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ASIA-PACIFIC HYDROGEN 2024 SUMMIT & EXHIBITION



2024

EXECUTIVE SUMMARY

UNITING GOVERNMENT
& INDUSTRY TO **ACCELERATE**
HYDROGEN DEVELOPMENT

WRITTEN BY



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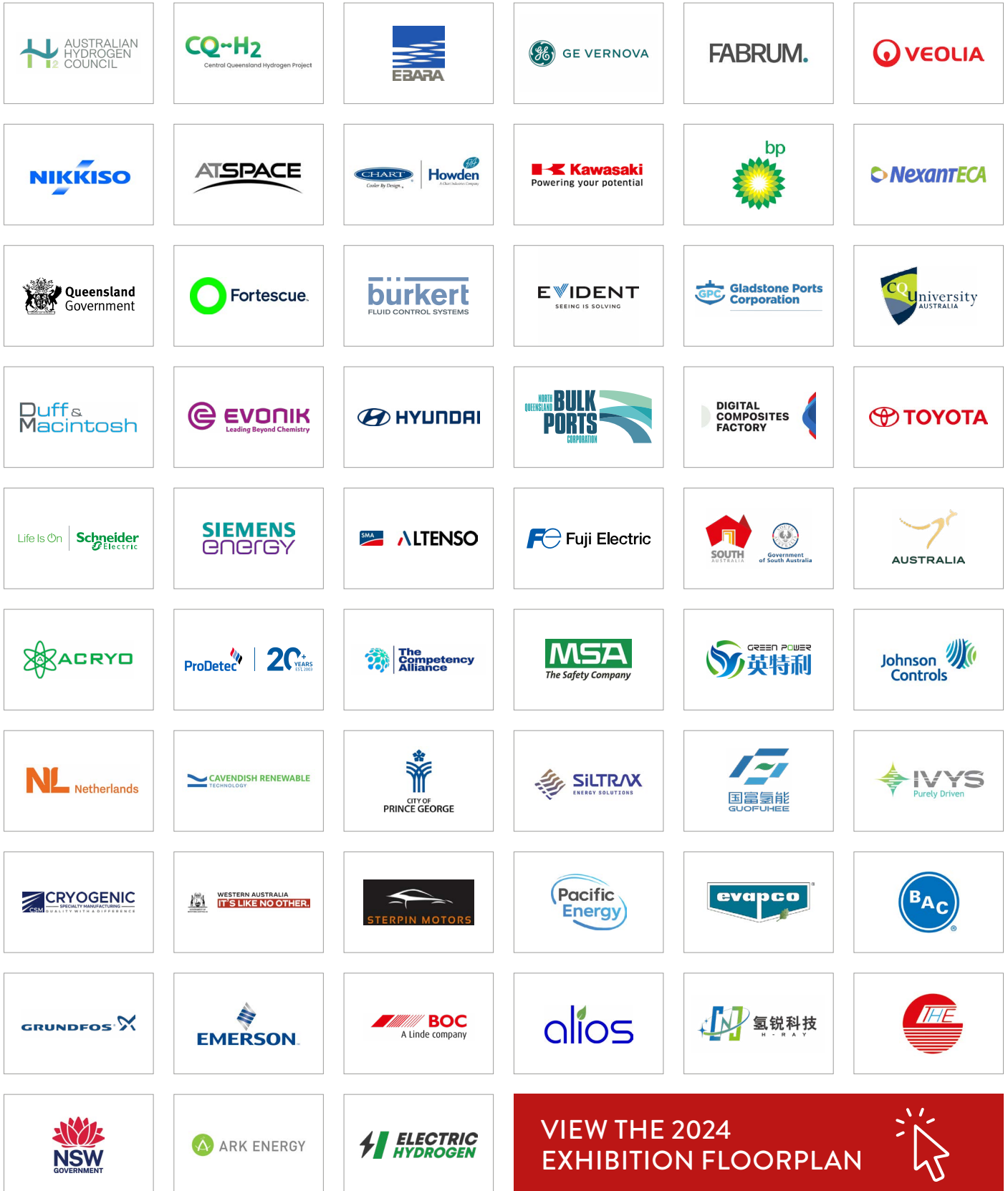
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SUMMIT DAY ONE



**ASIA-PACIFIC
HYDROGEN
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SUMMIT & EXHIBITION

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WELCOME REMARKS

Opening the conference for the organisers, Elliott McGinn thanked its partners the Australian Hydrogen Council, the Australian Trade and Investment Commission, and the Queensland Government. McGinn noted that over 30 countries were represented at the event and 3,000 attendees expected. Representing the Australian Hydrogen Council, Dr Fiona Simon welcomed delegations from Japan, Taiwan, China, Germany, the Netherlands, Austria, Canada, and Lithuania.

Simon said there was much cause for optimism. While the hydrogen sector has faced stiff challenges and setbacks, it is building up crucial experience for the future on a daily basis, she said. Simon noted industry calls for policy to stimulate demand in order to break the “deadlock” and help production projects advance. She said that governments are taking steps to address these sector challenges and urged industry to remain committed and keep working in the meantime.

The sector is increasingly homing in on the priority use cases for hydrogen: as feedstock for chemicals and fertilisers, in iron and steelmaking, for off-grid power generation, for heavy road vehicles, in aviation, and in shipping fuels. Making hydrogen to meet the demand from these sectors will need terawatts of new power generation and hundreds of billions of dollars of investment, according to Simon. Simon closed by encouraging attendees to use the conference to share information and lessons learned.

Elliott McGinn,
Director,
Sustainable Energy Council (SEC)

Dr Fiona Simon,
CEO,
Australian Hydrogen Council



SESSION 1: MEGA PROJECTS IN APAC DRIVING SUPPLY & DEMAND OF HYDROGEN

ENEOS' Yuichiro Fujiyama delivered an opening statement on how his company is aiming to develop a global clean hydrogen supply chain. ENEOS is aiming to bring clean hydrogen supply from many different parts of the world to Japan for use in its own refining assets and for deliveries to other customers, such as power plants, steel mills and chemicals producers.

ENEOS is looking at using MCH as a hydrogen carrier to import the hydrogen. MCH is easy to handle, liquid at room temperature, can be stored for a long time and can be transported in existing chemical tankers, according to Fujiyama. ENEOS uses its own technology which helps to reduce costs, he said.

Fujiyama's opening statement was followed by a panel discussion. The first theme was how to define what a "mega" project is in the hydrogen space. Fujiyama says that, in this industry, even "some hundred MW-scale" plants can be considered a mega project. Ark Energy's Michael Choi and GE Vernova's Jeffrey Goldmeer said that it is not only about the capacity of a project – it is about the complexity of a project in terms of approval processes and supply chains.

Choi talked about the experience of developing a renewable ammonia project and the challenges of coordinating the timing of the development of different parts: renewables generation, electrolysis plant and ammonia facility. Ark Energy's Han-Ho project in Australia is slated to produce 1mn t/yr of renewable ammonia using 3GW of wind power.

Dr Fiona Simon,
 CEO,
 Australian Hydrogen Council
 (Moderator)

Dr Yuichiro Fujiyama,
 Senior Vice President, CTO,
 ENEOS Holdings, Inc.

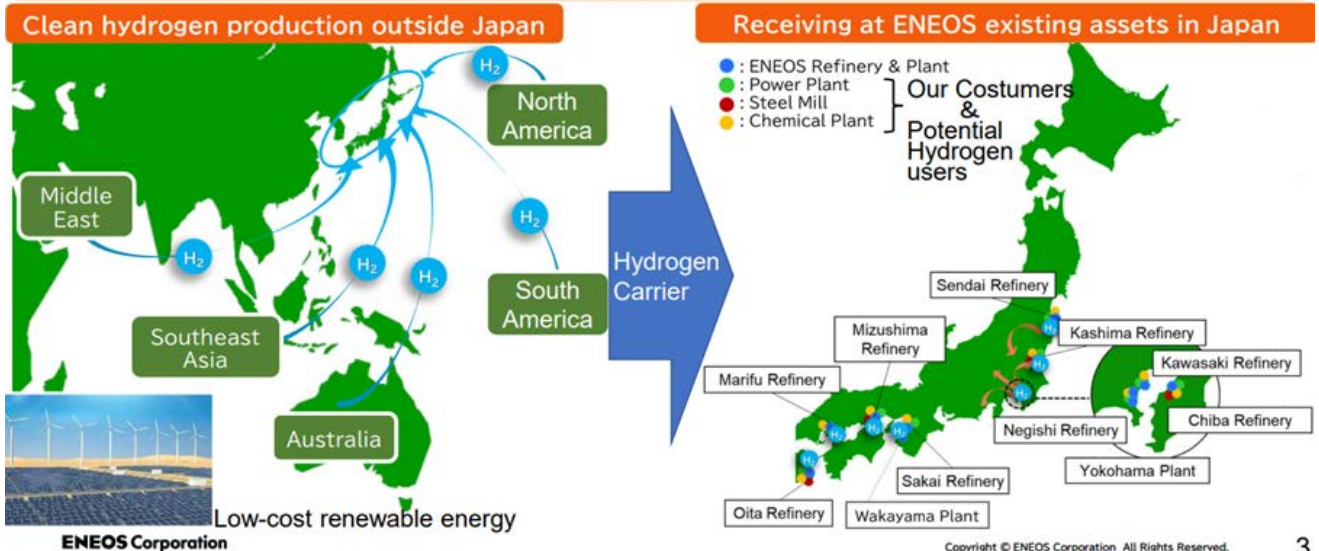
Lucy Nation,
 Country President Australia &
 Vice President Hydrogen, Australia
 and Asia Pacific,
 bp

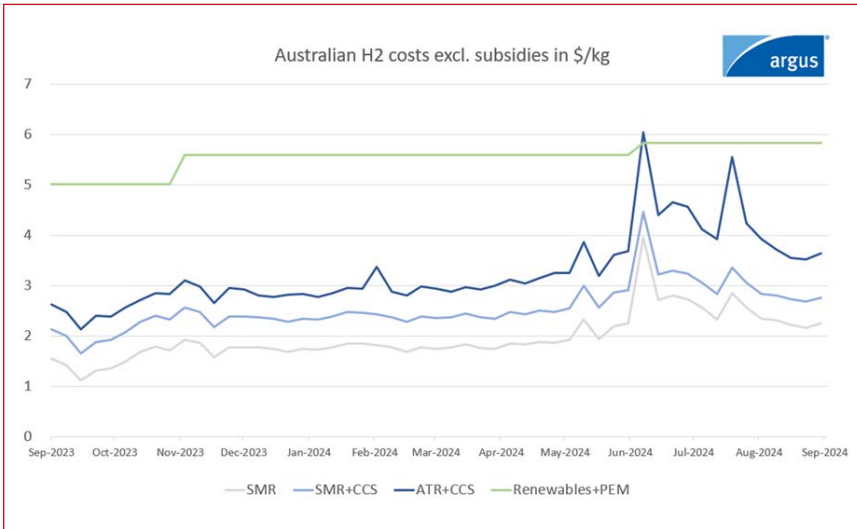
Michael Choi,
 Chief Executive Officer,
 Ark Energy

Dr Jeffrey Goldmeer,
 Director of Energy Transition
 Technologies,
 GE Vernova

ENEOS Clean Hydrogen Supply Chain

- Australia, Southeast Asia and the Middle East are promising sources of hydrogen
- ENEOS refineries are candidate receiving sites for hydrogen in Japan





BP’s approach is to develop “mega projects” in several phases, Lucy Nation said. This is to allow costs to decrease over time but also to keep up with changing variables in the industry such as electrolyser technology and shifting customer demands. Phased delivery offers more flexibility, Nation said. An example of this is the Kwinana project in Australia which will start with 70MW capacity to supply an adjacent renewable fuels facility and “industrial neighbours,” Nation said. Eventually, the project could be scaled up to a capacity of around 1.5GW capacity, at which point exports could become a possibility.

BP has approximately 30 hydrogen projects globally, but the company is narrowing its focus to projects that present three components, Nation said: supportive policy framework, clear demand that allows contracts to be signed now, and access to advantaged green power. The company will widen its focus after 2030s, as the market matures, she said.

Panellists also discussed recent increases in project costs and how effects from these can be mitigated. Choi pointed out that even small-scale projects, such as a 1MW plant that the firm was planning, have been affected by increase in costs and have suffered delays due to financial, technological and logistical challenges.

Other topics were the need for carbon pricing to enable customers to pay the “green premium” and the need for policy and definitions to be aligned globally to enable trade.

Speakers also covered different subsidy mechanisms around the world, with a particular focus on Australia’s Hydrogen Headstart mechanism and planned production tax credits of A\$2/kg. Hydrogen Headstart “has been a very efficient way of helping six projects really justify a lot of development spend that otherwise would be very difficult to justify without that carrot to chase,” Nation said. The tax incentives will “not be enough to make a project economically viable,” but are “a really good step in the right direction,” she said, noting that a lot is about layering different support mechanisms.

But Choi and Fujiyama said that some of the deadlines associated with the tax credits are too strict. Fujiyama said that it will be difficult for projects to reach final investment decisions by 2030, as required, because of bottlenecks around technology and labour. And Choi noted that the 2040 cut-off date for the support means that many projects will not be able to avail the full 10-year support as they are likely to only be completed well after 2030.

Argus calculates prevailing costs for making renewable hydrogen in Australia from dedicated wind and solar assets and using proton exchange membrane (PEM) electrolyzers at just under \$6/kg, including capital expenditures.



SPOTLIGHT SESSION: **FORTESCUE - NAVIGATING THE GREEN FRONTIER**

Fortescue’s Angela Walker outlined the company’s decarbonisation progress to date and its road ahead. Walker clarified that Fortescue has not pivoted away from green hydrogen but has renewed its focus. The iron ore mining giant aims to eliminate from its operation, its scope 1 and 2 emissions by 2030 and scope 3 emissions by 2040. To this end it is developing clean technologies, renewable power generation, and renewable molecules.

The company has piloted a dual fuel ammonia vessel and has designed a 1MW proton exchange membrane (PEM) electrolyser model for which it has built over the last two years a fully automated 2GW/yr factory in Queensland. Nearby it is using this technology to build a 50MW electrolysis plant capable of making 8,000t/yr hydrogen from 2025 to supply the local mobility market, having taken a final investment decision (FID) in November 2023. It took another FID at the same time, on a hydrogen plant in the US state of Arizona. The company is progressing more projects towards FID, including a 300MW green ammonia plant in Norway, an 837t/d renewable hydrogen plant in Brazil’s Pecem that will be used to make green ammonia, and a 300MW green fertiliser plant in Kenya that will harness geothermal power.

Angela Walker,
 Group Manager - APAC,
 Fortescue





Gladstone PEM50 Project, Australia



<p>TWO-STAGE 50MW Green hydrogen project</p>
<p>US\$150m PROJECT Construction underway</p>
<p>FIRST PRODUCTION Green hydrogen expected 2025 8,000 tonnes green hydrogen production per year</p>

FORTESCUE | 16



SESSION 2: HYDROGEN TRADE ACROSS APAC & THE WORLD

Hosted by:
Deloitte.

During this session, panellists discussed what is needed to enable exports from Australia and the global hydrogen trade.

Menno Weustink spoke about how established energy and LNG companies, such as Woodside, can build global value chains, using its own internal capabilities and knowledge, including for carbon capture and sequestration. Woodside is looking to export ammonia and liquid hydrogen and has already signed an initial agreement to supply 1,000 t/d of liquid hydrogen from the firm's Perth H2 project to Singapore's Keppel Data Centre from 2030 onwards. The company is collaborating with various shipping companies to realise the plans, Weustink said.

SEFE's Hans Hermes stressed the importance of energy security in Europe. Germany, in particular, will rely on imports of hydrogen to meet its decarbonisation targets. In a nod to Australian producers, Hermes said that in his view, having a favourable location for production of competitive renewable power is more important than proximity to Europe, as the shipping costs are not moving the needle too much. Austrade's Joel Smouha added that he has seen a lot of interest from international companies to develop partnerships with Australian projects.

SEFE is getting involved in projects abroad to secure offtake and is also operating gas storages which it is planning to eventually convert into hydrogen.

Speakers also talked about the need to stimulate demand, in addition to having production incentives, as a way to move the market forward. Even an export-oriented country like Australia could have some domestic demand incentives to help scale up the sector, Smouha said.

Japan is already sending strong signals for demand. Tokyo Gas' Yuji Kobayashi said the company has set targets to use e-methane to replace natural gas by 2030 and 2040. It wants to replace 1pc of its current LNG supply with e-methane by 2030 and 10-20pc by 2040. Tokyo Gas and other Japanese firms are developing e-methane projects in Australia in partnership with Santos.

Argus is currently tracking 18 projects for e-methane production, with many targeting Japanese offtakers in particular.

Other topics of conversation included the need for coordination of different actors across the value chain, the role of policies to get the market started and the importance of keeping the focus on carbon intensity instead of colours or production pathways. The panellists also talked about how to reduce production costs. They agreed that it will be important that electrolyzers increase efficiency so that plants can reduce power consumption – the main driver of costs in projects. Many discussions have focused on bringing down electrolyser costs, but this will not “turn a business case around if that is not flying anyhow,” Hermes said. Hermes added that the banking sector has not yet been adequately stimulated in terms of providing funding for hydrogen projects, while governments might have to step in to provide guarantees in order to move projects along.

Greg Pratt,
 Tax & Legal Climate & Sustainability
 Leader,
 Deloitte Australia (Moderator)

Menno Weustink,
 Vice President New Energy APAC,
 Woodside Energy

Dr. Hans Dieter Hermes,
 Executive Vice President Hydrogen
 & Clean Energies,
 SEFE Securing Energy for Europe
 GmbH

Yuji Kobayashi,
 Senior General Manager, e-methane
 Business Development Department,
 Green Transformation Company,
 TOKYO GAS CO., LTD.

Joel Smouha,
 Head of Hydrogen,
 Australian Trade and Investment
 Commission (Austrade)



SESSION 3: BREAKING BARRIERS: DECARBONISING APAC'S INDUSTRIAL SECTORS

Nippon Steel's Taisuke Horimi opened the session by stressing the importance of decarbonising the steel sector, given that it accounted for around 8pc of global greenhouse gas emissions globally in 2023. His company wants to reach carbon neutrality by 2050 and aims to use hydrogen in blast furnaces for reduction and melting of iron ore. Nippon Steel hopes "to start using hydrogen at a scale of 100,000 t/yr" in some of its steelworks from 2030 onwards, Horimi said.

Sam Crafter pointed to South Australia's opportunities in the hydrogen space, especially with regard to the state's large magnetite resources which could be treated at direct reduced iron (DRI) plants running on renewable hydrogen. "The steel industry is going to have to move very quickly if it's going to be able to keep track of the national targets that are being set, not just in Australia and Japan, but in Europe as well," he said. South Australia also sees opportunities for power generation such as in the 250MW Whyalla renewable hydrogen plant that it is funding and that will supply an adjacent power plant which is due to come on line in 2026.

While steel may be a key sector to decarbonise in the long-term, there are more obvious applications for hydrogen in the near future, Star Scientific's Matthew Hingerty argued. There are "easier low-hanging fruit," for example in food and pulp and paper around which "a deep, broad, sustainable, socially acceptable hydrogen industry" can be built, "while we are figuring out how to do the green steel and the power."

More generally, Hingerty argued that more attention needs to be paid to the question of how energy is extracted from hydrogen and how it is employed. "The orthodox thinking around hydrogen for energy is burning it...and there are lots and lots of problems [with this]," he said. Star Scientific's Hero technology allows for conversion of hydrogen and oxygen into heat. This process is "three-and-a-half times more efficient" than burning the hydrogen, Hingerty said. Hydrogen is unlikely to become a commodity that is traded over long distances like fossil fuels and will rather be used close to source with little need for long-term storage, Hingerty noted.

Jo Clarke,
 Australia Country Manager
 and Bureau Chief,
 Argus Media (Moderator)

Sam Crafter,
 Chief Executive Officer, Office of
 Hydrogen Power SA,
 Government of South Australia

Matthew Hingerty,
 Deputy Chairman, Deputy CEO,
 Head of Business Development,
 Star Scientific Limited

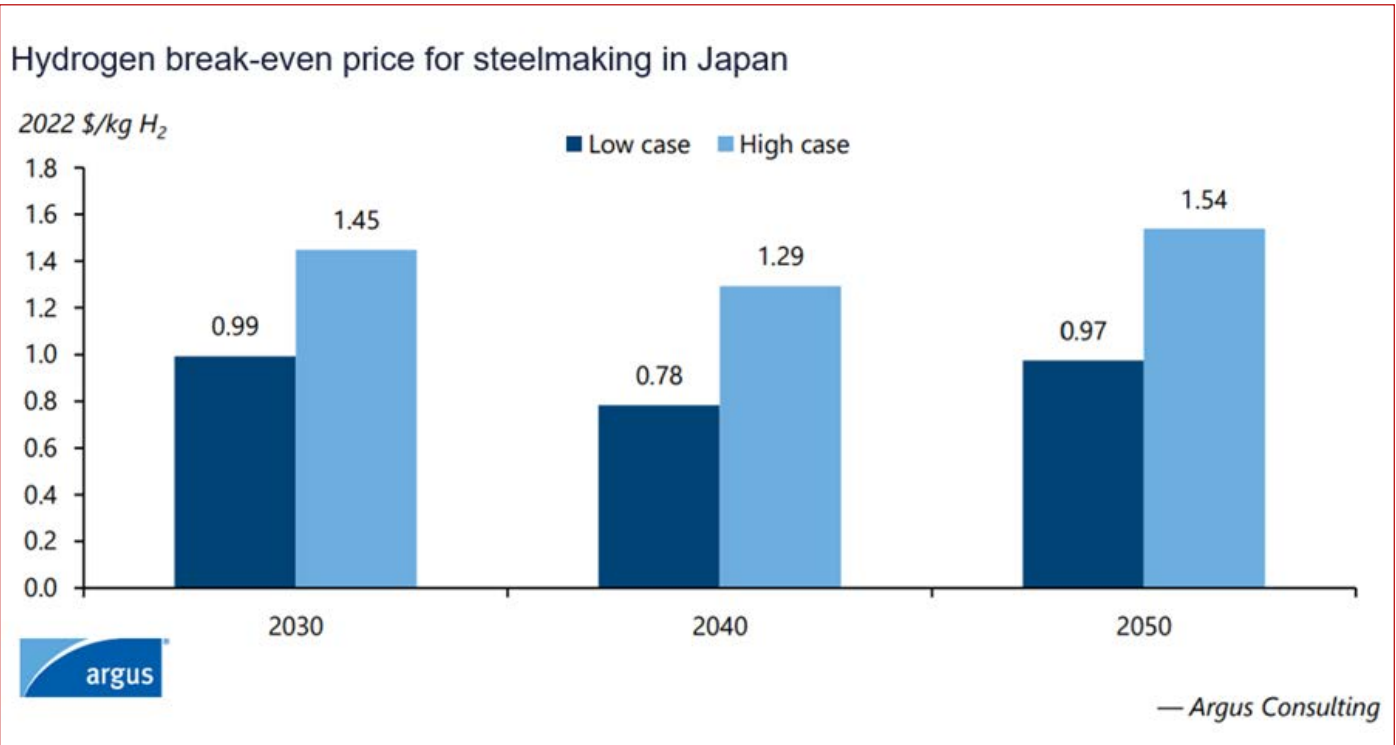
Taisuke Horimi,
 Executive Counsellor,
 Green Transformation Development,
 Nippon Steel Corporation

James Hunt,
 Vice President,
 Power Systems and Services,
 Schneider Electric



On the topic of costs and scale-up, Schneider Electric’s James Hunt noted that learning rates for hydrogen will need to be much faster than for renewable power and pointed to digital twins as a key technology to help with this.

For Nippon Steel, the switch to hydrogen will lead to increased costs across three categories: research and development, investment in equipment and facilities and raw materials, Horimi explained. Government support is therefore crucial for companies to retain global competitiveness, he said. As Japan will be heavily reliant on imports, Tokyo’s planned support scheme – which will take the form of contracts-for-difference – will be open to domestic production as well as imported supply.



SESSION 4: FINANCING THE FUTURE OF CLEAN ENERGY

SMBC's Jeremy Hasnip launched this session with some opening remarks, during which he introduced his company's decarbonisation aims and involvement in key projects, such as for financing Saudi-Arabia's Neom plant and H2 Green Steel's facility in Sweden. Hasnip noted that subsidy schemes in Australia, Japan and elsewhere are helpful but that "real demand" is key. "You actually want people physically taking it, the supply chains to be built out and for that demand to be real," he said. Such demand is emerging and technology is developing to support it, for instance in power generation and the maritime sector, according to Hasnip. "That's creating from a financier's perspective, a market that starts to look like the physical side is coming together."

Alex McIntosh of ARENA subsequently highlighted Australia's A\$2bn Hydrogen Headstart subsidy mechanism for which six projects have been shortlisted. Final winners are due to be announced by the end of this year, McIntosh said.

Tim Stock pointed to incentives that the state of New South Wales provides to projects, which include "traditional grant programmes" but also heavy discounts on electricity network charges. Under the state's Renewable Fuel Scheme, New South Wales is targeting renewable hydrogen production of 67,000 t/yr by 2030 and "there are liable parties that are required to purchase the equivalent amount of this," Stock said. These clear targets are intended to provide certainty and make projects bankable, he added.

The Japan Bank for International Cooperation is responsible for all of Japan's hydrogen-related debt transactions around the world and has "a list of more than 100 potential hydrogen projects," Kohei Toyoda said. But it has so far only closed one deal because hydrogen remains too expensive for most users, he said. Japan's contract-for-difference mechanism – which has a budget of around \$20bn – is intended to help bridge the gap between hydrogen production costs and consumers' willingness-to-pay through 15-year subsidies. By guaranteeing long-term revenue, the mechanism could "enable us financiers to provide debt to hydrogen production projects," Toyoda said, adding that his company is advising the government on the programme's details.

Jeremy Hasnip,
 Head of Energy Transition, Australia,
 Sumitomo Mitsui Banking Corporation
 (Keynote Address)

Susana Moreira,
 Executive Director, Co-chair,
 H2Global Foundation (Moderator)

Alexandra McIntosh,
 Director - Business Development
 & Transactions,
 Australian Renewable Energy Agency
 (ARENA)

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

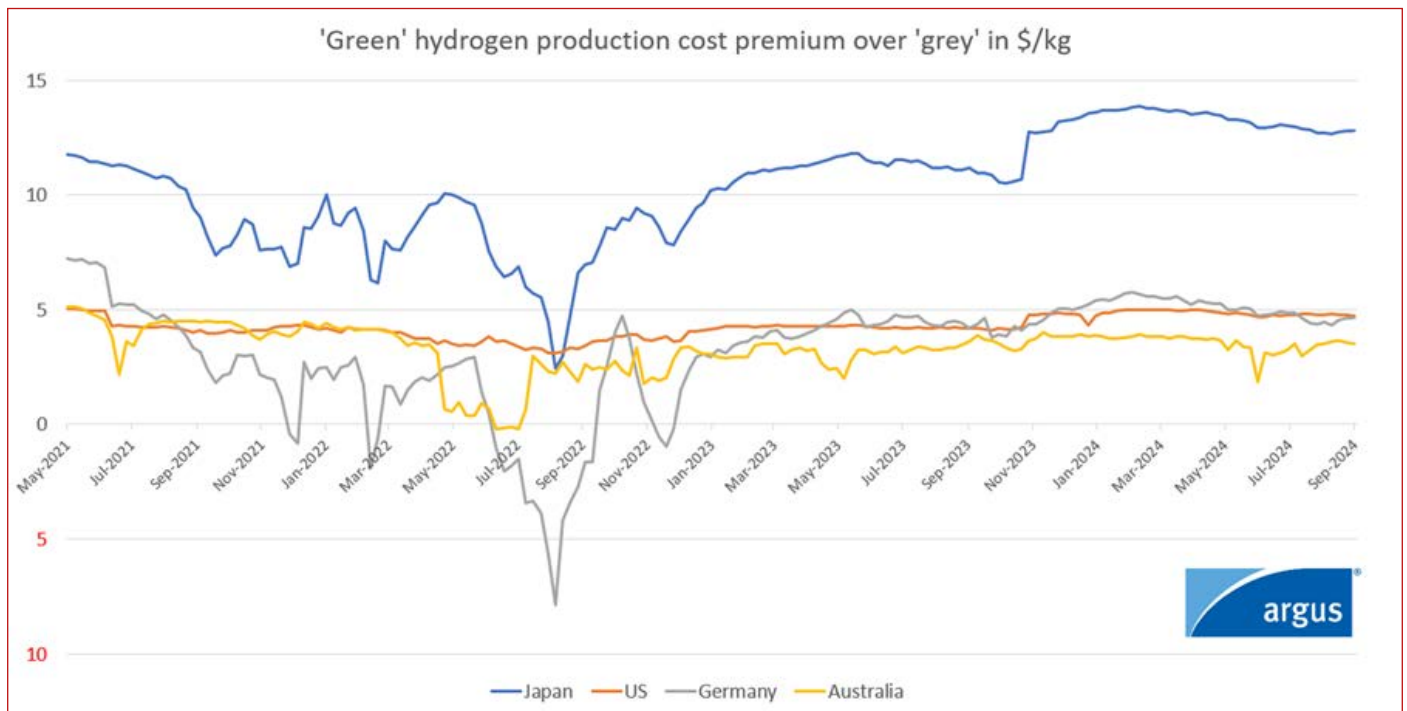
Rupert Maloney,
 Executive Director, Alternative Fuels,
 Clean Energy Finance Corporation

Tim Stock,
 Director Hydrogen and Clean Energy,
 Department of Climate Change, Energy,
 the Environment and Water,
 NSW Government



The Clean Energy Finance Corporation is in some ways Australia’s counterpart to the Japan Bank for International Cooperation as it also looks to provide investment for the government in the clean energy sector, Rupert Maloney said. Such institutions are key equity investors that will need to enter projects “earlier rather than later” to help them move forward, according to Maloney. Governments themselves “can’t be expected to build these industries” through grants or other subsidies, he said.

This was echoed by Toyoda who pointed out that the Japanese CfD mechanism’s budget would only suffice for subsidising 260,000 t/yr of hydrogen assuming support of \$5/kg. This would be far below Japan’s target of 3mn t/yr hydrogen supply by 2030, meaning that strike prices for projects will need to be brought down so that there is less of a gap that needs to be bridged. Reducing capital costs could be a key element here, Toyoda said, noting that reducing capital costs from 15pc to 10pc could cut a project’s renewable hydrogen production costs from \$4/kg to \$3/kg.



FIRESIDE CHAT: FIRST NATIONS CLEAN ENERGY NETWORKS

In the conversation between Australian Hydrogen Council’s Dr Fiona Simon and Gira’s Rebecca Halliday at the Summit, Halliday discussed her work engaging with the First Nations communities during Australia’s renewable energy transition, focusing on the Hydrogen Headstart initiative.

Halliday emphasised the importance of early and meaningful consultation with traditional “owner groups”. Working within a tight timeline, her team leveraged existing relationships to gauge the sentiments of eight traditional owner groups regarding potential hydrogen projects on their lands. She noted that communities were generally enthusiastic about participating in renewable energy projects, driven by a strong desire to be active stewards of their land and to benefit from these initiatives.

Halliday also highlighted varying experiences in community engagement. Some groups had positive interactions with project developers, while others experienced neglect. She stressed the need for developers to build trust and maintain open dialogue with communities from the beginning. This “early and often” approach to engagement ensures that communities’ rights and interests are respected, avoiding misunderstandings that could delay projects and increase costs.

Halliday shared examples of successful collaboration, such as a multi-stakeholder partnership on a pumped hydro project that created sustainable job opportunities for First Nations communities. On the other hand, she cited cautionary tales where poor communication led to costly project delays.

She concluded by advising developers to embrace First Nations participation as an integral part of project planning, particularly with evolving regulatory frameworks that mandate such inclusion. Halliday emphasised that First Nations communities bring valuable insights and opportunities for collaboration that can benefit projects, the environment, and the wider community.

Fiona Simon,
 CEO,
 Australian Hydrogen Council (Chair)

Rebecca Halliday,
 Founder – Principal,
 GIRA



SESSION 5: OPTIMISING HYDROGEN INFRASTRUCTURE TO ENABLE THE EMERGING INDUSTRY

This panel explored the role of governments to build or expedite vital enabling infrastructure like affordable power supply, power transmission, and water supply to aid private sector developers. It also looked at the balance between centralised and decentralised hydrogen infrastructure, the importance of engaging with stakeholder groups like First Nations, and the need for comprehensive planning.

Queensland’s Gerard Coggan stressed the need for more harmonisation and collaboration between state and federal approvals procedures. Queensland has set efficient approvals procedures, but it has found some developers are facing “significant challenges at the Commonwealth level,” Coggan said. The state is setting up several renewable energy zones to facilitate easier permitting, studying the infrastructure that needs to be set up in each zone.

South Australia has similarly passed its Renewable Energy Act, which simplifies permitting and releases access to land in dedicated renewable zones, the state’s Damien Walker said. Walker also outlined the state’s role as first mover in hydrogen, thanks to its ability to shoulder some technology and cost risks, which enable the private sector to follow. South Australia hopes to spur development of the hydrogen sector via building its integrated electrolyser and hydrogen power plant project, much like it did with a large-scale battery storage project in 2017, which unlocked the deployment of “batteries in abundance,” he said. The state expects the hydrogen project to deliver \$150mn savings for consumers, and moreover could attract downstream industry like green iron at Whyalla, further showing the benefits of catalytic government projects, he said.

“We are far more committed in South Australia, simply because we have not had the benefits that WA has had with iron ore or the coal and LNG of Queensland, or even the gold of Victoria back in the day,” Walker said.

Both government speakers mentioned the need for “expectation management” when dealing with communities, which are approached by tens of project developers promising investment, and said the states can play a role in planning the roll out of hydrogen infrastructure. At the same time, they said it was important to seek social license from communities, such as First Nations, as early as possible in the project development.

Chinese electrolyser maker LONGi is in discussions with several Australian states about setting up maintenance and overhaul teams on the ground as a first step, which it plans to make available also to alkaline electrolysers from other brands, Ren Jiang said. Alkaline electrolysers can weigh 40-90 tonnes, and up to 100 tonnes in future, so it is impractical to move them long distances for major overhauls, he said. LONGi may later build manufacturing facilities in Australia. When deciding where to locate its workshop, LONGi will be looking to governments for swift approvals for construction, and possibly subsidies for training the needed engineers, Jiang added.

Panelists agreed a centralised planning approach makes sense near term, to capture economies of scale for electricity and water infrastructure. But they also said there were cases where behind-the-meter projects might make sense.

Fiona Simon,
 CEO,
 Australian Hydrogen Council
 (Moderator)

Damien Walker,
 Chief Executive of the Department
 of the Premier & Cabinet,
 Government of South Australia

Gerard Coggan,
 Coordinator General, Office of the
 Coordinator-General, Department of
 State Development and Infrastructure,
 Queensland Government

Ren Jiang,
 Sales President, APAC,
 LONGi Hydrogen



SESSION 6: ADVANCING LOW-CARBON HYDROGEN PRODUCTION & CARBON CAPTURE SOLUTIONS

This panel discussion focused on the opportunities for and challenges of making hydrogen from gas with carbon capture and storage, a production pathway that some see as complementing renewable hydrogen production to reduce emissions especially in an early ramp-up phase.

“CCS becomes the way to ensure that cost-effective hydrogen production can be continued [and] can be developed from existing resources that we’ve proven from Australia,” LETA’s Damian Dwyer said. Tim Murray from Technip Energies concurred, arguing that “blue hydrogen is by far the cheapest way to decarbonise for ourselves and our partners in the short term,” noting that renewable hydrogen will take considerably longer to scale up. Chevron’s David Kagi similarly stated that “the only pathway that is scalable to deliver lower carbon hydrogen” is “the blue pathway at this stage”. He added that there is a lot of traction for this, especially in the US and Middle East, two regions with sizeable gas production and reserves.

Movement in the US could pick up pace early next year, Veolia’s Ashley Manners said. In the first half of next year a lot of projects which are currently “at the back end of their FEED [front-end engineering design]” could reach a final investment decision (FID), he noted. Manners pointed out that there is an “inherent risk of multiple projects all being awarded at the same time” as there will be a scramble for resources, people and materials which could drive prices up.

Many US projects on the Gulf coast are targeting deliveries to Japan or South Korea as ammonia. Argus’ Japan and Korea Low-Carbon Ammonia Benchmark (JKLAB) stood at \$547/t in late September. It reflects the cost of making ammonia from natural gas via autothermal reforming with carbon capture and storage on the US Gulf coast – including the 45Q tax credits for carbon sequestration – and delivering it to northeast Asia.

For Australia, the safeguarding mechanism – which sets specific greenhouse gas emissions targets for the country’s most polluting industrial facilities – is a good start towards getting more carbon capture projects off the ground, Murray said. But Murray noted that government approvals for some of these carbon capture and sequestration projects will need to come through more quickly to help the industry along. Alex Zapantis of the Global CCS Institute added that this is an issue elsewhere too, noting that the US Environmental Protection Agency (EPA) “has well over a hundred permits for storage” which it is trying to assess at the moment and which is “becoming a pinch point” for the country’s blue hydrogen and CCS ambitions.

Even more fundamentally, long-term policy certainty is key for realising projects, Kagi said, adding that “we need the government to come to the party in terms of shared infrastructure”.

Alex Zapantis,
 General Manager of External Affairs,
 Global CCS Institute (Moderator)

David Kagi,
 Hydrogen Commercial Manager
 for Asia Pacific,
 Chevron New Energies

Tim Murray,
 Head of Commercial -
 Australia and New Zealand,
 Technip Energies

Ashley Manners,
 Global Leader -
 Growth & Energy Transition,
 Veolia - Water Technologies & Solutions

Damian Dwyer,
 Director of External Affairs,
 Low Emission Technology Australia
 (LETA)



SUMMIT DAY TWO



OPENING WELCOME ADDRESSES

Starting the second day, Australia's Minister for Climate Change and Energy, Chris Bowen talked about the Australian government's initiatives to support hydrogen projects such as the Hydrogen Headstart programme and production tax credits. The government is committing A\$8bn to incentives for hydrogen projects over the next decade, Bowen said, expecting this amount to unlock A\$50bn in private investment and 5GW of electrolyser capacity by 2030. Bowen announced Australia's updated National Hydrogen Strategy which is targeting at least 500,000 t/yr of renewable hydrogen production by 2030 and 15mn t/yr by 2050.

Additionally, Bowen announced a partnership between Australia and Germany with the intent to negotiate a A\$660mn package, equally funded by the governments of both countries, for the German government-led H2Global auction scheme. The initial auction is planned to start in 2025, with the first annual sales auction due in 2027-28, according to H2Global.

Queensland's Former Minister Mick de Brenni talked about state and local support initiatives, particularly with regard to promoting jobs in the energy transition. The state is one of the leaders in terms of emissions reductions in Australia and has over 27.4pc renewable energy generation, de Brenni said. Some of the hydrogen initiatives in Queensland include converting gas-fired power plant into hydrogen, electrolyser manufacturing facilities and an electrolyser project that is a finalist of the Hydrogen Headstart programme, he said.

De Brenni also mentioned that the Queensland government recently procured its first hydrogen-powered bus for the public transport network.

The Hon Chris Bowen MP,
Minister for Climate Change
and Energy,
Australian Government

Honourable Mick de Brenni,
Former Minister for Energy
and Clean Economy Jobs,
Queensland Government



SESSION 7: RENEWABLE HYDROGEN PRODUCTION

The panel discussion provided insights on scaling up renewable hydrogen production and the challenges of making the industry globally competitive.

Jennifer Mackinlay of Austrade opened the session by discussing Australia's approach to and progress on decarbonisation efforts. Mackinlay stressed that renewable hydrogen is at the heart of Australia's plans to deliver affordable, reliable energy, both for local industries and export markets. She pointed out that the country's rich renewable resources make it well-positioned to lead in this sector, but noted that coordination with other governments and industry is essential.

Jeffrey Goldmeer from GE Vernova elaborated on the complexities involved in scaling up renewable hydrogen. He highlighted that demand, affordability, and government subsidies play a crucial role in ensuring that hydrogen can compete with traditional fuels. Goldmeer outlined the importance of viewing renewable hydrogen as part of an integrated system involving renewable energy, electrolysis, and storage, with each element having to align with end-user needs and timing.

Katie Cook focused on Western Australia's leadership in exporting iron ore and its potential role in hydrogen-driven decarbonisation of the steel industry. Cook highlighted the necessity of having strong domestic demand as a foundation for international partnerships and pointed to agreements with South Korea and Germany. She also stressed the importance of developing essential infrastructure, such as ports, roads, and renewable energy capacity, to ensure that the hydrogen industry scales effectively.

John Gunn provided a perspective on the challenges of managing large-scale projects. He emphasised the need for early contractor partnerships to mitigate risks and ensure that projects are completed on time and within budget. Gunn explained that hydrogen projects are highly complex, requiring seamless collaboration between technology providers, contractors, and project owners.

Samuel Morillon underscored the massive scale of hydrogen infrastructure and the challenges around making projects bankable. He highlighted the importance of long-term offtake agreements, noting that projects are not viable without guaranteed purchase of output. These agreements must be backed by state-level partnerships to ensure stability, particularly given the geopolitical uncertainties that can affect global supply chains.

Morillon provided an example demonstrating the scale of the build-out that is required: to power the central business district of Brisbane entirely with hydrogen, approximately 40GW of renewable energy would be needed, requiring thousands of wind turbines and vast amounts of hydrogen production and transportation. This kind of project would also demand a global effort in resource management.

He pointed out that securing the supply chain for such large-scale projects is essential. The sheer volume of materials, such as the turbines and cables needed to transport electricity or hydrogen, creates significant logistical hurdles. For example, Morillon explained that powering a city like Brisbane with hydrogen could require Australia to divert all available copper for two years, just to build the necessary electricity infrastructure.

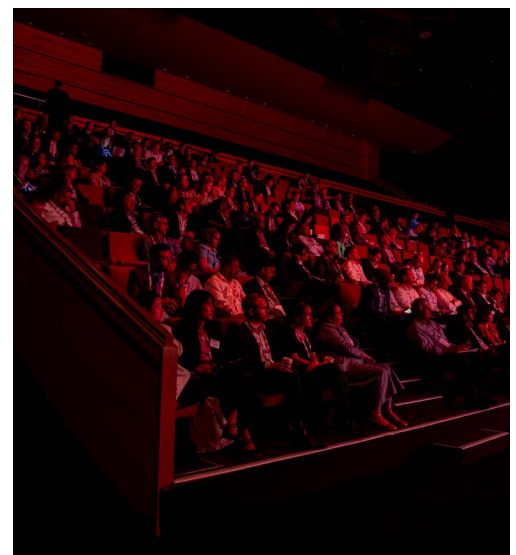
Jennifer Mackinlay,
General Manager – United Kingdom,
Europe & Israel,
Austrade (Moderator)

Katie Cook,
Acting Director, Energy Transition
Strategies,
**Department of Jobs, Tourism, Science
and Innovation, Government of Western
Australia**

Dr Jeffrey Goldmeer,
Director of Energy Transition
Technologies,
GE Vernova

Samuel Morillon,
Managing Director of Australasia,
Siemens Energy

John Gunn,
Global Operations Executive –
Hydrogen,
Bechtel



SPOTLIGHT: ELECTROLYSER DEVELOPMENTS TRANSFORMING THE HYDROGEN LANDSCAPE

The Australian Hydrogen Council’s Leigh Kennedy opened the discussion, pointing to the fact that any forecasts for the hydrogen industry usually stress the enormous amount of electrolyser capacity that will be needed.

Jason Mortimer explained Electric Hydrogen’s “plant as a product model” of delivering 100MW “blocks” of electrolysers “as a single product”. “Everything is manufactured in a factory, it’s tested there and then delivered to the project site,” he said, adding that “the benefit of that is largely in reducing onsite cost”. Mortimer explained challenges around bankability, namely that large projects create debt and that “credit committees” want to see track records and “40,000 hours of operating data” which electrolyser manufacturers do not have at this scale. This means that there is a gap in terms of expectations and what companies can deliver at the moment.

Fortescue’s Cameron Smith agreed, noting that risk-sharing is key to get projects off the ground. Fortescue sees itself as its “toughest customer” when it comes to deploying its own electrolysers, Smith said. The company’s approach more generally is to “sell a capability over a period of time,” including service and maintenance, rather than merely selling a product, he said.

Fortescue in April opened its factory in Gladstone that is slated to produce 2 GW/yr of proton exchange membrane electrolysers. The firm said in July that it signed the first contracts for sales of the equipment.

According to Mortimer, “what really matters is how good are the contractual guarantees and how reliable is the credit behind them”. He pointed out that insurances for electrolysers – such as warranty and viability insurances – can make up around 5-10pc of a project’s capital costs. Besides adding more costs, securing the insurances can also slow transactions for projects down. Still, “insurance is a good way to get going,” Mortimer said, although he noted that a government-led “credit instrument” to “backstop the performance guarantee” for an electrolyser system could be a more efficient mechanism.

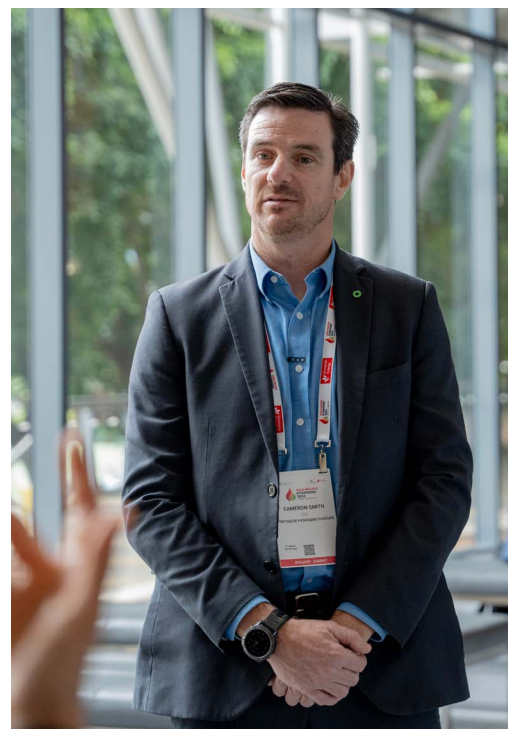
The industry is learning from experiences around some of these questions and challenges on guarantees and insurance, but it takes time, according to Mortimer.

Smith stressed the importance of automation in electrolyser manufacturing but dismissed the “myth” that this “removes huge numbers of people,” saying that “in the end what it gives you is volume, and volume creates the ecosystem around it”. While there may not be many people on the factory floor, there are lots of “enablers and support elements around” it, ensuring the smooth operation and the supply of materials, he said.

Leigh Kennedy,
 General Manager - Industry
 & Supply Chain Development,
 Australian Hydrogen Council
 (Moderator)

Cameron Smith,
 CEO,
 Fortescue Hydrogen Systems

Jason Mortimer,
 SVP of Global Sales,
 Electric Hydrogen



SPOTLIGHT: DELIVERING THE CENTRAL QUEENSLAND HYDROGEN PROJECT

Stanwell's Stephen Quilter presented the CQ-H2 project that his company is developing with partners near Gladstone in Queensland state. The project will have 720MW of electrolyser capacity in its first phase, expanding to 2.8GW at full capacity, and will utilise solar and wind power. In the first phase, the project is slated to produce 200 t/d of renewable hydrogen and this could quadruple to 800 t/d at full capacity. With a final investment decision planned for mid-2025, phase one operations are set to start in 2029 and full development could be completed by 2031.

In addition to hydrogen production, the project will feature hydrogen pipelines, liquefaction and ammonia production facilities. Stanwell is also planning to develop export facilities for liquid hydrogen and ammonia at Gladstone port. The partners chose Gladstone because of local government support, its track record of hosting new industries and infrastructure, a skilled workforce and proximity to Asian markets which are likely to develop into key demand centres. There is also scope for local industries to use hydrogen and derivatives, Quilter said.

The consortium is composed of Stanwell, Iwatani, Marubeni and Keppel. The partners are companies with experience across the value-chain and hence with complementary expertise, Quilter said. Chemicals company Incitec Pivot recently also signed a preliminary agreement to join the CQ-H2 consortium and will support the development of renewable ammonia processes. Foreign direct investment for the project is estimated at \$9bn, Quilter said. The venture has also received government funds for the front-end engineering design which is underway.

Steve Quilter,
Executive General Manager,
Growth and Future Energy,
Stanwell Corporation



Capabilities across the supply chain

The CQ-H₂ consortium members have a unique mix of competitive advantages to harness the potential of the project

- Capability across the renewable hydrogen supply chain, including credible, diversified offtakers
- Initial MOU executed between the parties in September 2021
- Detailed Feasibility Study was completed in June 2022 and validated in January 2023
- FEED commenced in May 2023
 - Commitment of AU\$117 million
 - \$82m from consortium members
 - \$20m from Australian Renewable Energy Agency, and
 - \$15m from Queensland Government's Queensland Renewable Energy and Hydrogen Jobs Fund.

Capability	Stanwell	Iwatani	Marubeni	Keppel
Renewable Energy	✓		✓	
H ₂ Production & Transport	✓	✓	✓	✓
Liquefaction		✓		
Ammonia Supply Chain			✓	✓
Utilisation		✓	✓	✓

Australian chemicals manufacturer Incitec Pivot Limited signed a Memorandum of Understanding in September 2024 with the intent to join the CQ-H₂ consortium in support of renewable ammonia development.

Feasibility Study
2021-2022

FEED Study
2023-2025

Final Investment Decision
2025

Initial phase commercial operations
2029

Ultimate scale commercial operations
2031

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SESSION 8: BEYOND HYDROGEN: ADVANCED ENERGY CARRIERS TO FACILITATE STORAGE & TRANSPORT OF MOLECULES

This session focused on different hydrogen carriers for different applications, providing insights on which approaches could prevail and how plans in this space can be progressed.

Representing the German government, Florence Lindhaus stressed her country's openness to receiving hydrogen in the shape of different derivatives and via a range of carriers, including as ammonia, methanol and via liquid organic hydrogen carriers (LOHCs).

Connie Lo of Nexanteca emphasised that the decision on how to best transport hydrogen hinges on many considerations, including distance and the final application. While pipelines can offer the lowest costs over certain distances, ammonia could be a frontrunner for seaborne applications, especially when it is to be used directly rather than cracked back into hydrogen. Infrastructure for ammonia transport exists already, although more and larger vessels will be needed going forward.

Silvio Konrad of TÜV Nord noted that a study his company prepared in 2023 found that "ammonia has a clear advantage to be the energy carrier for the future". The study compared ammonia with different transport vectors, including LOHCs, liquefied hydrogen, synthetic natural gas and examined their respective suitability with regard to aspects such as transport capacity, technical maturity and complexity, energy losses, cost, existing infrastructure and scalability, Konrad said. Besides the established logistics, the relatively high energy density and the ability to transport it "at reasonable temperatures" stand out as clear advantages, Konrad said.

In terms of CO2 supply for derivatives, such as e-methanol or e-SAF, countries like Australia should consider carbon captured at industrial point sources, Lindhaus said. Biogenic CO2 supply is limited globally and many of its sources are prone to outside influences such as wildfires, floods or parasites, she said. Direct air capture could be a solution, but there are questions around when the technology might be available and how costly it will be then. Countries need to align on what carbon sources are permitted for making CO2-based hydrogen derivatives, Lindhaus stressed.

Lindhaus said that in terms of storing hydrogen or derivatives "everyone is behind". Australia should develop a roadmap for hydrogen storage to support efforts in the space, she said.

Lo, meanwhile, pointed to the importance of common-user infrastructure such as storage or port terminals in terms of bringing costs down. Hydrogen hubs such as those planned in the US offer opportunities to do so, while they can also help with harmonising standards, she said.

Dr Vicky Au,
 Decarbonisation Director – APAC,
 Wood (Moderator)

Connie Lo,
 Vice President,
 NexantECA

Florence Lindhaus,
 Head of Hydrogen, Cluster Manager -
 Energy & Head of Melbourne Office,
 German-Australian Chamber of Industry
 and Commerce

Silvio Konrad,
 Chief Operating Officer Business Unit
 Energy & Resources,
 TÜV NORD GROUP



SESSION 9: ADVANCING HYDROGEN MOBILITY ON SEA, LAND & AIR: MARKET GROWTH IN THE ASIA-PACIFIC REGION

During this session, panellists discussed the critical role of hydrogen in decarbonising transportation, particularly aviation and road transport.

Steven Forshaw from Airbus highlighted the challenges faced by aviation in transitioning from kerosene to sustainable aviation fuels (SAF) and that hydrogen will play a significant role in decarbonising the sector. He outlined three pathways for hydrogen in aviation: generating SAF from hydrogen (e-SAF), developing hydrogen-powered aircraft and using hydrogen fuel cells for electric flight. That said, direct hydrogen use is still some time away, with Forshaw noting that the first hydrogen-powered aircraft will likely enter into commercial service around 2035.

E-SAF is bound to make inroads sooner and many project developers are betting heavily on its potential, especially in the EU which has firm mandates for use of hydrogen or derivatives in the aviation sector already from 2030 onwards. Argus is currently tracking over 60 e-SAF production sites that are planned globally, with the vast majority of these in Europe. The plants could together produce over 2.8mn t/yr if realised as planned.

Forshaw stressed the necessity for early investment in SAF production in Australia, pointing out that the country currently does not produce any SAF, despite consuming around 10 billion liters of aviation fuel annually. He warned that without immediate action, the aviation sector is bound to become the second highest emitter of carbon in Australia.

The discussion then shifted to the automotive sector, with Toyota’s Andrew Willis and Hyundai’s Scott Nargar outlining their companies’ multi-pathway approaches to hydrogen and alternative fuels. They noted the importance of developing hydrogen refueling infrastructure and emphasised that without robust infrastructure, consumer adoption of hydrogen vehicles would be hindered.

BOC’s Vesna Olles spoke about ongoing projects at demonstration scale in Australia and the need to scale these efforts. She highlighted the importance of partnerships and collaboration among industry players and government to create a comprehensive hydrogen ecosystem. Olles called for long-term policy certainty to encourage investment in hydrogen technologies. There will be further technological advancements for hydrogen infrastructure based on key learnings, such as whether liquid or gaseous hydrogen is more appropriate in specific cases and around the volume of vehicles needed, Olles said.

The session underscored the broad potential for hydrogen across different transport modes but also stressed the need for urgent action in scaling infrastructure, production and policy frameworks to enable widespread adoption.

Alana Barlow,
 Deputy Director-General Hydrogen
 and Future Fuels, Department of
 Energy and Climate,
 Queensland Government (Moderator)

Vesna Olles,
 Director Strategy & Clean Energy,
 BOC

Andrew Willis,
 Manager, Carbon Policy,
 Toyota Australia

Scott Nargar,
 Senior Manager Future Mobility
 & Government Relations,
 Hyundai

Stephen Forshaw,
 Chief Representative,
 Airbus, New-Zealand & the Pacific



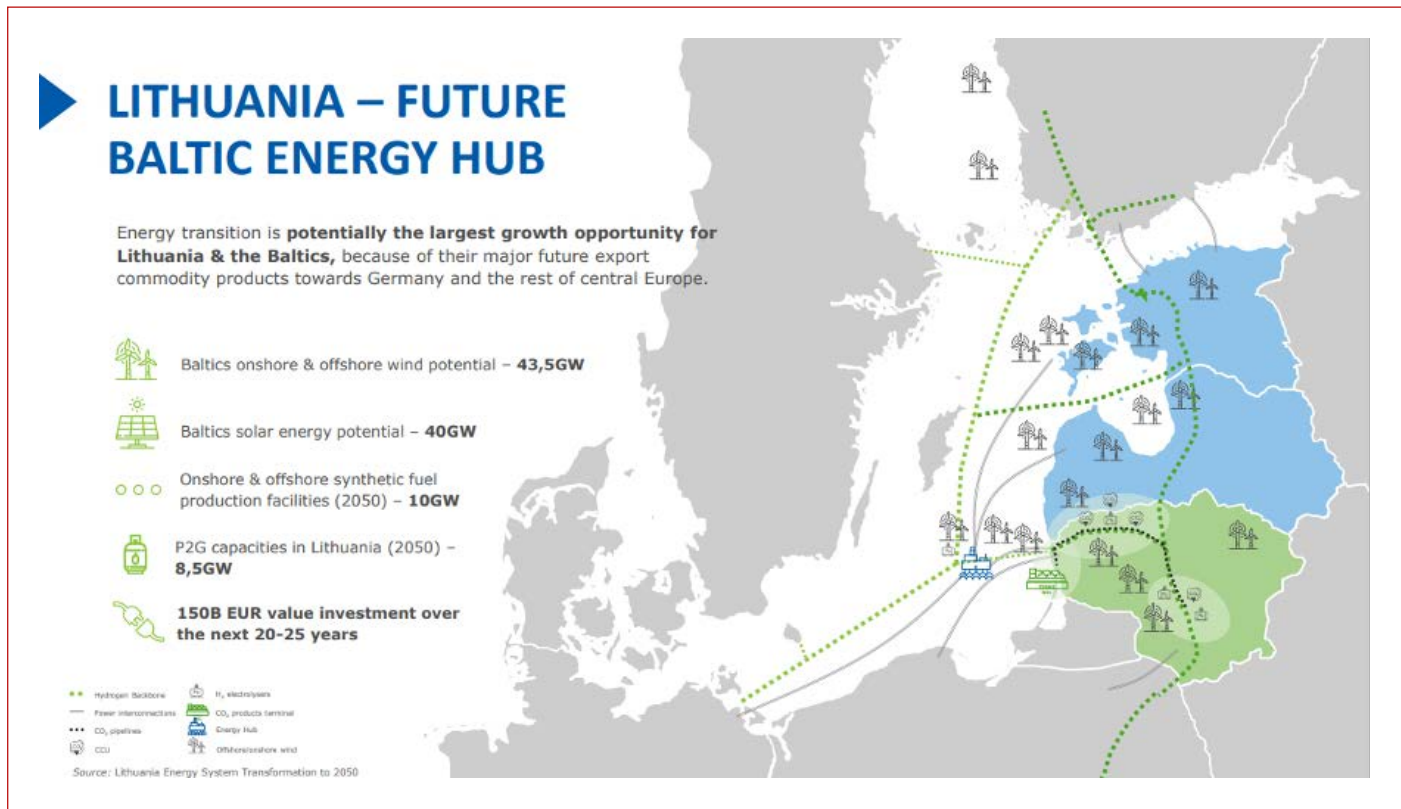
SPOTLIGHT: LITHUANIA'S HYDROGEN PLANS TOWARDS ENERGY SECURITY

Vice Minister Garbaliuskaite addressed the conference with a presentation that stressed hydrogen's potential for contributing to Lithuania's energy security.

The country's renewable power capacity has increased fourfold since 2020 and it is slated to double again by 2026, Garbaliuskaite said. Lithuania will later this year hold an auction for an offshore wind power block, she said. By 2028, Lithuania wants to be self-sufficient for its electricity supply and it seeks to be fully "energy independent" by 2050. The country eventually wants to become an energy exporter and aims to attract new industry that could benefit from its renewables potential.

"It's clear that hydrogen will play a pivotal role in decarbonisation efforts worldwide," but energy security can also be enhanced through the widespread production and use of hydrogen, Garbaliuskaite said. Lithuania wants to develop initial pilot projects, advance technologies and stimulate demand in a first phase until 2030, she said. In the following years, the focus will be on scaling up the sector and the government is estimating that in the 2050s, "hydrogen could provide up to one-third" of Lithuania's energy demand, she added.

H.E. Ms. Daiva Garbaliuskaitė,
 Vice-Minister of Energy,
 Republic of Lithuania



SPOTLIGHT: NAVIGATING GLOBAL MARKETS: STANDARDISATION, REGULATIONS & CERTIFICATION

David Bolsman from the Netherlands Enterprise Agency opened the session with a presentation during which he introduced the EU’s definition of renewable hydrogen and derivatives, termed renewable fuels of non-biological origin (RFNBOs). He provided an overview of the different aspects that are relevant for electrolyzers which are connected directly to dedicated renewable capacity and for grid-connected plants. The definition may sound complicated – especially with rules around additionality and temporal and geographical correlation – but it is not that difficult to comply, Bolsman said. Bolsman also presented findings from a study investigating the feasibility of renewable hydrogen exports from Australia to Europe, especially in terms of emissions intensity.

But Susana Moreira noted that some of the projects or countries wanting to participate in H2Global were “overwhelmed” by the rules for renewable hydrogen. “It’s almost like you have to have an interpreter” to understand the rules, she said. Still, Moreira acknowledged that reaching definitions and standards is “hard to do” and that initiatives to do this “are really important for projects” as they provide “the rules of the game” and help reduce uncertainties.

Moreira stressed that compliance with standards as well as sustainability criteria is key for producers in the H2Global scheme. Successful participants will have to have their product verified and certified regularly to ensure compliance with standards, she said. Beyond certifying a product as “renewable” or “green,” key sustainability criteria include protection of arid regions, sustainable land use, protection of biodiversity and local value creation.

Australia is advancing with plans for a guarantee of origin scheme for hydrogen, Rebecca Thomson noted. A bill for this had been introduced to parliament just a day before this panel discussion took place. The bill is based on extensive consultations and a lot of joint work with the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), as the aim was to align the scheme with international efforts as much as possible, Thomson said.

The Australian mechanism does not set the same criteria as the EU’s definition of renewable hydrogen but is largely an “information provision scheme” that is “about providing transparency over the attributes of a product such as carbon emissions through its lifecycle,” Thomson said. That said, more specific criteria are included in Australia’s funding support programmes such as the Hydrogen Headstart scheme and the country’s planned hydrogen production tax credits.

Thomson further pointed to a lot of ongoing collaboration between governments and other institutions, such as IPHE and the International Energy Agency, that aims to streamline definitions and creating convergence of standards and certification schemes.

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

David Bolsman,
 Senior Advisor on Hydrogen Policy
 Support,
 Netherlands Enterprise Agency

Susana Moreira,
 Executive Director, Co-chair,
 H2Global Foundation



SESSION 10: CHARTING THE FUTURE: COLLABORATIVE PATHWAYS FOR APAC'S HYDROGEN LEADERSHIP

Reflecting on some of the key themes discussed at the conference, panellists shared their views on the hydrogen industry's current state.

Rupert Maloney of the Clean Energy Finance Corporation opened the discussion by noting that the industry is “going through a really healthy phase” as there is now an increased focus on hydrogen use in the “hard-to-abate areas where there are really no alternatives”. This more specific focus on certain sectors is reflected in Australia's new National Hydrogen Strategy which was released on the same day the panel took place.

Fiona Simon of the Australian Hydrogen Council agreed. “We're already seeing fewer projects than we might have expected, but that's okay,” she said. “Maybe our expectations needed a dose of realism”.

As there is still a large gap between customers' willingness-to-pay and the cost of producing renewable hydrogen, either mandates or subsidies — or a combination of the two — are necessary to kickstart the industry, Maloney said. Mandates that increase over time might be the more efficient approach, according to Safoir's David Lloyd. In the US, prices for sustainable aviation fuels made from renewable hydrogen are in line with those for conventional jet fuels thanks to generous subsidies for producers, Lloyd said. Airlines are now trying to get their hands on as much as of this supply as possible “and that sounds all well and good until those subsidies one day disappear,” he said. “And I guarantee you that the demand will drop like a stone [when the subsidies are no longer there], whereas in the EU they have mandates that are being ratcheted up over time”.

But Maloney cautioned that “relying too heavily on mandates can, from an investor perspective and a project development perspective, get a bit scary”. This is because mandates can be changed by governments which in turn can “blow out a whole business case” if it is built around a “very rosy demand picture that everyone's gonna pay a premium,” Maloney said.

Simon said that the APAC region needs mandates to stimulate hydrogen, but these must be introduced incrementally to avoid industry relocating elsewhere. Ultimately a mix of “carrots and sticks” is needed to help the sector along.

Simon separately noted that there is less of a binary split between production projects that are focused on domestic demand areas and those targeting exports than there used to be in previous years. There is more convergence now and an understanding that for export-oriented projects an initial focus on domestic offtakers can be beneficial, she said. There is also an increased focus now on making downstream products such as green iron in Australia that could then be exported. Major exports of hydrogen derivatives — especially of ammonia — from Australia are likely to start at the “back end of this decade,” Maloney added.

Leigh Collins,
 Editor,
 Hydrogen Insight (Moderator)

Dr Fiona Simon,
 CEO,
 Australian Hydrogen Council

Rupert Maloney,
 Executive Director, Alternative Fuels,
 Clean Energy Finance Corporation

David Lloyd,
 Founder,
 Safoir





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