



Department of  
**Jobs, Tourism, Science  
and Innovation**

# Western Australia Renewable Hydrogen Strategy Refresh: Stakeholder Consultation Paper 2023



# Minister's Foreword

Western Australia was one of the first global jurisdictions to develop a Renewable Hydrogen Strategy.

Last year we reached the strategy's 2022 goals, putting us on the pathway for growth.

Over the last year, we have seen much progress in hydrogen initiatives and large-scale generation projects, progressing towards developing a world-scale renewable hydrogen industry. We're also investing hundreds of millions of dollars advancing our research, supporting emerging technologies and attracting investment.

We are currently working with industry and communities on a revised strategy to best position Western Australia over the next phase of development.

We are at a critical moment in history, a once in a generation opportunity to unlock economic and social benefits from global decarbonisation targets. Australia, and Western Australia, have a role to play in fuelling the demand for renewable hydrogen, green energy and critical minerals.

Like many other economies, Western Australia has committed to transitioning to net zero emissions by 2050.

Our State is equivalent to the size of Western Europe at 2.5 million square kilometres, 12,000 kilometres of coastline and 2.6 million residents. Most of this land has some of the world's best solar and wind resources and is close to complementary infrastructure and resources.

Western Australia has established mining and natural gas industries, with a proven capability in developing globally competitive supply chains. We have established infrastructure connections, world-class ports, and a skilled workforce with

transferable skills. With low sovereign risk, high environmental, social and governance standards, Western Australia is well-placed to support the development of a renewable hydrogen industry.

Global hydrogen use is forecast to grow to 500 to 800 million tonnes a year by 2050 – current demand is 115 million tonnes. We have around 30 different proposals for gigawatt scale projects that extend across the State. The project pipeline to 2040 has indicated the potential for 200 gigawatts worth of renewable energy generation. These projects could supply millions of tonnes of renewable hydrogen every year to Europe, Japan, South Korea and Singapore.

We understand attracting investment in renewable hydrogen projects is the key to developing the industry. These investments take risk. They take vision. They take leadership. To achieve our goals, we need to ensure there is appropriate government policy settings in place.

Our State has the mettle and the experience when it comes to building projects of epic scale and industries of global significance. All the necessary ingredients are here to build a global scale renewable hydrogen industry. Through international collaboration we can further explore how the gaps in the supply chain can be bridged and scaled rapidly.

I'm very pleased to lead this next chapter in Renewable Hydrogen for the state, and excited about the opportunities and experience I can bring from my role in the Energy, Mines and Petroleum portfolios.



Hon Bill Johnston MLA

Minister for Mines and Petroleum; Energy;  
Hydrogen Industry; Industrial Relations

# Contents

	<b>Document Purpose</b>	<b>4</b>
<b>1</b>	<b>Executive Summary</b>	<b>5</b>
<b>2</b>	<b>Western Australia’s Renewable Hydrogen Opportunity</b>	<b>7</b>
	2.1. The market for hydrogen	7
	2.2. Western Australia’s comparative advantages	10
	2.3. Western Australia’s opportunity	11
<b>3</b>	<b>Hydrogen Progress in Western Australia</b>	<b>12</b>
	3.1. A first mover	12
	3.2. Progress-oriented	12
<b>4</b>	<b>The Need for a Strategy Refresh</b>	<b>13</b>
	4.1. Changing international context	13
	4.2. Changing national context	14
	4.3. State context	16
	4.4. Changing technology feasibility and viability	17
<b>5</b>	<b>The Strategy Refresh Framework</b>	<b>19</b>
	5.1. The role for government in the hydrogen industry	19
	5.2. The strategy refresh framework	19
	5.3. The transition to pillars	20
<b>6</b>	<b>Vision and Strategic Focus Areas</b>	<b>22</b>
	6.1. Vision and mission	22
	6.2. Pillars and enablers	23
	6.3. Evaluation and goals	32
<b>7</b>	<b>Conclusion</b>	<b>33</b>
	<b>Appendix</b>	<b>34</b>
	Appendix 1: Summary of progress against Strategy goals	34

# Document Purpose

The Stakeholder Consultation Paper is designed to inform stakeholders on the rationale and direction of Western Australia’s refreshed Renewable Hydrogen Strategy. Feedback gathered from stakeholders on the Paper will be used to inform the release of the Strategy later in 2023. Stakeholder feedback from the National Hydrogen Strategy Refresh consultations will also be shared with the Western Australian Government to inform this Strategy. Both sets of feedback will guide the refreshed Western Australian Strategy to continue to position the State at the forefront of hydrogen industry development, and further collaborative efforts at the state and national level.

Completed	Current	Q3 2023	2023
Release of the 2022 Mission Update assessing current progress and future direction	Stakeholder consultation paper	Stakeholder workshops which include: in-person consultation and webinar(s)	Development of the refreshed renewable hydrogen strategy.
Industry roundtable held to understand current challenges	Feedback on stakeholder consultation paper welcome via <a href="mailto:hydrogen@jtsi.wa.gov.au">hydrogen@jtsi.wa.gov.au</a> Please submit feedback by COB Monday 16 October 2023		

## Disclaimer

The information contained in this publication is provided in good faith and believed to be reliable and accurate at the time of publication. However, the information is provided on the basis that a reader will be solely responsible for making their own assessment of the information and its veracity and usefulness. The State shall in no way be liable, in negligence or howsoever, for any loss sustained or incurred by anyone relying on the information, even if such information is or turns out to be wrong, incomplete, out of date or misleading.

**Published by the Department of Jobs, Tourism, Science and Innovation, 2023. © Government of Western Australia**

**The Western Australian Government is undertaking a refresh of Western Australia’s Renewable Hydrogen Strategy and is seeking stakeholder consultation on the high-level components of the refreshed Strategy to inform the development of the final document.**

Western Australia was one of the first jurisdictions globally to develop a Renewable Hydrogen Strategy and has made significant progress on this important initiative since 2019. The overall vision remains, however the **changing international environment including significant global policy shifts, and the completion of the 2022 Strategy goals necessitate a refresh to Western Australia’s Renewable Hydrogen Strategy.**

Developing a renewable hydrogen industry will assist in diversifying Western Australia’s economy by creating new industries, generating income and jobs for Western Australians, and contributing to economy-wide net-zero targets, and sector-specific decarbonisation.

Many nations have made hydrogen a priority for investment and government support since 2019, building upon carbon neutrality agendas. The emphasis of more recent international strategies has shifted away from end use toward a focus on industry differentiation, product differentiation and future international competitiveness. In an increasingly competitive renewable hydrogen market, the **Western Australian Government is redeveloping Western Australia’s Renewable Hydrogen Strategy to align with the State’s comparative advantages.**

The refreshed strategy will outline the State’s path forward on accelerating decarbonising hard-to-abate sectors, aligning with mineral resource opportunities in Western Australia and supporting international partners in their decarbonisation journey. This will help position the State to be a leading renewable hydrogen producer, user and exporter.

The 2019 strategic focus areas are highly end use focused, while the new proposed priority focus areas consider the changes in the domestic and international markets. The refresh will address learnings related to the hydrogen value chain and project development since the Strategy’s initial release. The proposed pillars link directly to the next stage in the industry, providing broad market development across the value chain - production, use and export. The fourth pillar area highlights the importance to focus on ensuring the renewable hydrogen industry develops sustainably, safely, and equitably, delivering economic, social and environmental benefits to the Western Australian community.



# Western Australian Renewable Hydrogen Strategy Refresh

## Vision

Western Australia will be a significant producer, exporter and user of renewable hydrogen.

## Mission

Western Australia will develop industry and markets for the domestic use and export of renewable hydrogen. The renewable hydrogen industry will decarbonise local and global markets and increase the diversification of the State's economy.

## Pillars



Production



Use



Export

## Enabling Development

- Skilled and productive workforce
- Environmental, social and governance frameworks
- Aboriginal empowerment
- Science, innovation and technology
- Advanced manufacturing capabilities
- Key Infrastructure and project ready land
- Policy and regulatory frameworks
- Investment and trade ecosystem

## Activities and Actions

The pillars including hydrogen production, domestic hydrogen use, and hydrogen export will be underpinned by enablers. Government activities and actions within enabler areas will assist in achieving the goals or objectives of each pillar.

Figure 1: Strategy refresh overview

The vision for renewable hydrogen in Western Australia remains relevant, however a realignment of the State's Mission and shift from Strategic Focus Areas to pillars is proposed in recognition of advances in the thinking and technology in the global hydrogen industry.

# Western Australia's Renewable Hydrogen Opportunity

## 2.1. The market for hydrogen

Over the next decade, the global renewable hydrogen economy is predicted to grow rapidly to support decarbonisation. Early market development is critical for countries to benefit from global investment, which would support the development of a domestic and international industry.

Hydrogen can be produced in multiple ways and is predominately produced today through the reforming of fossil fuels (Steam methane reforming). Whilst efficient, this has a high carbon dioxide equivalent intensity (~10 kgCO<sub>2</sub>e/kg H<sub>2</sub>). Hydrogen produced using electrolysis uses electricity to split a water molecule into hydrogen and oxygen. Provided the electricity is from renewable energy, with close to zero marginal greenhouse gas emissions, the carbon dioxide equivalent intensity will close to zero.

A number of jurisdictions are seeking to define the lifecycle carbon content in relation to the hydrogen, while others are providing requirements on the hydrogen in relation to the nature of the energy source used in production.

The Strategy defines renewable hydrogen as hydrogen produced using energy from renewable hydrogen sources. In addition, the Strategy recognises the fast pace of technological change and that there may be new developments in hydrogen production that are low-emissions.

However, the word 'renewable' has been maintained in the title to signal the end goal and where Western Australia will have the strongest advantage.

### Supply projections

Globally, approximately 60,000 tonnes of hydrogen are produced per annum using renewable electricity.<sup>1</sup> This currently is less than one percent of total fossil fuel hydrogen production, but is expected to grow up to ~25 million tonnes per annum by 2030 (if all announced projects achieve maximum production).<sup>2</sup> While Europe, South America and Oceania currently have the highest planned capacity for renewable hydrogen projects, announcements from China and Africa are growing rapidly. Global announced investment in the hydrogen industry to 2030 grew 33% in the 8 months to January 2023 from ~AUD 358 billion to ~AUD 522 billion, with the majority concentrated on supply.<sup>3,4</sup> However, announced project capacity is not expected to cover forecast hydrogen demand by 2030 and there remains a predicted investment shortfall of up to ~AUD 164 billion on supply projects, ~AUD 201 billion on infrastructure projects and ~AUD 201 billion on end-use applications.<sup>5,6</sup> Western Australia's cumulative pipeline of potential renewable hydrogen projects has an estimated output of up to ~11 million tonnes per annum by 2040, assuming maximum capacity.<sup>7</sup> However, production faces

1 Hydrogen Council with McKinsey & Company 2023, *Hydrogen Insights 2023*, Hydrogen Insights 2023 | Hydrogen Council, accessed 12 June 2023.

2 Ibid. Note this is a projection based on forecasted capacity of global committed, announced and in planning projects as at January 2023.

3 Ibid

4 Exchange rate conversion as of 11th July 2023, 1 AUD = 0.67 USD

5 Hydrogen Council with McKinsey & Company 2023, *Hydrogen Insights 2023*, Hydrogen Insights 2023 | Hydrogen Council, accessed 12 June 2023

6 Exchange rate conversion as of 11th July 2023, 1 AUD = 0.67 USD

7 Department of Jobs, Tourism, Science and Innovation projections. This forecast assumes all Western

challenges across land and infrastructure access, approval and construction timelines and access to sustainable water resources.

## Demand projections

Fertiliser production and refining dominate the existing global demand for hydrogen. These sectors used ~94 million tonnes of hydrogen combined in 2021, driven by the post-lockdown recovery of global chemical manufacturing and refining.<sup>8</sup>

By comparison, emerging uses for hydrogen (including transport and fuel production) utilised 40,000 tonnes of hydrogen.<sup>9</sup> Despite a small increase relative to dominant hydrogen applications, this use of hydrogen in non-dominant sectors represented a 60% increase on 2020 levels and indicates the strong interest in expanding hydrogen applications seen globally.<sup>10</sup>

A 2023 report forecast global hydrogen demand to reach up to ~170 million tonnes by 2030, increasing to ~600 million tonnes by 2050.<sup>11</sup> The renewable hydrogen demand by end use is expected to become significantly more varied by 2030, with increasing quantities required in iron and steel production and transport.<sup>12</sup> Western Australia is expected to follow this projection of increasingly diversified renewable hydrogen demand. The National Hydrogen Infrastructure Assessment estimated Western Australia's renewable hydrogen demand could reach up to 1 million tonnes of hydrogen per annum by 2040 and up to 4 million tonnes per annum by 2050.<sup>13</sup> By 2040, the mining, industrial and shipping sectors are projected to account for nearly half of Western Australia's total demand, with power generation and transport also significant sources of demand.<sup>14</sup>

---

*Australian projects in planning, construction or delivery reach maximum output capacity.*

8 International Energy Agency 2022, *Hydrogen*, <https://www.iea.org/reports/hydrogen>, accessed 12 June 2023. Note, this figure includes use of hydrogen produced using fossil fuels.

9 *Ibid*

10 *Ibid*

11 Deloitte 2023, *Green hydrogen: energising the path to net zero*, *Green hydrogen: Energizing the path to net zero* (deloitte.com), accessed 13 June 2023. Note, this forecast represents the demand required to reach net-zero by 2050 in a scenario where hydrogen is a significant decarbonisation tool.

12 *Ibid*

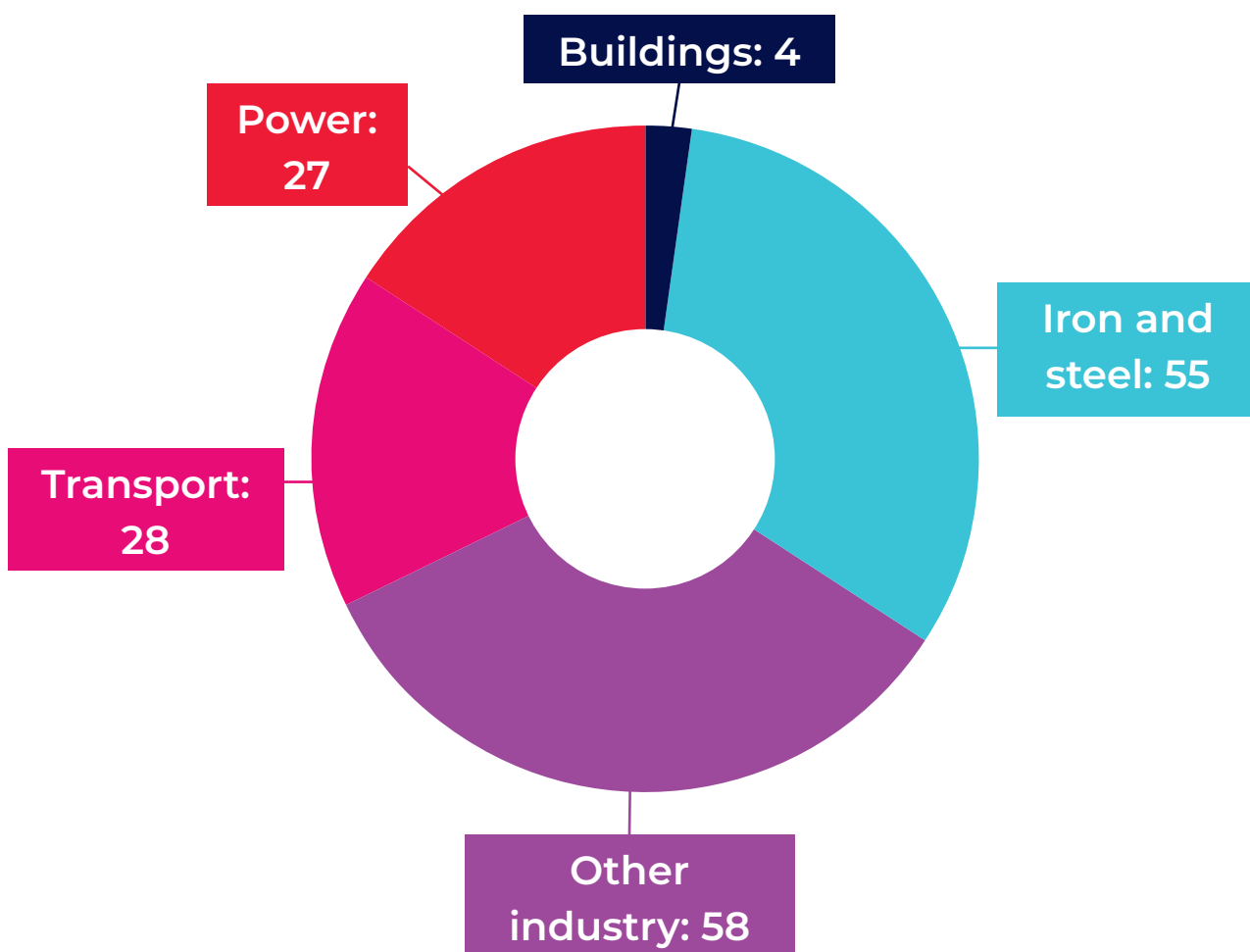
13 Arup 2023, *National Hydrogen Infrastructure Assessment: Final Report, for the Department of Climate Change, Energy, the Environment and Water*, *National Hydrogen Infrastructure Assessment: Final Report* (dceew.gov.au), accessed 19 June 2023. Note, this report modelled hydrogen demand based on several key assumptions about the pace of industry development and infrastructure.

14 *Ibid*



Figure 2: Global estimated hydrogen demand by sector (2030) millions of tonnes per annum

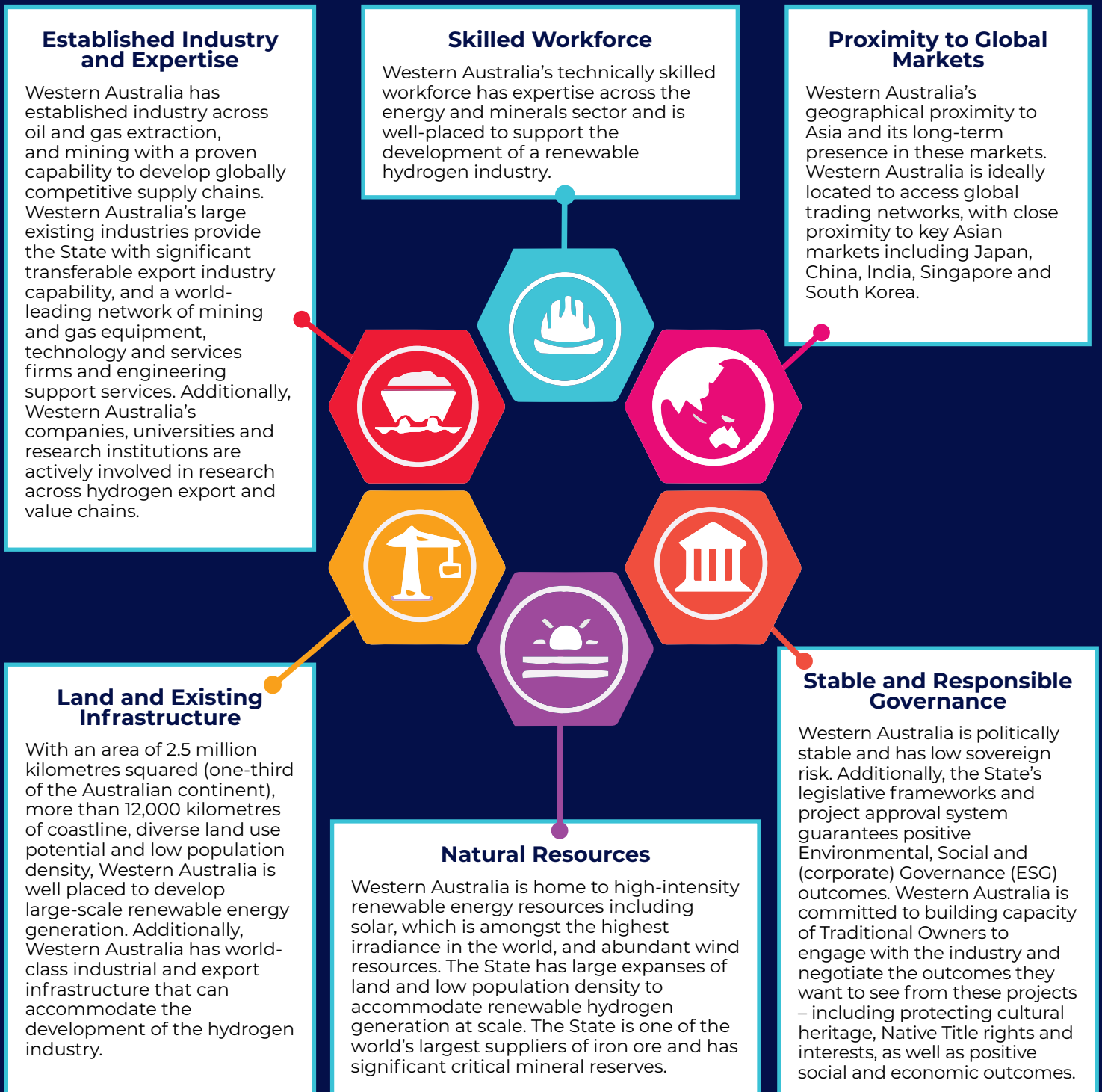
Source: Deloitte 2023<sup>15</sup>



<sup>15</sup> Deloitte 2023, *Green hydrogen: energising the path to net zero*, *Green hydrogen: Energizing the path to net zero* (deloitte.com), accessed 13 June 2023

## 2.2. Western Australia's comparative advantages

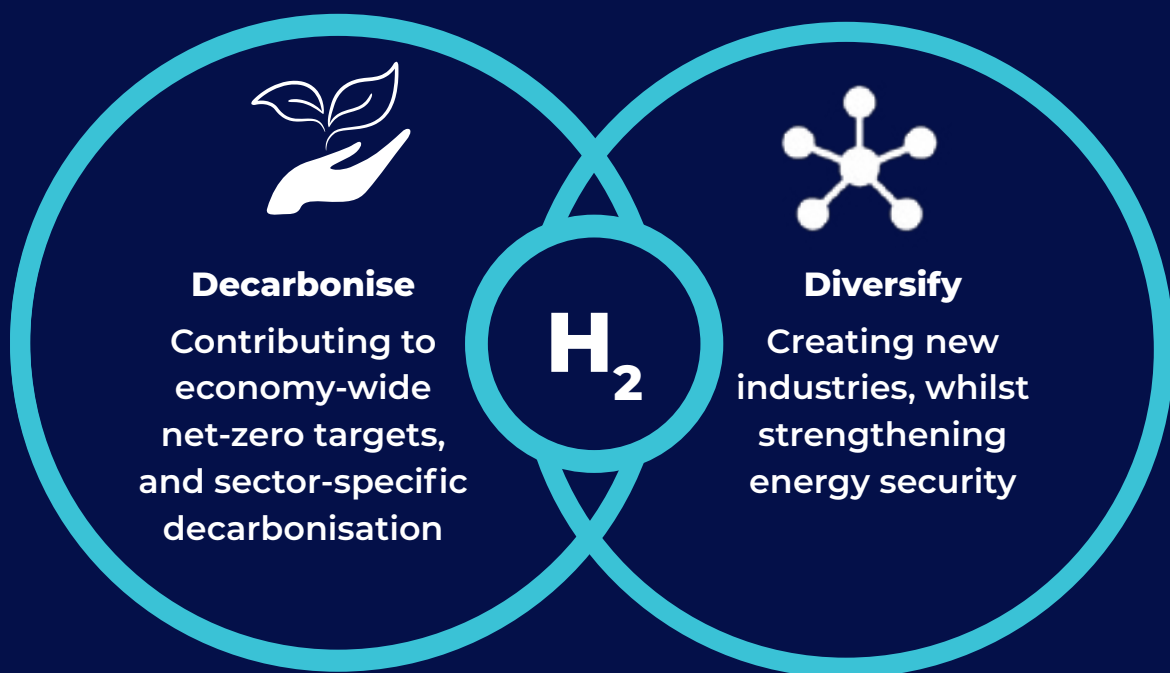
Western Australia has significant comparative advantages in producing, exporting and using renewable hydrogen. The State's geography, industry and skilled labour force place it at the forefront of the emerging global renewable hydrogen industry.



### 2.3. Western Australia's opportunity

**The State of the Hydrogen Report stated that Australia has around 40% of all announced global hydrogen projects, with the Australian pipeline valued from \$230 billion to \$300 billion<sup>16</sup>. Western Australia is well positioned to capture some of this market.**

The renewable hydrogen economy is developing quickly across the world as countries seek to maximise the benefits arising from new industry development. The Western Australian Government is prioritising the development of a renewable hydrogen industry because it aligns across the key priorities for the State: diversify and decarbonise.



<sup>16</sup> DCCEEW 2023, *State of Hydrogen 2022 Report*, at [www.dcceew.gov.au/energy/publications/state-of-hydrogen-2022](http://www.dcceew.gov.au/energy/publications/state-of-hydrogen-2022)

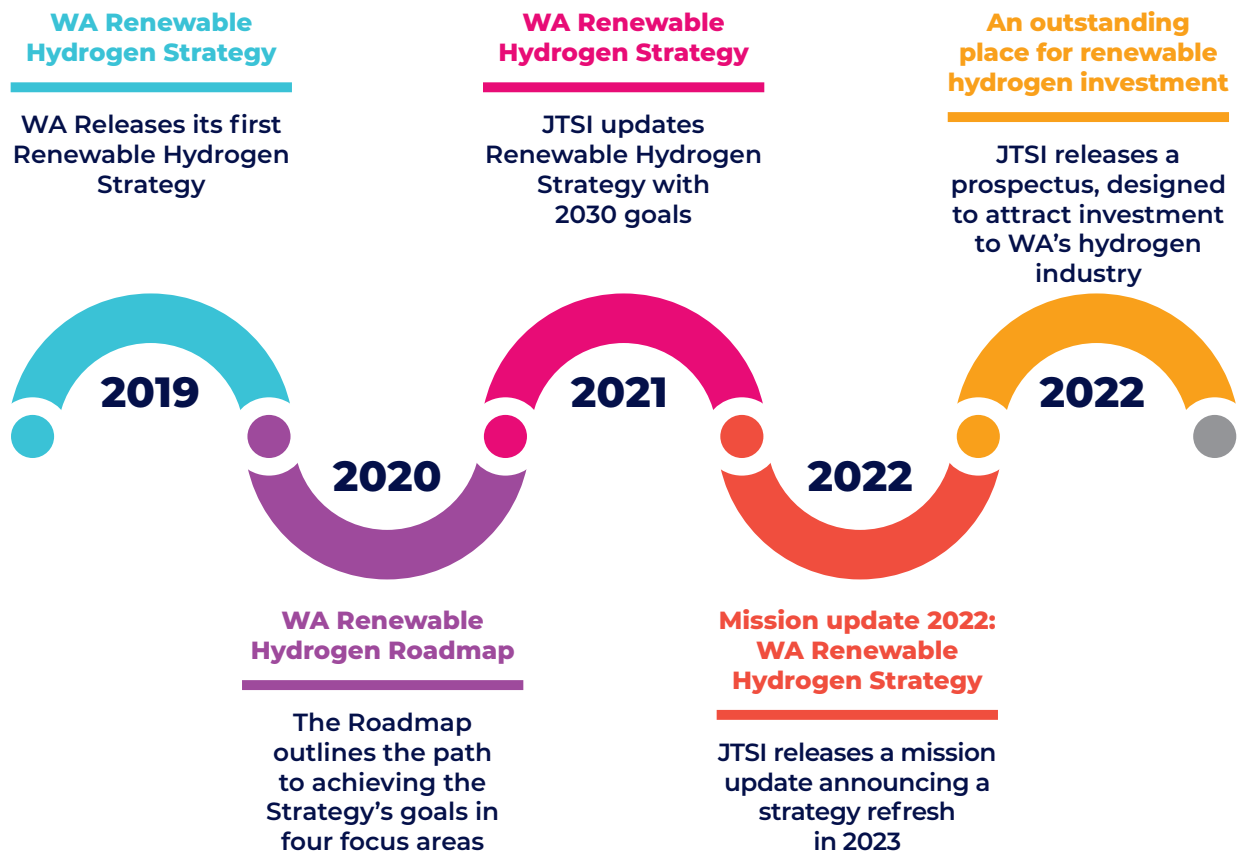
# 3

## Hydrogen Progress in Western Australia

### 3.1. A first mover

In 2019, Western Australia became the first state in Australia to publish a renewable hydrogen strategy. In this document it outlined four strategic focus areas for the hydrogen industry – export, remote application, hydrogen blending in natural gas networks and transport – each with goals for 2022 and 2030. Subsequent policy documents include the Roadmap, Strategy Update, Mission Update and the Investment Prospectus. The lead agency in delivering Western Australia’s Renewable Hydrogen Strategy is the Department of Jobs, Tourism, Science, and Innovation (JTSI).

Figure 3: Timeline of strategy development



### 3.2. Progress-oriented

The 2019 Western Australia’s Renewable Hydrogen Strategy originally set goals for 2022 and 2040. The 2021 update of the Strategy moved forward the timeline on long-term goals to 2030 as the industry developed more rapidly than initially anticipated. Each of the 2022 goals were achieved with government facilitation and/or funding within the required timeframe.

**Q1) What are the most effective government actions in the current Strategy for stimulating the renewable hydrogen industry?**

**The Western Australian Government announced its intention to deliver a refreshed Renewable Hydrogen Strategy in the December 2022 Mission Update. Western Australia has made considerable progress in the hydrogen market since the release of the Strategy.**

As noted in the Renewable Hydrogen Strategy December 2022 Mission Update, each 2022 goal for the Strategic Focus Areas has been achieved. This is a promising sign of industry development – and in the context of a changing domestic and international landscape – creates motivation to reassess strategic priorities moving forward. The need for a Strategy refresh was reiterated by two independent reports commissioned by the Western Australian Government in 2022.

The forecast global ramp-up of renewable hydrogen uptake presents a challenge. Key obstacles facing the renewable hydrogen industry include the immense scale of renewable electricity and electrolyser production and storage capacity required in a relatively short timeframe, the need for large expanses of project-ready land, and the current commercialisation gap for renewable hydrogen relative to other hydrogen production pathways and dominant fuel sources. A coordinated effort between government, industry and academia can assist in developing the measures to support and facilitate this growing industry and reduce uncertainty surrounding the commercial viability and technical feasibility of renewable hydrogen. Government support and facilitation of the industry aims to be flexible as the market changes, promoting industry's ability to scale up and enable social return on investment.

## 4.1. Changing international context

The international hydrogen market is rapidly developing, indicating now is the right time for the Western Australian Government to refresh the Renewable Hydrogen Strategy. More than 20 countries have released national hydrogen strategies since the Western Australia Strategy was published in 2019. Recently, the United States published its National Clean Hydrogen Strategy in June 2023, building on legislative work in the Inflation Reduction Act and Bilateral Infrastructure Law. Other countries that are looking to become net importers of hydrogen including Japan, South Korea, Singapore and Germany have release strategies and are open to collaboration with Western Australia. Additionally, countries likely to become hydrogen exporters – similar to Western Australia's own vision – have released strategies, including Chile, Norway, Canada and Namibia. Funding support globally has also seen a marked increase in recent years, as nations strive to become competitive in production, use and distribution of renewable hydrogen.

Russia's invasion of Ukraine has impacted global energy security, particularly in Europe, increasing the speed of transition from oil and gas to renewable sources (including renewable hydrogen).



Western Australia's ability to compete in the global market will be challenged by ambitious policy support from other nations, which will reduce the cost of their renewable hydrogen and hasten the development of their industries. The change in pace and scale of renewable hydrogen support increases the need for Western Australia to quickly develop competitiveness and capture the advantages associated with being a first-mover in areas of sustainable competitive advantage. Therefore, the Western Australian Government is considering how public sector support can be best utilised to promote the industry's development and viability through a refresh of the Renewable Hydrogen Strategy.

Select international developments are given over the page in Figure 4.

## 4.2. Changing national context

A Hydrogen Strategy has been released at the federal level, and from every state and territory (except the Australian Capital Territory) since 2019. The Australian Government recently announced its intention to refresh the National Strategy and has made several significant steps forward in renewable hydrogen policy in recent months.

Western Australia has a strong opportunity to align with national efforts in these areas and maximise the opportunities arising from federal support mechanisms. These include:

- » National funding programs: The Australian Government has allocated numerous funding sources to develop the renewable hydrogen industry. These include the Clean Hydrogen Industrial Hubs Program, which has awarded funding to 2 projects in Western Australia, and the recently announced Hydrogen Headstart, an AUD 2 billion

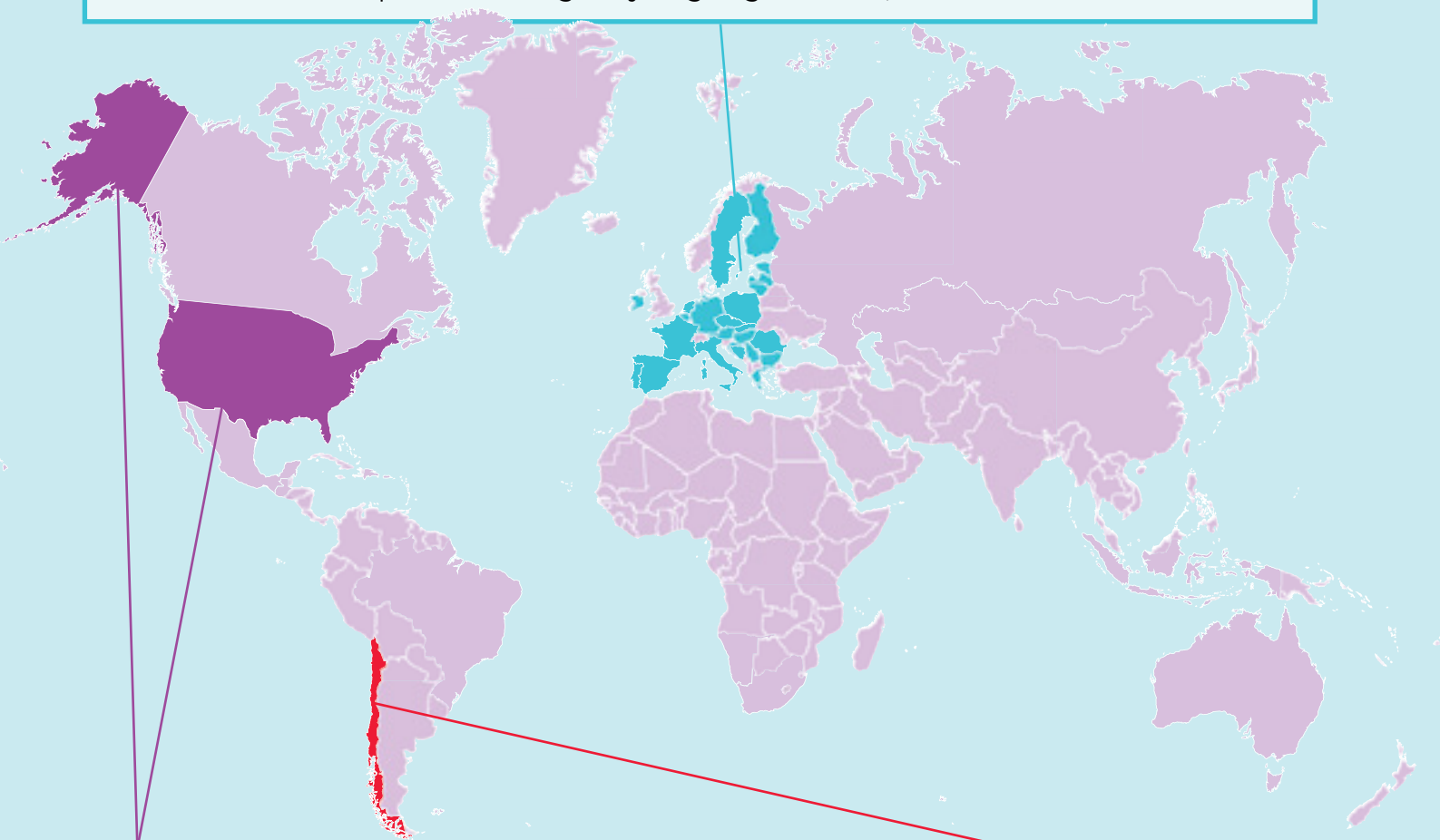
program in development to fund production credits for 2 to 3 large scale renewable hydrogen projects. The Australian Government has also facilitated R&D through programs such as Australian Renewable Energy Agency's (ARENA) Hydrogen Research and Development Fund and Advancing Renewables Program.

- » Bilateral partnerships: The Australian Government is strengthening bilateral partnerships within the renewable hydrogen industry. For example, the HyGATE program seeks to drive hydrogen innovation by lowering cost barriers to investment and encouraging collaboration between Australia (a predicted net exporter) and Germany (a predicted net importer). Australia is also exploring cooperation on clean energy and hydrogen technologies with South Korea, Japan, Singapore, Germany, the United Kingdom, India, the United States and the Netherlands.
- » Renewable hydrogen certification: Certification is a vital step to ensuring renewable hydrogen (when exported or used domestically) is verifiably produced using renewable energy and is actively contributing to decarbonisation goals. Two draft policies were released for public consultation in December 2022: Australia's Guarantee of Origin Scheme, and Renewable Electricity Certification.

Australia's other states and territories have been moving forward with their own hydrogen industry development as well. As the renewable hydrogen industry develops across the country, knowledge-sharing, cooperation on regulation and legislation, and promotion of innovation across jurisdictions will assist in strengthening Western Australia's, and Australia's, renewable hydrogen economy.

## EU

The EU delivered further strong funding support under its Green Deal Industrial Plan. The renewable hydrogen industry is eligible to receive funding under multiple direct funding plans InvestEU, NextGenerationEU and the Innovation Fund, with fixed premium subsidies also available in a competitive auction process. Additional funding support for hydrogen-based initiatives have been announced, such as the European Hydrogen Bank which is expected to invest up to 3 billion euros in the hydrogen industry once commissioned in late 2023. The EU has awarded two hydrogen projects – Hy2Tech and Hy2Use – Important Projects of Common European Interest (IPCEI) status. They have jointly received €10.6 billion in grants across individual companies working in hydrogen generation, distribution and end-uses.



### United States of America

The Inflation Reduction Act (2022) created a ripple effect across the global hydrogen economy due to its ambitious production support for renewable hydrogen. From 2023 and for the first 10 years of operation, renewable electricity producers can receive a production tax credit of 2.6 US cents per kWh and clean hydrogen plants can receive credits up to USD 3 per kg of hydrogen. Producers of green hydrogen made from renewable electricity can claim both credits. This is expected to generate significant investment into renewable hydrogen production and use in the United States. Additionally, the US released its National Strategy for Clean Hydrogen in June 2023, stating, amongst other aims, its ambition to become a cost-competitive producer of renewable hydrogen.

### Chile

Chile published its renewable hydrogen strategy in late 2020. It seeks to become the lowest levelised cost producer of renewable hydrogen globally by 2030, with significant focus on the ability of hydrogen to decarbonise oil refining and mining haulage in existing industry and isolated power grids. Additionally, the strategy prioritises production of green ammonia for export, with a long-term view to extend production to shipping and aviation fuels.

Figure 4: Major renewable hydrogen industry developments globally

### 4.3. State context

Multiple economic, social, and environmental factors have influenced Western Australia's development since 2019. The industry and supply chain disruptions associated with the COVID-19 pandemic, State commitment to net-zero by 2050 and skilled labour shortages are some of the influences that are impacting the economy. The role of renewable hydrogen has been referenced by several policies released since 2019, including the Future State Strategy, the Western Australian Climate Policy and the Sectoral Emissions Reduction Strategies (currently in development).

#### Future State

Future State provides a targeted, whole-of-government approach to attracting investment and growing trade opportunities that will enable Western Australian industry to become smarter, more sustainable and diversified. Key synergies with hydrogen include:

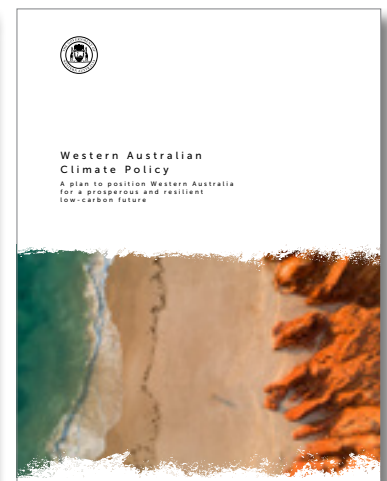
- » Production and scaling of renewable hydrogen is a sector-specific diversification opportunity, and there are opportunities in green products such as green iron ore, steel and aluminium.
- » Future State aspires for Western Australia to be a leading producer and exporter of renewable hydrogen by 2035.
- » The enabling areas in Future State will assist renewable hydrogen development, particularly skilled workforce development, innovation stimulation, infrastructure suitability, an investment and trade ecosystem, and policy and regulatory reviews.

### Western Australian Climate Policy

The Western Australian Climate Policy outlines the State's plan for change across industries and communities to reach net-zero greenhouse gas emissions in Western Australia by 2050. Key synergies with hydrogen include:

- » Renewable hydrogen, and products like green steel, form part of the clean manufacturing and future industries focus.
- » The policy's actions on energy transformation of Western Australia's grid will be vital to ensuring a supply of electricity for renewable hydrogen production.
- » Actions under the 'Government leadership' focus in the policy will relate strongly to resource management and strategic alignment across government departments on industry development efforts.

Existing actions underway as part of the current Renewable Hydrogen Strategy, Future State, Western Australian Climate Policy, and other relative government strategies will be used to inform the development of the refreshed Renewable Hydrogen Strategy.



#### 4.4. Changing technology feasibility and viability

In addition to numerous strategic and policy developments at a local and international level, the knowledge relating to hydrogen production and application technologies is evolving rapidly.

Production technology, including electrolyser manufacturing, continues to progress as more countries invest in research and development. Western Australia has multiple projects using electrolysers, including an export project (Yuri Green Ammonia Project) and a demonstration trial (Denham Hydrogen Demonstration Plant), and will continue to support the development of increasingly efficient technologies that could significantly reduce project costs.

The State is considering strategic priorities for renewable hydrogen end-uses, by adapting the framework known as the Clean Hydrogen Ladder.<sup>17</sup> The original ladder ranks renewable hydrogen end-uses from unavoidable to uncompetitive based on technological and economic feasibility, and the availability of more appropriate competitor technologies. A version of the Clean Hydrogen Ladder – adapted for the unique Western Australian context and comparative advantages – is provided over the page in Figure 6.

The viability and feasibility of end-uses reduces as the levels move down. End uses located in the top levels are more likely to deliver effective and efficient decarbonisation outcomes under the appropriate supporting environment.

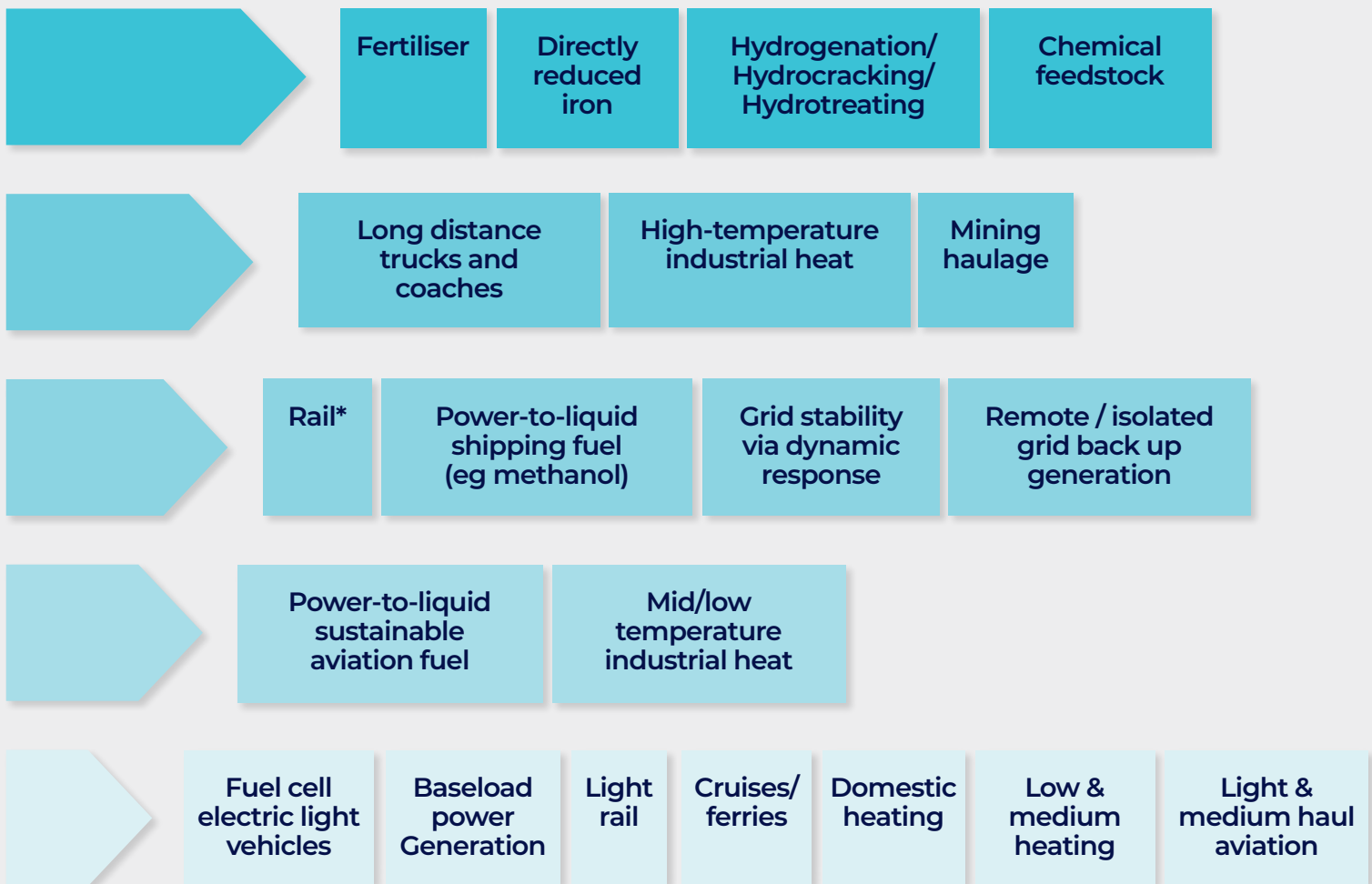
The higher viability and feasibility uses of renewable hydrogen do always overlap with existing dominant industries in Western Australia. However, the State is well-placed to supply renewable hydrogen at all stages along the value chain, from production to export of commodities produced with renewable hydrogen (e.g. ammonia, directly reduced iron ore and alumina). The refresh of the Strategy will aim to align government efforts and resources to facilitate the private sector in stimulating the most viable and feasible end-uses of renewable hydrogen in Western Australia.

---

<sup>17</sup> Michael Liebreich/Liebreich Associate, *Clean Hydrogen Ladder, Version 4.1, 2021*; as modified by Deloitte. Concept credit: Adrien Hiel, *Energy Cities as modified by Deloitte. CC-BY 3.0*

Figure 6: Western Australia's renewable hydrogen ladder<sup>1</sup>

## Higher anticipated use



## Lower anticipated use

<sup>1</sup> Ibid

\*Rail fuelled by derivatives (ammonia/methanol)



The renewable hydrogen industry is a nascent industry in Western Australia and therefore, requires facilitation from the Government to fully realise the State's renewable hydrogen opportunity. This section details the role for government in the hydrogen industry, and presents the framework used to structure the strategy refresh.

## 5.1. The role for government in the hydrogen industry

The Western Australian Government is seeking to build a renewable hydrogen industry that assists in diversifying and decarbonising the economy, while providing jobs and income for Western Australians. The Western Australian Government can act as a facilitator and leader to catalyse industry development and realise the economic and decarbonisation potential of renewable hydrogen. It is anticipated that industry will continue to drive hydrogen project development to support decarbonisation targets of existing and future customers. The refreshed strategic focus areas within the Renewable Hydrogen Strategy seek to leverage and expand existing activities to achieve Western Australia's hydrogen vision through a coordinated, flexible and results-oriented approach to governance, with clearly defined stakeholder responsibilities and government actions.

## 5.2. The strategy refresh framework

The Western Australian Government has developed a framework to guide the refresh of the strategy, as outlined in Figure 1. This framework will take into consideration Western Australia's comparative advantages, existing progress in the hydrogen industry and changes in the hydrogen market around the world.

### Vision and mission

The overarching vision and mission for the renewable hydrogen industry in Western Australia describes the highest-level ambition for the State. The vision is unchanged from the current Renewable Hydrogen Strategy, and the mission is updated to reflect the increasing focus on the decarbonisation of state activities.

### Strategic focus areas

The 2019 Strategy update contains four strategic focus areas – export, remote applications, transport and hydrogen blending in the gas network - each with specific goals for 2022 and 2030. Chapter 6 elaborates on the proposed changes and transition to pillars and enablers.

### Activities and actions

Activities and actions are groups or themes of government actions that underpin the achievement of the Strategy.

### 5.3. The transition to pillars

The Western Australian Government is developing a refreshed strategy to encompass changes over the last four years. The refresh seeks to build on the significant progress already made in the industry and will be continuing support outlined under the existing Strategy.

Western Australia's current Renewable Hydrogen Strategy focuses on specific hydrogen end uses. The emphasis of more recent international strategies has shifted away from end use toward industry differentiation, product differentiation and future competitiveness. The refreshed strategy proposed in Chapter 6 works along the renewable hydrogen value chain, from building domestic production capacity, to encouraging domestic use, to servicing international demand through export, and ensuring the industry develops in a responsible and beneficial manner for the broader community.

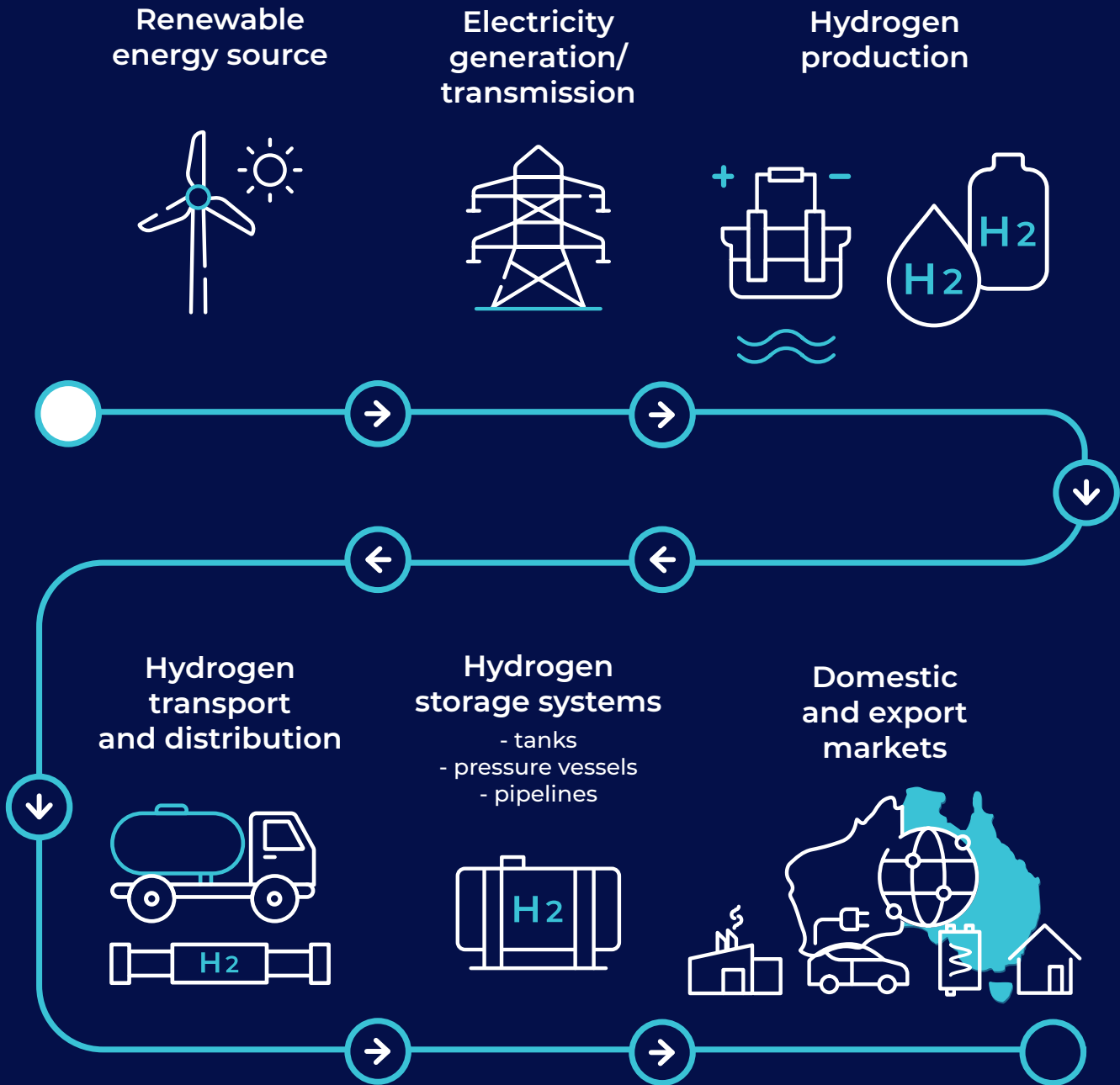
The renewable hydrogen value chain is shown over the page in Figure 7.

The refreshed pillars reposition focus towards the value chain and government priorities including decarbonising and diversifying the economy and delivering benefits to the community. The pillars were selected such that a range of activities, enablers and actions can be considered, to allow the Strategy the flexibility and agility to stay relevant in the dynamic, nascent market.

The activities, enablers and actions within each pillar are more focussed to provide industry differentiation, product differentiation and international competitiveness. They have been designed to leverage where possible with existing government work to avoid duplicating effort. For example, the Legal Frameworks Review fits within the Enabling Pillar and future initiatives would seek to extend, rather than replace, this existing activity.

**Q2) Will the transition from Strategic Focus Areas to pillars and enablers positively impact the renewable hydrogen industry?**

Figure 7: The renewable hydrogen value chain



The Western Australian Government is committed to use the strategy refresh framework to develop refreshed strategic focus areas within Western Australia's existing renewable hydrogen vision.

## 6.1. Vision and mission

The Western Australian Government expects the vision and mission statement used in the original 2019 Renewable Hydrogen Strategy, and its 2021 update, to remain in the refreshed strategy.

**Q3)** Are the vision and mission for the Renewable Hydrogen Strategy refresh relevant and appropriate for Western Australia?

## Renewable Hydrogen Strategy Refresh

### Vision

Western Australia will be a significant producer, exporter and user of renewable hydrogen.

### Mission

Western Australia will develop industry and markets for the domestic use and export of renewable hydrogen. The renewable hydrogen industry will decarbonise local and global markets and increase the diversification of the State's economy.

### Pillars



Production



Use



Export

Enabling Development

### Activities and Actions

The pillars including hydrogen production, domestic hydrogen use, and hydrogen export will be underpinned by enablers. Government activities and actions within enabler areas will assist in achieving the goals or objectives of each pillar.

## 6.2. Pillars and enablers

### Rationale for each proposed pillar

High level pillars and enablers are proposed for inclusion in the Renewable Hydrogen Strategy. These pillars and enablers are high-level 'buckets' for government action and align with the State's vision to become a significant producer, exporter and user of renewable hydrogen.

<p><b>Production</b></p> 	<p>The production pillar centralises all efforts to enable Western Australia to produce renewable hydrogen cost-effectively, competitively and at-scale. This pillar will include considerations of land, and natural resource use, port, transport and infrastructure planning and development, approval and regulatory reform, project facilitation and hub development.</p>
<p><b>Use</b></p> 	<p>The use pillar highlights the efforts required to build domestic demand for renewable hydrogen and its applications. This field has become an increasing priority in global hydrogen markets as governments and private sector seek to stimulate hydrogen demand. Demand stimulation will be considered in relation to decarbonisation and energy security. Transport and remote applications and domestic application for hydrogen products, amongst others, will fall under this pillar.</p>
<p><b>Export</b></p> 	<p>The export pillar will remain in place, with the addition of export in green products (such as direct reduced iron). This allows Western Australia to begin focusing on moving along the value chain towards higher value exports. The export pillar will include government actions, international relationships and trade corridors to develop export capacity.</p>
<p><b>Enabling Development</b></p> 	<p>The enabling industry development pillar will underpin development across export, production and use of renewable hydrogen – providing for accelerated project decisions whilst ensuring community benefit. It will ensure the industry is delivering environmental and social benefits for Western Australians – in the form of emissions reduction and responsible use of resources, skills and training. The Western Australian Government will ensure Aboriginal peoples are empowered to make decisions in the development of hydrogen industry, and projects' impact on land and cultural heritage. This pillar will look at industry development through targeted opportunities for local manufacturing and R&amp;D.</p>





# Production

**Western Australia can become a major producer of renewable hydrogen, and a premier destination for hydrogen investment.**

## Opportunity

Demand for hydrogen is expected to grow domestically and globally as countries around the world intend to achieve their nationally determined contributions for decarbonisation. Western Australia can capitalise on this opportunity by positioning itself as global leader in renewable hydrogen production for domestic and global markets.

Several factors support Western Australia's advantage in renewable hydrogen production. Firstly, the State's large land mass, diverse land use potential and low population density are excellent for developing large-scale renewable energy generation required for renewable hydrogen production. The State also has a significant potential to supply a hybrid mix of solar and wind energy, and desalinated water, which are the key resources required to produce renewable hydrogen. Additionally, Western Australia has world-class industrial infrastructure, workforce capability, and innovation expertise due to its established resources sector. Finally, Western Australia's low sovereign risk and political stability make it an attractive jurisdiction for investment.

## Challenges

The production of renewable hydrogen in Western Australia is currently facing challenges across approval times, renewable electricity capacity, land use, sustainable water use, offtake certainty, access to high voltage infrastructure and cost-competitiveness. Land use in particular is a pressing challenge for

**Q4) Is production an appropriate pillar, and if so, what are its most pressing opportunities and challenges, and most important actions WA government can take to support production of renewable hydrogen in Western Australia?**

the industry. Renewable electricity and renewable hydrogen generation at scale requires large amounts of suitable land to be viable. Despite the State's significant expanses of land, there is a high level of competing interest for conservation, mining, industrial and pastoral uses, and investment is required to transform some land to become project-ready. An ability to balance competing interests and uses, along with the approvals needed to enable land access, is a key consideration for project viability, environmental and community benefit. In addition, land and infrastructure for equipment imports, such as wind turbine blades, needs to be planned.

## Current progress

The Western Australian Government has invested in the development of hydrogen hubs such as Pilbara, Mid West and Kwinana Hydrogen Hubs - an important step for industry development in co-locating supply and demand. The Hydrogen Value Chain Model was completed to provide guidance on the lowest levelised cost value chains in the state, and infrastructure options which facilitate this. A Green Approvals team

has been established to assist in streamlining approvals for green energy projects including renewable energy and renewable hydrogen. A review of the legislative framework for land access led to reform including the introduction of diversification leases, and a guidance paper on land tenure for large-scale renewable hydrogen projects was released in late 2022. Planning for electrical transmission grids is ongoing through a number of initiatives.

### **Proposed activities and enablers**

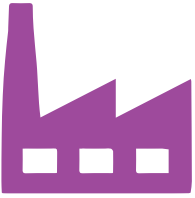
Recognising both the emerging nature and the potential of the renewable hydrogen industry, the Western Australian Government will work with industry to develop and promote the State's ability to supply cost-competitive renewable hydrogen and green commodities.

The State expects strong synergy between examples of potential activities and enablers provided below, and the Future State enablers including infrastructure and project-ready land. This includes further planning and works around the Strategic Industrial Areas, associated infrastructure corridors and equipment laydown areas. Infrastructure planning for renewable hydrogen production aligns with Infrastructure Western Australia's (IWA) recommendations in the 2022 State Infrastructure Strategy, particularly the strategic economic opportunity of leading the transition to net zero emissions technologies. This could include further investigation and planning on land use, particularly coordinating industry and community requirements for large scale renewable energy and water.

#### **Example activities and enablers:**

- » **Renewable electricity & hydrogen hub development.**
- » **Strategic Industrial Areas Activation.**
- » **Project facilitation services.**
- » **Land use strategy.**





## Use

### Western Australia adopts a targeted approach to using renewable hydrogen to decarbonise the State, which maximises resource efficiency.

#### Opportunity

Increasingly, global research and development is leading to two opportunities: broader potential application of hydrogen as an energy source or feedstock and lower cost of use. Western Australia's public and private sectors should prioritise the highest impact end-uses of renewable hydrogen, to ensure resources are used effectively and benefits are maximised.

Renewable hydrogen presents a potential avenue for decarbonising existing heavy industry that relies on hydrogen as a chemical feedstock (such as ammonia production). Given the challenges involved in reducing emissions from existing heavy industry, the Western Australian Government is facilitating discussions with the private sector to develop pathways and goals for reduced emissions including heavy haulage within the mining sector.

Renewable hydrogen can also be used as a feedstock within chemical processes (such as green steel, cement, aluminium and glass production and refining). It also has applications in isolated power systems using renewable electricity as a storage or generation mechanism, and to support the reliability of the grid through grid firming. The Denham Hydrogen Demonstration Plant, supported by the Renewable Hydrogen Fund, is a current pilot in this field. Additionally, fuel cells and hydrogen in various forms are being considered for transport, such as in long-haul trucking, rail transport and shipping.

The use pillar would also encompass the transport, storage and distribution

**Q5) Is use an appropriate pillar, and if so, what are its most pressing opportunities and challenges, and most important actions WA government can take to support use of renewable hydrogen in Western Australia?**

of hydrogen from its production source to its final use destination (export or domestic use).

#### Challenges

Cost competitiveness relative to existing energy or feedstock is the key challenge, as alternate decarbonisation technologies such as electrification are often more cost efficient. However, these are not always suitable, for example in hard-to-abate sectors such as ammonia production. In addition, hydrogen use often comes with a capital barrier related to the equipment and infrastructure transition. New vehicle fleets require significant time and expense to transition from petrol to hydrogen fuel cell vehicles, and new fuelling infrastructure. Low-cost transport, storage and distribution of renewable hydrogen is remain important challenges to overcome. Challenges also relate to the managing social license, building familiarity of potential users with hydrogen technologies and training and awareness around hydrogen safety.



## Current progress

The WA government is in the process of developing a Renewable Hydrogen Target. Additionally, the Renewable Hydrogen Fund has allocated financial support to end-use trial sites, such as the Denham Hydrogen Demonstration Plant and a hydrogen refuelling station in Jandakot. The Department of Mines, Industry Regulation and Safety also released a safety guide for the storage, handling and production of hydrogen in May 2023. Pilbara Ports and Yara Clean Ammonia have also begun collaborating on assessing the viability of ammonia produced using renewable hydrogen as a marine fuel. Western Australia is also progressing with the Australian

Government's Hydrogen Highways initiative, to build out a network of refuelling stations.

## Proposed activities and enablers

To promote the uptake of renewable hydrogen, the Western Australian Government can undertake actions under activities and enablers proposed below. It will also leverage Future State enablers including policy and regulatory frameworks.

### Example activities and enablers:

- » **Use sector prioritization.**
- » **Existing industry decarbonisation.**
- » **Domestic demand stimulation.**
- » **Transport, storage and distribution.**
- » **Remote applications.**



# Export

**Western Australia is well-placed to capture a significant share of the global export market for renewable hydrogen, and green commodities made using renewable hydrogen.**

## Opportunity

The global market for renewable hydrogen is expanding, presenting an important economic opportunity for Western Australia as a leading energy and resource export economy.

Hydrogen can be converted into a chemical carrier to enable large-scale export. Many jurisdictions are positioning themselves to import hydrogen, including Japan, South Korea and Europe, and many are positioning themselves to export, such as Saudi Arabia, Namibia and Chile. In order to establish market share, it will be important for Western Australia to utilise its existing energy and raw materials export capability, and existing trade ties with partners including but not limited to South Korea and Japan, to capture early development opportunities.

In addition to exporting renewable hydrogen, Western Australia is uniquely positioned to capture a portion of the emerging export market for 'green commodities' made using renewable hydrogen, such as ammonia, directly reduced iron, steel and alumina. Western Australia is a leading global exporter of mineral resources, with exports of iron ore valued at AUD 126 billion in 2022. There is a potential opportunity to utilise renewable hydrogen for the decarbonisation of these industries and grow the export of green commodities with embodied renewable hydrogen. In the longer term, there is also an opportunity to integrate the supply chain for critical minerals with the renewable hydrogen industry through electrolyser and battery manufacturing.

**Q6) Is export an appropriate pillar, and if so, what are its most pressing export opportunities and challenges, and most important actions WA government can take to support export of renewable hydrogen from Western Australia?**

## Challenges

The renewable hydrogen export market has many prospective players, and the infrastructure and technology to export renewable hydrogen is changing quickly. Growing low-cost competition and offtake certainty are key challenges facing the renewable hydrogen export market. Additionally, significant work needs to be undertaken on the possibility of transforming existing export infrastructure to become suitable for hydrogen export. Improving technical feasibility to produce green commodities using renewable hydrogen is also an important step.

## Current progress

The existing Renewable Hydrogen Strategy identifies and seeks to address many of these challenges. Projects in this area include a gap analysis of hydrogen export infrastructure, and funding support for the Yuri Renewable Hydrogen to Ammonia Project, a joint venture between Yara, Engie and Mitsui to export ammonia produced using renewable hydrogen from Karratha. The Western Australian Government has also signed a Memorandum of Understanding with Japan's



Organisation for Metals and Energy Security, and a Letter of Intent with South Korea's Ministry of Trade, Industry and Energy to further cooperation in the clean energy and renewable hydrogen industries. The TrHyHub between the Western Australia, the Fraunhofer Institute in Germany and Port of Rotterdam in the Netherlands will study the feasibility of novel concepts for a hydrogen port in the Mid West. Western Australia's global trade and investment offices, including in Japan, South Korea and the United Kingdom, are being leveraged to provide opportunities in renewable hydrogen. Finally, the Western Australian Government's Investment Attraction Fund, Renewable Hydrogen Fund and Green Steel Challenge each work to support the development of nascent

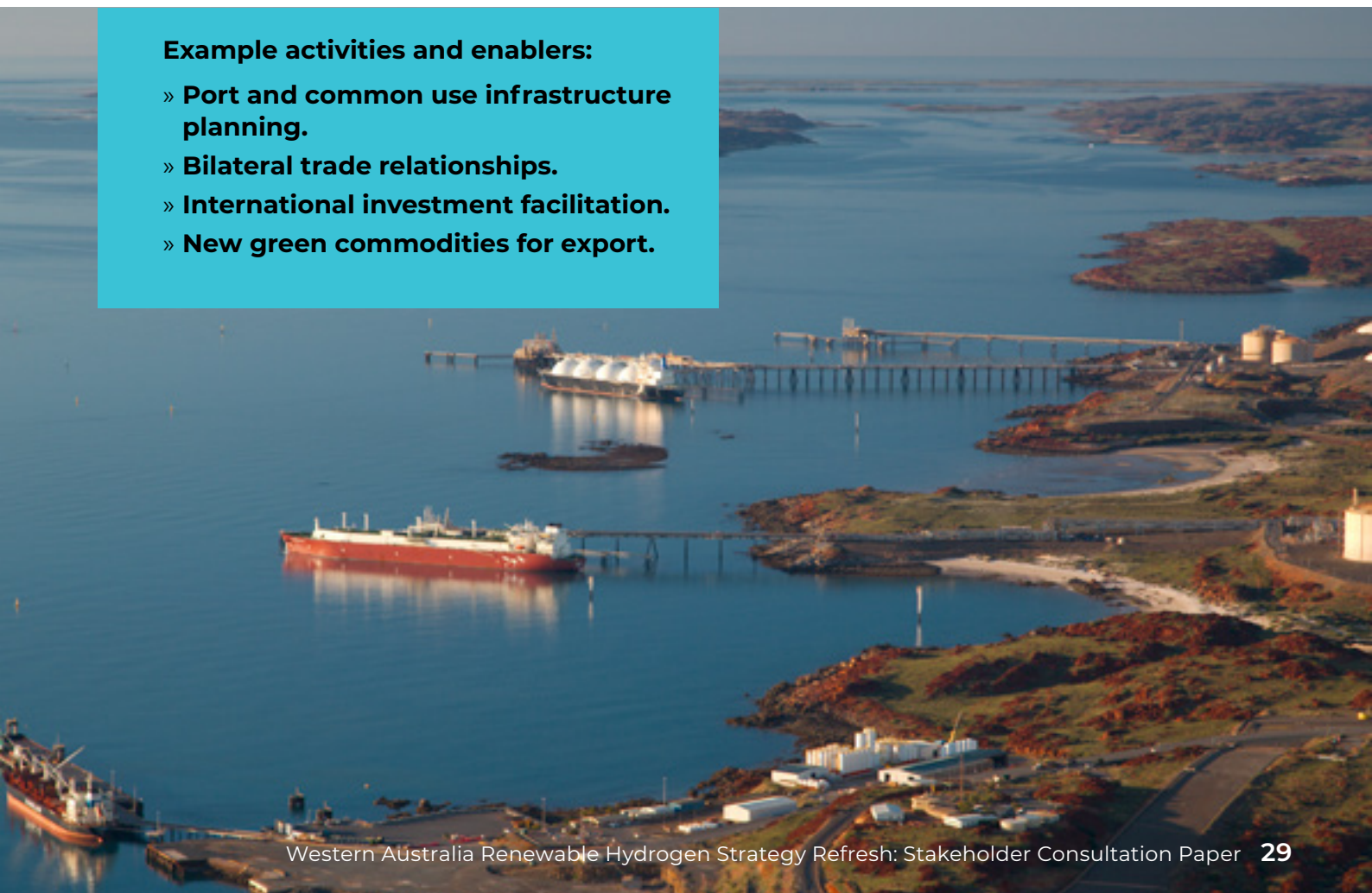
industries like hydrogen or green commodity manufacturing.

### **Proposed activities and enablers**

The refreshed export pillar will contain actions across activities and enablers (see below for examples). There will be a high-level of synergy between activities and enablers given under this pillar, and enablers in the Future State Strategy, such as investment in a trade ecosystem, and advanced manufacturing in relation to hydrogen products. The planning of infrastructure is anticipated to strongly align with IWA's recommendations in the 2022 State Infrastructure Strategy, specifically focusing on enhancing capacity to seize the value-adding potential of strategic commodities.

#### **Example activities and enablers:**

- » **Port and common use infrastructure planning.**
- » **Bilateral trade relationships.**
- » **International investment facilitation.**
- » **New green commodities for export.**





# Enabling Development

**Western Australia's renewable hydrogen industry can be a responsible, strategic and socially conscious contributor to long-term growth. The industry should be well understood by, and provide benefits for, local communities.**

## Opportunity

The renewable hydrogen industry is expected to provide substantial economic benefits to Western Australia. The Western Australian Government is committed to ensuring these benefits are shared across the community. It will also support the industry to develop in a coordinated and efficient manner across the whole value chain and contribute to reducing emissions in the State.

The industry has the opportunity to empower Aboriginal peoples to become decision-makers in the development of the renewable hydrogen industry, particularly as it relates to economic involvement and cultural heritage protection.

The renewable hydrogen industry should support the creation of skilled, well-paying jobs for Western Australians, and provide opportunities for worker transition from fossil fuel industries. This is particularly important as global decarbonisation takes place, potentially reducing demand for employment in heavy industry sectors. The Western Australian Government is also committed to ensuring best-practice Environmental, Social and Governance standards are followed in the industry, limiting environmental and social costs. Consideration of safety and environmental regulations will be key to ensuring the industry develops in a responsible and secure manner.

**Q7) Is enabling development an appropriate pillar, and if so, what are the most pressing opportunities and challenges, and most important actions WA government can take to enable development of renewable hydrogen in Western Australia?**

This pillar will look at industry development through targeted opportunities for local assembly and manufacturing including electrolyzers and balance of plant and R&D which will help reduce supply chain risk and build the diversity in skills and jobs available within the hydrogen industry.

## Challenges

Given renewable hydrogen is a nascent industry, public awareness and education on hydrogen is currently limited. Developing a workforce capable of sustaining the hydrogen industry is also a challenge and will require significant investment in training and educating workers across construction, operation, regulation and first responder fields, in addition to having labour compete with the mining industry. This is more important in the regions, where construction booms and labour pressures are amplified. Hydrogen is also a core component of the State's decarbonisation and diversification agenda, and therefore industry development needs to be well coordinated

across government departments to ensure maximum efficiency.

Unless research and development is encouraged locally, the state could lose the potential to develop high skilled jobs and again export a commodity without significant value add.

### **Current progress**

The Western Australian Government maintains strict Environmental, Social and Governance standards for all renewable hydrogen project proponents. In addition, work has begun to identify and enable training pathways to support the development of a renewable hydrogen workforce. Additionally, the Western Australia Government and research

institutions are involved in the Future Fuels, Heavy Industry Low-carbon Transition and Future Energy Exports Cooperative Research Centres, each of which contribute to growing knowledge in the renewable hydrogen industry.

### **Proposed activities and enablers**

Example activities and enablers given below are designed to develop a renewable hydrogen industry that maximises benefits and reduces costs to communities. There will likely be cooperation across Future State all seven cross-section activities, and additional support and focus on Aboriginal empowerment.

#### **Example activities and enablers:**

- » **Economic and cultural empowerment and capacity building of First Nations.**
- » **Economic development of regional communities.**
- » **Legal framework review.**
- » **Workforce development.**
- » **Obtaining social license.**
- » **R & D and local manufacturing.**





### 6.3. Evaluation and goals

The 2019 Strategy contained 2022 and 2030 aspirational goals to signal government and industry ambition and boost investor confidence, with a minor update provided in 2022. The current goals for 2030 are as follows:

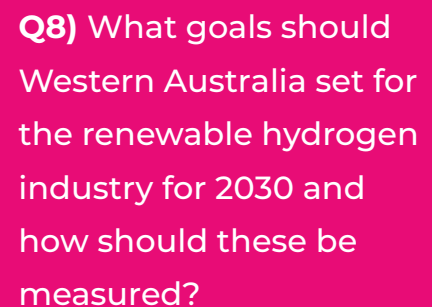
- » Western Australia's market share in global hydrogen exports is similar to its share in LNG today.
- » Renewable hydrogen is widely used in mining haulage vehicles.
- » Demand stimulation measures which could include a broader renewable hydrogen target and certification scheme.
- » Renewable hydrogen is a significant fuel source for transportation in regional Western Australia.

However, these goals may not be the most appropriate benchmarks for success given significant global policy shifts since 2019 and shifts from focus on particular end uses.

The Strategy's existing goals may therefore be altered or reset, with the intent to balance investment certainty with agility in a dynamic market. Goals could also be considered to align with the objectives of decarbonisation and diversification, rather than pillars.

The 2030 goals will therefore be re-examined in the refreshed Strategy. Stakeholder feedback will be considered from past work, this consultation paper, and other consultation in the refreshed Strategy.

Any potential updates will be considered in conjunction with existing work across state and federal government to maximise alignment and efficiency.



**Q8)** What goals should Western Australia set for the renewable hydrogen industry for 2030 and how should these be measured?

**Western Australia’s natural resources, skilled workforce, attractive investment environment and trade capacity place it in a prime position to create a competitive renewable hydrogen industry. The State was a first mover in the creation of its 2019 Renewable Hydrogen Strategy and has made significant progress in developing its industry – including the achievement of all 2022 goals outlined in the Strategy.**

However, international and domestic markets have moved rapidly since 2019, and increasing support for hydrogen in other jurisdictions is potentially reducing Western Australia’s competitiveness. Additionally, research into hydrogen end-uses has shifted the feasibility ranking of many applications, and the State’s priorities in diversification and decarbonisation have progressed since 2019.

This paper proposes a refresh of Western Australia’s Renewable Hydrogen Strategy to ensure it is best suited to deliver meaningful support to develop a responsible, competitive and sustainable renewable hydrogen industry. This feedback, and further consultations will be used to develop the full refreshed Strategy in late 2023. The full list of questions posed in this paper is given below:

1. What are the most effective government actions in the current Strategy for stimulating the renewable hydrogen industry?
2. Will the transition from Strategic Focus Areas to pillars and enablers positively impact the renewable hydrogen industry?
3. Are the vision and mission for the Renewable Hydrogen Strategy refresh relevant and appropriate for Western Australia?
4. Is production an appropriate pillar, and if so, what are its most pressing opportunities and challenges, and most important actions WA government can take to support production of renewable hydrogen in Western Australia?
5. Is use an appropriate pillar, and if so, what are its most pressing opportunities and challenges, and most important actions WA government can take to support use of renewable hydrogen in Western Australia?
6. Is export an appropriate pillar, and if so, what are its most pressing export opportunities and challenges, and most important actions WA government can take to support export of renewable hydrogen from Western Australia?
7. Is enabling development an appropriate pillar, and if so, what are the most pressing opportunities and challenges, and most important actions WA government can take to enable development of renewable hydrogen in Western Australia?
8. What goals should Western Australia set for the renewable hydrogen industry for 2030 and how should these be measured?

Any additional feedback is welcomed.

# Appendix

## Appendix 1: Summary of progress against Strategy goals

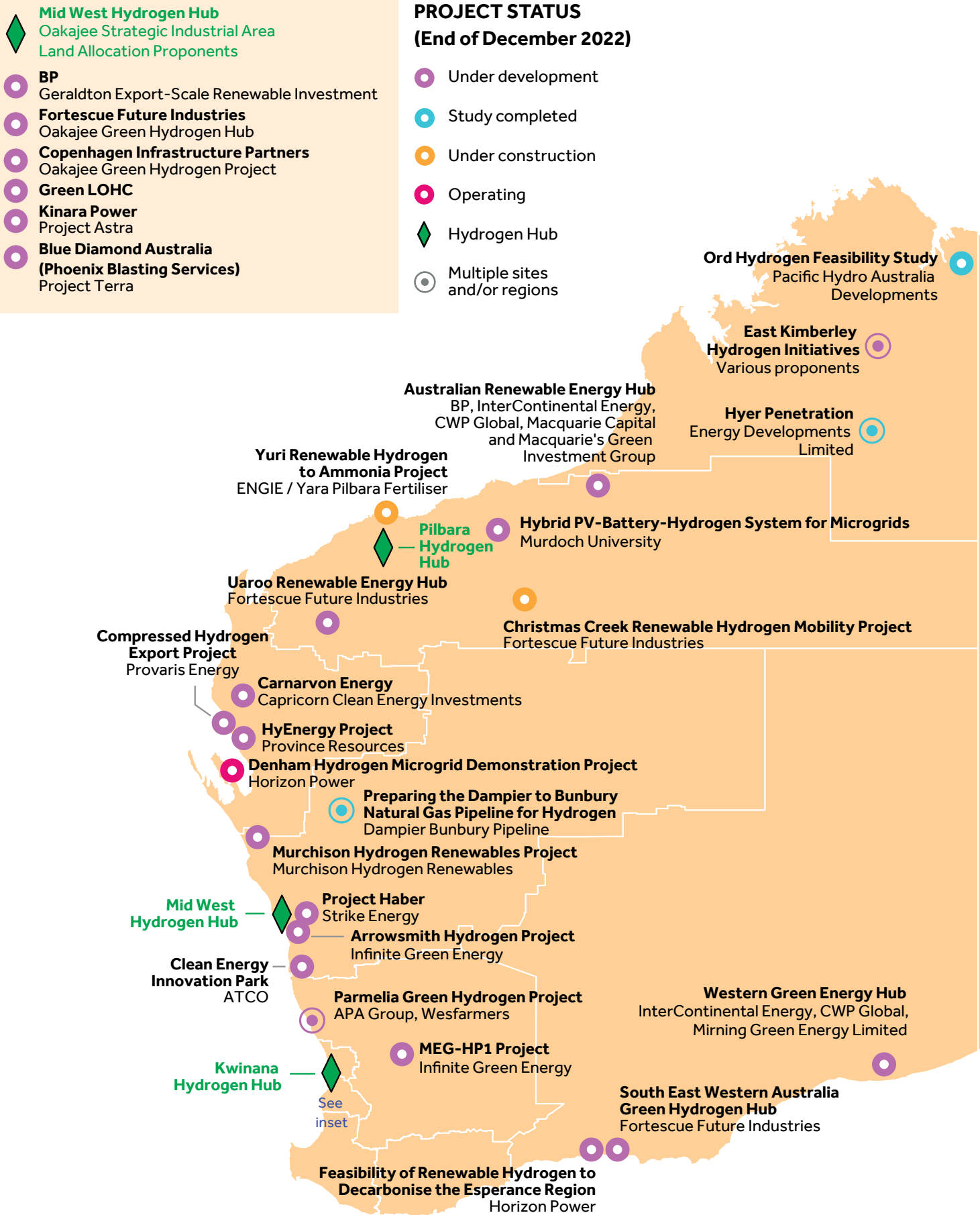
Strategic Focus Area	2022 Goal	Project	Project Status
<b>Export</b>	A project is approved to support export renewable hydrogen from Western Australia.	Western Australia's Renewable Hydrogen Fund and ARENA contributed funding to the Yuri Renewable Hydrogen to Ammonia Project, a joint venture between Yara, Engie and Mitsui to export ammonia from Karratha.	The project is currently under construction, with delivery of the first phase expected in 2024. The first phase will provide capacity to produce up to 640 tonnes of renewable hydrogen per annum.
<b>Remote applications</b>	Renewable hydrogen is being used in one remote location in Western Australia.	Western Australia's Renewable Hydrogen Fund and ARENA contributed funding to Horizon Power's Denham Hydrogen Demonstration Plan, which is a trial integration of renewable hydrogen.	The plant produced its first output of hydrogen in late 2022. Testing is currently ongoing to assess the linkages between the hydrogen production plant, solar farm, battery and diesel power station.
<b>Hydrogen blending in natural gas</b>	Renewable hydrogen is distributed in a Western Australian gas network.	ATCO is delivering a renewable hydrogen blend trial in gas networks in Cockburn. The blending uses hydrogen generated via electrolysis at ATCO's Jandakot Operations Centre.	The project undertook the first trial of blending in late 2022 and will continue the trial for another two years.
<b>Transport</b>	A refuelling facility for hydrogen vehicles is available in Western Australia.	Western Australia's Renewable Hydrogen Fund contributed to ATCO and Fortescue Future Industries' hydrogen refuelling station in Jandakot, the first infrastructure of its kind in Western Australia.	The refuelling station in Jandakot completed construction in 2022 and has begun operating.

The current landscape of projects under development in Western Australia is a promising sign of the State's strength in renewable hydrogen.

Figure 8 indicates most projects are in development or feasibility study phase, with an increasing number moving to construction and operation. As the State's market matures, and the global market brings new technology, applications and competitors, the Western Australian Government recognises the need for a new assessment of how best to support Western Australia's renewable hydrogen industry.



Figure 8: Renewable hydrogen projects in Western Australia as at December 2022





Department of  
**Jobs, Tourism, Science  
and Innovation**

## Contact

Renewable hydrogen unit  
E: [hyrdogen@jtsi.wa.gov.au](mailto:hyrdogen@jtsi.wa.gov.au)  
T: 61 8 6277 3000  
Level 11, 1 William Street,  
Perth, Western Australia, 6000  
[www.wa.gov.au/jtsi](http://www.wa.gov.au/jtsi)