



# ASIA-PACIFIC HYDROGEN 2023

SUMMIT & EXHIBITION

26-27 OCTOBER 2023

THE ICC SYDNEY, AUSTRALIA

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# 2023

## EXECUTIVE SUMMARY

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# SUMMIT DAY ONE

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## OPENING KEYNOTE ADDRESSES

Fiona Simon of the Australian Hydrogen Council launched the event, emphasising the need for the public and private sectors to collaborate in three key areas to overcome challenges holding back the hydrogen industry. “Government needs to lead but the emerging industry can very usefully provide guidance and lessons learned,” she said. Firstly, developers should share learnings from their projects to equip policy makers with the information they need to take decisions. Industry bodies like the Hydrogen Council regularly convey the voice of companies, and information is also being shared thanks to stipulations attached to some public money grants and subsidy schemes. Secondly, industry and government should jointly work to instil positive social impact on communities impacted by hydrogen projects as a matter of basic decency and to maintain public support for the industry going forwards, she said. Simon’s third suggestion was collaboration to upgrade common user infrastructure like roads, ports, storage, and waste management. “I’ve heard often that in Australia we have roads and bridges that are vital for transporting the equipment for wind farms, but these aren’t necessarily fit for purpose in terms of weight or turning circles for giant wind turbine blades,” she said. Simon suggested that the hydrogen industry should try to draw in other interested sectors to help pay for the necessary upgrades. Simon said that government needs to take the lead to encourage hydrogen projects, since these are not yet economically attractive for private players. But she also acknowledged that governments are under pressure from voters and from other sectors of society which also need funding and said that hydrogen industry players can help more. She ended by urging attendees to play their role by sharing whatever information they can during the conference.

Representing New South Wales, The Hon. Penny Sharpe outlined the state’s aim to cut its own emissions to net zero by 2050 and use hydrogen to decarbonise its heavy industry to “ensure its status as a trusted trading partner in the world’s most populous region”. The state is on track to have 2GW of hydrogen production capacity, far exceeding its target of 700MW – if it can realise the projects announced so far, she said. The minister highlighted policies to push the industry forward, such as exempting hydrogen developers from tariffs for connecting to the electricity grid, which could cut the cost of hydrogen production by around \$2/kg and providing its three hydrogen hubs with a combined A\$100mn in funding to top up funds from Australia’s national government. By 2026, NSW plans to open a hydrogen centre of excellence to deliver hundreds of new apprenticeships and upskilled workers every year.

The minister from neighbouring South Australia, The Hon. Tom Koutsantonis, explained the state’s vision to capitalise on its magnetite resources and build a green iron and green steel export industry, based on locally produced green hydrogen. He said that the state would still export hydrogen or hydrogen carriers like ammonia or liquid hydrogen from its planned hub at Port Bonython – but he said that ultimately using hydrogen to make value-added products like steel would be easier and faster. Moreover, he said that this question was facing not only South Australia but the entire nation. He highlighted that South Australia’s plan to build a 250MW electrolyser and 200MW power generation plant has made progress, as it had the prior weekend appointed Canada’s Atco and the Linde company BOC to build the plant. Minister Koutsantonis highlighted the size of the scale up needed as he pointed out that South Australia was home to a 1.25MW electrolyser which is currently the largest in Australia. He also advertised South Australia’s plan to integrate all the various planning processes for hydrogen projects into a single piece of legislation to simplify approvals.

### THE HON. PENNY SHARPE

Minister for Climate Change,  
Minister for Energy, Minister for the  
Environment, and Minister for Heritage  
**Government of New South Wales**

### THE HON. TOM KOUTSANTONIS MP

Minister for Infrastructure and Transport,  
Minister for Energy and Mining  
**Government of South Australia**

### DR FIONA SIMON

CEO  
**Australian Hydrogen Council**



# SESSION 1: LEADING HYDROGEN PROJECTS BUILDING APAC SUPPLY CHAINS

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The session started with a presentation from bp's Lucy Nation which introduced her company's larger strategy in the hydrogen space and shed light on some of its specific projects. bp is firmly focused on decarbonising hydrogen use at its own facilities first before pursuing more extensive supply to third parties in the vicinity of its key locations. Large-scale exports will only become a key focus area as a final step. The initial focus on adjacent industrial demand helps derisk projects, she said. Nation highlighted the importance of infrastructure build out that has to happen in parallel with production projects.

bp is developing three projects in Australia which could have a combined 40GW of renewable power generation capacity. Nation pointed out that this is a "staggering number" given that Australia currently generates around 90GW of electricity. The H2Kwinana project south of Perth is to initially host 100MW electrolyser capacity with a view to expanding this to 1.5GW. It could serve bp's biorefinery at the location but also provide supply for mineral and mining processing and exports. bp has already secured electrolysers for the site to ensure a 2026 start-up, Nation said. In the Pilbara region, bp is developing the Australian Renewable Energy Hub which could become one of the largest renewable energy projects in the world. The site has the potential to host 26GW renewable power capacity and to produce 1.6mn t/yr of hydrogen. Near Geraldton in Western Australia, bp is planning to set up Project GERI which is slated to eventually entail 14GW of renewable power capacity to feed 7GW of electrolyser capacity, with a focus on critical minerals processing, iron and steel production and power networks in the wider area.

During the subsequent panel discussion, Keisuke Miyoshi of JOGMEC highlighted Japan's need for imports and Australia's favourable position for supplying some of these. Japan is aiming for 3mn t/yr of hydrogen supply by 2030, rising to 12mn t/yr by 2040 and 20mn t/yr by 2050.

Richard Bolt of Nous Group painted a slightly gloomier picture than many other speakers at the event. "We've hit a point in Australia with hydrogen and the energy transition generally, where reality is beginning to bite," he said. "It is the sheer scale, complexity, coordination challenge, social license challenge [which] means that what looked like a really euphoric promise of a green future – which is still there – is going to take an awful lot of hard yards to be made up," Bolt added. But Bolt stressed that this was "not to suggest that people should be downcast". Instead, "we are going to have to redouble our efforts into tackling this not as a short-term crisis with a quick fix, but as a very long-term transformation with a huge amount of joint effort required".

Nation subsequently questioned the expression "willingness to pay" when it comes to talking about potential offtakers. She noted that bp is working with many customers which are "all very committed to the energy transition," but that "they can't pay prices that are going to put them out of business". There are industries where there are more opportunities and companies are increasingly willing and able to pay a premium, for instance in the lithium sector. But Orica's Paul Evans said that there is too little willingness from downstream consumers to really take up cleaner products. "We need the fine words of the CEOs in the downstream of these supply chains in regards to emissions reduction to be matched by the actions and behaviours of their deal teams and procurement guidelines," Evans said. "Unfortunately, the history of Australia over the last 10-15 years suggests that they will not go there voluntarily." The government should start to focus on scope three emissions of downstream companies to spur the transition, he said.

## DR FIONA SIMON

CEO

**Australian Hydrogen Council (Moderator)**

## KEISUKE MIYOSHI

Director General,  
Hydrogen and CCS Project Department

**Japan Organization for Metals and Energy Security (JOGMEC)**

## LUCY NATION

Vice President - Hydrogen,  
Australia and Asia Pacific

**bp**

## PAUL EVANS

Vice President – Corporate Affairs,  
Sustainability and Property,

**Orica Limited**

## RICHARD BOLT

Principal

**Nous Group**

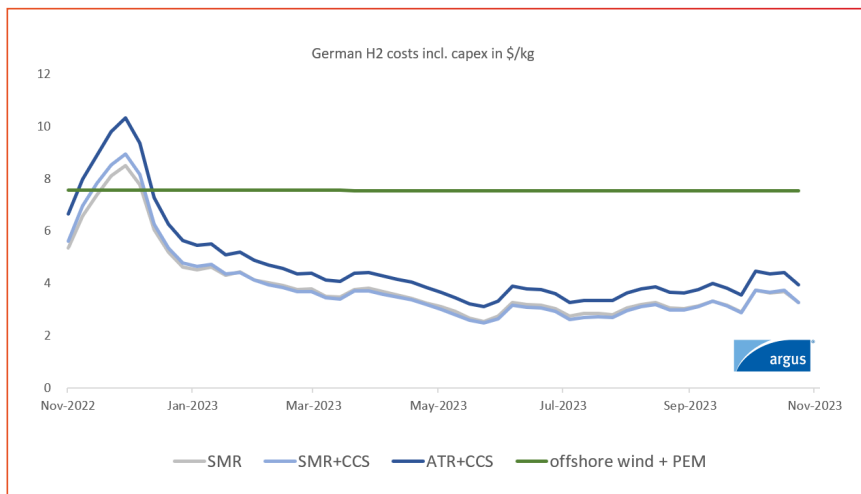


# GERMANY'S HYDROGEN AMBITION AND IMPORTANCE OF AUSTRALIA-GERMANY COOPERATION

Representing the German government, Dr Juergen Friedrich highlighted his country's need for "large amounts of domestically-produced and imported hydrogen and its derivatives" to meet its goal of reaching net zero emissions by 2045. At this stage of the hydrogen industry, governments have to "play a crucial role in enabling markets and providing opportunities for the private sector," Friedrich said. Mechanisms such as the H2Global scheme and domestic carbon-contracts-for-difference – which are aimed at helping industry switch to cleaner supply sources – are among the incentive programmes that Germany has drawn up.

In its updated hydrogen strategy published in June 2023, Germany lifted its electrolyser capacity deployment target to 10GW from 5GW previously and Berlin has outlined measures to help with the build out of this capacity – including direct support for production projects. The country has also drawn up an initial core hydrogen pipeline network that would span 1,800km. Based on the strategy, Germany will be open to using any type of low-carbon hydrogen, although on the production side direct financial support will be restricted to supply made from renewable sources via electrolysis. Germany expects to need 45-90TWh of hydrogen imports by 2030, which would account for around two-thirds of its anticipated demand, Friedrich said. Berlin is keen to diversify its supply sources and is currently working on a separate import strategy. Thanks to its ample renewable power generation capacity, Australia could become a major supplier of renewable hydrogen and derivatives for Germany, Friedrich noted.

**DR JUERGEN FRIEDRICH**  
 Ministerial Envoy for International Hydrogen Projects  
 Federal Ministry for Economic Affairs and Climate Action, Federal Republic of Germany



## SESSION 2: REGIONAL COLLABORATION & TRADE FROM APAC TO THE WORLD

Following on from Dr Juergen Friedrich's comments in the previous session, Dutch government representative Sandor Gaastra stressed that, like Germany, the Netherlands will need imports of hydrogen and derivatives to meet its decarbonisation ambitions. And like Friedrich, he highlighted Australia's favourable conditions for becoming a key exporter. But the port of Rotterdam's Martijn Coopman stressed that domestic projects will need to take priority first for both production and offtake projects. "In Rotterdam, we're actually first developing our local hydrogen production...and then imports will come later," he said, adding that for demand similarly "the offtake within the port is the priority." Coopman also expressed discontent with some countries that have not committed to targets set out in the Paris Agreement, but that still want to supply Europe with hydrogen. "I personally have a problem with that policy. It doesn't make sense," he said. "We're working on a global problem, right?"

The Australian port of Newcastle's Simon Byrnes stressed the importance of creating new industries, such as for hydrogen and derivatives, as others, most notably coal mining, are disappearing, amid the decarbonisation efforts. The port is working with companies focused on exports, such as South Korea's Kepco, but also with firms that aim to decarbonise domestic industry, including Origin and Orica. But the port's position as the world's biggest coal export port in some ways poses a challenge for its transition to becoming a hub for cleaner energy, Byrnes said, specifically with regard to financing and investments. "Having any form of investment is now really difficult for us," he said, noting that "we only have one Australian bank left that finances the port." Byrnes added that "we've seen some transition funds come through" but that a challenge exists in determining how such funds can invest in the transition part of the businesses, "without taking the advantages of the fossil fuel side of it".

New Mexico's governor Michelle Lujan Grisham highlighted that her state has ample opportunities for hydrogen production, not only because of its land mass – the fifth largest of any US state – but also because of its position as a tech hub. Hydrogen will have a key role in helping the state's industry, which has been based heavily around oil and gas, to decarbonise, she noted.

### MICHAEL OTTAVIANO

Managing Partner

Renewable Energy APAC, ERM (Moderator)

### SANDOR GAASTRA

Secretary-General, Ministry of  
Economic Affairs and Climate Policy

Government of the Kingdom of the Netherlands

### MICHELLE LUJAN GRISHAM

Governor of the State of New Mexico

Government of New Mexico

### MARTIJN COOPMAN

Program Manager International  
Hydrogen Supply Chains

Port of Rotterdam

### SIMON BYRNES

Chief Commercial Officer

Port of Newcastle

### VICENTE PINTO

Counsellor for Investment Affairs (Asia)

InvestChile



# PRE-RECORDED KEYNOTE ADDRESS

Australia’s climate change and Energy Minister Chris Bowen highlighted the importance of hydrogen for Australia’s future, calling it the “foundational piece of our nation’s prosperity”. “In a net zero future, it’s central to our potential as a renewable energy superpower,” he said. Minister Bowen noted that he is working with state and territory ministers to refresh Australia’s hydrogen strategy. The government had in February 2023 announced plans to review the strategy. The strategy was first drawn up in 2019 but needed an update partly because of policy developments elsewhere, such as the US’ Inflation Reduction Act, the government said at the time.

Argus calculates prevailing costs for hydrogen production in Australia using a 100mW proton exchange membrane (PEM) electrolyser fed by solar photovoltaic and wind power at just over \$5/kg, including recovery of capital costs. That makes it one of the lowest production costs in the world.

Minister Bowen further announced the award of A\$69.2mn of federal funds into the Central Queensland (CQ) hydrogen hub. The investment is part of the government’s hydrogen hub programme for which A\$500mn have been earmarked and will be used to support the construction of an electrolyser plant, a pipeline as well as water and

**THE HON CHRIS BOWEN MP**  
 Minister for Climate Change and Energy,  
 Department of Climate Change,  
 Energy, the Environment and Water  
**Australian Government**

hydrogen storage at the Gladstone site. The CQ hydrogen hub, developed by a consortium led by Stanwell, is slated to start operations in 2027 with a production capacity of 36,000t/yr, which could rise to 292,000t/yr at full capacity which is due to be reached by 2031. Supply from the hub will be used for domestic consumption and for exports.





## SESSION 3: APAC OFFTAKE AGREEMENTS DRIVING THE DEMAND TO DECARBONISE HARD TO ABATE SECTORS

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The session started with a presentation by Stefan Hakansson of the GFG Alliance who highlighted the decarbonisation opportunities for hydrogen in the steel sector, while also stressing the enormous build out of renewable power generation capacity needed for this. Hakansson noted that Australia has favourable conditions for making iron and steel using renewable hydrogen, not just because of the ample wind and solar power generation capacity but also because places like Whyalla provide high grade iron that needs less energy to make steel. Hakansson emphasised the need for collaboration and for getting all stakeholders on board, especially given the urgency for pushing ahead with green iron and steel production.

Another use case for hydrogen within Australia could be zinc production, as Daniel Kim of Ark Energy explained. His company is working with parent company Korea Zinc's Sun Metal Zinc refinery in Townsville with the aim of making it "one of the first refineries in the world to produce green zinc". Renewable hydrogen could also play a key role in decarbonising heavy haulage transport, Kim said. Ark Energy is looking to deploy five ultra heavy fuel cell electric trucks in Queensland to operate between the local zinc refinery and port. The firm is also involved in a Queensland project that targets 1.8mn t/yr ammonia exports to South Korea.

Providing the perspective of a technology supplier, Siemens Energy's Samuel Morillon highlighted the enormous scale-up needed. If Australia wants to meet its target of reaching net zero emissions by 2050, it will need around 72,000 wind turbines until then, meaning that around 50 would have to be installed every week, Morillon noted. He added that visibility on future demand is key for technology providers. For Morillon, steel, cement and plastics will have to be priority sectors for decarbonisation efforts as this could help cut global CO2 emissions by around 30pc.

Origin Energy's Ryan Willemsen-Bell noted that for now it is not yet firm offtake agreements that are driving demand, but rather a "belief and conviction" that there will be very large demand in the future because of the need to decarbonise. Kim agreed that a fundamental belief that "we should be doing everything we can to decarbonise and lower our emissions" is driving plans ahead for now. At the same time, policies such as the EU's carbon border adjustment mechanism requires producers like Korea Zinc to take decarbonisation measures in order to stay competitive and retain access to key markets, Kim said. Hence opting for green solutions is "the right thing to do, and it's the smart thing to do". Willemsen-Bell added that eventually offtake agreements will have to materialise, however, for projects to become bankable.

In order to trigger demand for renewable hydrogen and derivatives, policy interventions will be key, Utility Global's CEO Claus Nussgruber said. Kim agreed, noting that support for capital and operational support will be needed on both the demand and production side. Nussgruber added that a challenge comes from the fact that when handing out subsidies, government "need to insist on local content in order to not be voted out by the electorate". "This is counterproductive to keeping costs down," given that cost efficiencies "typically come from a global economy and international trade.

### JO CLARKE

Australia Country Manager and Bureau Chief  
**Argus Media (Moderator)**

### STEFAN HAKANSSON

Chief Clean Energy Officer (CCEO)  
**GFG Alliance**

### SAMUEL MORILLON

Managing Director, Australia  
**Siemens Energy**

### CLAUS NUSSGRUBER

CEO  
**Utility Global**

### RYAN WILLEMSEN-BELL

General Manager, Future Fuels & Carbon  
**Origin Energy**

### DANIEL KIM

Chief Executive Officer  
**Ark Energy**



# INDONESIA'S RESPONSE TO THE JETP MODEL FOR CLIMATE ACTION

H.E. Rachmat Kaimuddin from the Indonesian government called for global community to recognise that developing countries require different policies compared with developed nations to ensure an equitable transition. “The fiscal capacity of Indonesia is somewhat more limited than our international partners,” he said. He explained the need for innovative compensation mechanisms to support Indonesia in its early coal phase-out as this is likely to threaten jobs, profits for asset owners, and energy supply.


This was one of the lessons learned so far as part of Indonesia’s Just Energy Transition Partnership (JETP), which is a scheme for developed nations and international banks and financiers to support green investment in several developing nations.

The early retirement of coal-fired power stations is one of the hardest decarbonisation projects to finance as it is tantamount to “destroying value” since these are “perfectly good assets making energy people are willing to pay for,” Deputy

**H.E. RACHMAT KAIMUDDIN**  
Deputy Minister for Infrastructure and Transportation Coordination  
**Coordinating Ministry of Maritime Affairs and Investment of the Republic of Indonesia**

Minister Kaimuddin said. Indonesia has invested significant amounts in coal fired power plants over the past two decades and the average age of plants in Indonesia’s fleet is 12 years, with some plants having only come online in the past couple of years, he said. Therefore, suitable mechanisms are needed to help Indonesia bridge the cost gap for closing coal plants and starting replacement green energy projects – whether that be carbon taxes, voluntary carbon markets, or the payment of premiums for green products, Deputy Minister Kaimuddin said.

**Three Lessons From Our Decarbonization Journey and Partnership So Far**



**No cookie cutter solution**

**Each country is different** – developing countries should continue to grow but also slow down the emission

**We cannot 100% apply solutions from developed nations**, as their fiscal capacity, access to tech and political reality is very different



**No silver bullet**

**No single universal tech that can solve this issue globally, yet.** We should not be dogmatic about usage of any carbon reduction technology

**If we can reduce emission without creating more problems, we should use it**



**No free lunch**

Almost all of the financing available are **business-as-usual financing (commercial or multilateral rate). Very little grants.**

Current financing **cannot to fix the prerequisite problems:** reducing coal fleet outputs and building transmission

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## SESSION 4: FINANCING GLOBAL HYDROGEN PROJECTS

Alex McIntosh highlighted Arena's role in helping to finance hydrogen projects, noting that her organisation has so far invested over A\$300 across 46 renewable hydrogen projects. These projects span from research and development to transport infrastructure, refuelling and industrial demonstration sites.

The US' Inflation Reduction Act with its generous production tax credits spurred a wave of incentives around the world, to the point where Australian project developers were considering leaving the country for more bankable prospects elsewhere, McIntosh said. Australia has responded by implementing its Hydrogen Headstart programme which will back investors with a 10-year government contract to provide a fixed premium on hydrogen production. The mechanism helps to bridge the gap between hydrogen production costs and what customers are willing to pay, McIntosh said.

JBIC's Kohei Toyoda stressed the importance of such mechanisms to bridge cost gaps and make projects more bankable. "Hydrogen is still very expensive. We know the price will fall, but we don't know when or how much," JBIC's Kohei Toyoda said. The sector faces a deadlock as customers still will not commit to long-term offtake contracts because of price uncertainty, making it difficult for suppliers to take final investment decisions, he said. "We need to break the deadlock," Toyoda said. He added that Japan is in the process of developing a contracts-for-difference mechanism similar to that established in the UK. The Japanese mechanism will be designed to bridge the cost gap between hydrogen and natural gas and between ammonia and coal. Just as important is that supply and demand are "physically connected" through infrastructure investments, Toyoda noted. International public-private partnerships will be crucial for driving such efforts forward, he added.

Hydrogen producers ought to go for "low-hanging fruits" when looking for offtakers, NexantECA's Connie Lo advised, saying that ammonia producers and refiners will be an easier sell as they already have infrastructure on-site and require very little modification to adopt low-carbon hydrogen. This model would allow producers to kickstart production and later move to newer markets, she said.

### MARK ELLIOT

Hydrogen Systems Commercial Authority  
**Xodus (Moderator)**

### H.E. RACHMAT KAIMUDDIN

Deputy Minister for Infrastructure  
and Transportation Coordination  
**Coordinating Ministry of Maritime Affairs and  
Investment of the Republic of Indonesia**

### JOHN HIRJEE

Head of Research & Analysis, Resources,  
Energy & Infrastructure  
**ANZ Banking Group**

### KOHEI TOYODA

Director General for Energy Transformation  
Strategy, Energy and Natural Resources  
Finance Group  
**Japan Bank for International Cooperation  
(JBIC)**

### CONNIE LO

Principal Consultant  
**NexantECA**

### ALEXANDRA MCINTOSH

Director - Business Development & Transactions  
**Australian Renewable Energy Agency (ARENA)**





# SPOTLIGHT SESSION: CENTRAL QUEENSLAND HYDROGEN PROJECT

This session came back to the CQ Hydrogen Hub for which Minister Chris Bowen had earlier announced the funding award from the central government.

The project will include a hydrogen production facility at Aldoga, which is about 20km outside of Gladstone in Central Queensland, Stanwell's Phil Richardson said. A hydrogen pipeline will be developed to bring hydrogen to an ammonia production facility and a hydrogen liquefaction facility combined with ship loading facilities at Gladstone port, Richardson said.

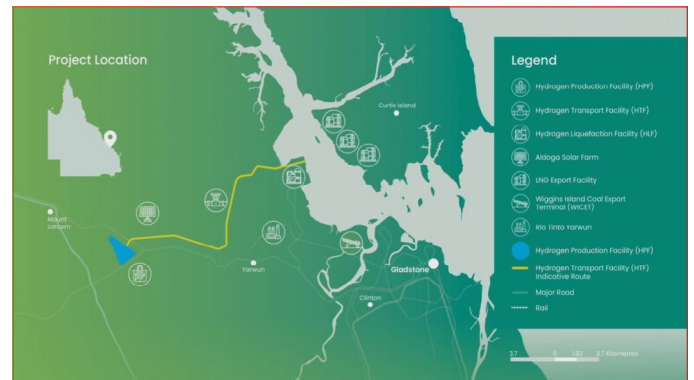
An early engineering and design study is underway and a final investment decision is planned for late 2024, Richardson said, which will help the project begin commercial operations from 2028. In its initial phase, the project is due to produce 200 t/d of hydrogen that is to be turned into ammonia. Output will then be scaled up early in the following decade, Richardson said. Stanwell, Iwatani, Marubeni, Kansai and Keppel Infrastructure all joined as partners for the project in 2021 and have each taken charge of the various segments of the project. Liquefied hydrogen from the project could be shipped to Japan and Singapore using different carriers, based on the project plans.

**PHIL RICHARDSON**  
General Manager Hydrogen Projects  
**Stanwell Corporation (Moderator)**

**KAZUSHIGE UEMURA**  
General Manager – Hydrogen Division  
(Australia), Chief Representative of Melbourne Office  
**Iwatani Corporation**

**MASAO IMAZATO**  
Assistant General Manager, New Energy Business Development Department  
**Marubeni Corporation**

**NOBUAKI EBISAKA**  
General Manager, Hydrogen Business Strategy Division  
**Kansai Electric Power Company Inc.**



## SESSION 5: ADVANCEMENTS IN INFRASTRUCTURE AND PRODUCTION TO LOWER THE COST OF HYDROGEN SUPPLY CHAINS

This session took a closer look at some technological developments but also covered key policy developments, including the US' Inflation Reduction Act, and their effects on progress in the industry.

The US bill has drawn attention to the country's hydrogen potential, but "the irony is that it hasn't helped the US yet" because guidance has yet to be issued on many of its incentives, Bloom's Adam Bacon said. "The unfortunate consequence is that it's halted a lot of activity," he said. Meanwhile, offtakers in Japan and South Korea are showing increasing interest in hydrogen and derivatives because of constrained supplies of natural gas, and interest is growing in Singapore, Taiwan and other parts of Asia because of net-zero goals, Bacon said. But despite that increased interest, final investment decisions are not being taken, he said.

Bloom Energy's biggest hurdle will be getting brand recognition among the many other electrolyser makers vying for dominance, Bacon noted. But different electrolyser technologies can co-exist – Bloom's solid oxide electrolyzers can achieve efficiencies of 37.5kWh/kg of hydrogen if using waste heat, but for some plants the technology may need to be coupled with proton exchange membrane (PEM) or alkaline modules, he said.

Among the rival electrolyser manufacturers is Hysata which is also claiming particularly high efficiencies. The firm's Tom Campey said that Hysata's electrolyzers can achieve efficiencies of 41.5kWh/kg using only electricity and no waste heat. Hysata's cell design allows for a simpler balance-of-plant set-up than many other technologies which reduces installation costs, Campey said, adding that his company raised A\$42.5mn last year. Similar cash injections are key for helping technological developments along. "Even though the market for venture capital has deteriorated a bit over the last couple of years, there's still plenty of money looking for good technologies to invest in," Campey said.

The maritime sector should begin spurring demand for hydrogen and derivatives around 2028 or 2029, Woodside's Menno Weustink said. Korean shipbuilders are

### DR DEAN BIALEK

Chief Officer External Affairs &  
Government Relations  
**CWP Global (Moderator)**

### ADAM BACON

Regional Executive – Asia Pacific  
**Bloom Energy**

### TOM CAMPEY

Chief Commercial Officer  
**Hysata**

### STEVE CHONG

Technical Specialist for Hydrogen and  
Process Engineering  
**ABB**

### MENNO WEUSTINK

Vice President New Energy APAC  
**Woodside Energy**

confident about having hydrogen and ammonia-fuelled ships ready in that timeline, which will also transport ammonia at a massive scale, he said. Despite the low round-trip efficiency of hydrogen and ammonia, hydrogen boil-off can be used in ship engines to improve energy losses and balance the use-case, he added.



## SESSION 6: LOW CARBON HYDROGEN PRODUCTION & CCUS SUPPLY CHAINS

Bechtel's John Gunn said that signs from Europe for an increased acceptance of blue hydrogen and ammonia could help push production projects, such as on the US Gulf coast, closer to final investment decisions (FIDs) because of improved prospects for offtake. Gunn expects "several" blue hydrogen and ammonia projects in the US to reach FIDs "in the next six months".

Representing Low Emission Technology Australia, Damian Dwyer gave his view on the Hydrogen Headstart programme that is to subsidise production from 2-3 large-scale renewable hydrogen projects in the country. For Dwyer, the scheme is "a recognition of the role that hydrogen can play". But he criticised the "singular focus on renewable hydrogen" noting that a "technology neutral approach" focused on bringing down emissions would be preferable.

A key aspect for realising projects is the construction of common user infrastructure, for instance related to hydrogen or CO2 transport, according to Technip Energies' Eva Druk. Her company often has "multiple clients in the same areas asking the same questions", which should lead to investigations around how infrastructure can be build that is beneficial for multiple parties.

SLB's Rafael Fejervary agreed on the need for common user infrastructure buildout and noted that governments can support this in multiple ways, especially by cutting permitting times. "We're in a rush to get our emissions reductions and then when we look at some countries, it takes nine years to get a permit for a full renewable project, or it takes five years to get interconnection permits," he said. "So all of these things really need to be debottlenecked and that's really a government responsibility". But Fejervary also noted that the industry "needs to come together" on infrastructure development.

A connected aspect is that regulatory frameworks still need to be put in place in many areas, Gunn said. "There's lack of clarity on the regulatory oversight of permitting or standards in certain parts of the hydrogen value chain," he noted. Challenges around getting power interconnection agreements for electrolyser plants also increase the need for other hydrogen production pathways, such as from natural gas with carbon capture, to contribute to emissions reductions.

James Kim of Approtium also emphasised the need for blue hydrogen to play a role in a transition period, especially to reach scale and help infrastructure build-out. The "best in class" renewable power assets globally produce at a levelised cost of electricity of around \$20/MWh and these "still can't beat the blue right now," Kim said. There is room for blue and green hydrogen to "coexist", he said, adding that "if governments would understand that from a policy standpoint and they don't get in the way with credits and with subsidies, then I think we can make that transition much quicker."

### SIMON ALLISON

Asia Pacific Regional Director

**Xodus (Moderator)**

### JOHN GUNN

Global Operations Executive – Hydrogen

**Bechtel**

### DAMIAN DWYER

Director – Policy and International Relations

**Low Emission Technology Australia (LETA)**

### RAFAEL FEJERVARY

Director – Hydrogen

**SLB**

### EVA DRUK

Delivery Manager

**Technip Energies**

### JAMES KIM

President & CEO

**Approtium**





# SUMMIT DAY TWO

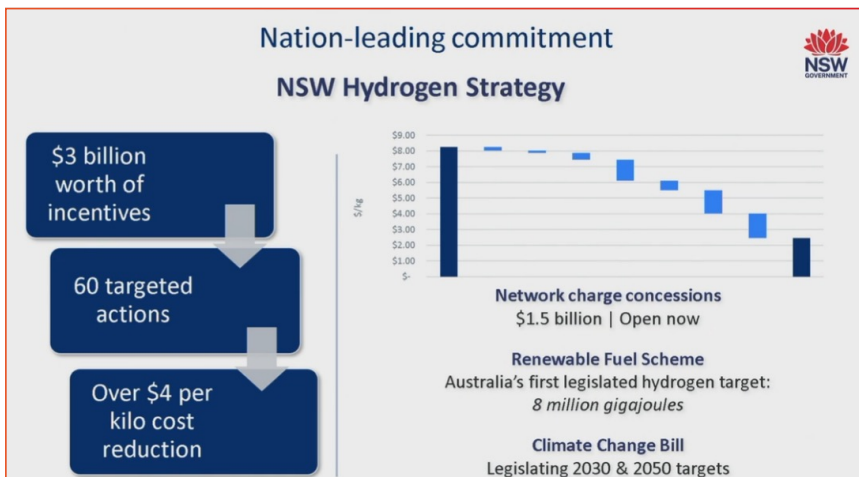
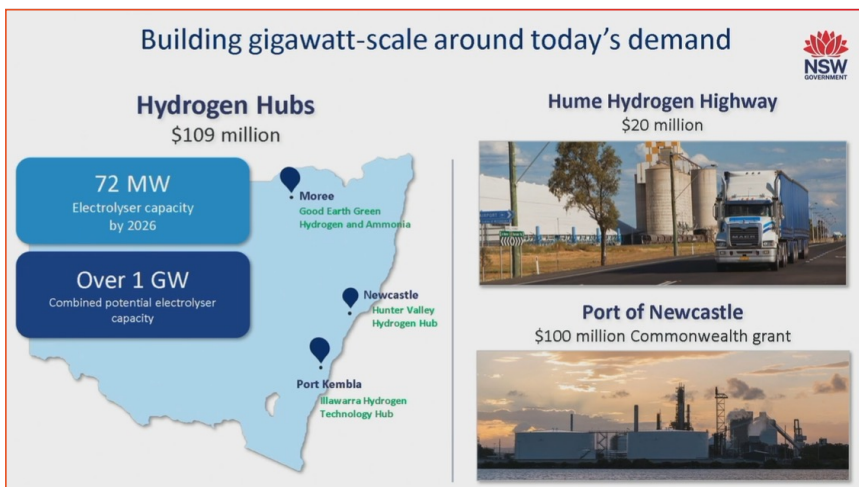
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# OPENING KEYNOTE ADDRESSES

Tim Stock outlined New South Wales’ plan to provide incentives worth over A\$3bn and several policy interventions designed to drive down the cost of hydrogen to \$4/ kg and attract international investment in the state. NSW has disbursed \$109mn to three hydrogen hubs in the state and \$20mn to create the Hume Hydrogen Highway with Queensland and Victoria. It has also invested a further \$100mn in infrastructure at the port of Newcastle to turn it into a “a gigawatt scale, clean energy precinct,” set up for large scale hydrogen and ammonia production and export. But Stock emphasised that a suitable fiscal and regulatory framework to encourage production was also needed alongside grants. “We understand the government intervention is more than just capital grants. It’s about how do we structurally improve the operating costs of these plants to make them viable over the long term,” he said. The state is accepting applications from hydrogen project developers to get a reduction of up to 90pc on their network charges which could cut their production costs by \$2/ kg since power is a key input. The scheme is the only one of its kind in Australia and represents about \$1.5bn in concessions, he said. Sydney has mandated 8mn GJ of hydrogen consumption in the state by 2030 to provide a signal for producers and is also launching Australia’s first green gas certification pilot, which will use the voluntary market to support projects that inject hydrogen and biomethane into the gas network. The programme is designed to help projects access the green premium for renewable hydrogen and will provide a further income stream, Stock said.

**TIM STOCK**

Director Hydrogen and Clean Energy,  
Office of Energy and Climate Change  
within NSW Treasury  
**Government of New South Wales**





# PRE-RECORDED KEYNOTE ADDRESS: U.S. NATIONAL CLEAN HYDROGEN STRATEGY AND DOE HYDROGEN PROGRAM REMARKS

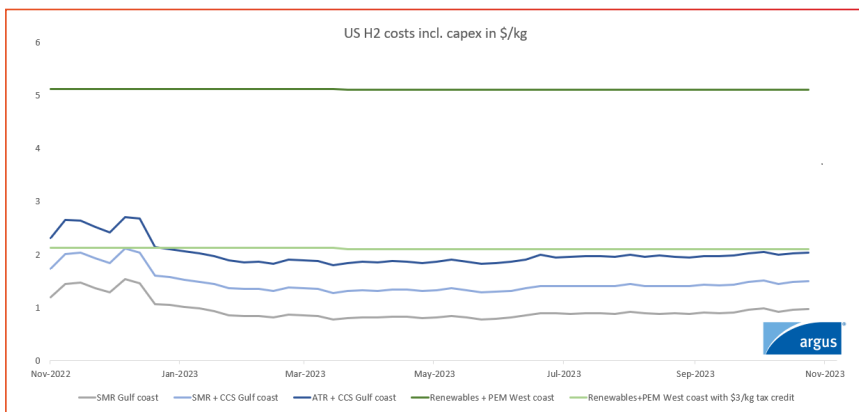
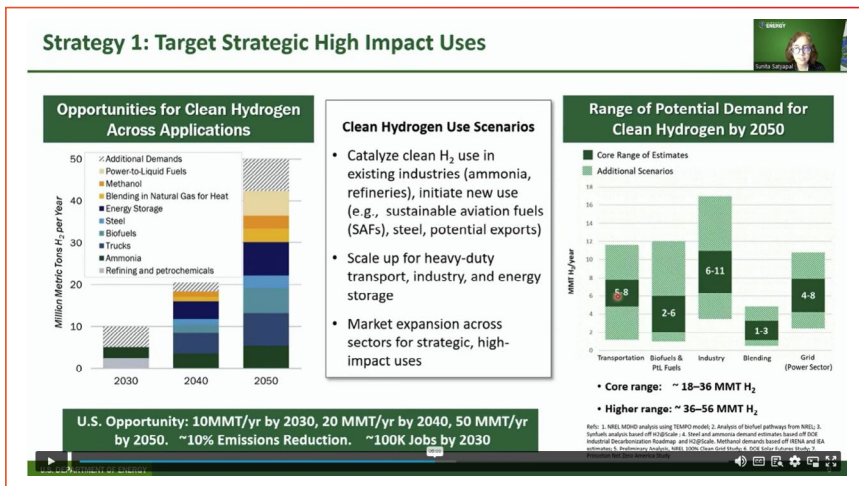
Representing the US government, Dr Sunita Satyapal presented her country's view on and approach to clean hydrogen. She outlined the US' goal to produce 10mn t/yr of clean hydrogen by 2030 which is to double a year later and increase to 50mn t/yr by 2050. The US' focus is on catalysing clean hydrogen use initially in industry that already now consume fossil fuel-based hydrogen, especially ammonia production and refining. After that, new applications, such as use for sustainable aviation fuels and for steel production, could be targeted, Satyapal said. But Satyapal also highlighted that there is a large uncertainty around long-term demand for clean hydrogen. In a "core range of estimates" demand reaches around 18mn-36mn t/yr by 2050, but it could climb as high as 56mn t/yr when scenarios foreseeing more extensive use are taken into account. Satyapal also highlighted the US' ambitious cost reduction targets of producing clean hydrogen at \$1/kg by the early 2030s.

Subsidies, such as the production tax credits provided under the Inflation Reduction Act (IRA), are envisaged to pave the way for this. The IRA provisions could provide tax credits of up to \$3/kg, depending on the carbon intensity of hydrogen production. The other key pillar of the Biden administration's support for the sector is the hydrogen hubs programme. In mid-October, seven hubs were selected to each get a share of the \$7bn in funds set aside for the programme, while more support may be made available through additional measures, such as a scheme focused on the demand side.

## DR SUNITA SATYAPAL

Director, Hydrogen and Fuel Cell Technologies Office, and DOE Hydrogen Program Coordinator

U.S. Department of Energy



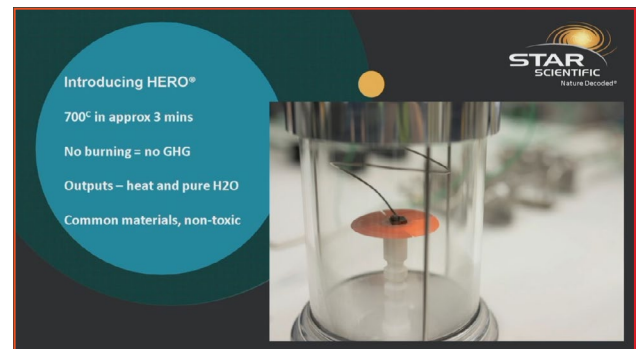
# HERO® AND ALTERNATIVE APPROACHES TO THE TRANSITION

Andrew Horvath of Star Scientific highlighted the importance of innovation in driving forward the hydrogen sector and noted Australia’s potential for advancing this. “Australia has so much more to offer than our potential to export hydrogen. In my view, our talent for innovation can accelerate this global transition more than a make and ship mentality,” he said. Horvath noted that this is “a complex time for the energy transition” and that “some may say we’ve entered some troubled waters here in Australia,” given protests against solar and wind installations on farmlands or against the “visual and environmental impacts” of offshore wind farms. Horvath urged resilience in the face of this and called on governments to push ahead with necessary policies, including to foster innovation.

Star Scientific’s Hydrogen Energy Release Optimise (HERO) technology is a catalyst that chemically oxidises hydrogen and oxygen into high heat at a quick pace, Horvath said. The company sees two key applications for this. The first is providing process heat up to 700°C, with the food and drink sector an initial target. The second is energy generation by use of the technology in conjunction with supercritical CO2 turbines. Such equipment would be “easily transportable and deployable” and could hence be used in remote locations.

Horvath urged more government support for innovative technologies that go “beyond wind, solar and electrolysis”. “In Australia, government funds are overly complex to apply for...especially in case of competitive tenders where smaller companies will be up against larger companies,” he said. But Horvath acknowledged that the government is now trying to streamline processes to make them easier to navigate. Star Scientific is planning to build a mass manufacturing facility in Australia and another in New Mexico in the US, he said.

**ANDREW HORVATH**  
Global Group Chairman  
Star Scientific Limited



# THE IMPROVING OUTLOOK FOR FINANCING LARGE HYDROGEN PROJECTS

Representing financial services group SMBC, Jeremy Hasnip explained that the economic case for hydrogen and derivatives project has become better understood over the past 2-3 years and outlined the key factors for making production projects bankable. Estimated costs for producing green hydrogen in places like the Middle East and Australia were becoming more visible at around \$750 – 800/t, compared with under \$400/t for blue hydrogen, and \$200-300/t for grey hydrogen, Hasnip said. But he said that this is likely to change over time, not least because of greater economies of scale in renewable power generation.

The 1.2mn t/yr green ammonia Neom project reaching a final investment decision was indicative of the key ingredients needed for a “gold standard project,” he said. The project benefits from long-term offtake and very competitive construction costs thanks to attractively priced labour in the Middle East. The developers stacked finance from multiple different sources – international banks, middle eastern banks, development funds, export credit agencies – which allowed them to raise over \$6bn. “That’s something to aspire to, to build something like this at that scale, and to do it competitively, and pull whatever sources of capital we need to make that happen. So that’s what keeps me focused every day looking for opportunities like that,” Hasnip said.

SMBC is initially providing advisory services to clients – such as the Central Queensland Hydrogen Hub – and will later look to provide project financing for hydrogen projects from its balance sheet. SMBC is monitoring opportunities in Australia and Asia – for example in India which is looking at producing hydrogen for its domestic refining sector and for exports, he said. The company is also seeing hydrogen opportunities in Malaysia and in Singapore, where the government is conscious for the country to stay relevant by supplying clean fuels for its maritime bunkering and aviation sector customers. Hasnip said that the price gap still needs to close to enable investment in hydrogen projects but said that the industry is increasingly focused on addressing this and that the outlook for financing is looking “a lot better than it was two and a half years ago”.

## JEREMY HASNIP

Head of Energy Transition, Australia  
SMBC



### Case Study – NEOM Green Hydrogen Project (NGHP)

**NGHP is the first large scale green ammonia project to have reached financial close.**

**Transaction Summary**

- NGHP is a green hydrogen production facility located in NEOM City, Kingdom of Saudi Arabia
- NGHP is financed by USD6.2bn debt composed of facilities provided by conventional international and local commercial banks, ECA, Islamic lenders, the National Infrastructure Fund (NIF) and the Saudi Industrial Development Fund (SIDF)
- The lenders group includes 20+ international and local lenders

**SMBC's Role in the Transaction**

- SMBC Group acted as **Coordinator, Bookrunner, MLA and Green Documentation Bank**
- SMBC Group is amongst the top lenders to NGHP, with participation in the uncovered commercial term loan and the Euler Hermes ECA-covered term loan
- SMBC Group delivered high quality service focusing on the documentation strategy and assisting on negotiation with new 'national champions' such as NIF and SIDF

**Project Overview**

- NGHP is the world's largest utility-scale hydrogen facility powered entirely by 4GW of renewable energy including solar PV (2.2GW), onshore wind (1.85GW) and battery storage solutions (400MW)
- The Kingdom of Saudi Arabia has adopted a comprehensive transformation plan known as Vision 2030, with NGHP being one of the key flagship projects of this plan
- When commissioned in 2026, it will produce 600tpd of green hydrogen and up to 1.2mtpa of green ammonia. When complete, the project will mitigate the impact of 5mtpa of CO2 emissions
- NGHP is backed by strong sponsors including the City of NEOM (33.4%), Air Products (33.3%) – leader in industrial gases and ACWA Power (33.3%) – key player in renewables

|   |                                      |
|---|--------------------------------------|
| <br><b>4 GW</b><br>Solar, Wind, Storage | <br><b>600 tpd</b><br>Green Hydrogen |
| <br><b>- 5 MMtpa</b><br>CO2             | <br><b>1.2 Mtpa</b><br>Green Ammonia |

Sources: [https://www.smbc.com.au/insights/industry-news/industry-projects](#)  
[https://www.smbc.com.au/insights/industry-news/industry-projects](#)



## SESSION 7: HARNESSING RENEWABLE POWER TO POSITION APAC AS A LEADER IN CLEAN HYDROGEN

Panellists discussed the potential of different Australian regions to produce renewable hydrogen, with different speakers advocating for sites in South Australia, Queensland, Western Australia, and New South Wales.

Speakers suggested that Australia should go beyond clean hydrogen to make value-added green products to export to the world. Representing ATCO, Colin Sadlier highlighted that the company's project in South Australia could be able to produce green steel, plastics, glass, fertilisers for domestic and customers across the APAC region. The company was recently selected to co-develop the South Australian government's A\$593mn hydrogen project, comprising a 250MW electrolyser and 200MW power generation.

Decarbonising Australia's lucrative export industry is especially important as it is threatened by increasingly stringent international regulations for decarbonisation such as the EU's carbon border adjustment mechanism (CBAM), said Andrew Dickson of CWP. He added that "iron ore is Australia's most valuable commodity and 90pc of it comes from the Pilbara," where CWP is co-developing the AREH project in the region. The Pilbara region has the most need for decarbonisation in Australia, with abatement potential of 30mn t/yr CO<sub>2</sub>, followed by Gladstone with over 20mn t/yr, Hunter Valley with 9mn t/yr, Illawarra with 6mn-7mn t/yr, and Kwinana with 2mn t/yr, Dickson said.

Dickson said the opportunity to make value-added green iron products is opening for Australia, thanks to a softening in the stance of overseas steelmakers in Asia and Europe. These steelmakers originally wanted to import hydrogen to continue processing of iron ore domestically, but Dickson said he sees a "really clear trend now" that the traditional steelmakers are increasingly willing to "devolve" energy-intensive iron ore processing to be closer to more affordable sources of renewable energy and to avoid the challenges of transporting hydrogen. This green iron could be substituted into existing steel mills abroad he said. He highlighted that South Korea's Posco is exploring the idea in Pilbara while and Dubai-based GFG is mulling the same in Whyalla.

Thinking about the power infrastructure needed to underpin Australian hydrogen economy, Andrew Kingsmill from Energy Corporation of NSW said the company was mulling the idea of a second electricity grid dedicated for hydrogen projects, which could potentially be a bigger version of the existing national electricity market (NEM) grid which spans from Queensland down to Tasmania. Kingsmill said that

### JUSTIN PAYNE

Partner, Sustainable Energy Solutions  
**ERM (Moderator)**

### JODY HERLEY

Associate Director - Business  
Development & Transactions  
**Australian Renewable Energy Agency (ARENA)**

### COLIN SADLIER

General Manager, Clean Fuels  
**ATCO**

### ANDREW DICKSON

Development Director  
**CWP Global**

### ANDREW KINGSMILL

Executive Director, Technical Advisory Services  
**Energy Corporation of NSW (EnergyCo)**

### CHRIS SHAW

Deputy Director-General, Hydrogen,  
Department of Energy and Public Works  
**Queensland Government**

around 5-10GW of spare power capacity from the existing grid could be available to power electrolyzers in the state once its five major renewable electricity zones are built.



# SHARED LEARNINGS FROM SPACE TO HYDROGEN

Professor Alan Duffy pointed to some similarities between the space sector — a field where turnover has more than doubled between 2009 and 2021 — and the hydrogen industry. Just like hydrogen, the space sector presents a “very large market opportunity”, but is also “comprised of many disparate activities,” Duffy noted. And as for hydrogen, the entire ecosystem and an integrated supply chain is key for the sector’s development, he said. Another similarity is that in the space industry as in the hydrogen sector there are only a few companies that do not work across other sectors as well, Duffy said. In both sectors, there is a need for companies to be “agile enough to take products from one use case and deploy [them] to another”.

Swinburne University has drawn up a “Hydrogen Skills Roadmap” and is developing e-learning opportunities in the field. Duffy also pointed to the theoretical potential of producing hydrogen on the moon, using water and — in some locations — potentially 24/7 solar power availability.

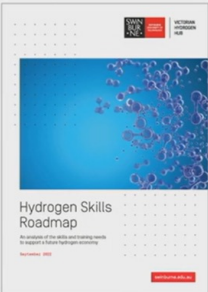
**PROF ALAN DUFFY**  
 Pro Vice-Chancellor Flagship Initiatives  
 Swinburne University of Technology

## Building a strong hydrogen workforce with Swinburne

VH2 and Swinburne Edge are actively leading efforts in the hydrogen workforce activities.


**Two Key projects:**

### Hydrogen Skills Roadmap



### Development of e-learning micro-credentials

1. Hydrogen fundamentals
2. The hydrogen economy
3. Hydrogen safety awareness
4. Electrolysers
5. Fuel cells
6. Hydrogen in mobility
7. Small bore tubing
8. Understanding standards and regulations
9. Instrumentation and control (I&C) systems
10. Store and distribute hydrogen Part A (include compressors)
11. Store and distribute



Credit: AIR.HUB.SUT



## SESSION 8: HYDROGEN MOBILITY MARKET DEVELOPMENT IN APAC

Moderator Florence Lindhaus opened the session by pointing to ambitious goals for reducing transport emissions, such as recommendations by the EU's Environmental Committee to cut bus and truck emissions by 90pc until 2040, compared with 2019 levels. Foton's Neil Wang emphasised that the best decarbonisation pathway depends on the specific use case and pointed to the necessity of using hydrogen for some mobility applications, including buses. A "normal" bus depot in Australia has around 140 buses, he said, adding that the energy required for these is similar to that required by roughly 3,000 houses in a single location. For such depots hydrogen will likely be the only option, especially given that this would allow for refilling buses in 15 minutes while recharging battery-electric vehicles would take 4-5 hours. A bus depot of this size may require close to 2t/d of hydrogen, as each vehicle could need around 6kg per 100km and would typically travel around 200km a day.

Asked regarding the safety aspect of having hydrogen refuelling stations at bus depots in the middle of a city, Gexcon's Derek Cross noted that people often tend to view this in one of two extremes. "Either it's particularly benign, it floats away, nothing to worry about, don't need to do any assessments – or it's going to be the Hindenburg and we're all going to die." Meanwhile, "the truth is probably somewhere in between". All fuels have their own risks which need to – and can be – managed, Cross said, adding that for the specific case of a mid-city bus depot there would be challenges and the feasibility would partly depend on what else is in the vicinity and on the regulatory regimes in place. Usually tweaks need to be made to project plans as they move along, including reductions to planned inventories or the installation of blast protection. But from Cross' experience, such projects typically manage to go ahead following some adjustments to the specific necessities.

Sojitz's Tats Kato pointed to his company's various initiatives for driving ahead decarbonisation offers through hydrogen, including in the aviation sector through partnerships with firms like Boeing. Australia could become a key supplier of lower-carbon aviation fuels, including e-kerosene, for northeast Asian countries like Japan, which has a target of 10pc sustainable aviation fuel use in aircraft landing in and departing the country by 2030, Kato said. That said, while Kato is confident that there will be sufficient renewable hydrogen available in Australia for e-kerosene production, he noted that there are questions over the availability of CO<sub>2</sub>, especially from biogenic sources, and about the certification schemes for this.

### FLORENCE LINDHAUS

Head of Hydrogen, Cluster Manager – Energy,  
**German-Australian Chamber of Industry and  
Commerce (Moderator)**

### DEREK CROSS

Team Lead  
**Gexcon Australia**

### TATS KATO

Head of Project Origination  
(ESG, Decarbonization & Infrastructure)  
**Sojitz**

### NEIL WANG

CEO  
**Foton Mobility Distribution Pty Ltd**

Cross noted that mobility projects will be key in helping get the hydrogen industry off the ground. "We love seeing the big chunky export-scale plants" but "the projects you see on the road right now or very, very soon...they are all mobility projects," he said. Wang agreed, adding that creating domestic demand in Australia from heavy-duty vehicles should be the first step before moving towards exports. He noted that from Foton's perspective, the hydrogen production pathway is secondary for now, as ramping up the industry first should take priority.



## SESSION 9: HYDROGEN CARRIERS: AMMONIA, METHANOL, LOHC, LIQUID HYDROGEN

This session focused on hydrogen transport and carriers. Bharat Abhyankar of Black & Veatch pointed to ammonia and methanol gaining a lot of traction as potential carriers because of existing infrastructure. But he also noted that the preferred mode of transport depends partly on what end users want to do with the supply. For direct use of hydrogen in fuel cells, liquefying hydrogen for seaborne transport and then regasifying it again may be preferable to conversion into carriers like ammonia and methanol. That said, this also depends on the transport distance, especially given that “the efficiencies in liquid hydrogen are still challenging,” Abhyankar said, referring to the energy losses in the liquefaction and gasification processes.

Several panellists underlined the importance of global safety standards and environmental compliance around transport of hydrogen and derivatives, especially given the potential hazards associated with products such as ammonia. Yuko Fukuma of Hydrogen Engineering Australia noted that engagement with communities is important for this, as many people have questions around safety protocols and environmental standards. Establishing global safety standards should be possible, given that this has been done for other commodities such as LNG, said Welspun’s Kapil Maheshwari.

Maheshwari highlighted India’s ambitions in the renewable hydrogen sector, with the country, like Australia, aiming to position itself as a key producer and exporter. As part of its national green hydrogen mission, New Delhi is targeting 5mn t/yr of green hydrogen production by 2030, utilising some 60-80GW of electrolyser capacity. The government is currently conducting tenders to stimulate output as well as electrolyser manufacturing. According to Maheshwari, India could have one of the lowest levelised costs of renewable power globally, therefore providing favourable conditions for hydrogen output. Green hydrogen and ammonia will present domestic decarbonisation opportunities for India and could help replace current grey ammonia imports, Maheshwari said. But Delhi also has its eyes firmly on exports, with government officials having said that around 70pc of the country’s 2030 production could be sold overseas.

### CATHERINE ZERGER

Branch Head – Hydrogen Strategy,  
Department of Climate Change, Energy,  
the Environment and Water  
**Australian Government (Moderator)**

### BHARAT ABHYANKAR

Process and HSE Engineering Leader  
**Black & Veatch**

### DAVID BOSTIC

Vice President of Business Development  
**Molecular Products**

### KAPIL MAHESHWARI

MD & CEO  
**Welspun New Energy Limited**

### YUKO FUKUMA

Acting General Manager  
**Hydrogen Engineering Australia, Pty Ltd.  
(HEA)**

### MARKUS THEWES

Chief Commercial Officer  
**NSB GROUP**



# SPOTLIGHT SESSION: NSW: HYDROGEN AT SCALE IN AUSTRALIA'S LARGEST ECONOMY

Gary Foster shed some light on New South Wales' plans in the hydrogen space. The state has so far invested A\$110mn into facilities related to the Hydrogen Hubs Initiative which focuses on co-located supply and demand projects, Foster said. Three projects were selected for support through a competitive process. Together the projects will initially have 72MW of electrolyser capacity, but they have potential to scale up either on site or to be replicated elsewhere, Foster said. The largest of the selected projects is a 50MW plant developed by Origin Energy in Newcastle which is aimed at decarbonising Orica's ammonia production.

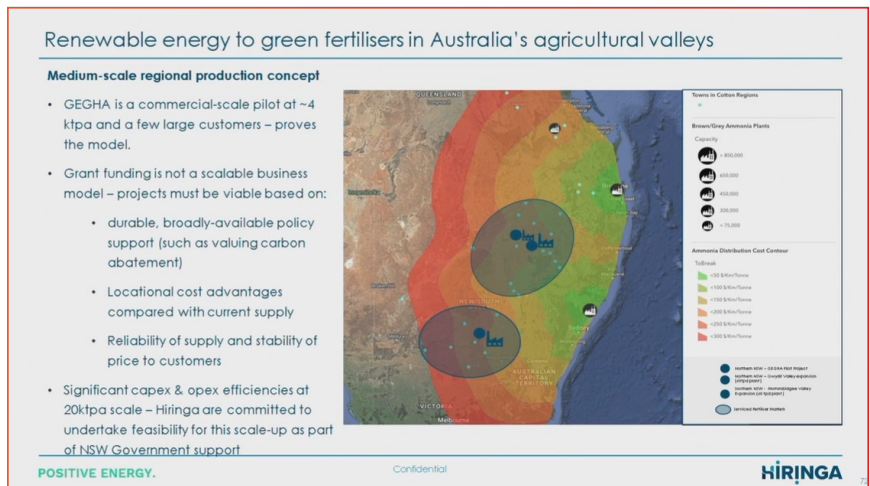
Hiringa's David Heard then introduced the Good Earth Green Hydrogen & Ammonia project which is located in NSW. He noted that while it is an export project for hydrogen, "it just so happens that what we're exporting is a very high value added derivative of hydrogen in the form of cotton". The project will use hydrogen as a fertiliser for cotton production and "the cotton is accessing carbon sensitive markets" directly through the Good Earth brand, Heard said. At the moment, the project is in consultation, with environmental impact and front-end engineering design studies being carried out. Eventually, the project is slated to have 12MW of electrolyser capacity, fed by a 27MW solar farm. It will be grid connected to provide opportunities for trading around electricity markets and to bring in additional "green energy supply," Heard said. The New South Wales government has supported the project, with Heard saying that this would have been partly because of the potential to scale up the project within a larger "agricultural valley".

## GARY FOSTER

Manager, Hydrogen Programs, Hydrogen and Clean Energy Branch, Office of Energy and Climate Change  
Government of New South Wales

## DAVID HEARD

Executive Director  
Hiringa Energy





# SPOTLIGHT SESSION: STANDARDISATION, REGULATIONS & CERTIFICATION FOR A GLOBAL MARKET

Rebecca Thomson of the Australian government opened the session by providing an overview of the country’s guarantees of origin scheme which is currently under consultation. She noted that the scheme “doesn’t actually set a definition of what is clean hydrogen or low-emissions hydrogen, but it basically is going to track and verify all the information that producers will need to show that...varying standards have been met in different markets”. This means that it is about “information provision”. While the scheme will initially be for hydrogen, it is intended to cover other products at a later stage.

Dutch government representative Han Feenstra highlighted the importance of certification from an international trade perspective. Certification is “about trust, it’s about certainty, it’s about level playing fields – all the things that are really important when you want to build up a market.” Discussions with technical experts that have been involved in biofuels certification make Feenstra optimistic that the process for hydrogen will be “quite doable,” he said. “It’s much easier than biofuels.”

Panellists agreed that building certification schemes requires a balance between speed to deliver them in support of developing a market with building a robust framework that can be trusted. Over time, certification will have to be tweaked and evolve as it gets adjusted based on stakeholder feedback and experience. Feenstra noted the importance of providing certainty, even if a specific system is not perfect from the get-go. He referred to the EU’s delegated act on the definition of renewable hydrogen and its derivatives in this regard, noting that the system that the bloc has created is not perfect – even after long discussions between different institutions and member states – but that it at least provides developers with the certainty to move ahead with projects. Along similar lines, Thomson noted that the Australian guarantee of origin system was built with main hydrogen production pathways in mind initially, but that it could be adapted to cover less common approaches as well.

## DR FIONA SIMON

CEO

**Australian Hydrogen Council (Moderator)**

## REBECCA THOMSON

Director, Guarantee of Origin and Trade,  
Department of Climate Change,  
Energy, the Environment and Water

**Australian Government**

## MANUEL WEIRICH

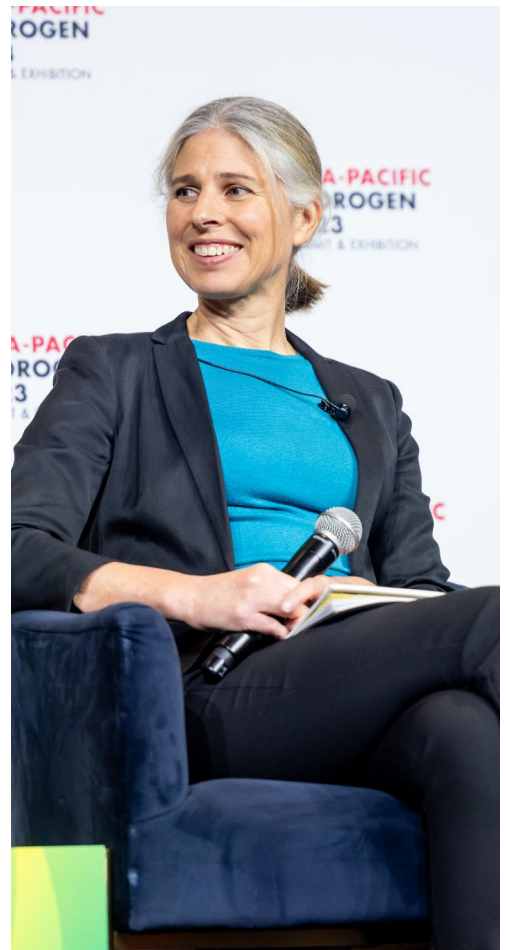
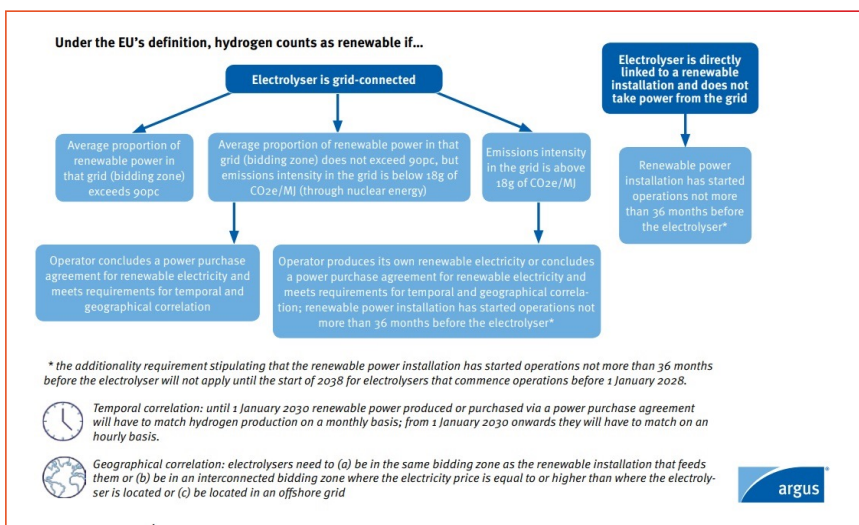
Manager Clean Energy Programs and  
GreenPower, Office of Energy and  
Climate Change within NSW Treasury

**Government of New South Wales**

## HAN FEENSTRA

Hydrogen International Program Manager

**Ministry of Economic Affairs and  
Climate Policy, Government of the  
Kingdom of the Netherlands**



## SESSION 10: AN OUTLOOK FOR HYDROGEN'S FUTURE

The US' Inflation Reduction Act (IRA) created an “amazing” amount of subsidies, and a countdown clock to the next presidential election as companies hurry to sign contracts with government agencies to reserve funding in the event of a political shift, BloombergNEF's Kobad Bhavnagri said. Carbon capture and storage (CCS) is in the spotlight with the funding being poured into it – but it is also the technology's “last stand” and CCS faces irrelevancy if it fails in the US, Bhavnagri said.

Europe will take a slower and more measured approach than the US to build out its hydrogen market, and companies will likely continue investing in small demonstration projects as larger projects wait for funding, Bhavnagri predicted. The APAC region will build out slower still, with the exception of China “where the majority of the activity is”. The Chinese market will remain strong as state-owned corporations continue to invest in and build hydrogen projects across their operations, Bhavnagri said.

Resources and capital focus have moved away from Australia in the wake of the IRA, Clean Energy Finance Corporation's Rupert Maloney said. Australia's Hydrogen Headstart is just a start, “but at least it's something” and its design will encourage private investment in the sector, he said. The two or three projects that come out of the program's first round “won't be perfect” and will be expensive, but will facilitate learning that will help in the long-term, he said. In any event, “we cannot build the hydrogen industry through grants alone,” Maloney said.

Australia's green or renewable hydrogen costs around \$4-6/kg to produce today, while its blue or low-carbon hydrogen costs around \$2-4/kg. But dynamics should change by 2030 when green reaches costs of around \$2-2.5/kg and the same will be true all over the world, Maloney said.

Blue hydrogen is touted as having the advantage of being able to produce hydrogen at scale – but there are no customers for huge amounts of decarbonized hydrogen at its current price, Bhavnagri argued. “Who wants to buy 500 t/d of hydrogen? If scale is the most important thing, show me the customer?” Bhavnagri said. But there will be plenty of customers if prices drop below the price of traditional grey hydrogen, Maloney said, although he noted that replacing comparatively cheap fossil fuel pathways is very difficult in a high-inflation environment.

The world cannot wait for hydrogen to “magically” be cheap in 2040-2045, and companies that do so will be locked out of the market, Maloney said. Costs will be

### LEIGH COLLINS

Editor

**Hydrogen Insight (Moderator)**

### DR FIONA SIMON

CEO

**Australian Hydrogen Council**

### YOSHI SAITO

Director, New Energy (Asia Pacific)

**SLB**

### RUPERT MALONEY

Executive Director, Alternative Fuels

**Clean Energy Finance Corporation**

### KOBAD BHAVNAGRI

Global Head of Strategy

**BloombergNEF**

driven down by step-changes in technology along the entire electrolyser supply chain, which has seen little investment in research and development until the last two or three years, he said.

But focusing on the economics of the energy transition draws the focus away from the actual issue it is meant to address, which is climate change, AHC's Fiona Simon said. “If this was an economic question we would never get off fossil fuels,” she said. “How much do we really care about climate change? How much are we really prepared to pay?”





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