. The Government will play a central role in the realisation of these opportunities through investment in critical infrastructure upgrades and expansions; ensuring the policy and regulatory settings are supportive of industry development, and that there is an overarching strategy and plan to inform industry and guide decision making of government and industry.

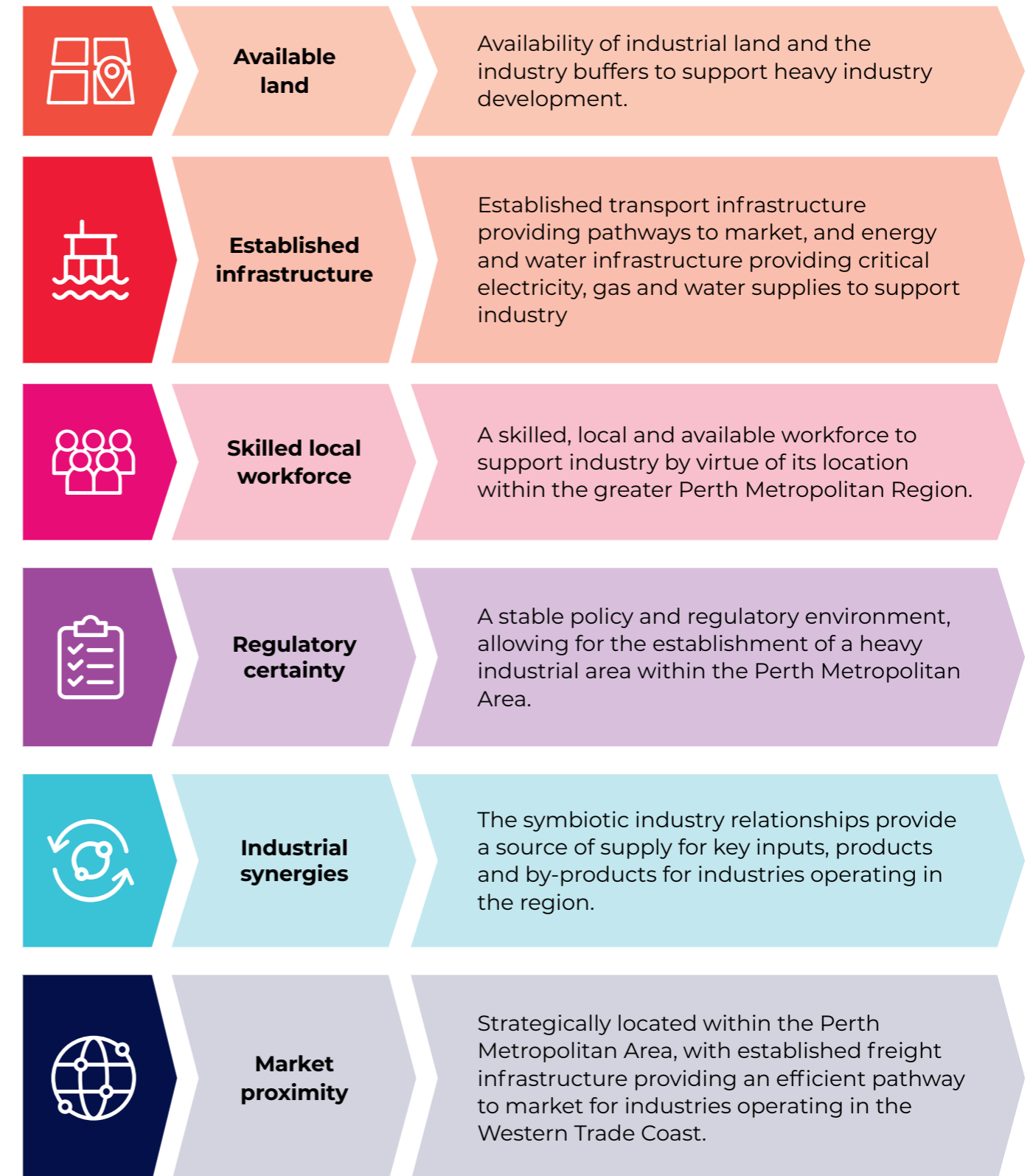
“The presence of all of these critical success factors in the Western Trade Coast provides a unique source of competitive advantage for our business and for industry more broadly. This is why industry is continually investing in the region.”

*Source: Established industry stakeholder operating in the Western Trade Coast*



Image source: BP

Figure 1.3 Critical success factors supporting industrial development in the Western Trade Coast





## Available land

Image source: Tianqi Lithium  
Image credit: Gary Peters

Availability of industrial land and the industry buffers to support heavy industry development.

Ensuring the supply of strategically located and well-serviced industrial land is critical to supporting the industries that drive economic prosperity. In recognition of this, the Western Australian Government has established Strategic Industrial Areas (SIAs) throughout the State, providing large, connected land areas which are close to a skilled and productive workforce.

Importantly, SIAs benefit from the Western Australian Government Lead Agency Framework, which has been designed to ensure proponents can be guided effectively through approvals processes and know what is expected of them in order to bring complex business operations, new technologies, innovations and progressive operations to life.

The Western Trade Coast includes both the Kwinana Industrial Area and Rockingham Industry Zone, both of which are designated SIAs, with the Australian Marine Complex established as Western Australia's key shipbuilding and sustainment industrial precinct.

With the demand for large parcels of industrial land in the Kwinana Industrial Area, Rockingham Industry Zone and the Australian Marine Complex precincts exceeding the supply of remaining undeveloped land, the Western Australian Government, through its land development agency, DevelopmentWA, is developing the Latitude 32 precinct to provide a flexible and adaptable industrial area that supports economic and employment growth in the Western Trade Coast. Latitude 32 has been planned to

complement these estates, providing more than 1,400 hectares of land, which by itself will make it one of the largest industrial zones in Australia.

To further support industrial development in the Western Trade Coast, the region is also protected from potential land use conflicts through the establishment of an industrial buffer that surrounds the precinct. With the risk of urban encroachment on the core of the heavy industrial zone of the Western Trade Coast reduced by the presence of an industrial buffer, this has helped to progressively expand the region's industrial base – from the establishment of chemicals industries from the 1950s, minerals processing from the 1960s, and shipbuilding from the 1980s. With the next wave of industrial development beginning, the Western Trade Coast is set to realise the Western Australian Government's vision for it to become a Global Advanced Industries Hub (GAIH) as it helps to facilitate opportunities in renewable hydrogen, future facing minerals processing, and shipbuilding and sustainment.

## Established infrastructure

Established transport infrastructure providing pathways to market, and energy and water infrastructure providing critical electricity, gas and water supplies to support industry



The Western Trade Coast is well-serviced by major transport links, including deep-water bulk port facilities, high-wide and dangerous goods freight routes, and heavy rail. Heavy road freight has easy access to the Kwinana Freeway and a high wide load corridor that links eastwards to the major freight networks leading to the north and south. The freight rail network connects a range of industries with an extensive footprint in regional Western Australia; in particular, mining and agriculture, with tenants on the Western Trade Coast for further processing or for export to overseas markets through the existing port infrastructure.

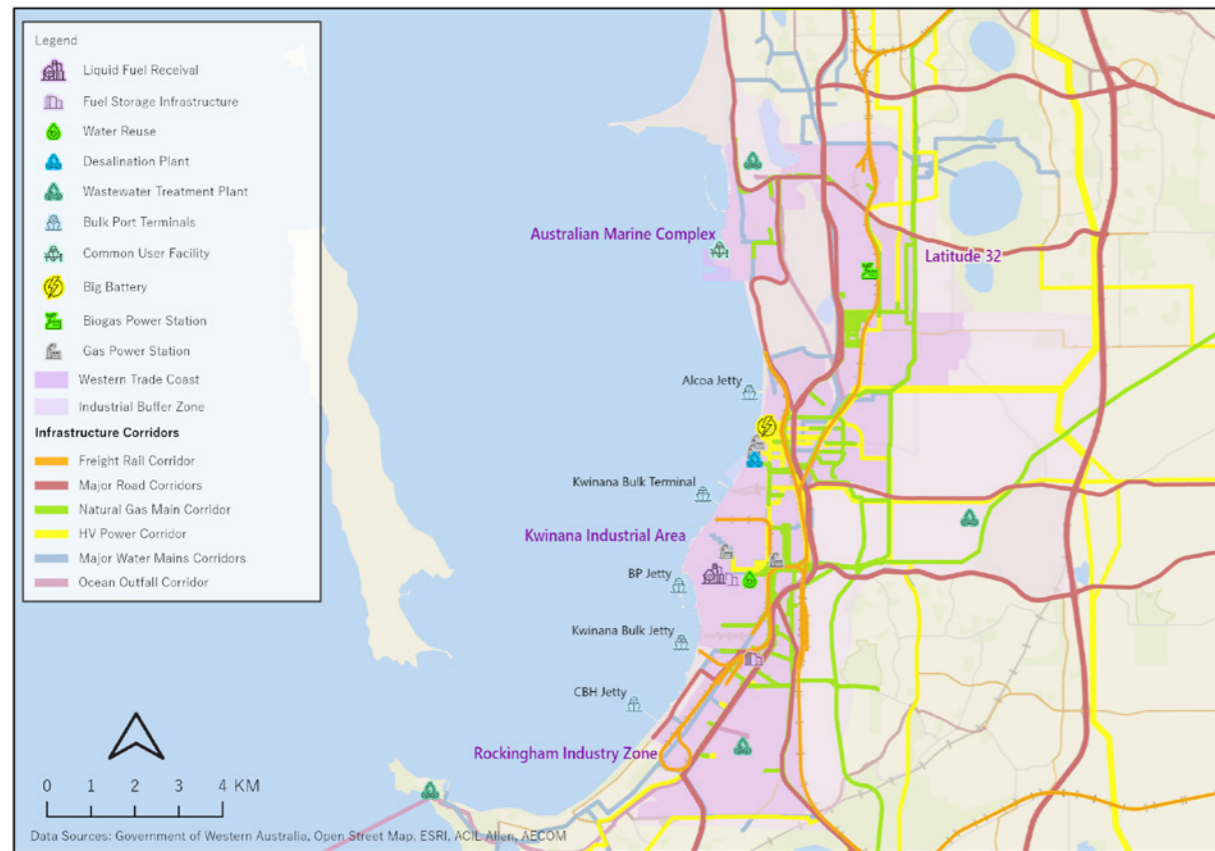
In relation to marine infrastructure, bulk exports and imports of products are through the Kwinana Bulk Jetty (KBJ) and Kwinana Bulk Terminal (KBT), which are owned and operated by Fremantle Ports. In addition to these bulk facilities, the Western Australian Government's Westport Program is investigating the development of a future container port in Kwinana with integrated road and rail transport networks. The future port will potentially be located between the existing Alcoa Jetty and BP Jetty.

The Western Trade Coast also has well-established water and energy infrastructure networks, which are critical inputs into the production processes of industries operating in the region.

**The Western Trade Coast is connected to the South West Interconnected System (SWIS), which is Western Australia's principal power network, and gas is piped to industry through the 1,597km Dampier to Bunbury Natural Gas Pipeline (DBNGP) and Parmelia Gas Pipeline (PGP). The Water Corporation operates a number of key water infrastructure assets which service tenants on the Western Trade Coast, including the Woodman Point Water Resource Recovery Facility (WRRF), Kwinana Water Reclamation Plant (KWRP), Perth Seawater Desalination Plant (PSDP) and the Sepia Depression Ocean Outlet Landline (SDOOL).**



Figure 1.4 Western Trade Coast Infrastructure



Source: ACIL Allen, AECOM

Private infrastructure; in particular, marine infrastructure and pipelines, have developed organically to meet the supply chain needs of major tenants on the Western Trade Coast. The private infrastructure on the Western Trade Coast plays a critical role in supporting the extensive network of industrial synergies between tenants in the region. Privately owned marine infrastructure on the Western Trade Coast includes the Alcoa Refinery Jetty, BP Oil Refinery Jetty and CBH Grain Terminal.

## Skilled local workforce

Alongside the availability of large parcels of industrial land which is supported by an established network of transport, energy and water infrastructure and services, the other essential input for industry is access to a skilled and available workforce. One of the defining features of the Western Trade

Coast is that it is located within the Perth Metropolitan Area and its 2.1 million residents. This provides industries operating in the Western Trade Coast with access to a skilled local workforce, setting it apart from other industrial precincts in Australia and around the world.

## Skilled local workforce

A skilled, local and available workforce to support industry by virtue of its location within the greater Perth Metropolitan Region.

The traditional catchment area for industries operating in the Western Trade Coast has been the surrounding Cockburn, Kwinana and Rockingham Local Government Authorities (LGAs), which have a combined population of 299,636 people and a working age population of 197,257 people.

However, through improved transport linkages, industries operating in the Western Trade Coast now source workers from across the Perth Metropolitan Area.

The Western Trade Coast is one of the employment epicentres of the State, housing a number of large-scale industrial operations. Proximity to a skilled and available workforce is a critical success factor for the long-term success and sustainability of industry.

Perth is the fourth largest and fastest growing capital city in Australia. The growth in Perth's population reflects the economic opportunities that exist in the city and in Western Australia more broadly. More than 1.1 million people living in Perth are in the labour force, with the majority working full time. They have a high level of education attainment, with more than 37% of the labour force holding a diploma, advanced diploma or bachelor's degree or higher, with a further 17% holding a Certificate level III or IV. People living in Perth are employed across a wide range of occupations, including Professionals (24%), Technicians and Trade Workers (15%), Clerical and Administrative Workers (13%), Community and Personal Service Workers (12%), Managers (12%) and Labourers (9%).

As one of the world's most liveable cities, Perth's population is boosted each year by thousands of migrants from around the world and interstate that are attracted to the opportunities created by its strong economy, alongside lifestyle factors from a strong healthcare and education systems to climate. On average, between 2016 and 2020, approximately 22,500 people migrated to the Greater Perth region each year from interstate destinations. Over the same period, on average, approximately 44,320 people migrated to Western Australia each year from overseas destinations.

To ensure that Western Australia has a labour force that meets the needs of industry, the Western Australian Government established the Department of Training and Workforce Development to drive strategies to build, attract and retain a skilled workforce now and into the future. This is delivered through a range of programs that support skilled migration and develop the skills of the local workforce through education and training.

The whole-of-state workforce strategies are also complemented by strategies and initiatives at a local level. The Department of Jobs, Tourism, Science and Innovation (JTSI) is developing a Workforce Strategy for the Western Trade Coast as part of the Global Advanced Industries Hub Program, to contribute to the broader task of ensuring the current and future needs of industry are met. This includes targeted investments in the apprenticeships and traineeships system targeted at developing skilled workers for advanced industry and manufacturing capabilities.



## Regulatory certainty

Availability of industrial land and the industry buffers to support heavy industry development.

The availability of land, labour and supporting infrastructure are necessary preconditions for the long-term competitiveness of industries operating in the Western Trade Coast. However, these success factors can only be enabled if there exists a stable regulatory environment and policies to support industry development.

Industries operating in the Western Trade Coast adhere to a set of regulatory requirements in relation to air quality and noxious emissions, under the Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992 and the associated policy alongside broader obligations which apply to all industrial activities across Western Australia.

Industries operating in the Western Trade Coast operate under an established set of environmental regulations, which determine the maximum permissible limits of emissions from each facility. The so-called “air shed” reflects the measurement of concentration of noxious compounds in the air, as required under the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy.

While industry understands that these regulatory requirements are part of their licence to operate, it is the existence of an industrial buffer, that has provided industry with the confidence to establish long-term operations in the precinct.

Regulations, which have evolved over time through the application of planning policy as opposed to the creation of a specific planning instrument, were designed to reduce the prospect of land use conflicts within the southern Perth Metropolitan Area region generally. This is widely seen to have helped facilitate industry development and the significant economic opportunities that have been realised. Current efforts are underway by the Department of Planning Lands and Heritage to identify a future planning framework for the Mandogalup area to the east.

Through the establishment of its 2050 Net Zero greenhouse gas emissions target, the Western Australian Government has also provided industry with the time to address this target over a set period. To support industries operating in the Western Trade Coast to meet this target, the Western Australian Government is investing in a range of complementary policies, including the development of Sectoral Emissions Reduction Strategies, direct investment in emissions reduction projects through the Clean Energy Future Fund, and an investment to overhaul the planning and approvals system for green energy projects through JTSI and the Department of Water and Environmental Regulation.

## Industrial synergies

The symbiotic industry relationships provide a source of supply for key inputs, products and by-products for industries operating in the region.

The Western Trade Coast has evolved over many decades into a complex industrial ecosystem of trade relationships that exist between tenants across the region. Through this study, ACIL Allen identified 122 bilateral relationships between tenants.

The resulting industrial agglomeration has generated efficiencies and enhanced productivity of industries operating in the Western Trade Coast through lower transport costs associated with sourcing key inputs, reduced waste where by-products from one industrial process can be used in another industrial process, and economies of scale through the concentration of infrastructure and labour. Industrial agglomeration in the Western Trade Coast has also catalysed the development of new industries from the development of waste to energy projects, and in the processing of future facing minerals.

In the absence of any one pairing of tenants where these synergistic relationships exist, both parties would have a need to find an alternative supplier for their particular product needs. All things being equal, this would increase their exposure to international market fluctuations, add shipping and logistic costs, and increase supply chain complexity. The existence of these synergies is a critical underpinning factor for the success of all tenants of the Western Trade Coast today. Collectively, the industrial agglomeration that has evolved in the region provides a unique source of

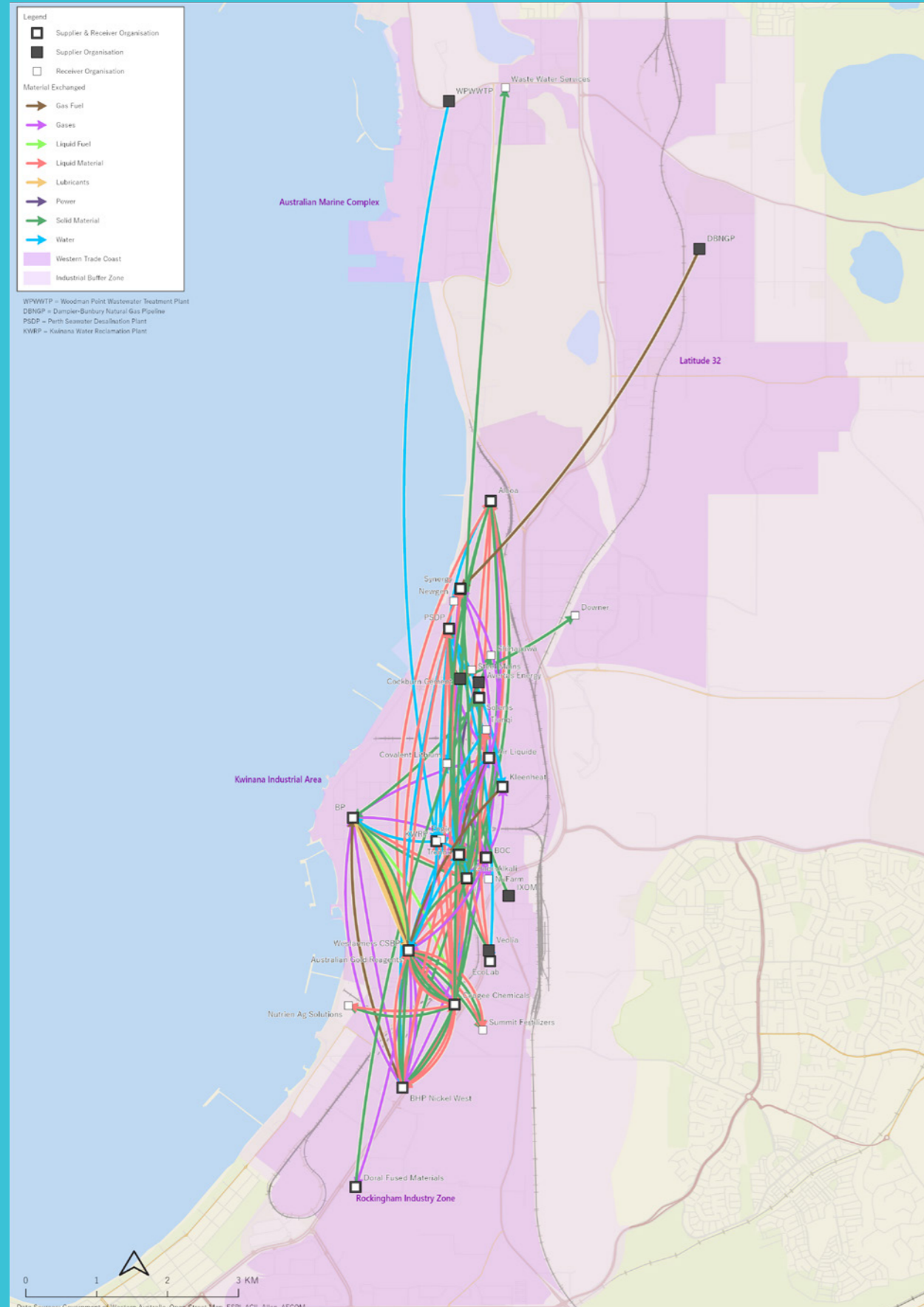
competitive advantage for industries and has been a key reason why the Western Trade Coast continues to attract interest from around the world as a place to invest.

Unsurprisingly, tenants report there is no one “critical pillar” to these synergies, such is the interwoven nature of the network which has been built over time. There is an in-built resilience which has emerged over the decades. This is confirmed by the change in focus in the region away from petroleum product refining to refined fuel product imports. There were a range of synergies based on the refining of crude oil within the precinct which existed during the last comprehensive study of the region by the KIC. Despite the cessation of crude oil refining in 2021, the former synergy partner companies have adapted and found alternative sources of their inputs – through a combination of imports and alternative relationships within the region.

While the networked aspect of the synergies is their strength, there is no one “dominant” player. As presented in Figure 1.4, it is clear the longest-standing tenants – Alcoa, BHP Nickel West, Coogee Chemicals and Wesfarmers – are amongst the most “embedded” parts of the synergistic supply chain in the region. Indeed, the likes of Coogee Chemicals and BOC are ostensibly within the Western Trade Coast due to their capacity to act as a synergistic honey pot with their variety of chemical products and processes.



Figure 1.5 Western Trade Coast Industrial Synergies



Source: ACIL Allen, AECOM

## Market proximity

Strategically located within the Perth Metropolitan Area, with established freight infrastructure providing an efficient pathway to market for industries operating in the Western Trade Coast.

The Western Trade Coast is strategically located within the Perth Metropolitan Area, which is Australia's western gateway to the global economy. The established freight infrastructure in the Western Trade Coast provides an efficient pathway to market for industries operating in the Western Trade Coast.

The Western Trade Coast is well-served by a number of bulk port terminals; is in close proximity to Western Australia's primary container port at Fremantle, and has also been earmarked through the Westport Program as the location for the State's future container port. Each year, industries operating in the Western Trade Coast export billions of dollars in industrial products to markets around the world. While the industrial synergies that exist in the Western Trade Coast ensure that supplies of key inputs can be sourced locally, a number of industries need these ports to import key products.

Industries within the Western Trade Coast are also strategically located to serve Western Australia's key industries, including chemicals for the resources industry, fertilisers for the agriculture industry, and critical material inputs for the local construction industry. The Western Trade Coast is connected to key road and freight routes that allow for the efficient transportation of products across Western Australia and to the east coast of Australia.

The Australian Marine Complex is one of only two naval shipbuilding hubs in Australia, and the only one which is strategically located on the Indian Ocean Rim. The Australian Marine Complex, and the broader Henderson region's proximity to HMAS Stirling (on Garden Island), have been earmarked by defence authorities to play a critical role in Australia's future defence posture.

The next section of this report provides an overview of the value that is generated from the Western Trade Coast, and the key markets that industries serve across the globe.





Kwinana Industrial Area and Rockingham Industry Zone  
Source: Coogee Chemicals

## Providing critical inputs into global supply chains

*The Western Trade Coast has a complex and unique industrial ecosystem which produces a range of industrial products that serve as critical inputs into local and global supply chains. The Western Trade Coast is a multi-billion dollar industrial precinct which supplies Western Australia's leading industries and exports its products to markets around the world. The industries operating in the Western Trade Coast employ thousands of Western Australians in a range of highly skilled professions, and indirectly supports thousands of jobs across Australia.*

### Supplying the global market with industrial and material products

The Western Trade Coast is a locus of domestic economic activity and value-adding. The ultimate end customer for the products manufactured and synthesised in the region is, in many cases, global.

Based on the information provided by tenants who participated in the economic analysis components of the Rapid Current State Assessment (RCSA), ACIL Allen estimates the total value of products exported through, or produced as an import replacement, in the Western Trade Coast was \$16.5 billion in 2021-22. This is 5.6% of Western Australia's total trade by value, or over 15% when iron ore (\$131.4 billion) and petroleum products (\$50.4 billion) are removed.

The list of products produced and exported (or consumed domestically as import replacement), or imported by tenants is long and multifaceted, reflecting the diverse synergies which have evolved over time in the region. Tenants import and export chemical products like ammonia, fuels like jet fuel and automotive petrol, building materials, refined minerals, fabricated metals and other associated value-added products, agricultural commodities and highly specialised materials and components, which feed global value chains.

In line with this, ACIL Allen estimates the major tenants of the Western Trade Coast supply some 32 countries products on an annual basis.

The export relationships are demonstrated in Figure 2.1.

The Western Trade Coast's major markets are broadly aligned to Western Australia's largest trading partners in general, with China (\$1.3 billion), Taiwan (\$773.8 million), Japan (\$485.1 million) and South Korea (\$369.9 million) making up four of the top five. However, the United States is the Western Trade Coast's third-largest market for exported products, at \$516.7 million.

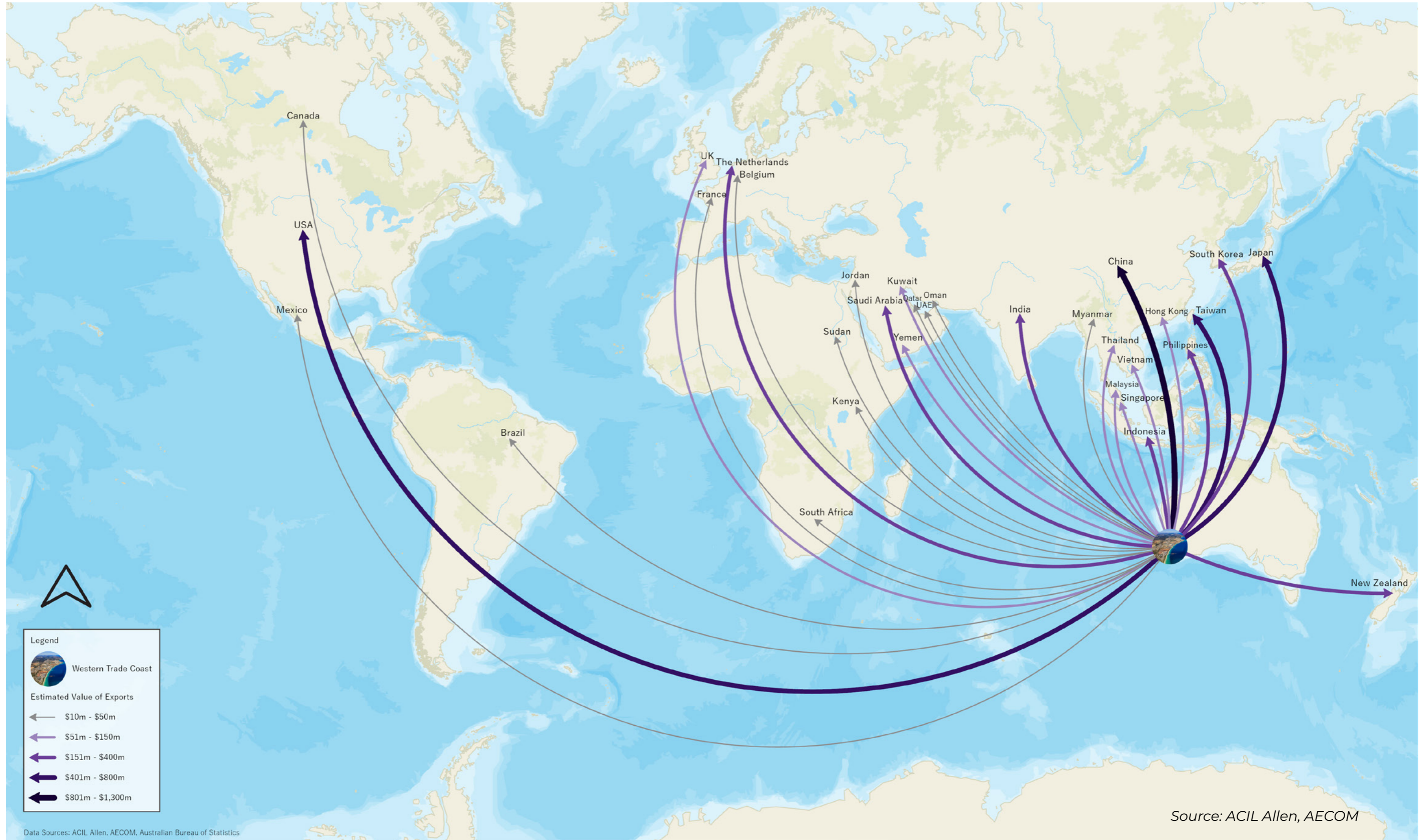
A further 11 countries are estimated to receive over \$100 million of products, principally throughout South East Asia but as far away as The Netherlands, Yemen and New Zealand. The Western Trade Coast's major tenants export to every continent, with trade flows of \$10 million or greater modelled to exist with the United Kingdom, France, Canada, Brazil, Kenya, Thailand, and Oman alongside the larger relationships.

Export trade flows are typically dominated by one particular export commodity category, except in the case of export parties in Asia where it is a combination of chemicals, minerals and agricultural products

This value includes the implied value of products manufactured or transformed within the Western Trade Coast (ie alumina), plus the exports of tenants who host specific supply chain infrastructure in the region (ie grain), as well as ACIL Allen's judgement of products which are produced within the Western Trade Coast which would otherwise be imported due to their importance in a domestic supply chain (ie ammonium nitrate). However, this excludes the value of goods traded over Fremantle Ports' public access / common user berths except where these were material to the operations of major tenants within the Western Trade Coast (for example: the value of cement clinker imports are counted, but the value of silica sands exports are not).



Figure 2.1 Western Trade Coast global market linkages





## Economic contribution of the Western Trade Coast

The Western Trade Coast has long been thought to be one of Western Australia's most significant economic drivers. As part of the RCSA, ACIL Allen worked with industry to measure, estimate and articulate the economic contribution of the region to the Western Australian and National economies in a robust, evidence-based manner.

The economic activity associated with the Western Trade Coast is measured through the gross value of production, the expenditure and employment it supports, and the taxation payments and payments to owners of the businesses and industries hosted in the region. This includes the value of raw materials mined or produced outside of the region where there is a significant value-adding or supply chain component within the Western Trade Coast.

To measure the economic contribution, ACIL Allen worked with major tenants to understand the value of their production, business operations, employment, and sources of supply for major inputs and expenditure. This was analysed in detail utilising ACIL Allen's in-house Input-Output modelling framework, which includes some 118 industry sub-sectors and the relationships between them.

Results are reported for Western Australia on a direct (Western Trade Coast) and indirect (Rest of State) basis, for Western Australia in total, and for Australia as a whole (both combined contribution results).

## Western Trade Coast

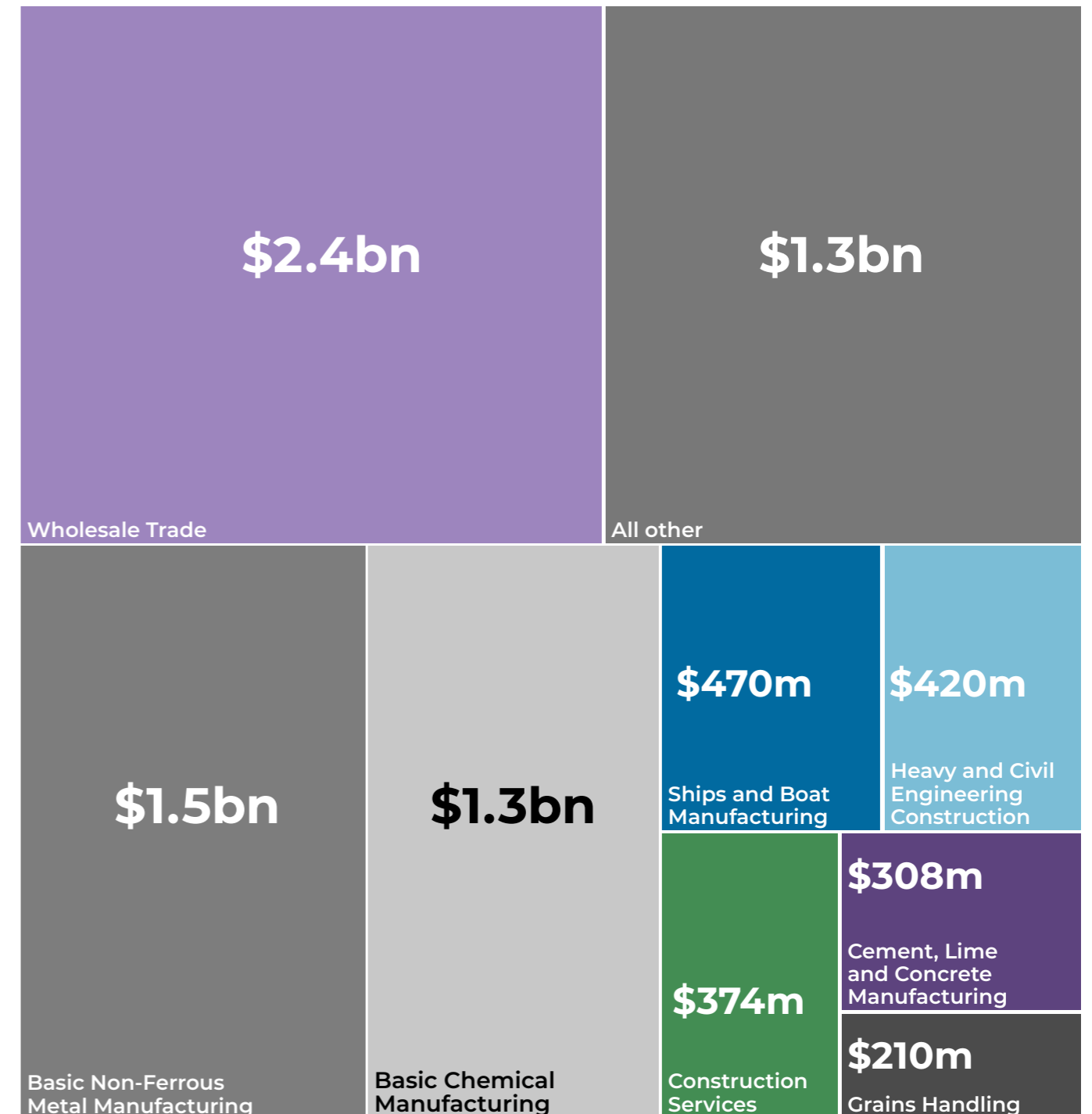
The total direct Gross Regional Product of the Western Trade Coast region in 2021-22 was \$8.8 billion (\$8,794.4 million), accounting for 2.4% of Western Australia's total Gross State Product (GSP). At \$8.8 billion, the direct economic value of the Western Trade Coast is broadly equivalent to the State's agriculture industry (\$8.5 billion), and nearly as large as the education and training sector (\$10.2 billion).

A range of industry sectors contributed to the direct value of the region. These are summarised in the figure below, and include:

- » Wholesale trade: \$2.4 billion
- » Non-ferrous metal manufacturing: \$1.5 billion
- » Basic chemical manufacturing: \$1.3 billion
- » Ship and boat building: \$470 million
- » Heavy and civil construction: \$420 million
- » Construction services: \$374 million
- » Cement, lime and concrete manufacturing: \$308 million
- » Agricultural product handling: \$210 million

In this context, wholesale trade refers principally to transport, storage and margins associated with fuel and chemical product sales.

**Figure 2.3 Western Trade Coast direct gross regional product (industries >\$20 million direct GRP)**



Source: ACIL Allen

ACIL Allen estimates the Western Trade Coast directly supported 22,336 FTE jobs in 2021-22. The vast majority of these are in two industries: manufacturing (8,764) and construction / construction-related services (5,090). Other significant employing industries include transport, postal and warehousing (1,701), utilities services (1,131), wholesale trade (985) and professional, technical and scientific services (848).



### Contribution to Western Australia

The economic contribution of the Western Trade Coast itself is what's known as a "direct" contribution. The economic contribution of a region also comprises the indirect contribution outside of the region, which accounts for the flow-on expenditure, profits, taxes and jobs. In the case of the Western Trade Coast, these indirect contributions manifest in the Rest of Western Australia and Rest of Australia. Combined, these make up the overall economic contribution.

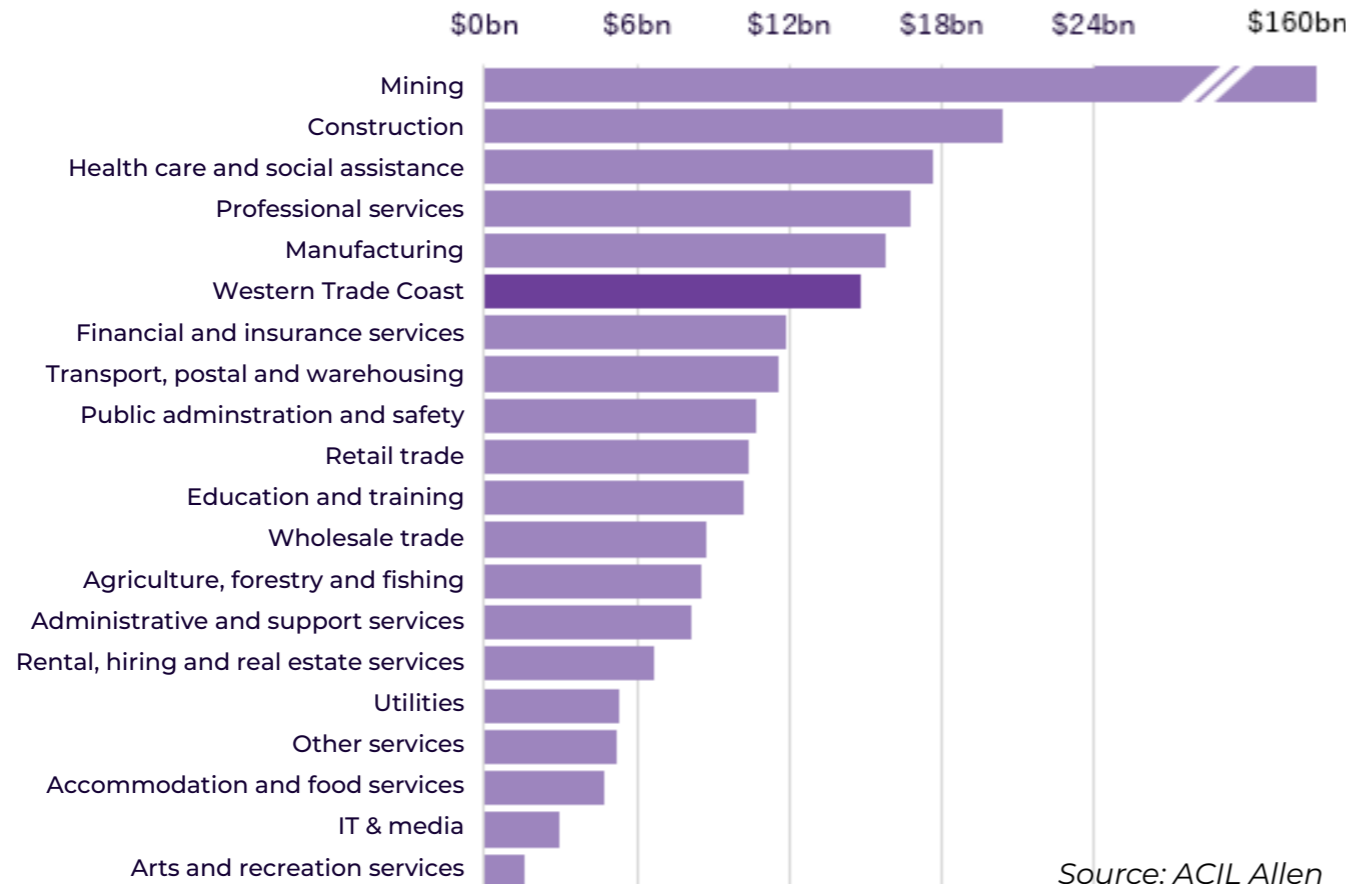
ACIL Allen estimates the Western Trade Coast made an indirect economic contribution of \$6.0 billion (\$6,024 million) to the Western Australian economy in 2021-22, with \$4.7 billion (\$4,725 million) of this due to indirect industry value added

and a further \$1.3 billion (\$1,299 million) accounted for by household, business and government expenditure due to wages, profits and taxes respectively.

When combined, this yields a **total economic contribution of the Western Trade Coast of \$14.8 billion (\$14,819 million) in 2021-22**, an extraordinary value and what is likely to reflect the single largest economic node in Western Australia outside of the iron ore and Liquefied Natural Gas (LNG) sectors.

At \$14.8 billion, the Western Trade Coast would be Western Australia's sixth-largest industry by gross value added, ahead of financial services and just trailing the manufacturing industry in its totality (Figure 2.3).

**Figure 2.3 Western Trade Coast WA Contribution, \$bn of GVA / GRP, 2021-22**



Source: ACIL Allen

The economic multiplier of the Western Trade Coast is 1.68, meaning for every \$1 of economic activity directly occurring in the Western Trade Coast there is a spillover to the

broader Western Australian economy of \$0.68. Typically, multipliers fall in a range of 1.3 to 1.5, with a multiplier of 1.6 to 1.7 considered to be a strong result on the indirect economic contribution side of the assessment. This highlights the important role the Western Trade Coast plays in supporting the Western Australian economy at large.

Similarly, the economic contribution to employment outside of the direct jobs within the Western Trade Coast is significant. ACIL Allen estimates the Western Trade Coast supports some 20,500 FTE jobs across the Rest of Western Australia, taking the total employment contribution to 42,900 FTE jobs. This suggests the Western Trade Coast directly or indirectly supports just under 3% of Western Australia's total workforce.

### Contribution to the Australian economy

Finally, the indirect economic contribution of the Western Trade Coast extends to support for the broader national economy (including jurisdictions other than Western Australia) on account of the links companies have to suppliers and customers around the nation.

ACIL Allen estimates the indirect economic contribution of the Western Trade Coast to the Rest of Australia is \$3.3 billion (\$3,346 million), taking the total economic value of the Western Trade Coast to the national economy up to \$18.2 billion (\$18,165 million). Based on the 2021-22 financial year, this suggests the Western Trade Coast accounts for just shy of 1% of Australia's Gross Domestic Product.

Similarly, ACIL Allen estimates the number of indirect jobs supported by the Western Trade Coast totals 19,100 FTE jobs for a total of 61,949 FTE jobs supported across the country. Unsurprisingly, the manufacturing industry accounts for 12,601 FTE (20%) of the total.

The total economic contribution comprises the direct contribution of the activities of the Western Trade Coast and the indirect economic activity supported across the Rest of Western Australia and Rest of Australia. This is summarised in the figure below (Figure 2.4).

**Figure 2.4 Western Trade Coast Total Economic Contribution, \$bn Output vs FTE Employment, 2021-22**





# A global investment destination

The Western Trade Coast has developed a reputation as one of the premier heavy industrial precincts globally, reflecting the provision of essential infrastructure, the availability of buffered industrial land and supportive environmental regulations, and the region's proximity to a skilled and available workforce.

The presence of these critical success factors in the Western Trade Coast provides a unique source of competitive advantage for industry, with the region increasingly viewed as a location of choice for new major projects.

Image credit: Wesfarmers Chemicals, Energy and Fertilisers Ltd



## Current opportunities

The Western Trade Coast is constantly evolving. Since the formation of the Kwinana Industrial Area in the 1950s, the Western Trade Coast's industrial base has diversified from the establishment of chemicals industries from the 1950s, minerals processing from the 1960s, and shipbuilding from the 1980s. With the next wave of industrial development beginning, the Western Trade Coast is set to realise the Western Australian Government's vision for it to become a GAIH as it helps to facilitate opportunities in renewable hydrogen, future facing minerals processing, and shipbuilding and sustainment.

There is a significant pipeline of projects that have either been recently completed, are under construction or are under active consideration. These projects are presented in Figure 3.1, and have largely developed organically to either meet an emerging market opportunity or to build off the existing industrial synergies between tenants. The major projects cover a wide range of emerging industries, including battery mineral processing, waste-to-energy and renewable hydrogen. These projects collectively represent a \$6 billion investment in the future of the Western Trade Coast.

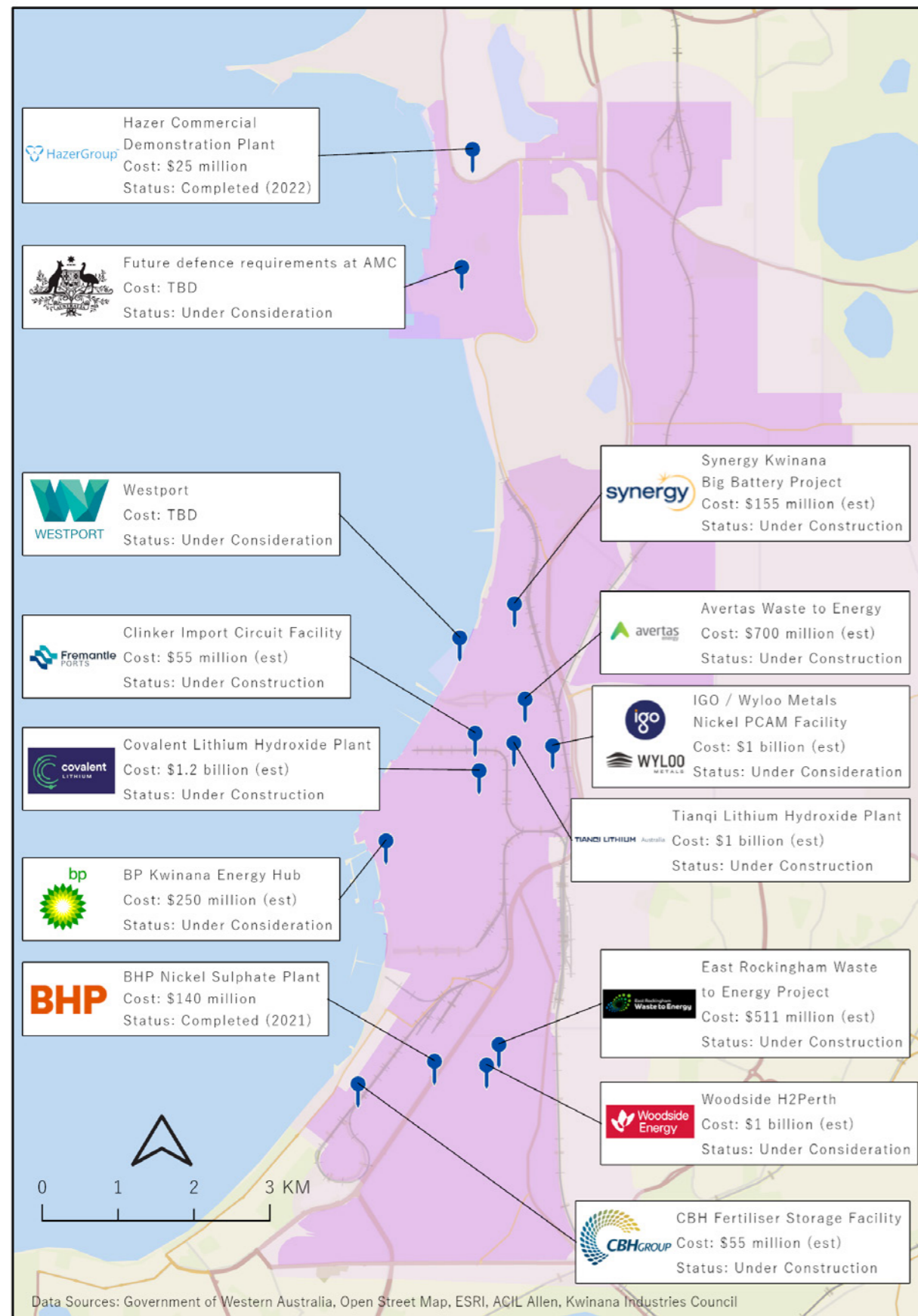
While the current wave of investment projects are primarily centred on **future facing minerals** processing and energy generation including the recently announced investment in Precursor Cathode Active Material manufacturing facility proposed by IGO / Wyloo Metals, the next wave of opportunities will likely see major investments in **renewable hydrogen** by Woodside Energy and BP, significant investment in the Australian Marine Complex to support the development of the State's **shipbuilding and sustainment** capabilities, and the proposed major investment in a new container port as part of the Westport Program. Collectively, once operational, these projects will continue the transformation of the Western Trade Coast into a GAIH, generating billions of dollars to the State's economy, and creating thousands of new, highly skilled jobs.

Some of the significant projects recently completed or under construction include:

- » BHP's \$140 million Nickel Sulphate Plant (\$140 million), which will convert nickel powder into nickel sulphate for the battery market; in particular, lithium-ion batteries that power electric vehicles.
- » Covalent Lithium Hydroxide Plant (\$1.2 billion), which will produce battery-quality lithium hydroxide for the worldwide manufacture of lithium batteries.
- » Tianqi Lithium Hydroxide Plant (\$1 billion), which will be the second production train at the facility, exporting lithium hydroxide for the manufacture of lithium batteries.
- » Avertas Waste to Energy Project (\$700 million), which will process 460,000 tonnes of Municipal Solid Waste under an agreement with LGAs in the region, which will generate more than 38MW of electricity per hour to the grid.
- » East Rockingham Waste to Energy Project (\$511 million), which will process 300,000 tonnes per annum of waste from municipal, commercial and industrial sources, and contribute 28.9MW of electricity per hour to the grid.
- » Synergy Kwinana Big Battery Project (\$155 million), which will absorb excess energy from rooftop solar and be capable of powering 160,000 homes for two hours.



**Figure 3.1 Major Projects in the Western Trade Coast – Completed, Under Construction & Under Active Consideration**



### Target industries

The current wave of investment opportunities within the Western Trade Coast represents the beginning of a fundamental transformation of the Western Trade Coast, with the most prospective opportunities relating to shipbuilding and sustainment, renewable hydrogen and future facing minerals processing. These are discussed further below.

## Shipbuilding and sustainment

**Supporting Australia's defence industries through manufacturing, maintenance and vessel sustainment.**

Over the next decade, Western Australia is expected to have a growing geo-strategic role in the Indo-Pacific region. This will necessitate higher levels of investment by the Federal Government in defence infrastructure that is assessed as being in the national interest. Of particular interest to Western Australia is ensuring the capability to support the continuous build of naval vessels, as well as the future maintenance and sustainment of submarines and surface vessels, is available at the Australian Marine Complex. As a result, it is critical that infrastructure at the Australian Marine Complex is matched to the current and emerging requirements of the Department of Defence.

The Western Australian Government's Strategic Infrastructure and Land Use Plan (SILUP) for the Australian Marine Complex was released in 2020. The SILUP outlines the short, medium and long-term infrastructure upgrades required to support the Australian Marine Complex's capacity to be a nationally significant industrial area for the defence, marine and resources industries. The primary objective for the Western Australia Government is to establish the Australian Marine Complex as the principal location for all maintenance,

upgrades and sustainment of Australia's submarines and frigates, and to position the Australian Marine Complex to support the construction of new naval vessels.

The Defence Strategic Review (DSR) was announced in August 2022, with the final report handed to the Australian Government in February 2023. The DSR is an independently led examination of Australia's defence force posture, force structure and capabilities. The DSR was informed by engagements with more than 150 individuals and experts including Defence officials, Australian Defence Force personnel, defence industry, national security think tanks and academics, representatives from State and Territory Governments, and interest groups. The Australian Government's response to the DSR has earmarked the Western Trade Coast, encompassing the Australian Marine Complex, the broader Henderson region, and HMAS Stirling (on Garden Island, to the south of the Western Trade Coast) as critical to the future defence posture of Australia. It is anticipated future land use planning decisions at the Australian Marine Complex will be informed by recommendations relating to large vessel infrastructure made in the DSR.





The Australian Marine Complex is also expected to continue to support export opportunities and international sustainment work, building off previous contracts such as Austal's delivery of two Cape-class Patrol Boats to the Trinidad and Tobago Coast Guard. An important factor in Western Australia's future export potential is its geo-strategic status as Australia's Indian Ocean capital and western gateway. As a result, Western Australia is an ideal location for primes to set up manufacturing hubs to service the Southeast Asian market, while enjoying the stability of the Australian market. Existing tenants at the Australian Marine Complex are investing in operations and sustainment technology, and building their capacity in decarbonisation products with applications for both new and older naval and commercial vessels.

The defence industry requires highly skilled, experienced and specialised workers. It is well positioned to support job creation for occupations requiring trade and technical skills, such as welders and

engineers, as well as people with experience in professional and specialist roles, such as communications and cyber security. The Rockingham Jobs and Skills Centre at the Rockingham campus of South Metropolitan TAFE is expected to play an important role in delivering apprenticeships and traineeships in the defence industry. A specialist defence industry team is based at the Rockingham Jobs and Skills Centre.

The supply chain for the build, maintenance and sustainment of naval vessels at the Australian Marine Complex undertaken by the major tenants provides opportunities for local small and medium size businesses. A large proportion of these businesses are located within the Fabrication and Support Precincts at the

Australian Marine Complex, as well as in Canning Vale and Bibra Lake.

**The Australian Marine Complex is expected to have an ongoing role in the continuous build of naval vessels, as well as the future maintenance and sustainment of submarines and surface vessels. At present, major investment**

**decisions, such as the LVDB, are on hold, however it expected greater clarity on the defence construction opportunity at the Australian Marine Complex will be provided in the first half of 2023 through the release of the DSR.**



# Renewable hydrogen

Leading the emergence of the hydrogen economy by leveraging local demand and access to global markets.

Hydrogen and hydrogen-based fuels are expected to be key technologies in the drive towards net zero emission targets in Western Australia. The Western Trade Coast is an attractive location for renewable hydrogen projects due to proximity to potential local industrial users, which is a critical point of difference for the Western Trade Coast relative to other prospective locations across the State. The Western Trade Coast is already home to existing tenants who are hydrogen users.

In the industrial sector, hydrogen can be used in fuel cells to power fixed and mobile plants, combusted for heat generation, and as a feedstock and precursor for a variety of products including fertiliser and ammonia production. Aside from supporting the operations of local industrial users, renewable hydrogen projects on the Western Trade Coast would have access to a deep water harbour for export to overseas markets. The location of renewable hydrogen projects at the Western Trade Coast also opens up opportunities for the potential re-use of purified wastewater as an input to hydrogen production.

The opportunity presented by renewable hydrogen as a driver of the transformation of the Western Trade Coast was described below by a stakeholder:

**“There are a number of key industries that are significant users of gas as an input into their production processes. Government needs to facilitate green hydrogen projects not only as an economic development and diversification opportunity for the State but also to support the decarbonisation objectives of industry along the Western Trade Coast by replacing gas with hydrogen. This is the opportunity.”**

*Source: Established industry stakeholder operating in the Western Trade Coast*

There are a range of industrial, energy and heating use cases which have varying levels of expected hydrogen commerciality, compared to next best available alternatives. A number of these use cases have linkages to existing and future industrial activities on the Western Trade Coast, including fertiliser, shipping, chemical feedstock and commercial aviation.

The *Western Australian Renewable Hydrogen Strategy and Roadmap (Renewable Hydrogen Strategy)* are critical components of the State's policy architecture for a low carbon energy transition and the achievement of net zero emissions by 2050.

The *Renewable Hydrogen Strategy* is intended to ensure the State has the appropriate policy settings and industry activation initiatives in place to drive forward the development of the renewable hydrogen industry. The State has a goal to achieve a market share in global hydrogen exports by 2030 similar to the 12 per cent share the State has in LNG today.

The Renewable Hydrogen Strategy identifies four market pillars that the State is focused on developing to achieve its objectives with respect to the development of renewable hydrogen projects in Western Australia.

- 1. Export:** Exporting renewable hydrogen produced in Western Australia in one or more of the various forms it can be transported effectively (e.g. compressed liquid hydrogen or utilising chemical bonds to ship hydrogen as ammonia) to international markets.
- 2. Remote applications:** Utilisation of renewable hydrogen-based products to substitute existing energy products consumed in regional and remote areas of the State.
- 3. Hydrogen blending in natural gas networks:** Blending of renewable hydrogen with pipeline specification natural gas to a level which remains within the tolerance of end use applications. In this case, the energy content of the natural gas can remain broadly unchanged, while the carbon emissions associated with its combustion decline.
- 4. Transport:** Supporting the deployment of alternatives to Internal Combustion Engine (ICE) vehicles, initially centred on long haul trucking and other remote applications but progressively for small passenger vehicles as technology evolves.

As of June 2022, Western Australia had more than 30 hydrogen projects at various stages of planning. The Woodside H2Perth, BP Kwinana Energy Hub and Hazer Group Commercial Demonstration Plant are three hydrogen projects in progress or under investigation within the Western Trade Coast. As a collective, these three projects (at an operational stage) would address three of the four market pillars listed above from the Renewable Hydrogen Strategy. For example, BP has proposed hydrogen produced through the Kwinana Energy Hub will support renewable fuels production, ammonia, metals and minerals processing, on-site gas blending and hydrogen for heavy duty transport.

Proposed hydrogen projects on the Western Trade Coast are located in close proximity to the DBNGP. For example, Woodside's H2Perth site is located only 2 km away from the DBNGP. In January 2022, Australian Gas Infrastructure Group completed a feasibility study, funded through the Renewable Hydrogen Fund, on preparing the DBNGP as a critical support infrastructure for Western Australia's hydrogen industry. The study determined that the DBNGP could support up to a 9 per cent volumetric hydrogen blend without causing harm to pipeline safety or performance.

Alongside government support focused on stimulating the production of renewable hydrogen, demand and offtake agreements are also essential for underpinning investment. On this basis, the Western Trade Coast is in a unique position due to the existing presence of hydrogen users, who can provide long-term and certain offtake agreements if the price is right.



Image source: BP

Renewable hydrogen remains some way off being a commercial proposition. A Consultation Paper prepared by Energy Policy WA for the Renewable Hydrogen Target for Electricity Generation in the SWIS suggested the Levelised Cost of Hydrogen (LCOH) production today was between \$6.87/kg to \$9.36/kg at the plant-gate, prior to consideration of storage and shipping and assuming a relatively modest Weighted Average Cost of Capital. This converts to an effective equivalent electricity generation fuel cost of up to \$78.02/GJ on an energy equivalent basis with natural gas. The current spot price for natural gas in the south west of the State at the time the Consultation Paper was published was \$5.60/GJ.

However, in the long run it is expected renewable hydrogen will become competitive with both clean hydrogen and fossil fuel sources of energy, particularly when exporting to energy-poor countries. It is therefore important to remain cognisant of the pathways associated with the hydrogen economy more broadly, rather than picking “green” over “clean” in absolute terms.

**Renewable hydrogen represents an industry opportunity for the Western Trade Coast due to proximity to potential industrial users, many of whom already use hydrogen as a critical feedstock in their supply chain.**

**Given the density of demand for hydrogen, and potential future role for hydrogen substitution in the Western Trade Coast, it is expected the Western Trade Coast will play an important role in the broader renewable hydrogen supply chain through the manufacture of critical components, logistics and handling of materials required to establish the renewable energy infrastructure to support electricity generation, and to facilitate the export of hydrogen products.**

**The benefits of renewable hydrogen will likely be realised in the medium to long-term, with the technology still in an early stage and the economics weak on a cost comparison basis with other energy sources, such as natural gas.**

## Future facing minerals processing

**Value-adding to minerals to support global development and decarbonisation initiatives.**

Future facing minerals are defined as the resources the world needs to develop and decarbonise. In particular, within the context of the Western Trade Coast, future facing minerals applies largely to both nickel and lithium due in part to the major projects on the Western Trade Coast involving these two commodities that are either under construction or recently completed.

Future facing minerals processing supports and creates trade and investment opportunities for Western Australia in a range of existing and emerging global supply chains, including renewable energy, defence, aerospace, automotive manufacturing and advanced manufacturing.

Western Australia’s development as a hub for future facing minerals processing has been driven in part by the ambition underpinning the vision and intent of the Future Battery Industry Strategy, which was launched in January 2019. The strategy sets out the vision that in 2025, “*Western Australia has a world leading, sustainable, value-adding future battery industry that provides local jobs, contributes to skill development and economic diversification, and benefits regional communities.*”

The opportunity presented by future facing minerals processing as a driver of the transformation of the Western Trade Coast was described below by a stakeholder:

**“The Western Australian Government should position the Western Trade Coast as the State’s “battery valley” given the range of opportunities to promote and support the processing of critical minerals.”**

*Source: Established industry stakeholder operating in the Western Trade Coast*

The automotive industry supply chain in particular is in the process of being reinvented around batteries and electrification, due to global pressure on manufacturers to formalise their clean, low emission technology credentials stemming from government-mandated emission targets and shifting consumer preferences. The automotive industry has been active in securing supply through offtake agreements for lithium hydroxide monohydrate and nickel sulphate for use in lithium ion batteries for electric vehicles.



Global sales of all types of electric vehicles increased by 40 per cent in the nine months to September 2022 compared with the same period in 2021 – with Chinese sales up 110 per cent, European sales up 6 per cent, and North American sales up 27 per cent. Tesla has signed supply agreements with tenants located on the Western Trade Coast, including Covalent Lithium and BHP Nickel West. In order to secure their supply chain, automotive manufacturers are also providing direct project development funding to lithium projects located in Western Australia, such as the \$300 million loan from Ford Motor Company to support the development of the Kathleen Valley lithium mine.

Western Australia's track record and experience in mining, low sovereign risk, high environmental and social standards, and tried-and-tested regulatory framework have been identified as factors that could differentiate Western Australian producers as suppliers of choice in a competitive global market. For companies with mine operations located outside of Western Australia, the State is perceived to provide companies with better access to mining services providers, particularly those with project delivery experience in battery and critical minerals.

Tianqi Lithium (lithium hydroxide), Covalent Lithium (lithium hydroxide), BHP Nickel West (nickel sulphate), EcoGraf (high purity battery graphite) and Australian Vanadium (vanadium electrolyte manufacturing) are five Western Trade Coast tenants with operations either underway, proposed or under construction, involving future facing minerals processing. The Western Australian Government also recently provided a partnership between IGO and Wyloo Metals an option to lease land to establish a Precursor Cathode Active Materials (PCAM) facility in the region.



Image source: BHP Nickel West



Tenants with operations on the Western Trade Coast are also readily involved in the supply chain of future facing minerals processing. For example, Coogee Chemicals manufactures caustic soda at its chlor-alkali facilities at Kwinana, which is an essential feedstock for companies in the lithium industry.

Tenants on the Western Trade Coast have found commercially viable solutions to transporting mineral processing inputs, such as spodumene ore concentrate, to site from deposits located in the Goldfields, Wheatbelt and the South West. For example, Covalent Lithium plan to transport spodumene ore concentrate from the Mt Holland mine in the Wheatbelt region in sealed containers by train to a local rail siding in Kwinana.

Stakeholders have outlined a key factor in deciding to locate their mineral processing project on the Western Trade Coast was the availability of infrastructure, in particular ports and pipelines, as well as raw materials, such as sulphur gas and caustic soda. It was expressed that tenants have had the opportunity to leverage each other's infrastructure, including sharing tank and pipe infrastructure. This has resulted in cost efficiencies for major mineral processing projects currently under construction. Targeted investments in supporting value chain activities, such as battery material manufacturing, assembly and recycling, are also seen as opportunities by industry in support of primary heavy industrial activities.

**Lithium and nickel present as the two primary critical mineral processing opportunities for the Western Trade Coast and will create trade and investment opportunities for Western Australia in a range of existing and emerging global supply chains, including renewable energy, defence, aerospace, automotive manufacturing and advanced manufacturing. Western Australia's track record and experience in mining, low sovereign risk, high environmental and social standards, and tried-and-tested regulatory framework have already been contributing factors in the successful signing of supply agreements with major automotive manufacturers, such as Tesla.**



Image source: Coogee Chemicals



# A strategic priority for the Western Australian Government

*The Western Australian Government's vision for the Western Trade Coast is for the region to be transformed into a Global Advanced Industries Hub. This study provides the evidence base for the Western Australian Government to understand the critical success factors that underpin industry development in the Western Trade Coast and the future investment opportunities that are aligned with this vision. This will help inform the future role of the Western Australian Government in driving towards this vision by ensuring the region's strengths are maintained, any emerging constraints are addressed, the future opportunities are enabled, and the policy and regulatory landscape continues to support industry development, diversification and decarbonisation.*

## Development, Diversification and Decarbonisation agenda

The Western Australian Government has a broad economic development, diversification and decarbonisation agenda which aligns strongly with its vision to transform the Western Trade Coast into a GAIH.

### Diversify WA

Diversify WA is Western Australia's economic development framework. It sets the vision for "a strong and diversified economy delivering secure, quality jobs through increased investment across a broad range of industries."

Building off the overarching Diversify WA economic development framework, the

**Diversify WA: Supply Chain Development Plan 2021-22** (the Plan) recognises the importance of activities that improve value and productivity across multiple sectors of the external-facing economy.

The Plan identifies eleven supply chain opportunities with strong benefit and feasibility prospects. Of the eleven supply chain opportunities identified, seven are already taking place on the Western Trade Coast or are expected to in the short to medium-term, including defence vessels, critical minerals processing, mining fabrication and equipment, large-scale renewable projects, renewable hydrogen production, petrochemicals, and agribusiness and processing.

Capturing supply chain opportunities would enable Western Australia to replace imports in existing supply chains, value-add into existing processes, or participate in the emergence of a new industry. Importantly, the Plan identifies the transition of the Western Trade Coast into a GAIH would "enable the State to not only capture the global opportunities that are currently on offer, but cement WA in the global supply chains of the world's emerging industries."

**Building on the Diversify WA economic framework, Diversify WA: Future State (Future State) focuses on the most significant opportunities to drive international investment to support Western Australia's economy.** Future State nurtures Western Australia's unique strengths in resources and manufacturing, while targeting diversification opportunities in industries experiencing extraordinary global growth.

## Diversify WA

9 targeted, sector-specific diversification opportunities have been identified by the Western Australian Government based on their alignment with key global trends, potential for strong economic and social benefits, synergies with existing government commitments and industry investment and capability.

1. Production and scaling of renewable hydrogen
2. Advanced critical minerals processing
3. Manufacture of medical products and digital health devices
4. Decommissioning of oil and gas infrastructure
5. Naval shipbuilding, sustainment and maintenance
6. Development of regional tourism destinations
7. Manufacture, utilisation and maintenance of space and cross-sector technologies
8. Development of new carbon capture, utilisation and storage projects
9. Value-added food and beverage production

With each of the transformational opportunities presenting in the Western Trade Coast identified as priority targets for the Western Australian Government, the transformation of the Western Trade Coast into GAIH will be a key enabler.

## State Infrastructure Strategy

The State Infrastructure Strategy was released in 2022 with the intent of outlining an understanding of the State's infrastructure needs and priorities over the next 20 years, and in addition identifying solutions to improve the State's infrastructure system.

On 3 February 2023, the Western Australian Government released its response to the State Infrastructure Strategy, which made some 93 recommendations across nine sectors and seven themes, ranging from climate action and sustainability to transport, health and planning. After extensive consultation across the public sector, the Government has supported the majority of recommendations made by Infrastructure Western Australia in its inaugural strategy.

The Western Australian Government's response reinforced its commitment to transform the Western Trade Coast into a GAIH, through the program of works (including this study) that is being progressed, and the establishment of a Ministerial Taskforce, Steering Committee and IRG to provide governance and oversight over delivery of this election commitment.

## WA Climate Policy

The Western Australian Government is committed to achieving net zero emissions by 2050, consistent with the aspirations of the Commonwealth Government. The WA Climate Policy, released in 2020, is intended to drive this ambition and position the State for a low-carbon future.



The Policy acknowledges that a low-carbon future presents opportunities for new manufacturing and export industries, such as renewable hydrogen, future batteries and hydrogen-intensive commodities like green steel. The Policy includes the Commercial Demonstration Plant under development by Hazer Group at the Woodman Point Wastewater Treatment Plant as a case study of the opportunities afforded to the State stemming from clean manufacturing, and more specifically, renewable hydrogen.

In the context of the Western Trade Coast, the Policy details the role the Government will play in planning, designing and delivering industrial land and infrastructure, including Technology Precincts, to enable industry estates to move towards net zero emissions by 2050.

The Western Australian Government has instituted a Government Emissions Interim Target. This is a target to reduce emissions from its operations by 80 per cent below 2020 levels, by 2030. In 2023, the Western Australian Government will introduce climate change legislation to establish a framework for responsible emissions reductions to meet the goal of net zero emissions by 2050. This legislation is expected to formalise the aim to achieve the Government Emissions Interim Target.

### **Industrial Lands Strategy**

The Industrial Lands Strategy, released in June 2021, provides recommendations on the priority infrastructure required to unlock industrial land across Western Australia over the next decade. In the context of the Western Trade Coast, the Industrial Lands Strategy highlighted the opportunity to open up Latitude 32 as a location for a variety of transport and logistics users to establish their operations. There were also a range of infrastructure projects in the Western Trade Coast that were recommended in the Strategy covering infrastructure types including water access, power access, rail, port, marine infrastructure and road, that have each been assessed on their urgency and timing.

### **Australian Marine Complex Strategic Infrastructure & Land Use Plan**

The Australian Marine Complex SILUP was funded by the Western Australian Government and released in 2020. SILUP outlines the short, medium and long-term infrastructure upgrades required to support the Australian Marine Complex's capacity to be a nationally significant industrial area for the defence, marine and resources industries. Objectives of particular importance stemming from the SILUP were establishing the Australian Marine Complex as the principal location for all maintenance, upgrades and sustainment of Australia's submarines and frigates, as well as ensuring the Australian Marine Complex is positioned to support the construction of new naval vessels.

The SILUP outlined the need for upgrades to precinct wide infrastructure to support the Australian Marine Complex and improve the amenity of the complex. It was identified upgrades to the local and regional road networks accessing the Australian Marine Complex were of particular importance, as well as the need to consider upgrades to public transport,

pedestrian and cycling networks. In response, the Western Australian Government invested and delivered \$87.6m of infrastructure upgrades including a new vessel transfer path, a new shipbuilding facility, a major wharf extension and upgrade, and three road intersection upgrades.

### **Westport**

Westport is the Western Australian Government long-term program to investigate, plan and build a future port in Kwinana with integrated road and rail transport networks. The announcement by the Western Australian Government that the future container port would be built at Kwinana occurred in 2020. The Supply Chain Integrated Design project commenced in October 2022, which will design, model and refine a preferred whole of supply chain solution for Westport. This includes the navigation, breakwater/s (if required), container terminal/s and integrated road and rail networks. This body of work follows the completion of the Landside Logistics Opportunities Study, which identified a shortlist of three landside logistics options, which all include road freight concentrated on Anketell-Thomas Road Freight Corridor and north-south along Tonkin.

The Western Australian Government is expected to consider the Westport business case in mid-2024.



Image source: Austal



### Industry development strategies

Over the last five years, the Western Australian Government has released a range of industry strategies, which have focused on growing the economic contribution of these emerging industries, investment attraction and highlighting the benefits of a secure supply chain, both with respect to sovereign risk and diversification. A number of the industry strategies released by the Western Australian Government have close alignment to both existing and emerging industries on the Western Trade Coast, including:

- » *Future Battery and Critical Minerals Strategy* – This Strategy aims to grow Western Australia’s future battery industry and transform it into a large source of economic development, diversification, jobs and skills. The Strategy outlines the four actions of investment attraction, project facilitation, research and development, and adoption of new battery technologies.
- » *Renewable Hydrogen Strategy and Roadmap* – Together, the Strategy and Roadmap set out the Western Australian Government’s strategic areas of focus for the development of the hydrogen industry. It aims to harness Western Australia’s competitive advantages, including world-class renewable energy resources, vast land mass and proud history of exporting energy to international markets. The four strategic focus areas of the Strategy are exports, remote applications, hydrogen blending in natural gas markets, and transport.
- » *Defence and Defence Industries Strategic Plan* – This Strategy outlines six key strategies to continue to grow Western Australia’s defence industry to diversify the economy and create jobs. The six key strategies identified were: (1) supporting a strong and enduring defence presence; (2) growing the State’s defence industry capability and contribution; (3) developing strategic infrastructure; (4) building research and innovation partnerships; (5) advancing education, training and skilling; and (6) supporting veterans and families.

### A strategic development agenda for the Western Trade Coast

Guided by its broader economic development, diversification and decarbonisation agenda, and the findings of this study, the Western Australian Government is progressing an agenda that is focussed on ensuring the Western Trade Coast has the enabling infrastructure, available land for future investment, and a skilled and available workforce to support its transition into a GAIH.

In recognition of the priority that has been placed on this strategic development initiative, a Ministerial Taskforce has been established to drive collaboration between all three levels of government, industry, unions and the local community. The Taskforce is chaired by the Minister for State Development, Jobs and Trade; Hydrogen Industry; Tourism; Science. The Taskforce is also informed by an IRG, chaired by a dedicated Industry Advisor appointed by the Minister, and supported by a Steering Committee comprised of senior members from relevant State Government agencies and departments.

The Western Australian Government is progressing its vision for the Western Trade Coast through a number of strategies and targeted initiatives that enhance the critical success factors that support industry development and the realisation of opportunities in shipbuilding and sustainment, renewable hydrogen and future facing minerals processing.



Image source: BHP Nickel West



## Glossary of Terms

AMC	Australian Marine Complex
CUF	Common User Facility
DBNGP	Dampier to Bunbury Natural Gas Pipeline
FID	Final Investment Decision
FTE	Full-Time Equivalent
GAIH	Global Advanced Industries Hub
GSP	Gross State Product
GTE	Government Trading Enterprise
ICE	Internal Combustion Engine
IMT	Intermodal Terminal
IRG	Industry Reference Group
JTSI	Department of Jobs, Tourism, Science and Innovation
KIA	Kwinana Industrial Area
KIC	Kwinana Industries Council
KWRP	Kwinana Water Reclamation Plant
LGA	Local Government Authority
PPA	Power Purchase Agreement
PSDP	Perth Seawater Desalination Plant
RCSA	Rapid Current State Assessment
RIZ	Rockingham Industry Zone
SDOOL	Sepia Depression Ocean Outlet Landline
SERS	Sectoral Emissions Reduction Strategies
SIA	Strategic Industrial Area
SWIS	South West Interconnected System
WAPC	Western Australian Planning Commission
WTC	Western Trade Coast
WRRF	Woodman Point Water Resource Recovery Facility

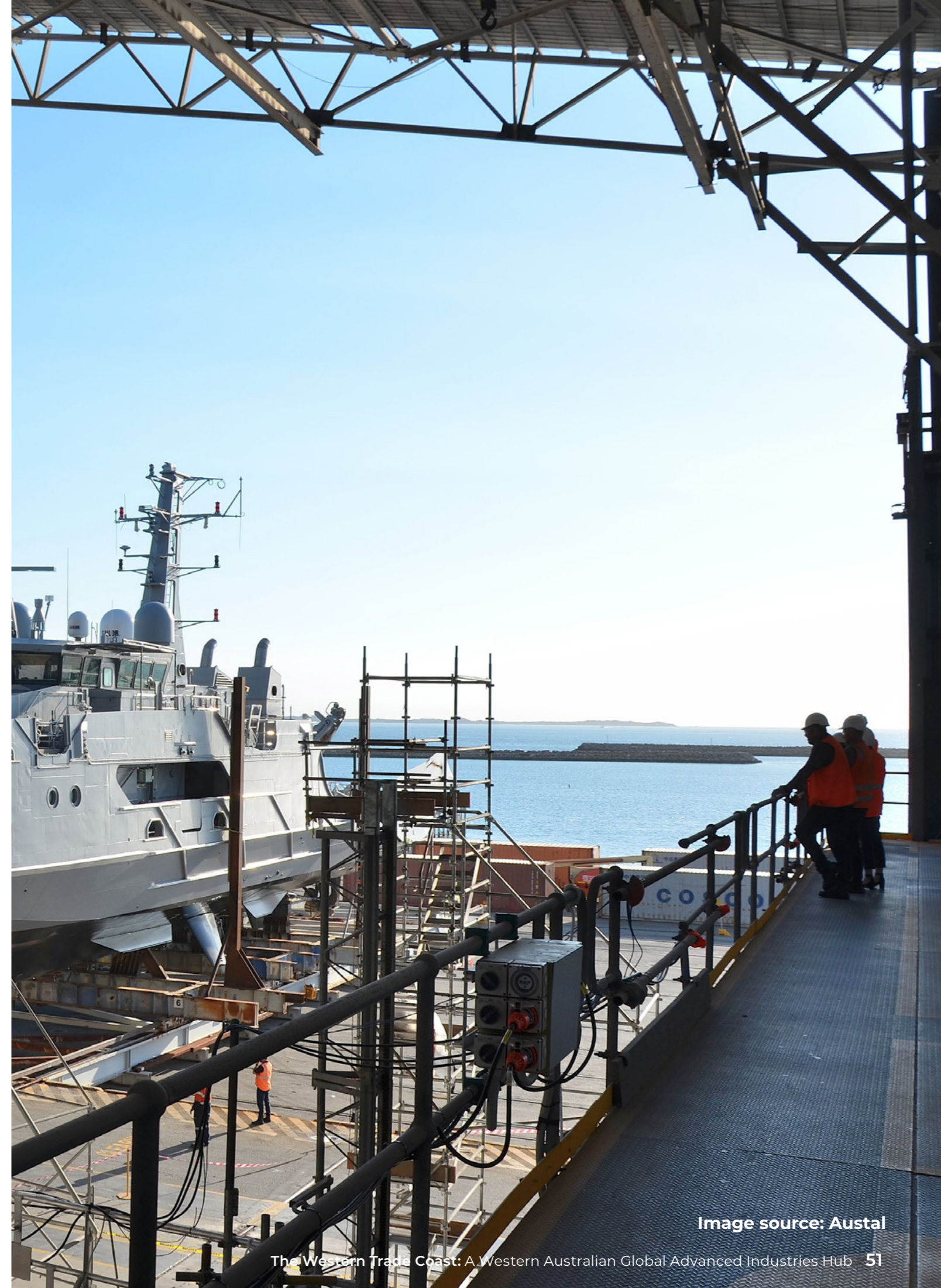


Image source: Austal





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