GOVERNMENT OF
WESTERN AUSTRALIA

Western Australia

An outstanding place for renewable hydrogen investment

MAY 2022

Minister's foreword

Western Australia has an extraordinary opportunity to become a global renewable hydrogen industry leader and help our international partners meet their future energy and emissions reduction goals.

We have some of the best solar, wind, tidal and wave resources in the world together with a landmass of 2.5 million square kilometres, shared by just 2.6 million people.

We have well established infrastructure connections, including world-class ports, and a skilled workforce with experience in expertly managing and exporting resources.

We are also home to a range of critical minerals and rare earths required for the manufacture of electrolysers, wind turbines, electric vehicles and decarbonised products, such as green steel and green aluminium making us uniquely positioned to play a key role in servicing the entire renewable hydrogen supply chain.

Renewable hydrogen also provides some real opportunities for domestic market offtake, by allowing us to reduce our reliance on imported fuels and improving the competitiveness of our industries through the availability of greener cheaper energy.

We have made a substantial commitment to unlock that potential and deliver the infrastructure we need to fast-track local renewable hydrogen production and exports across Western Australia, with a strong focus on the Pilbara and Mid West regions.

We have an interest in attracting investment and technological know-how to Western Australia and we are determined for Western Australia to have a significant stake in this bold new industry.

We look forward to welcoming you to our beautiful State.

Hon Alannah MacTiernan MLC
Minister for Hydrogen Industry

Alignment with global purpose and momentum

Hydrogen and hydrogen-based fuels are key pillars to achieving net zero targets. To achieve global net zero emissions scenario by 2050, the International Energy Agency forecasts that hydrogen-based fuel production will need to increase to 212 million tonnes per annum by 2030 and 530 million tonnes per annum by 2050. Renewable hydrogen from electrolysis-based production is forecast to achieve a 60% share of this.

Western Australia (WA) is committed to achieve net zero emissions by 2050 and to working with all sectors of the Western Australia economy to achieve this. The implementation of Western Australia's Renewable Hydrogen Strategy and its more detailed Roadmap is a key part of the State's low carbon energy transition.

WA's vision is to be a significant producer, exporter and user of renewable hydrogen. The State is on a mission to develop local industry and markets and to be a major exporter of renewable hydrogen. Western Australia will develop domestic production capabilities and applications of renewable hydrogen, and improve the State's hydrogen industry expertise, contributing to global decarbonisation in parallel with decarbonising our own economy.

Western Australia knows that it is not alone in this mission and faces fierce competition for the hydrogen market. However, WA possesses attributes and advantages that set it apart and make it an optimal place for investment.

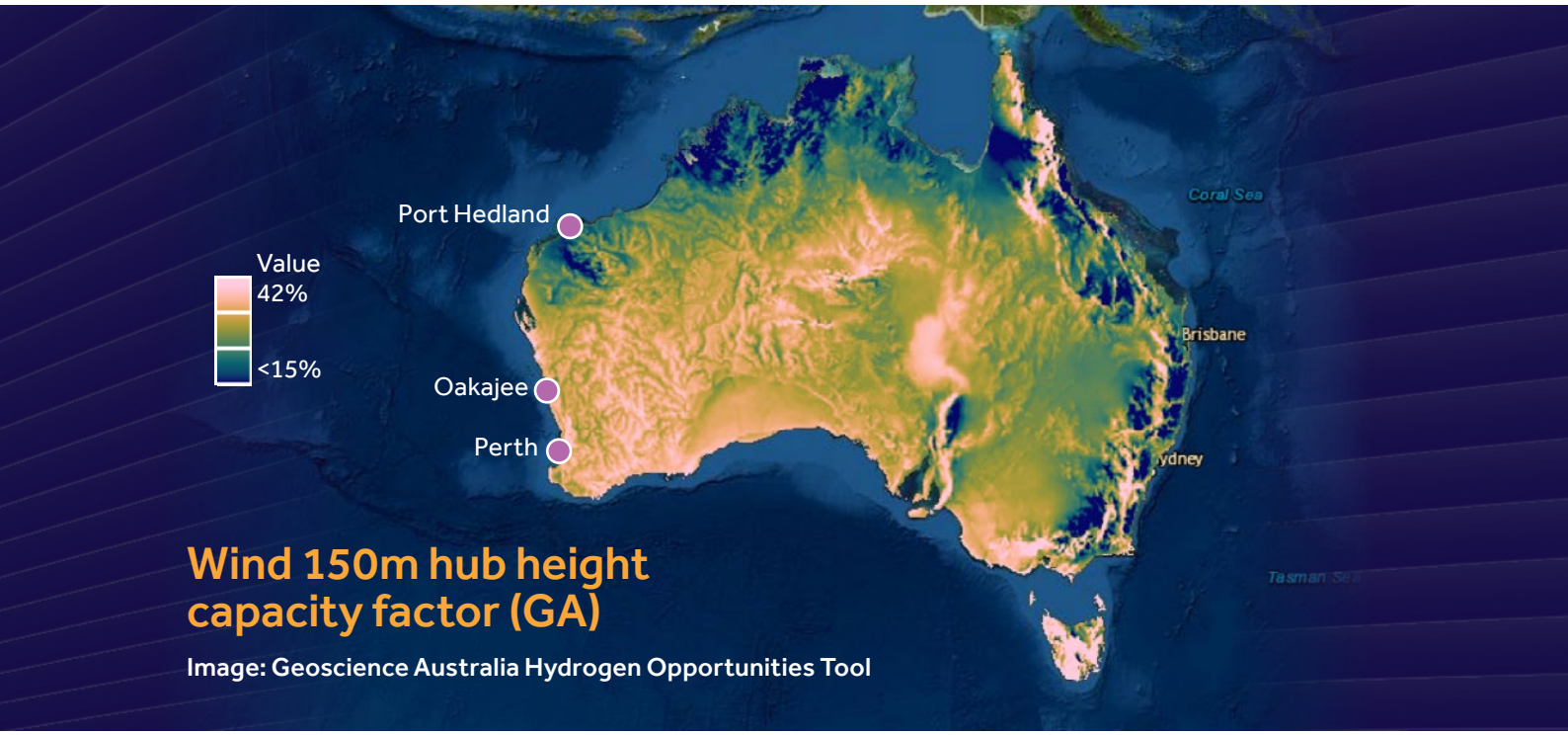
What sets Western Australia apart?

Natural resources

Foremost what sets Western Australia apart is its solar, wind and land resources, the critical ingredients for making renewable hydrogen. Western Australia has exceptional solar and wind resources for low-cost renewable electricity generation. The north of the State offers the highest solar irradiance per square kilometre in the world. Western Australia's Mid West and Southern regions have some of the country's greatest potential for wind generation, with wind resources extending hundreds of kilometres inland and capacity factors for wind turbines in the region demonstrated to exceed 45%.

As the largest State in Australia, covering 2.5 million square kilometres (approximately 10 times the size of the United Kingdom), Western Australia has large expanses of land and low population density to accommodate renewable hydrogen energy generation at scale. An unlimited supply potential of desalinated seawater along its 12,889 km of coastline is available to meet the need for water for electrolysis.

Western Australia is also home to critical minerals including nickel, copper, aluminium, lithium, vanadium, platinum and palladium. These minerals are required across the renewable hydrogen value chain including in electricity networks, electrolysers, fuel cells, batteries, electric vehicles and decarbonised products. Western Australia will soon see Australia's first integrated rare earths refinery which is expected to commence production in 2025, producing rare earth oxides of neodymium, dysprosium, praseodymium and terbium, needed in wind turbines. Western Australia has a unique opportunity to service a large component of the renewable hydrogen value chain.



Wind 150m hub height capacity factor (GA)

Image: Geoscience Australia Hydrogen Opportunities Tool

Infrastructure backbone and dedicated industrial land

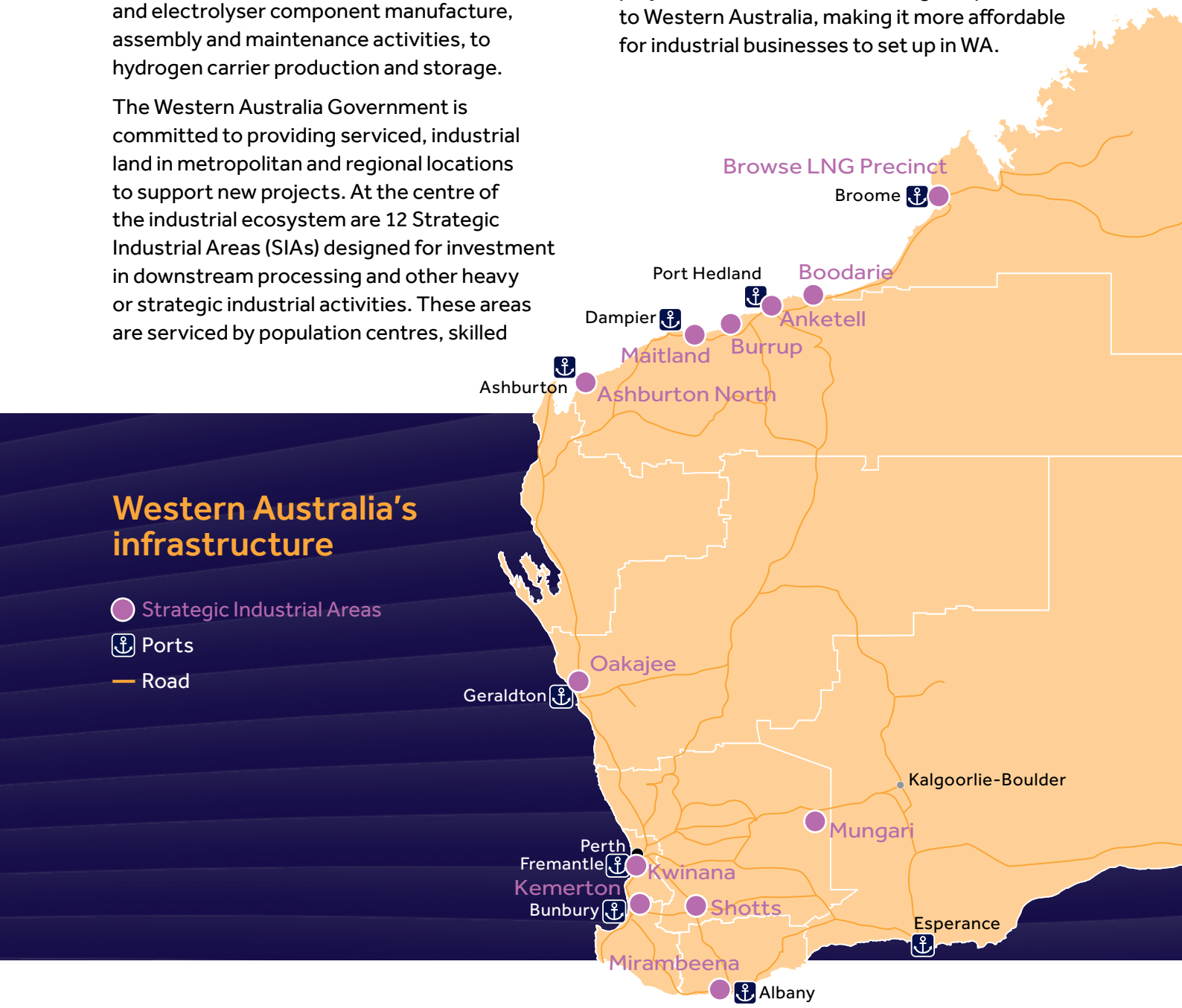
Western Australia has an existing backbone of infrastructure to support renewable hydrogen industry development. This includes 18 ports along its coastline, a state-wide road freight network and a 1600km pipeline corridor.

Western Australia also has world class manufacturing and expertise, that can accommodate industries across the renewable hydrogen supply chain from renewable energy components manufacture, electrolyser and electrolyser component manufacture, assembly and maintenance activities, to hydrogen carrier production and storage.

The Western Australia Government is committed to providing serviced, industrial land in metropolitan and regional locations to support new projects. At the centre of the industrial ecosystem are 12 Strategic Industrial Areas (SIAs) designed for investment in downstream processing and other heavy or strategic industrial activities. These areas are serviced by population centres, skilled workers and existing infrastructure including rail, road, power, gas, process water and telecommunications.

Western Australia also has a number of strategically located General Industrial Areas, offering string connectivity to major transport routes and proximity to local employment bases. The WA Government offers long-term leases on land within these areas.

Announced in March 2021, the $50 million Industrial Land Development Fund will enable the State to consider reduced lease rates in projects deemed to be of strategic importance to Western Australia, making it more affordable for industrial businesses to set up in WA.



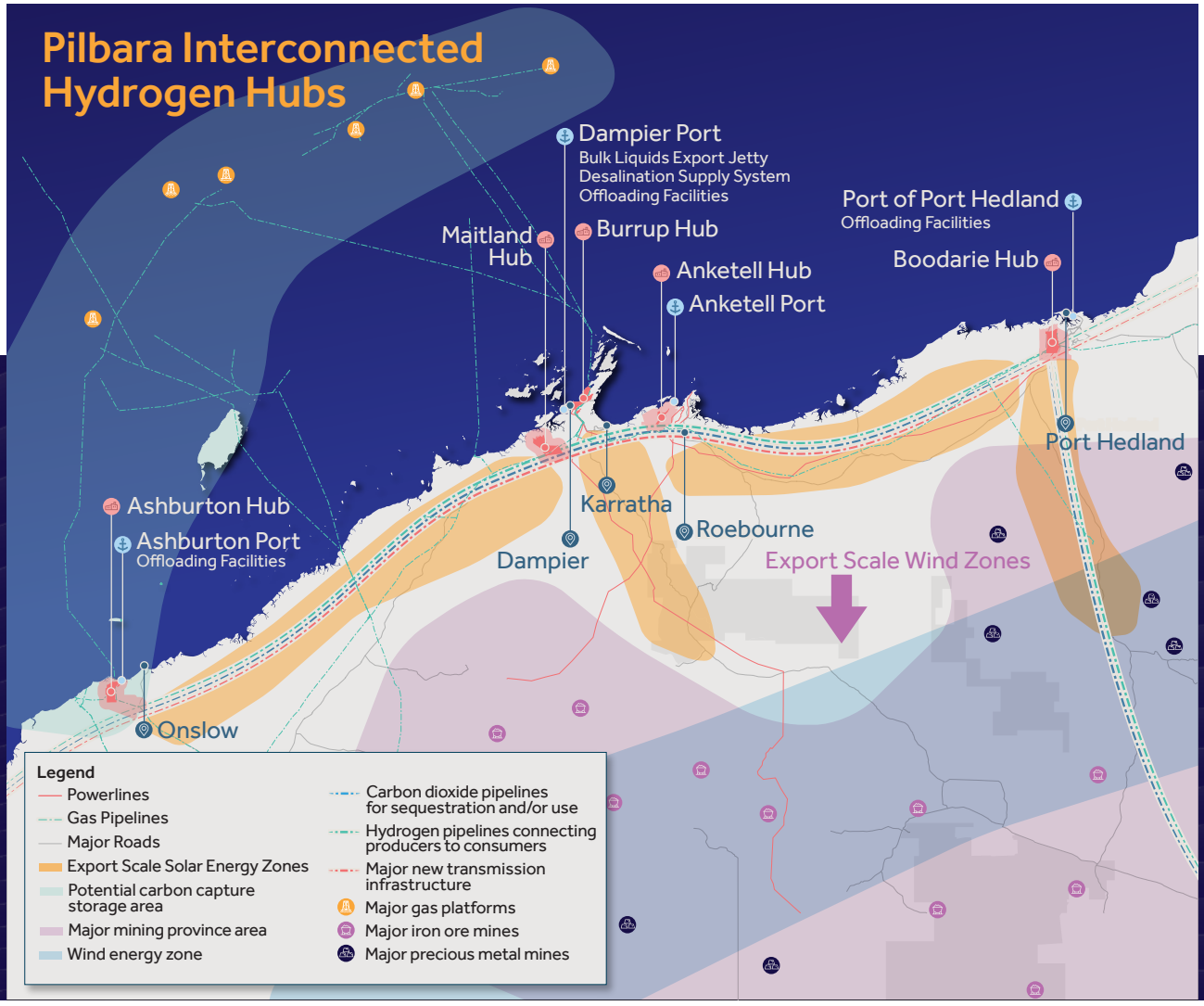
Renewable hydrogen hubs

Hydrogen hubs, or industrial precincts, provide common user infrastructure to support renewable hydrogen supply chain activity. They are located at strategic sites to respond to known industry demand and to leverage existing infrastructure, industrial land and workforces. A centrepiece of the Western Australia Government's strategy to drive industry development and cater for the export market is its $117.5 million commitment for the establishment of renewable hydrogen hubs in the Pilbara and Mid West regions of Western Australia and support for the hydrogen hub in Kwinana.

The Pilbara region has been identified as the nation's most prospective centre for hydrogen demand to 2050. Estimates for hydrogen production and exports in this region range from 3 to over 10 million tonnes per annum by 2050. The region is a natural industrial hub, with a strong activity across the resources, oil and gas and energy sectors.

The Pilbara is home to five Strategic Industrial Areas and five ports including one of the world's largest ports at Port Hedland, and a highly skilled workforce. The State's initial investment is expected to see upgrades at Port Hedland's Lumsden Point that will facilitate the import of equipment to build and develop the renewable energy and hydrogen projects.

The Pilbara Hydrogen Hub is expected to see the construction of a Clean Energy Training and Research Institute by 2025. This innovative and collaborative space will bring together industry, vocational education and training and



universities to deliver essential training and cutting-edge research, ensuring a pipeline of skills to build and sustain this industry.

The green-field Oakajee Strategic Industrial Area in the Mid West, conveniently located in close proximity to the regional City of Geraldton, boasts an excellent combination of wind and solar resources and potential for low cost energy to unlock the region's mineral resources, including iron magnetite, vanadium, aluminium, and heavy mineral sands.

The State is actively seeking opportunities for co-location of hydrogen producers, users and exporters to the site. In late 2020 a global Expressions of Interest was run for the development of the Oakajee SIA, which attracted over 65 national, international and multi-national submissions. This strong interest has allowed us to build a business case to activate the Oakajee SIA with early headworks commencing in 2022.

Resource industry experience

Western Australia has a long and reputable history of delivering energy and resources to the world. The State has an established and reliable LNG export industry. The year 2019 marked 30 years since the State commenced exporting LNG from the North West Shelf. Western Australia now accounts for 12% of global LNG exports with onshore LNG trains in the Pilbara Region. WA's current total LNG export capacity is 50 million tonnes a year with sales reaching 44.3 million tonnes in 2021.

37%

Western Australia is the largest supplier of iron ore in the world, accounting for 37% of global supply in 2021.

44.3m

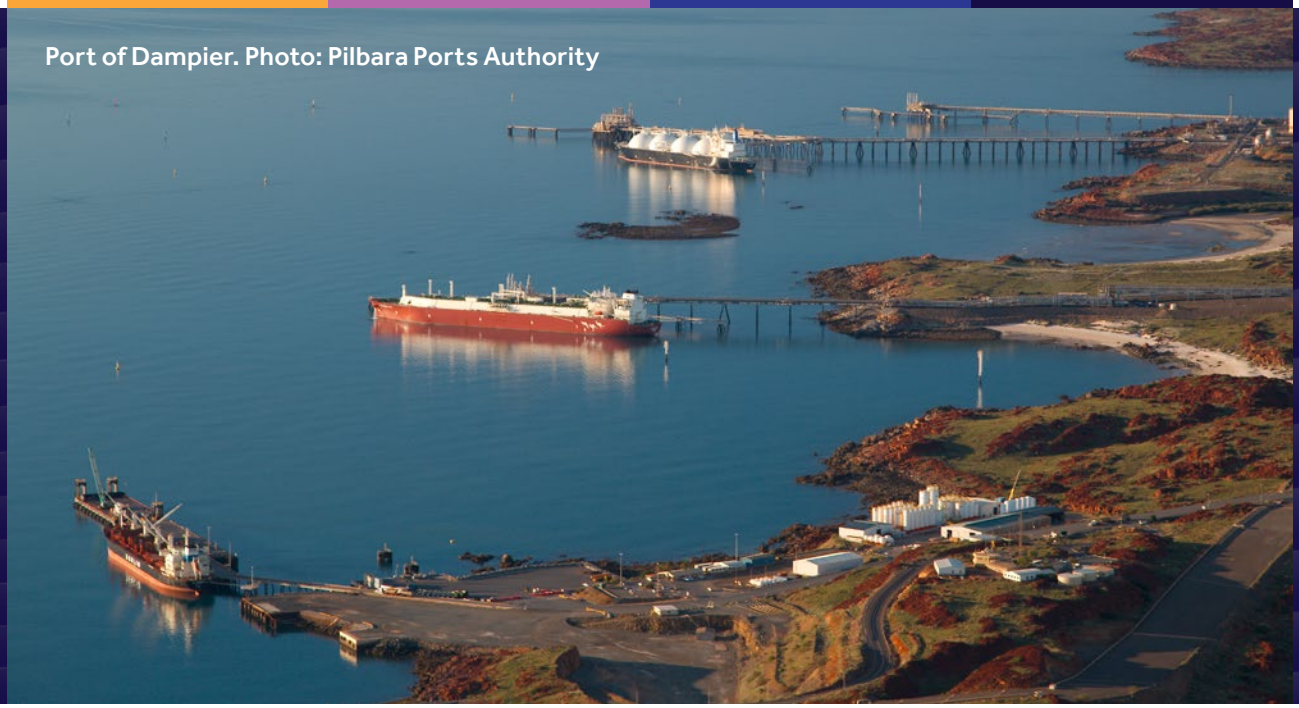
Western Australia exported 44.3 million tonnes of LNG in 2021.

50+

More than 50 different minerals are mined in Western Australia.

27,104

27,104 tonnes of rare earth elements sold in 2020-21 up 22% on previous year.



Port of Dampier. Photo: Pilbara Ports Authority

With its first shipment of iron ore from the Pilbara region in 1966, Western Australia has become the largest iron ore supplier in the world, accounting for 37% of global supply in 2021, more than doubling the next supplier, Brazil (17%). WA iron ore miners are among the world's lowest cost seaborne iron ore exporters.

As a result, Western Australia has significant transferable export industry capability and hosts an established, world-leading network of mining and gas equipment, technology and services firms and engineering support services.

Research & Development initiatives

Our universities and research institutions are actively involved in research across hydrogen export and value chains. The University of Western Australia and Curtin University are among the leadership of Australia's Future Energy Exports Cooperative Research Centre (CRC). This CRC recognises the opportunity for Australia to leverage the know-how, capability, infrastructure and supply chains of its LNG industry, and build on our world-class renewable energy resources to establish a global leading position in the nascent hydrogen export industry.

Western Australia is also part of the Australian Future Fuels CRC and the Heavy Industry Low-carbon Transition (HILT) CRC. The Future Fuels CRC is focusing on net zero emissions fuels, including hydrogen. The HILT CRC is Australia's leading research collaboration, enabling heavy industry to compete in a low-carbon economy.

There is leading research in WA with respect to green steel, iron, alumina and glass as well as in storage technologies such as metal hydides.The State's Mineral Research Institute has a Green Steel Challenge to investigate the pathways for decarbonisation of haematite and magnetite.

Skilled and adaptable workforce and research capabilities

Western Australia has a highly-skilled and experienced workforce with capabilities developed through our world leading resource sector. Our workers and businesses have been successfully servicing export projects for decades, across highly competitive global

Image: Pilbara Development Commission

supply chains including iron ore, gas, chemicals, mineral processing and defences industries.

A key focus for the Western Australia Government is ensuring our local workforce is ready to meet the skills and capabilities required by the renewable hydrogen industry. In the wake of the COVID-19 pandemic, the Western Australia Government is focused on upskilling our workforce to ensure it is well-placed to support fast-track industries like this. Western Australia has invested more than $280 million to upskill and reskill in preparation for future demand.

Reliability and stability

Western Australia is a reliable trading partner with low sovereign risk and political stability. The Western Australia Government acts predictably and in accordance with the law, ensuring legal certainty in administrative decision-making. Good governance, the rule of law and strong institutions are key foundations of the Australian democracy.

The Western Australia Government employs a rigorous budget management framework, underpinned by annual budgets including medium term financial forecasts and audited outcomes. The effectiveness of this fiscal discipline and strong track record of adherence to targets is underpinned by a legislated financial management framework, and is regularly referenced as a positive contributor in rating agency assessments. In October 2021, ratings agency S&P Global revised its outlook on Western Australia's AA+ credit rating to 'positive', citing the State's 'continued budget outperformance compared with domestic and global peers' and 'exceptional fiscal metrics'.

Ideally located to do business

Western Australia shares a similar time zone with many countries in Asia, making it internationally connected and easy for you to do business with 4.5 billion people. Western Australia is ideally located to access global trading networks, with close proximity to key Asian markets including Japan, China, India and South Korea.

Western Australia has strong international partnerships with Europe, including a MOU with the Port of Rotterdam.

Best practice environmental and ethical standards

Western Australia's legislative frameworks and project approval system guarantees positive Environmental, Social and (corporate) Governance (ESG) outcomes. We have a robust and transparent regulatory framework including an independent Environmental Protection Authority, the peak body responsible for conducting environmental impact assessment of environmentally significant proposals in Western Australia. Further safeguards are environmental appeal rights enshrined in law and available to anyone.

Legislation, policies and processes are in place to protect the rights and interests of Traditional Owners, and manage impacts to Aboriginal heritage sites. Western Australia is additionally committed to building capacity of Traditional Owners to engage with the industry and negotiate the outcomes they want to see from these projects – including protecting cultural heritage, Native Title rights and interests, as well as positive social and economic outcomes.

Green Certification

The Western Australia Government is a founding member of the Australian Smart Energy Council's Zero Carbon Certification Scheme. This Guarantee of Origin-style scheme will certify the renewable hydrogen, green ammonia or green metal that has been made from renewable energy sources, and provide an embedded carbon rating. It will operate as a tracking system for the amount of greenhouse gas emissions connected with the production. As a founding partner, the Western Australia Government will collaborate with the Smart Energy Council and its domestic and international partners to develop and implement the scheme.

Photo: Independence Group

Western Australia's commitment to its renewable hydrogen industry

The Western Australia Government is committed to renewable hydrogen industry development through the implementation of its Renewable Hydrogen Strategy and Roadmap, these are focused on ensuring that we have the appropriate policy settings and industry activation initiatives in place to drive forward the development of the industry. This includes building both the domestic market and export markets for renewable hydrogen.

Western Australia's goal is to achieve a market share in global hydrogen exports by 2030, similar to the 12 percent share it has in LNG today. In parallel, Western Australia is aiming to achieve a 10% renewable hydrogen blend in its gas pipelines and networks, and to see renewable hydrogen used in heavy haulage and as a large fuel source for transportation in regional Western Australia.

The Western Australian Government is working collaboratively with the Australian Government to establish clear policy and regulatory settings, which will grow our participation in global supply chains and support industry access to investment and partnership opportunities.

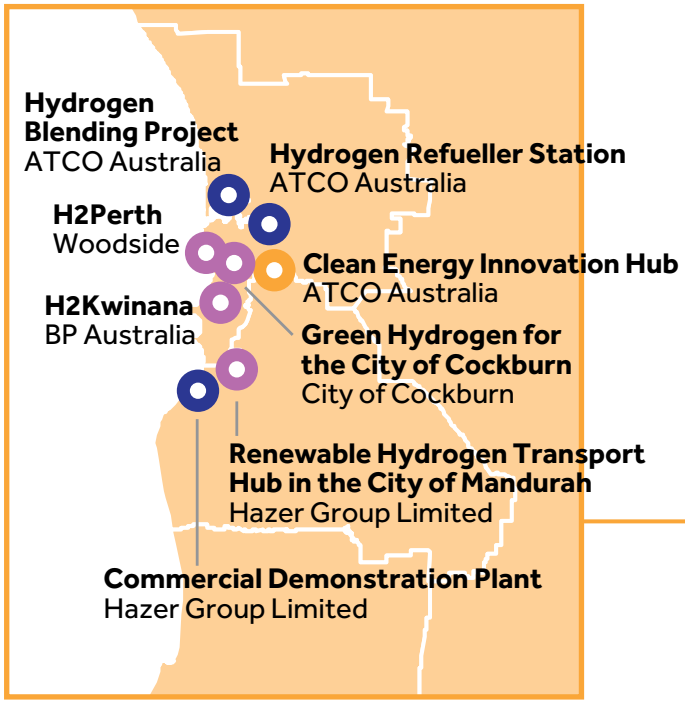
Western Australia has more than 30 hydrogen projects at various stages of planning across many aspects of the supply chain. Among these are very large gigawatts scale production projects. Recent multibillion dollar hydrogen projects announcements such as H2Perth hydrogen, the Western Green Energy Hub on the southern coast; and a massive Asian Renewable Energy Hub planned for the Pilbara, signal global confidence in Western Australia's renewable energy credentials and ambitions.

With current and planned projects under consideration we could see Western Australia produce up to 100 gigawatt of renewable energy for hydrogen in the next 10 years, which could increase to 200 gigawatt by 2040.

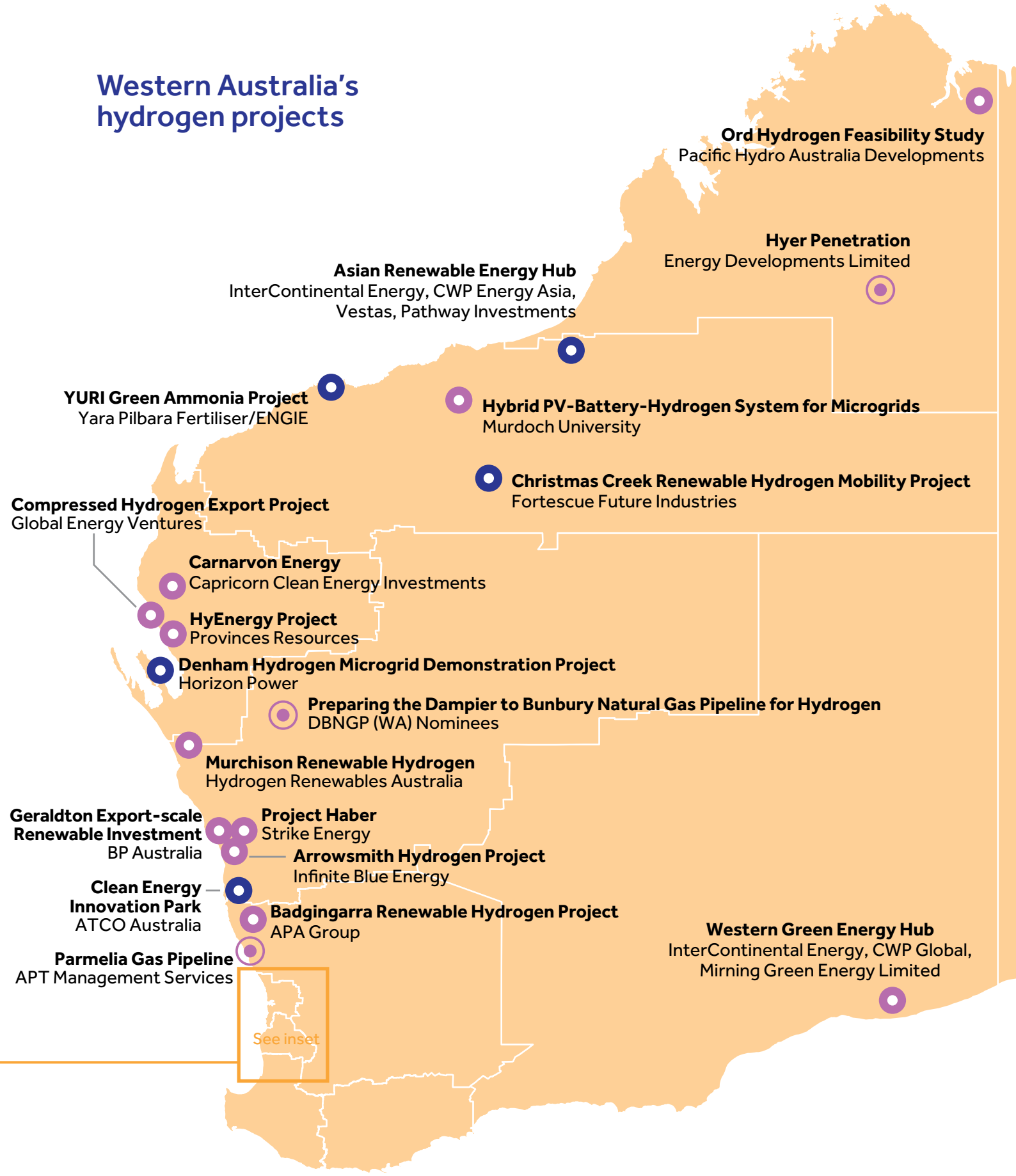
The Australian Government's HyResource platform provides up to date information about these and other projects across Western Australia visit http://research.csiro.au/hyresource/.

Project status (as at April 2022)

- Investigation study
- In progress
- Completed
- Multiple sites and/or regions



Western Australia's hydrogen projects



Investment and project support

The Western Australia Government will actively support industry efforts to accelerate the development of the industry to meet its goals, through:

- Access to a one-stop-shop for incoming trade and investment enquiries
- Identification and facilitation of access to industrial land
- Project approvals facilitation services to help you navigate our project approvals process efficiently and effectively
- Introductions across the supply chain
- Identification of relevant Western Australian and Australian Government funding opportunities when they become available

To date the Western Australian government has committed $160 million to support the development of the renewable hydrogen industry in Western Australia, and is on track to meet the 2022 goals set out in the Western Australian Renewable Hydrogen Strategy. In addition, the State has committed:

- $750 million to a Climate Action Fund which includes $206 million for renewable energy initiatives and $118 million for investment in future climate related initiatives
- $100 million for an Investment Attraction Fund
- $50 million to an Industrial Land Fund to help unlock strategic industrial sites.

A great place to work and live

Western Australia is a great place to live, work, do business and explore. We have an enviable climate, pristine coastline, unique wildlife, natural wonders, as well as globally significant biodiversity. Western Australia's capital city Perth consistently rates as one of the most liveable cities in the world.

Where to start

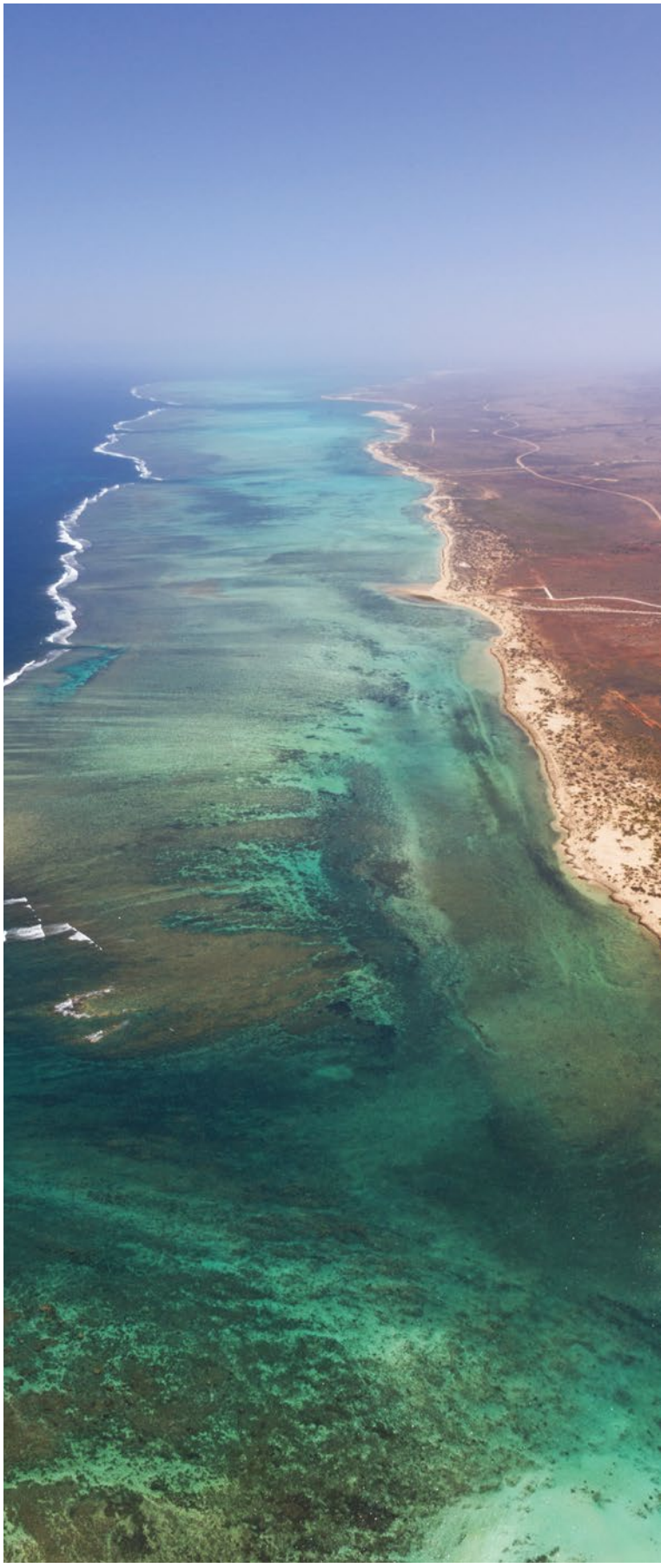
The Western Australia Government will make your entry into Western Australia as seamless as possible. The Department of Jobs, Tourism, Science and Innovation's Invest and Trade Western Australia team provides a one-stop shop for incoming trade and investment enquiries.

At Invest and Trade Western Australia, a team of business facilitation professionals will work with you to assess your business requirements and connect you with relevant government and industry stakeholders, to fast track your entry into Western Australia. Through a network of local and international offices, the team can help you navigate the Western Australian investment and trade ecosystem. Invest and Trade Western Australia can help you by providing:

- a dedicated point of contact for your business or project
- introductions to local relevant suppliers, consultants, organisations, agencies and industry bodies
- investment ready project support
- assistance with site visits
- a guide to working in Western Australia - business registration, property, visas, banking, employment standards and Australian tax – to accelerate investment
- access to relevant and timely market intelligence to assist you to develop your market entry strategy
- advice on business support grants, funding, incentives and projects.

Contact us

Please contact the Invest and Trade Western Australia team at investandtrade.wa.gov.au



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Cover image: Ammonia plant - Yara Pilbara