

## Woodside Submission to National Hydrogen Strategy

Woodside Energy is the pioneer of the LNG industry in Australia and the largest Australian natural gas producer. We see hydrogen as a natural evolution of our energy export business model, post 2030. Our experience in producing and exporting LNG, underpinned by strong customer relationships, positions us well for complementary opportunities in large-scale hydrogen for industrial use.

We commend the Council of Australian Governments (COAG) in commissioning a national hydrogen strategy. The LNG industry was a result of visionary government and industry leadership and the hydrogen industry could follow the same path.

It is an opportune time for a bold and ambitious energy vision. As a nation rich in natural energy and resources, Australia can continue to make a difference to global emissions through trade.

Australia is competing with nations like Saudi Arabia, United States of America, Norway and Qatar who are rapidly developing their hydrogen industries. We believe the correct support, policy settings and regulations need to be made for Australia to fully participate and capture this energy opportunity.

We believe a hydrogen industry and a local market could generate significant opportunities for Australia. It could enable lower emissions both in Australia and internationally, reduce energy costs, deliver energy security, together with new employment and manufacturing opportunities.

Australia's hydrogen future vision must be specific, bipartisan and enduring. Our trading partners, Japan and Korea, have galvanised support through specific, well-defined objectives that can be achieved over time. With certainty, support mechanisms can be enacted that help align our country towards a lower-carbon future.

### **Our Approach**

In the context of developing a hydrogen industry, Woodside advocates a technology-neutral, lowest-cost approach. Lower costs will result in faster uptake and increased social licence.

We believe the lowest cost and lowest emissions pathway to build hydrogen infrastructure is through a transition from 'blue' hydrogen to 'green'.

Woodside is focusing on two technologies: carbon-neutral hydrogen, sourced from gas ('blue' hydrogen), and zero-carbon electrolysis of water, powered by renewable energy ('green' hydrogen).

Green hydrogen is an important part of our vision, as we seek to respond to the needs of our customers over time. We believe blue hydrogen is the key to building scale and lowering costs in transport and distribution, which will enable an earlier transition to green.

We look forward to a continuing engagement with Department of Industry, Innovation and Science to realise this opportunity.

## **Policy Questions**

### **What do you think are the two or three most significant recent developments in hydrogen?**

1. There are emerging international policies to adopt hydrogen. This is driven by the need to decarbonise other sectors aside from electricity (e.g. steel production accounts for 7% of the global emissions, hydrogen could reduce these emissions). There is a growing realisation of the cost, environmental impact and impracticality of batteries at the scale needed to support grid stability.
2. Blue hydrogen is cost competitive against liquid fuels in some markets. There is line of sight to closing the gap on the cost of production for renewable hydrogen due to the decreasing cost of renewable power and electrolysis. Blue hydrogen is increasingly recognised as the means to build out the infrastructure, regulatory standards, trading relationships and consumer preferences that green hydrogen can then inherit.
3. Industry, commercial and consumer end products are now available. For example, in the transport sector hydrogen powered forklifts, buses and cars are already in use with hydrogen powered heavy vehicles in development.

### **What are the most important safety issues to consider in producing, handling and using hydrogen in Australia?**

1. Existing infrastructure: material compatibility in transmission/distribution system.
2. Capability: limited engineering and technical familiarity/competence.
3. Refuelling facilities: appropriate risk based hazardous area management.
4. Ammonia: loss of containment at industrial facilities or in urban areas.
5. Liquid organic hydrides: effects and protection from chronic exposure.
6. Liquid hydrogen: loss of containment and oxygen deposition on cryogenic surfaces.

### **What environmental and community impacts should we examine?**

1. Impact and mitigations of large-scale renewable energy gathering systems.
2. Impact and mitigations of remote area water use.
3. Net climate impact for transportation vectors (liquid organic hydrides, ammonia).

### **How can Australia influence and accelerate the development of a global market for hydrogen?**

1. Global leadership.

Australia could demonstrate its leadership through policies, innovation and investment that further the support of a hydrogen economy.

Woodside is promoting four ideas: (1) the lowest cost pathway commencing with blue hydrogen then transitioning to green; (2) offering the consumer choice based on gas source; (3) the use of bio-sequestration to achieve carbon neutrality at lowest possible cost, which could also generate additional environmental and social benefits and (4) district level hydrogen generation and storage sites, which can be used for Hydrogen Fuel

Cell Electric Vehicle (HFCEV) refuelling, Battery Electric Vehicle (BEV) recharging, and local level grid stabilization to enable high levels of renewable penetration in the energy system.

## 2. Reciprocity

Australia could accelerate the development of a global market by demonstrating its willingness to reciprocate the support given by foreign governments to deliver a domestic and export industry.

Market development in client nations has been facilitated by government support, including hard market growth targets, direct subsidies, government and municipal demand, and emissions control mechanisms.

## 3. Foreign investment.

Australia could financially support joint developments with interested countries like Germany, Japan, South Korea, and China that provide projects that will ultimately contribute to the national hydrogen strategy. In this way, new project opportunities can be assessed for their fit with the national strategy, providing a more cohesive and strategic approach to hydrogen project development.

Our client nations have been proactive in promoting a hydrogen economy, with Japan providing co-investment to Australia-based hydrogen projects like the Hydrogen Energy Supply Chain (HESC) project in Victoria with Kawasaki Heavy Industries and Iwatani, and Sumitomo working with Queensland University of Technology. Australia has funding mechanisms that provide grants and incentives for renewable and clean energy.

Some competitor nations (Norway, United Arab Emirates, Saudi Arabia, Qatar, and Kuwait) use their sovereign wealth funds to create strategic investment positions that facilitate export and international trade. Australia could do the same through its Future Fund.

## 4. Trade agreements.

Bilateral agreements to mutually recognise carbon credits between Australia and client nations would increase the confidence our clients have in the carbon neutrality of our product.

There are co-benefits (e.g. local jobs and development) from generating offsets locally, but there are also likely to be competitive opportunities overseas. Presently, the world's Governments have not agreed how offsets could be traded internationally, but this is their intention (Article 6 of the Paris Agreement) and progress to agreeing the detailed rules was made at the recent COP-24 summit.

Bilateral agreements should recognise that exports of low emissions energy has value to the client nation, due to reduced Scope 3 emissions. A mechanism that enables energy exporting nations to accrue some of the value of lower-carbon energy would promote the development of low carbon energy over high carbon options.

5. Strategic positioning.

Australia must exploit its scale and domestic infrastructure to stay in front of its competitors on the experience curve.

A first-mover advantage could be leveraged to build a lower cost position than our international competitors.

Green hydrogen will benefit from the economies of scale that blue hydrogen can create.

Australia will need to develop a competitive supply chain for the input factors of production for green energy. We envisage a supply chain that mirrors the efficient clusters of car manufacturing; or the efficient clusters of phone manufacturing in China.

**What are the top two or three factors required for a successful hydrogen export industry?**

1. Low cost of production. Requires an efficient domestic supply chain.
2. Demand certainty. Enables Australia to achieve minimum scale.
3. Government financial support. To overcome initial commercial barriers.
4. Credible path to green hydrogen. Provides customer confidence of long-term emissions benefits.

**What are the top two or three opportunities for the use of clean hydrogen in Australia?**

1. Large commercial and public utility fleets.
2. District and mid-scale renewable energy storage and grid stabilization.
3. Transport fuel for mining in the medium-term.

**What are the main barriers to the use of hydrogen in Australia?**

1. Technology bias (especially through electric vehicles, solar and battery incentives).
2. Low consumer awareness.
3. High energy cost.
4. Lack of infrastructure.

**What are some examples where a strategic national approach could lower costs and shorten timelines for developing a clean hydrogen industry?**

- Commitment to zero-emission fleets (including targets for public transport, government fleets)
- Clear national emission targets and policy frameworks at the federal level.
- Provide incentives for vehicle take up so that the early adopters, who accept greater inconvenience in the initial stages, accrue a greater economic benefit (e.g. rebates for vehicle purchase, fuel subsidies / tax credits, exemption from luxury vehicle tax for HFCEVs, exemption from fuel excise).
- A national education program will increase and accelerate public acceptance and uptake. A visible consumer focused approach, starting with transport, will increase the social license for this shift, ultimately reducing the public cost of high levels of renewable uptake.

- Adopt standards of measurement that are familiar to consumers so that the value of hydrogen vs other options is transparent. For instance, pricing hydrogen in litres of petrol equivalent will provide familiarity, versus a kilogram measurement.
- Adopt international standards as national standards - unless there is a specific geographic, health, safety or environment reason not to. This will provide certainty and accelerate the implementation timeline. It will prepare Australia for technology and energy export.

**What are Australia’s key technology, regulatory and business strengths and weaknesses in the development of a clean hydrogen industry?**

**Strengths**

- Natural renewable resource advantages – wind, solar and hydro power resources
- Natural gas – low carbon fuel
- Large land mass to take advantage of those renewable resources
- Proximity to key Asian markets
- Stable government
- Highly skilled workforce

**Weaknesses**

- Clear and legislated policy needed to support the industry
- Gaps in regulation for consumer hydrogen could feed insecurity over safety
- Low maturity of liquid hydrogen ship based transport
- Australia’s cost of labour and gas feedstock is a comparative disadvantage

**What workforce skills will need to be developed to support a growing clean hydrogen industry?**

1. Residential, commercial and industrial hydrogen gas plumbing and fitting.
2. Manufacturing engineering, to deliver a low-cost supply chain.
3. Broader education for safe handling.

**What areas in hydrogen research, development and deployment need attention in Australia?**

1. Low cost electrolyser technology.
2. Large scale, high efficiency liquefaction systems.
3. Efficient transportation vectors for domestic hydrogen use and export.