



WORLD HYDROGEN 2024

SUMMIT & EXHIBITION



2024

EXECUTIVE SUMMARY

THE LEADING
GLOBAL PLATFORM
WHERE HYDROGEN
BUSINESS GETS DONE

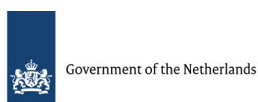
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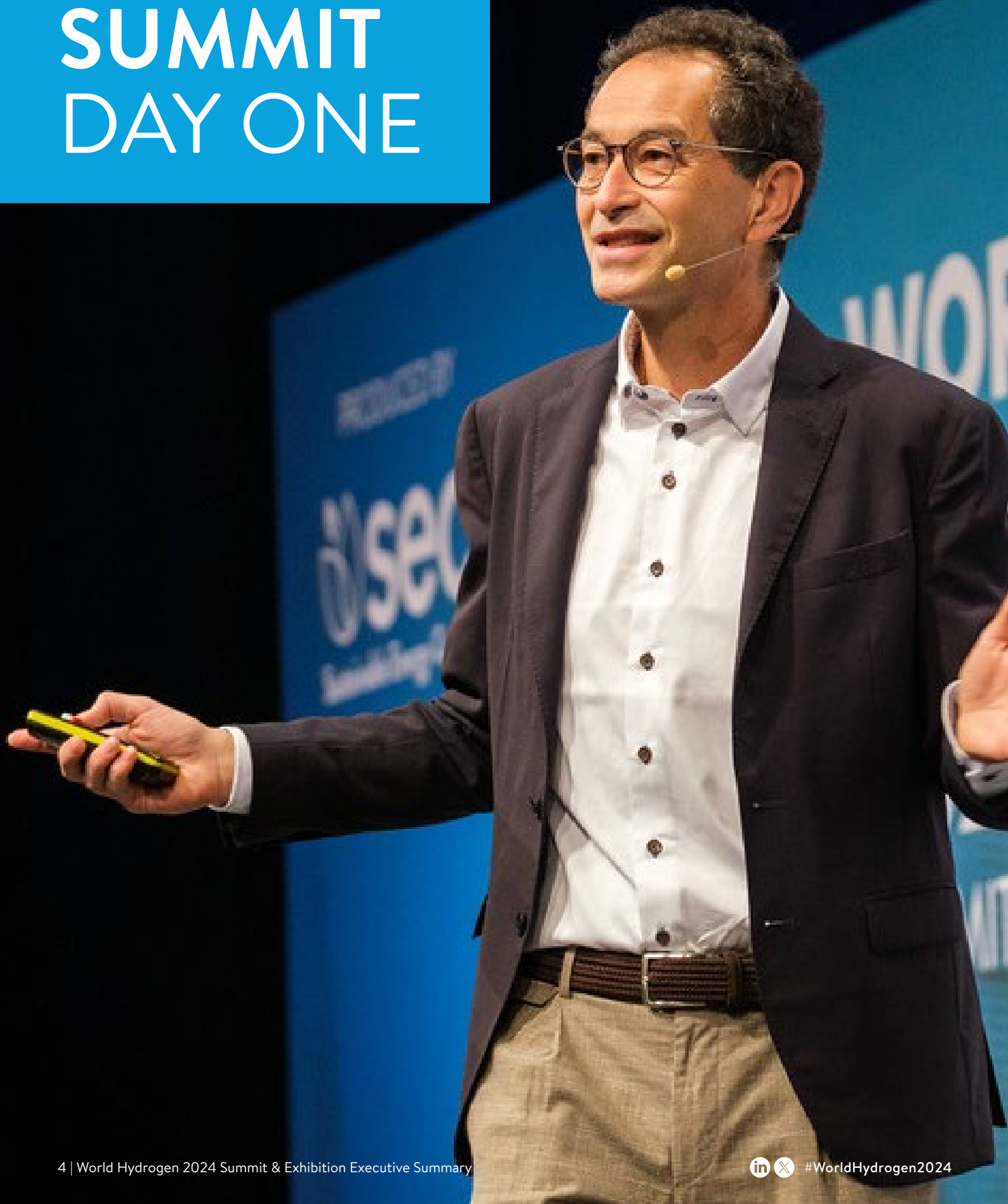


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SUMMIT DAY ONE



SUMMIT WELCOME ADDRESSES

The World Hydrogen Summit 2024 started with three opening addresses.

The first was delivered by the City of Rotterdam’s mayor Ahmed Aboutaleb who stressed the importance of collaboration for the energy transition as a whole and for developing renewable hydrogen specifically. This stretches from collaboration between everyone building actual projects to topics such as technology transfers and knowledge exchange, Aboutaleb said. He pointed to the importance of Rotterdam and especially its port, which will, for instance, facilitate hydrogen imports into Germany and at the same time take CO2 from the country for offshore storage. The biggest challenge in Europe will be having enough workforce for the transition, Aboutaleb said.

These topics were picked up subsequently by Frederik Zevenbergen of Zuid-Holland who stressed that his region is making initial inroads in the hydrogen space. The region currently has 22 operational hydrogen-powered buses, helping to reduce emissions.

Zevenbergen and Aboutaleb agreed that keeping citizens informed and involved while being honest about progress and challenges will be key.

Minister Rob Jetten pointed to progress made in the hydrogen sector in the Netherlands and globally, noting the increasing number of countries that have outlined hydrogen strategies and that have earmarked large funds in support of the industry. But he also urged more speed, especially as final investment decisions (FIDs) for hydrogen projects remain few and far between. “We need to do more and we need to do it faster,” he said. Still, Jetten said he is optimistic, pointing specifically to the opportunities for the “global south” that could benefit from exports to key demand centres in Europe and northeast Asia.

The port of Rotterdam’s Boudewijn Siemons pointed to the port’s status as a key industrial cluster which makes it a prime location for production and imports of clean hydrogen, reiterating Jetten’s push for speed. “We cannot wait until everything is settled, the path is paved and risks are reduced to zero.”

Ahmed Aboutaleb
Mayor, City of Rotterdam

H.E. Rob Jetten
Minister for Climate and Energy Policy,
Ministry of Economic Affairs and Climate
Policy, Government of the Netherlands

Frederik Zevenbergen
Regional Minister, Province of Zuid-Holland

Boudewijn Siemons
CEO, Port of Rotterdam



KEYNOTE ADDRESSES

The welcome addresses were followed by two keynotes, delving deeper into the challenges around developing a hydrogen economy.

Most experts agree that hydrogen will have to contribute at least 10pc to global decarbonisation efforts, Smartenergy's Christian Pho Duc said. The industry should focus on applications in cases where electrification will not work to decarbonise, Pho Duc stressed. These potential hydrogen applications include, for instance, fuels such as e-kerosene for the aviation sector, alongside direct hydrogen use in hard-to-abate sectors and other areas. Hydrogen represents an opportunity to use carbon molecules from carbon-emitting processes to open new markets and help drive the energy transition forward, Pho Duc said.

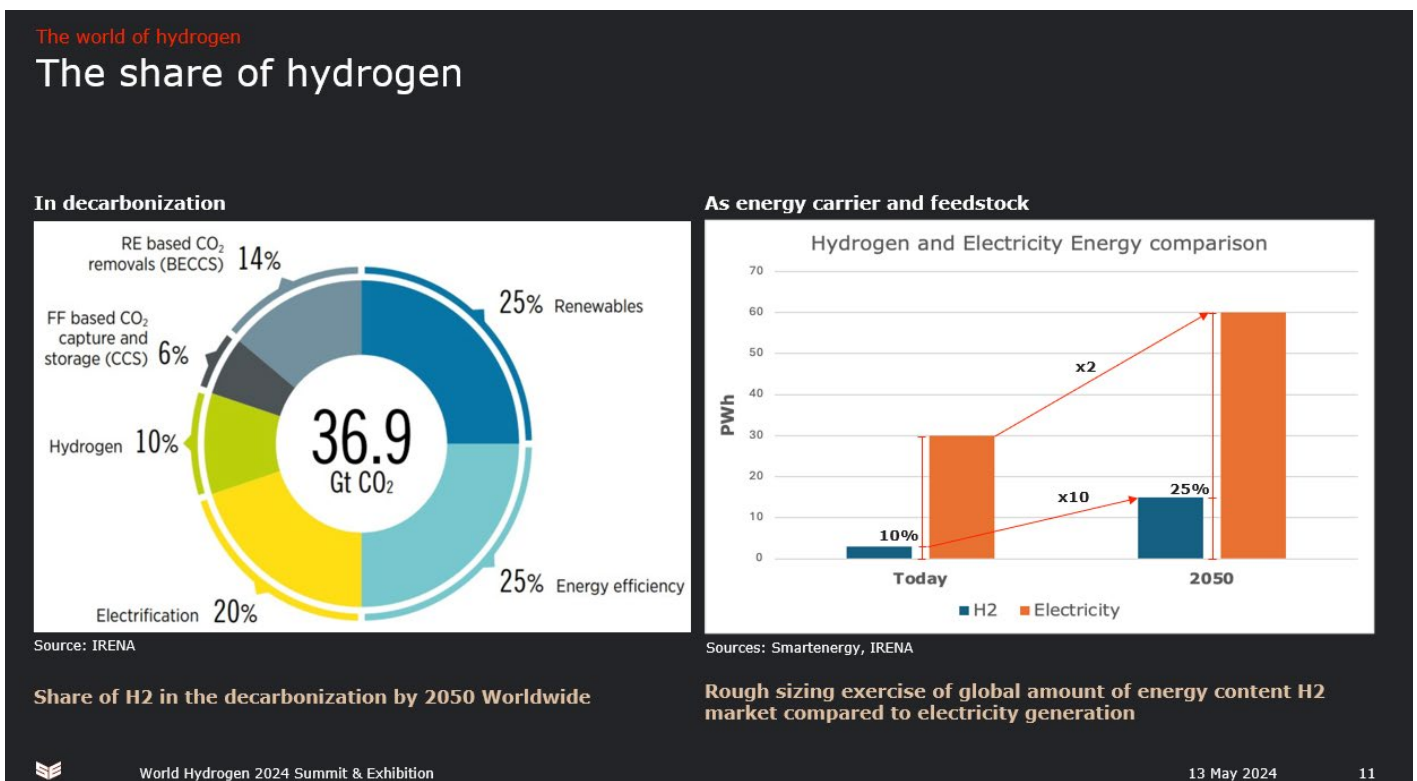
Scaling up renewables is a vital element for the growth of the hydrogen industry, according to Air Products' Ivo Bols. In hard-to-abate sectors, hydrogen is the only solution, Bols emphasised. Air Products has taken FIDs for around \$15bn of renewable and low-carbon projects and is developing some of the largest in the world, he said. The firm is developing plants in a wide range of geographies, including the US, Canada, Middle East and the Netherlands. However, several economic and regulatory challenges remain, in addition to accelerating investments in renewables and it will be essential to tackle these, Bols said. Key measures would include cutting lengthy permitting processes, increasing both private and public funding to close the gap, and enhancing collaboration between industry participants, including more concerted efforts to ensure global certification schemes are aligned.

Christian Pho Duc

Chief Technology Officer,
Smartenergy; SEC Hydrogen Advisory
Board Member

Ivo Bols

President for Europe and Africa,
Air Products



Source: Christian Pho Duc presentation

SESSION 1: LEADING GLOBAL HYDROGEN PROJECTS

Speakers from project developers and electrolyser makers shared their views on the current opportunities and challenges in moving projects forward and what is needed to reach larger scale, while also reflecting more broadly on industry developments over the past year.

While acknowledging that momentum has somewhat slowed, there is “a fundamental confirmation of the case for hydrogen” mainly in hard-to-abate sectors, CEPESA’s Carlos Barrasa said. Many project FIDs have been pushed back, but speakers noted that this is not unusual for a nascent industry.

Simon Herbert of ExxonMobil and Dr. Nikunj Gupta of ADNOC both noted that low-carbon hydrogen – made from hydrogen with carbon capture and utilisation or storage (CCUS) – could help drive market momentum in these initial stages. Low-carbon hydrogen can offer economies of scale to the industry in order to then move forward into renewable hydrogen at scale, Herbert said.

ADNOC’s Gupta has seen demand momentum growing in different sectors depending on geography: northeast Asia is primarily looking at hydrogen for power, while the EU is moving forward rapidly with green steel ambitions. Prospects for hydrogen use as feedstock for marine fuels are also increasing, he added.

Uniper’s Christian Stuckmann, thyssenkrupp nucera’s Paul Dainora and CEPESA’s Carlos Barrasa all stressed the need for associated infrastructure to be in place, pointing for instance to the need for pipeline connections across Europe.

Uniper is expecting imports to start coming in at scale from 2030 onwards, Stuckmann said. Ammonia imports will be available earlier, but cracking facilities need to be in place since “our customers ask for hydrogen,” he said. Argus is currently tracking 20 ammonia cracking facilities that have been announced globally, with the vast majority of these planned in Europe. But almost all facilities are still at very early stages and while some have been slated for commissioning by 2027 or even sooner, these targets might be difficult to hold. Uniper itself is planning a 2.6mn t/yr ammonia import terminal in Wilhelmshaven, northern Germany, that would include a cracking facility and that is due to come online by the early 2030s, Stuckmann said.

Other infrastructure elements also pose challenges, with Barrasa highlighting the need to unlock more grid connections and port infrastructure to allow exports.

Looking on the policy side, Jorge Palomar Herrero of Iberdrola argued that more demand-side incentives are needed in order to secure long-term commitments that are needed to get projects to FIDs.

Dr. Dean Bialek

Chief Officer for External Relations and Government Affairs
CWP Global (Moderator)

Simon Herbert

Vice President, EAME
ExxonMobil Low Carbon Solutions

Dr. Nikunj Gupta

VP, New Energies and Technical Projects Division, ADNOC

Carlos Barrasa

Executive VP Commercial & Clean Energies, CEPESA

Paul Dainora

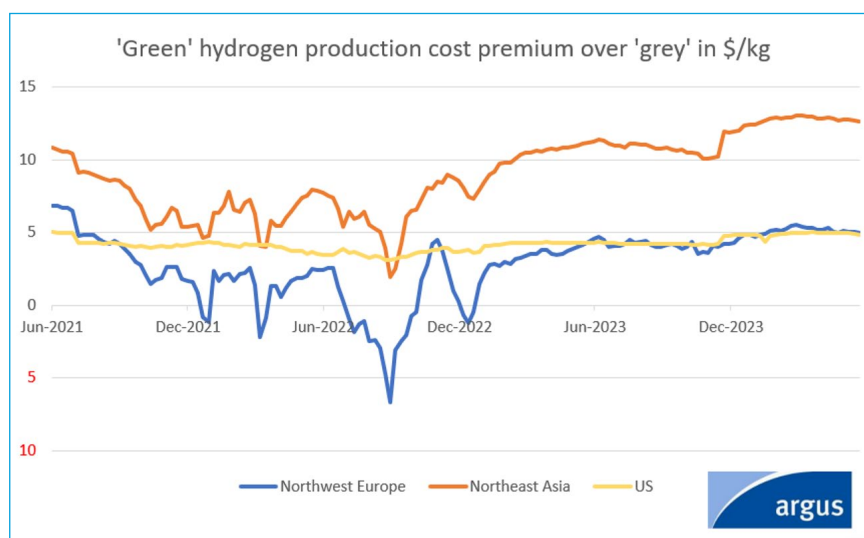
Head of Business Development
thyssenkrupp nucera

Christian Stuckmann

VP Business Development Hydrogen
Uniper Hydrogen

Jorge Palomar Herrero

Global Hydrogen Development Director
Iberdrola



Source: Argus

SPOTLIGHT: INTERNATIONAL HYDROGEN TRADE FORUM

This session presented key findings from the executive-ministerial roundtable of the International Hydrogen Trade Forum that took part on the sidelines of the World Hydrogen Summit.

Panellists stressed the need for cooperation and for learning from one another. A “coordinated” and “harmonised” approach is crucial for a successful ramp up of clean hydrogen and specifically for establishing international value chains, Austria’s Leonore Gewessler said. One concrete example is the plan for the southern Corridor that is envisaged to carry hydrogen from northern Africa into central Europe and that would span several countries.

Morocco’s Leila Benali agreed and highlighted the existing connectivity between Europe and Morocco with bidirectional gas and electricity connections. For Morocco, renewable hydrogen provides opportunities to boost growth rates while also meeting decarbonisation targets. Benali pointed to the “Moroccan Offer” unveiled in March, which will structure the land allocation process for projects and also aid with the development of common-user infrastructure.

Linde’s David Burns highlighted the potential benefits that international trade could bring along for the sector, referring to studies which show that unlocking international trade – as opposed to exclusively local production – could reduce clean hydrogen costs for end consumers by around 40pc by 2035. Savings on infrastructure could amount to \$3.7bn by 2050 in a scenario with hydrogen imports and exports, he said. Burns stressed the importance of supportive policies on the demand side, including mandates that oblige clean hydrogen use. It became clear during the roundtable discussions that there is now an increasing focus on demand also from policymakers, he said.

The Netherlands’ Rob Jetten argued that standards for renewable and low-carbon hydrogen will need to be simple and that this has been a focus of the International Trade Forum. Gewessler highlighted the importance of speed, while Benali added that everyone needs to be “laser focused on cost efficiency” to reduce the “green premium”. Benali also noted that hydrogen and its derivatives can provide a “geopolitical premium” through the versatility and optionality that it brings.

Daria Nochevnik

Director for Policy and Partnerships,
[Hydrogen Council](#)

H.E. Rob Jetten

Minister for Climate and Energy Policy,
Ministry of Economic Affairs and Climate
Policy, [Government of the Netherlands](#)

H.E. Leonore Gewessler

Federal Minister for Climate Action,
Environment, Energy, Mobility, Innovation
and Technology, [Government of Austria](#)

H.E. Leila Benali

Minister of Energy Transition and Sustainable
Development, [Government of Morocco](#)

Boudewijn Siemons

CEO and Interim COO, [Port of Rotterdam](#)

David Burns

Vice President Clean Energy, [Linde](#)

Yoshinori Kanehana

Chairman of the Board, [Kawasaki Heavy
Industries, Ltd.](#)



SPOTLIGHT: THE NETHERLANDS TO GERMANY HYDROGEN CORRIDOR

The Netherlands' Michel Heijdra opened the session by highlighting the close cooperation between his country and Germany on hydrogen and other matters.

Germany's Christian Maass pointed out that his country may have to cover 50-70pc of its expected hydrogen demand of around 95-130TWh/yr by 2030 with imports, and that consumption will ramp up further afterwards. Maass flagged up some of the measures that Germany has taken to spur on the ramp up of a hydrogen economy, including the country's carbon-contracts-for-difference scheme. This is directed at large industrial consumers of fossil fuels, supporting them with a switch to renewable power or clean hydrogen, in a bid to reduce CO2 emissions. A first €4bn round is underway and three more are scheduled to take place subsequently. Maass also pointed to the country's power plant strategy that foresees support for the construction of hydrogen-ready gas-fired power plants and an upcoming joint H2Global round for which Germany and the Netherlands put forward €300mn each to stimulate imports of renewable hydrogen.

Philipp Steinberg focused primarily on the infrastructure side, noting that Germany and the Netherlands will share four cross-border connection points based on their hydrogen network development plans. These will have a combined capacity of 11.7GW and could carry supply imported in the Netherlands onwards to Germany, he said. Overall, Germany's core hydrogen network is bound to entail 87GW of transport capacity across 10,000km of pipelines, with the country having recently reached agreements around the financing structure. The pipeline system will initially be "oversized" to make sure it is "future-proof," Steinberg said.

Both the Netherlands and Germany will primarily repurpose existing gas pipelines for their future hydrogen networks. In the Netherlands, around 80pc of the future grid could be repurposed pipelines, Heijdra said.

Dr. Michel Heijdra

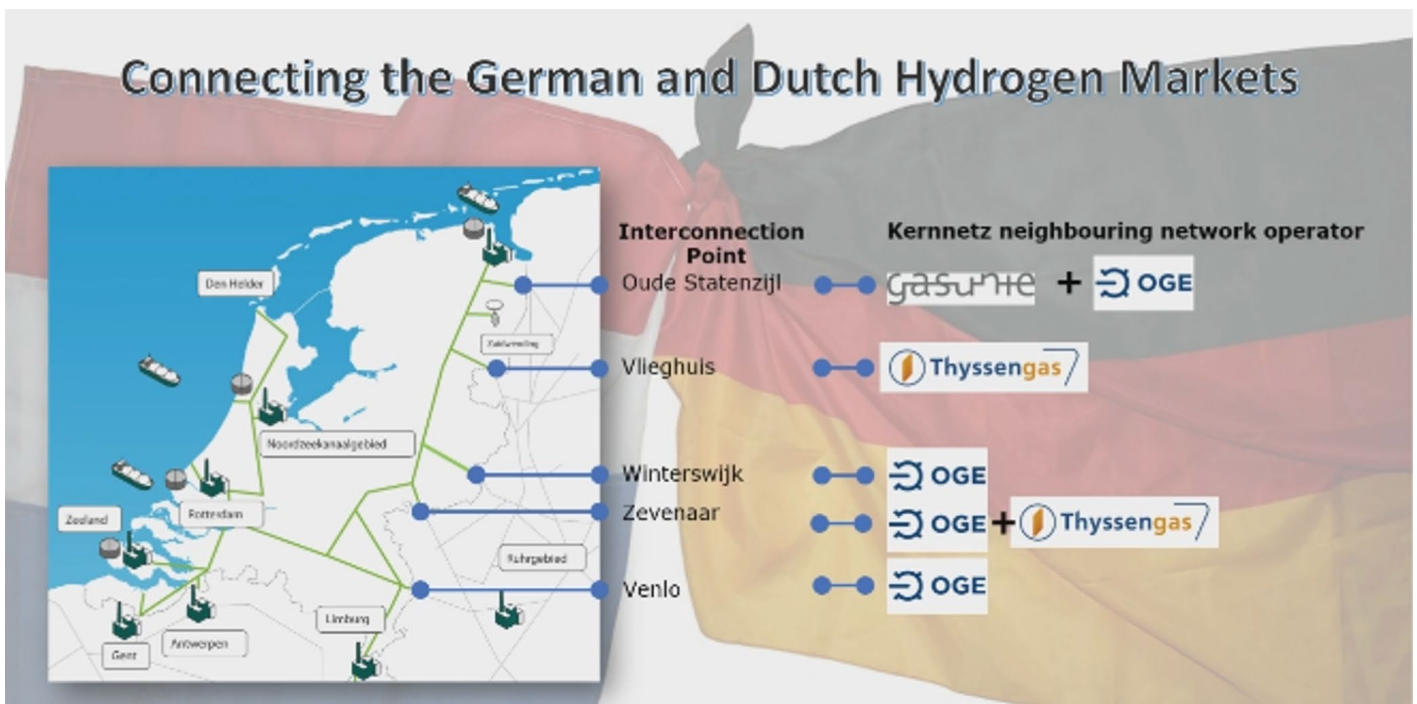
Vice Minister for Climate & Energy, Ministry of Economic Affairs & Climate Policy, Government of the Netherlands

Christian Maass

Director General for Heat, Hydrogen & Efficiency, Federal Ministry for Economic Affairs & Climate Action, Government of Germany

Dr. Philipp Steinberg

Director General of Economic Stabilisation, Energy Security, Gas & Hydrogen Infrastructure, Federal Ministry for Economic Affairs & Climate Action, Government of Germany



Source: Michel Heijdra presentation

SESSION 2: HARNESSING HYDROGEN TO DECARBONISE HARD TO ABATE SECTORS

Panellists discussed their companies' strategies to decarbonise operations in hard-to-abate industries. bp plans to start by replacing unabated fossil fuel-based hydrogen used in its refineries with lower-carbon supply, according to Felipe Arbelaez. In subsequent stages, bp will focus on supplying other firms in the vicinity of its production sites and eventually the firm will also look towards long-distance exports. The company's initial projects for decarbonising refinery operations include plans in Spain, the UK and the US. But bp is also already planning some of the larger export projects and is, for instance, leading development of the giant Australian Renewable Energy Hub (AREH).

Repsol is similarly starting with reducing carbon footprint in refining operations, Maribel Rodríguez Olmo said. Beyond that, the company is planning production of e-fuels. An e-methanol project in Spain's Tarragona with 150MW of electrolyser capacity is close to reaching FID, Rodríguez Olmo said. Repsol is already running a small 2.5MW pilot project and is learning the lessons needed to scale up the technology, she added.

Electrolyser manufacturers are confident that "the market is going to accelerate," Electric Hydrogen's Omar Shkeir said, noting that the company expects to reach 1.2GW/yr capacity at its factory in Massachusetts by the end of this year. That said, there is more work to be done to reduce electrolyser costs, Shkeir said. Electric Hydrogen is focusing on large scale modules of 100MW and will supply its technology to New Fortress Energy for a renewable hydrogen production plant in Texas that will deliver output to OCI and that is slated to begin operations in the first half of 2025.

Hard-to-abate sectors should consider redesigning their approach and "rethink the value chain," according to H2 Green Steel's Kajsa Rytberg Wallgren said. The company advocates for a model in which renewable hydrogen production plants are located at sites with plenty of renewable availability, along with adjacent iron-making facilities. Affordable renewable energy will be key, Rytberg Wallgren said. H2 Green Steel's €6.5bn facility in Boden, Sweden, is already under construction and due to come on line by 2026. The firm has signed several deals for offtake of its renewable hydrogen-based iron from the plant. It is planning to build facilities further afield as well and is mulling five other sites at the moment, including in Spain and Canada.

occo Roelofsen
Founder, [Power2X](#) (Moderator)

Felipe Arbelaez
Senior Vice President Hydrogen & CCS, [bp](#)

Taco Hoencamp
Director Business Development Renewable Energy, [Royal HaskoningDHV](#) (Moderator)

Kajsa Rytberg Wallgren
Executive Vice President, Growth & Hydrogen Business, [H2 Green Steel](#)

Michel Erades
Senior Director Global Energy Transition, [McDermott](#)

Omar Shkeir
Head of Business Development - EMEA, [Electric Hydrogen](#)

Maribel Rodríguez Olmo
Responsible of Hydrogen Business, [Repsol](#)



SESSION 3: HYDROGEN TRANSPORTATION, DISTRIBUTION AND STORAGE

The session was opened with a speech delivered by Willemien Terpstra from Gasunie. Terpstra said she has “great confidence” in a future hydrogen market but is also looking at recent developments with “great concerns” as things have moved forward slowly. “What we are seeing right now is that both supply and demand are certainly lagging far behind previous estimates,” she said, adding that “the market is slow in starting up because the business cases are under pressure”. Still, “we shouldn’t get too disturbed if we see a hiccup during this transition,” Terpstra noted. She urged clarity and predictability to help projects get off the ground and highlighted the need for demand-side support in the sector.

The need for certainty was also highlighted in the subsequent panel discussion by Nikkiso’s Peter Wagner who picked out South Korea as a positive example for government-led initiatives that help infrastructure, such as a system of refuelling stations, get off the ground. This initiative is making South Korea attractive for investments and other countries cannot afford to fall behind, Wagner said.

Reaching significant scale of infrastructure will be key to bringing costs down, Koole Terminals’ Tamme Mekkes said. Users will have to share infrastructure to be able to reach this scale and make it possible to establish all the facilities needed in the future, he said.

Future infrastructure will have to be utilised as much as possible from the beginning, regardless of whether it stores, transports or distributes “green” or “blue” hydrogen, according to RWE’s Sopna Sury. For this, it will be crucial to avoid regulations which could end up penalising first users of infrastructure, Sury said.

Paul Lucchese
Chair, IEA Hydrogen TCP (Moderator)

Willemien Terpstra
CEO, Gasunie

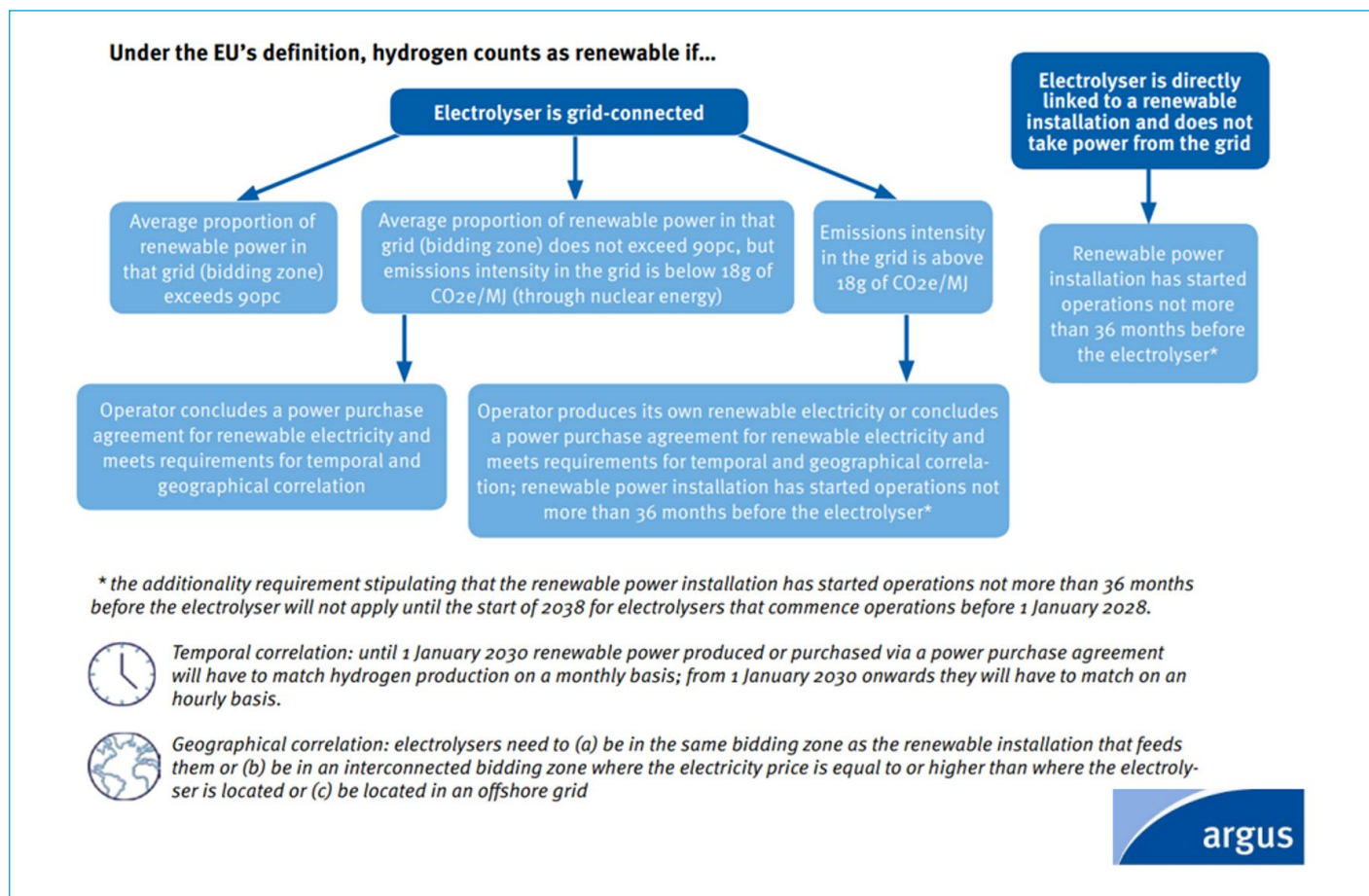
Helmie Botter
Director Business Development Hydrogen,
Gasunie

Peter Wagner
CEO, Nikkiso Clean Energy and
Industrial Gases Group

Dr. Sopna Sury
COO Hydrogen, RWE Generation SE

Tamme Mekkes
Business Development Director,
Koole Terminals

Sjoerd Boer
VP New Energies, Advario



Source: Argus based on the EU delegated act

Gasunie’s Helmie Botter noted that developing hydrogen storage is more challenging than onshore pipeline transport systems as it is “new” in Europe and requires more extensive research and permits. Other infrastructure such as offshore pipelines and ammonia cracking facilities also comes with sizeable challenges, she said.

Botter and Sury pointed out differences in funding for future hydrogen networks in Germany and the Netherlands which stem primarily from the fact that Gasunie is state-owned, while Germany’s gas system operators – which will be in charge of developing the hydrogen grid – are private-sector companies. Still, while tariffs for usage will ultimately have to cover the costs for the network, there is a role to play for governments in helping with the initial financing.

While Gasunie will exclusively be in charge of the pipeline network and is also pursuing storage and import terminal projects, other companies could also get involved in developing these facilities in the Netherlands, Botter said.

Sury criticised the renewable hydrogen definition drawn up by the European Commission, noting that it is “far from being a pragmatic solution”. “We have been actually artificially increasing the cost for any developer and producer who is trying to... generate green hydrogen,” she said, adding that this is partly responsible for FIDs remaining rare. Sury expressed hope that the definition from the delegated act could be reviewed, noting that there could be an “opportunity with the next commission after the European elections to very quickly call for a review because nothing is cast in stone”. She also urged more clarity on how much money will be available for the European hydrogen bank going forward.



FIRESIDE CHAT: HOW TO MAXIMIZE HYDROGEN'S CLIMATE BENEFITS AND MINIMIZE ITS RISKS

The Environmental Defense Fund's Steven Hamburg stressed that hydrogen is an indirect greenhouse gas and that at the moment "we know that we don't know how much hydrogen is being emitted from existing hydrogen value chains". There is a risk that we "significantly undercut the decarbonisation potential of deploying hydrogen" because of leakages and other issues, Hamburg said, adding that "we've got to get it right."

But "we don't actually have the technology to make those measurements," he said. There is technology under development to detect leakages and make measurements around hydrogen that is lost from systems but these are not yet available commercially, Hamburg noted. Collecting high-quality data will be key to tackling the issue, he added. Getting the metrics right is also key, including for upstream emissions relevant for low-carbon hydrogen production, Hamburg emphasised.

Ruud Kempener

Team Leader for Industrial Decarbonisation,
Directorate-General for Energy,
European Commission

Steven Hamburg

Chief Scientist, Environmental
Defense Fund



SPOTLIGHT: CLEAN ENERGY STORAGE SOLUTIONS FOR A NET ZERO FUTURE

Panellists in this session highlighted the important role that hydrogen can play for long-term storage, especially in a world that will be highly reliant on intermittent renewables. Hydrogen allows to go at scale, it makes it possible to store several hundred terawatt hours of energy,” said Hadi Hajibeygi from Delft University. The Netherlands can currently store around 136TWh of energy in the form of gas, equivalent to 16pc of the country’s entire energy demand, he said, adding that “hydrogen is our hope” to keep this up in a decarbonised world.

For the Netherlands and other countries, there are options for underground storage in salt caverns and depleted gas fields. Salt caverns have been used for hydrogen for a long time, but so far for cases where hydrogen is deployed as a feedstock. Utilising the caverns for hydrogen deployed for energy use and for balancing seasonal swings in demand will be a key challenge, Hajibeygi said. Storing hydrogen in depleted gas fields is less advanced, but there are trials for this ongoing, he added.

TechnipFMC’s Anders Lundquist pointed out that many different solutions will be needed for hydrogen storage, accommodating all different capacities and sizes, depending on the requirements. Lundquist also reiterated a point from the previous panel, noting that governments and state-owned companies will have to take responsibility for scaling up midstream infrastructure, including storage.

The panellists also agreed that data sharing and collaboration will be key for making large-scale hydrogen storage a reality.

Celia Greaves
CEO, Hydrogen Energy Association
(Moderator)

Anders Lundquist
Business Development Manager,
TechnipFMC

Dr. Peter Podesser
CEO & Board Chairman, SFC Energy AG

Hadi Hajibeygi
Professor of Geo-Energy Solid and Fluid
Mechanics, TUDelft



SESSION 4: LOW CARBON HYDROGEN PRODUCTION & CCUS

Panellists at this session largely agreed that so-called blue hydrogen from natural gas with carbon capture and storage or utilisation will be needed at the very least in a transitional phase as it can be scaled up sooner and at lower costs. “Blue can get to scale today,” Bechtel’s John Gunn said, with Linde’s David Burns agreeing “that all the components of blue hydrogen production are done at scale today.” So far, “it’s just not been done all together” at scale, Burns said.

Gunn pointed to a recent study by the US’ National Petroleum Council which found that hydrogen production in the US will have to increase sevenfold by 2050 to around 80mn t/yr to put the country on track for its net-zero targets. While electrolytic hydrogen would make up around two-thirds of this in a net-zero scenario, one-third would still have to be hydrogen made from gas with CCUS. Required investments for the electrolytic pathway would be around \$1.8 trillion until then, compared with less than \$100bn for the required CCUS-based hydrogen production, demonstrating how much cheaper the latter is, Gunn said.

Gunn noted that costs for electrolytic hydrogen have gone up recently. And while costs for electrolyzers could in future decrease as technology advances and manufacturing is scaled up, balance-of-plants components could continue to get more expensive with inflation, he said. This might “dampen” any “potential decline” in electrolyser costs. Moreover, compared with CCUS-based hydrogen plants there are also more recurring costs in electrolytic sites, as, for instance, electrolyser stacks have to be replaced.

Acceptance for CCUS-based hydrogen is still a mixed picture globally, however. Burns noted that Japan and South Korea are very accepting and only focus on the potential for carbon emissions, with Japan planning to subsidise such low-carbon hydrogen production through its contracts-for-difference scheme. Europe has been more hesitant although there has recently been some traction and getting a definition of low-carbon hydrogen soon could further accelerate the pace, Burns said. Linde sees “some opportunities” in Europe for CCUS-based hydrogen production, including in a Dutch project in Eemshaven that the firm is developing together with Norway’s Equinor. Still, the economics are naturally a lot less favourable than in the US because of higher gas prices and because of the Biden administration’s 45V hydrogen production tax credits and 45Q tax credits for sequestering carbon.

CRI’s Lotte Rosenberg agreed that there is still a stigma attached to CCUS-based hydrogen in Europe, as the continent has been focused almost exclusively on renewable hydrogen.

SLB’s Rafael Fejervary emphasised that the speed of building CO2 infrastructure will have to keep up, as otherwise a lot of the planned hydrogen production sites will not materialise. Permitting times for CO2 infrastructure are long, he said, noting that in the US the average time per well is around 5-6 years.

Rosenberg provided some insights on CRI’s projects, including for the Sailboat low-carbon methanol plant in China that can produce 200,000 t/yr using CO2 and hydrogen from onsite processes. In the longer term, the company is considering to build plants with capacities of as much as 500,000 t/yr, she said, adding that increasing the scale will be key to bringing costs down.

The panellists also discussed the crucial issue of carbon intensity of the natural gas feedstock, with Burns stressing that this varies considerably across regions. It is much higher in the US than in Norway, for instance, although it is still possible to make CCUS-based hydrogen with lifetime CO2 emissions equivalent of less than 3kg per kg of hydrogen and in some cases even less than 2kg in the US, Burns said.

Jeroen Steens

Commercial Delivery Director, [Port of Rotterdam](#) (Moderator)

David Burns

Vice President Clean Energy, [Linde](#)

Maulik Shelat

VP of Innovation & Project Development, [8Rivers](#)

Martin van’t Hoff

Commercial Manager Hydrogen, [Technip Energies](#)

Rafael Fejervary

Hydrogen Director, [SLB](#)

John Gunn

Global Manager of Operations, Energy Transition, [Bechtel](#)

Lotte Rosenberg

CEO, [Carbon Recycling International \(CRI\)](#)



SPOTLIGHT: INTERNATIONAL POWER-TO-X WORKSHOP: CONCLUDING STATEMENT

Dr Christopher Hebeling and Rene Peters shared insights from the International Power-To-X Workshop which was held on the sidelines of the World Hydrogen Summit.

There was agreement at the workshop about the opportunities that hydrogen has in terms of global decarbonisation, but participants also noted that “there is a significant disparity at the cost of energy sources” and that “policy regulation has to be tackled,” Hebeling said. Government funding is key but the massive investments needed in the hydrogen industry “cannot be covered by the public sector anymore,” he said. “There must be a reliable long-term stability also from the financial sector by a mixture of both public and private investments.”

TNO’s Rene Peters touched on the necessity to further develop carbon capture technology as this will be crucial for derivatives such as e-methanol. One of these technologies could be direct air capture which holds great promise but is still in its infancy. “Still a lot of research and technology development is needed,” Peters said, stressing that collaboration between countries will be vital for this.

In line with comments made by many other speakers at the event, Peters stressed that regulatory certainty is also essential to ensure that investments can be taken.

Dr. Christopher Hebeling
Director International, Fraunhofer Institute for Solar Energy Systems ISE

Rene Peters
Business Director Gas Technology, TNO

Concluding Statements

- Low carbon hydrogen (H₂) and its Power-to-X (PtX) derivatives are essential to **accelerate the defossilisation of all sectors** especially industry, chemistry, transport & power supply. **Large-scale PtX production, which starts now**, is vital for **facilitating the global trade in renewable energies** necessitating the expansion of a network of hydrogen trading routes including **existing infrastructure**.
- Nevertheless, there remains a **significant disparity** in the cost of energy sources, infrastructure availability, and policy and regulations that must be tackled to facilitate successful implementation. Closing these gaps require a **concerted global effort** involving policy makers, research, industry, financial market and society.
- The ramp-up of initiatives like H2Global is essential to **activate the market**. Given the **substantial investment required**, combined public and private capital are needed. **Reliable, easily implementable and long-term mechanisms** for private investment are necessary. Additionally, both, the **willingness and ability to pay premiums** in various markets must be considered.
- Hydrogen derivatives on the order of **170 million tons** are projected to be transported over long distances by 2050. While **ammonia will be the kick-starter, dimethyl ether (DME) emerge as a promising global point-to-point hydrogen carrier**, offering advantages in terms of cost, handling and safety.

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Source: Rene Peters and Christopher Hebeling presentation

SUMMIT DAY TWO



IN PARTNERSHIP WITH



Government of the Netherlands



province
Zuid-Holland



City of
Rotterdam



Port of
Rotterdam

WORLD HYDROGEN 2024 SUMMIT & EXHIBITION



#WorldHydrogen2024

OPENING KEYNOTE ADDRESSES

South Korea’s Sang Hyup Kim opened the World Hydrogen Summit’s second day, pointing out some of his country’s achievements in the sector and areas where it has been a first mover, such as with the clean hydrogen power bidding market launched in May this year. He urged pace across the sector, specifically on developing a global certification system and standard to define clean hydrogen based on its carbon intensity. Other key areas are infrastructure development and measures to stimulate demand, he added.

Similar to South Korea, Japan has also rolled out various measures to drive the sector forward, Shin Hosaka said. These include a subsidy mechanism in the shape of contracts-for-difference that is slated to support imported supply as well as domestic production. Japan is also focusing heavily on electrolyser manufacturing efforts to drive up scale and drive down costs.

South Australia’s Tom Koutsantonis highlighted his state’s favourable renewables conditions. The state wants to reach 100pc net renewable energy by 2027, which according to him is “quite frankly one of the most remarkable targets anywhere in the world”. Combined with South Australia’s huge landmass, this could open up ample opportunities for renewable hydrogen production. In order to facilitate these, the state has “collapsed all of its approval processes into one piece of legislation,” Koutsantonis said. The minister also outlined South Australia’s flagship project at Whyalla which is slated to entail a 250MW electrolysis plant, on-site storage and a 200MW hydrogen-fuelled power plant. Linde and BOC will build the project for which an FID has been taken and which is under construction.

Sang Hyup Kim

Co-Chairperson, Presidential Commission on Carbon Neutrality and Green Growth, Republic of Korea

Shin Hosaka

Vice-Minister for International Affairs, METI, Government of Japan

The Hon. Tom Koutsantonis MP

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

Johanna Schiele

Policy Officer Innovation Fund, European Commission

Dr. Nangolo Mbumba

President, Republic of Namibia

Seven bids were selected for grant agreement signature, covering 1.5GWe of electrolyser capacity

Project acronym	Project Coordinator	Project location	Bid price (EUR/kg)	Bid volume (kt H2/10years)	Bid capacity (MWe)	Expected GHG abatement (ktCO2/10years) *	Total requested funding (EUR) **
eNRG Lahti	Nordic Ren-Gas Oy	Finland	0.37	122	90	836	€ 45,228,375
El Alamillo H2	Benbros Energy S.L.	Spain	0.38	65	60	443	€ 24,605,819
Grey2Green-II	Petrogal S.A.	Portugal	0.39	216	200	1477	€ 84,227,910
HYSENCIA	Angus	Spain	0.48	17	35	115	€ 8,104,918
SKIGA	Skiga	Norway	0.48	169	117	1159	€ 81,317,443
Catalina	Renato Ptx Holdco	Spain	0.48	480	500	3284	€ 230,463,819
MP2X	Madoquapower 2x	Portugal	0.48	511	500	3494	€ 245,178,772
			Ø 0.44 €	Σ 1580 kt_H2	Σ 1502 MWe	Σ 10 808 kt_CO2	Σ 719,127,056 €

* Calculated vs. the [2021-2025 ETS benchmark](#) of 6.84 t_CO2e/t_H2. Not taking into account additional carbon abatement due to substitution effects in the H2 end use application (i.e. conservative estimate).

** Remaining budget will accrue back to the Innovation Fund.

Source: Johanna Schiele presentation

The European Commission’s Johanna Schiele gave an overview of the European hydrogen bank pilot auction’s results. The pilot auction saw “huge interest,” Schiele said. The commission received over 130 bids from projects with a combined electrolyser capacity of around 8.8GW and estimated production capacity of 880,000 t/yr. It selected seven projects in Spain, Portugal, Finland and Norway – with a combined electrolyser capacity of around 1.6GW – that will share €720mn in total funding through operational subsidies over a 10-year period. The auction cleared at €0.48/kg, far below the set ceiling of €4.50/kg.

Wrapping up this opening session, Namibia’s president Nangolo Mbumba highlighted his country’s ambition to become “a primary leader in the global market for green hydrogen”. Namibia currently hosts nine planned hydrogen projects across two “hydrogen valleys”. A third valley could be developed with a focus on green iron ore production, Mbumba said. The country is also developing an ammonia bunkering hub to decarbonise shipping, he said, alongside other infrastructure to drive down emissions in logistics at ports such as Walvis Bay and Lüderitz.



Source: Tom Koutsantonis presentation



SESSION 5: ELECTROLYSER DEVELOPMENTS

In this session, the panellists discussed the outlook for electrolyser manufacturing capacity. “I don’t see that we will necessarily have an electrolyser manufacturing bottleneck,” said Kasper Tipsmark Therkildsen of Envision Energy, although he cautioned that there may be bottlenecks for some components, such as catalysts for diaphragms used in alkaline electrolysers.

Accelera by Cummins’ Andreas Lippert agreed that factories and production capacity can be built out relatively quickly. He pointed to his company’s conversion of a US factory that traditionally produced diesel engines to now partly make electrolysers. But the lack of FIDs for hydrogen production projects is “really the bottleneck to unlock the supply chain efficiencies,” Lippert said. Fabian Jochem of SMA Altenso concurred that the issue is more on the market side.

Panellists agreed that increasing recycling and reuse of materials such as platinum group metals will be key for scaling up certain technologies such as proton exchange membrane (PEM) electrolysers.

Jochem pointed out that integrating renewables assets and electrolysers in one connection point with an intelligent energy management system could help improve economics for plants. The management system would have to control the intra-day or day-ahead market to decide whether to just provide power to the grid or to use all power for hydrogen production or a combination of the two.

Questioned on the role that Chinese electrolysers can play globally, Tipsmark Therkildsen noted that “we need to decarbonise the world” and “from a global perspective” it is “not that important” whether the equipment for this comes “from one country or another”. But it does have an impact from a local policy perspective and with regard to workforce operations, he said. Tipsmark Therkildsen said that there are more than 200 electrolyser manufacturers now in China and that a lot is happening in the space. It is impossible to ignore the political aspect of this, Xylem’s Darren Dale said. Some form of protectionism “is helpful in order to have strategic independence,” according to Battolyser’s Mattijs Slee.

Dr. Eva-Ravn Nielsen

Global Advisor, Power-to-X, Ramboll
(Moderator)

Kasper Tipsmark Therkildsen

Chief Engineer of Alkaline Electrolysis,
Envision Energy

Andreas Lippert

Vice President and General Manager
Electrolysers, Accelera by Cummins

Mattijs Slee

CEO, Battolyser Systems

Fabian Jochem

Head of Strategy, SMA Altenso GmbH

Darren A Dale

Director of Product Management, Xylem



SESSION 6: RENEWABLE HYDROGEN PRODUCTION

Hydrom's Hafsa Al Subhi opened the session with an overview of Oman's hydrogen potential and ambitions. She pointed out that Hydrom has now signed eight binding hydrogen project development agreements, five in Duqm and three in Dhofar. The projects could eventually produce a combined 1.4mn t/yr of renewable hydrogen, thereby exceeding Oman's 1mn t/yr target for 2030, Al Subhi said. They would amount to a total investment of around \$49bn. Hydrom is also in charge of developing a common user infrastructure for hydrogen projects – comprising hydrogen pipelines, electricity transmission and a water supply network – that will help bring down the levelised cost of hydrogen.

During the following panel, speakers pointed out that adding the renewable assets needed to meet electrolyser capacity targets in Europe will be challenging. "We need to push for better conditions for projects in Europe," SEFE's Hans Dieter Hermes said. But paving the way for imports will also be crucial, as at least 70-80pc of Europe's renewable or low-carbon hydrogen import will eventually have to be covered from elsewhere, Hermes said.

Smartenergy's Christian Pho Duc expressed optimism regarding the renewables build-out and said that Europe could even overachieve its targets. Around 263GW of solar power capacity was installed by the end of 2023, with 56GW added just last year, while the 2030 target is 900GW. For wind power, the target is for 440-450GW, while installed capacity stood at 255GW at the end of last year. "When I see that even those who don't believe in climate change put solar in their backyards because it starts to make sense, I think now we get to dynamics which can actually overachieve" the targets set, Pho Duc said.

Tim Hard
SVP Energy Transition, [Argus \(Moderator\)](#)

Hafsa Al Subhi
Accounts Manager, [Hydrom](#)

Christian Pho Duc
Chief Technology Officer, [Smartenergy](#)

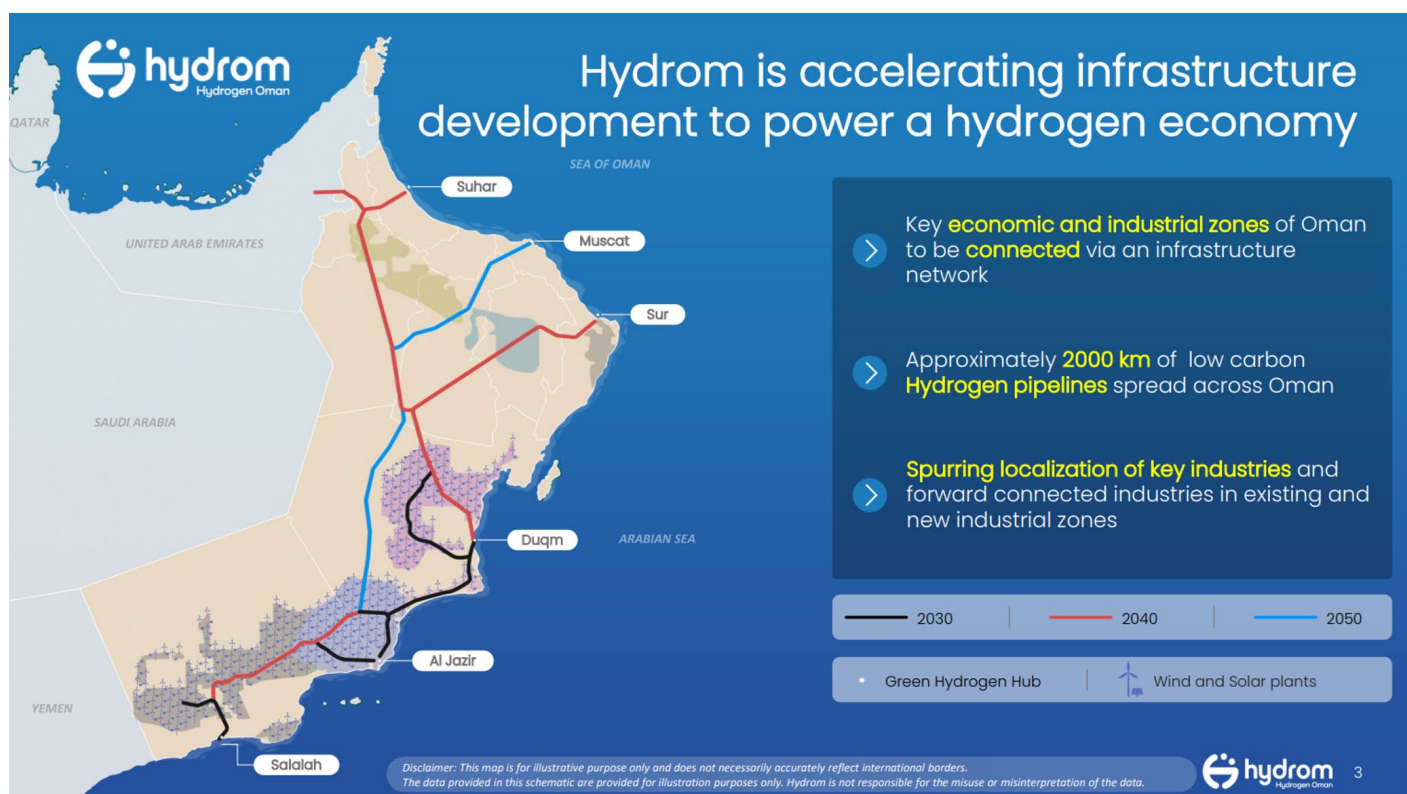
Caroline Stancell
Executive Director of Hydrogen, Europe & Africa, [Air Products](#)

Nizam Salem
Director for Projects Development and Execution, [Masdar Green Hydrogen](#)

Marcel Galje
Chief Strategy Officer, [HyCC](#)

Gonzalo Moyano
CEO, [MAE](#)

Dr. Hans Dieter Hermes
Executive Vice President for Hydrogen and Renewable Energies, [SEFE Securing Energy for Europe GmbH](#)



Source: Hafsa Al Subhi presentation

Caroline Stancell of Air Products argued that Europe will still likely be short on renewable energy “at least in the foreseeable future,” adding that the continent will depend on imports of renewable hydrogen or derivatives from elsewhere. Stancell said that the new European Commission incoming following the parliament elections in June should not modify EU hydrogen regulations. “Right now we have certainty, which allows you to make decisions,” she said, adding that “any change is going to cause delays of an undetermined magnitude.” Moreover, the current regulations ensure “that we are saving CO₂,” which is the most important aspect of the energy transition, Stancell argued.

Masdar’s Nizam Salem agreed with Stancell’s point regarding regulations, but noted that more policy interventions are needed on the downstream side. And Marcel Galjee of HyCC concurred that more alignment is needed between EU member states, for instance around topics such as grid tariffs.

Salem also stressed the importance of infrastructure developments, including pipelines and ports. Governments will need to do more to incentivise this “and put the investments into the infrastructure,” he said. This view was backed by Gonzalo Moyano of MAE who stressed that infrastructure developments can help lower the risk for production projects and increase bankability. That said, it is also important to look at projects that will only need minimal infrastructure additions to make them work, as these could get off the ground quicker, Moyano added.



SPOTLIGHT: U.S. NATIONAL CLEAN HYDROGEN STRATEGY PERSPECTIVES

The Department of Energy’s Dr. Sunita Satyapal gave an overview of the U.S. National Clean Hydrogen Strategy and the country’s incentive programs. She began by presenting data showing the global rise in temperature, emphasizing the importance of the energy transition and showing that the U.S. still relies heavily on fossil fuel.

The U.S. strategy emphasises regional models with its \$7bn hydrogen hubs program for which winners were selected late last year, Satyapal said.

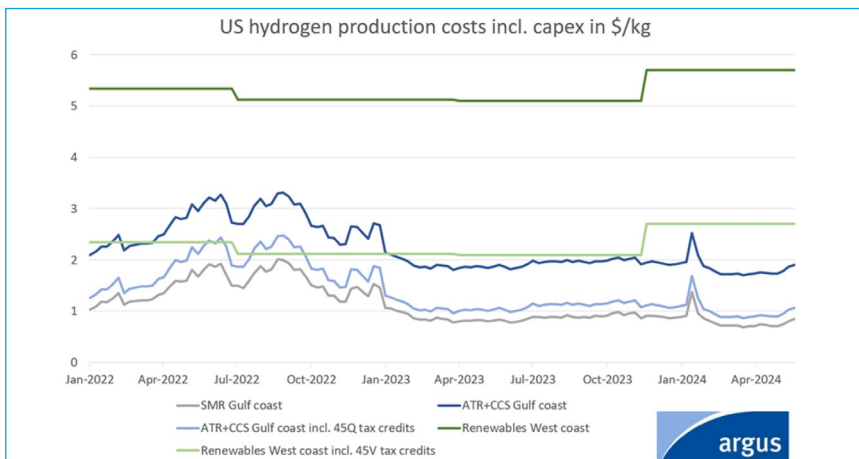
The country wants to produce 10mn t/yr of clean hydrogen by 2030, 20mn t/yr by 2040 and 50mn t/yr by 2050. If output indeed reaches 50mn t/yr by 2050, this would unlock emissions cuts of around 10pc, Satyapal said.

The strategy targets high-impact end uses like ammonia and refining, as well as steel, e-fuel production and heavy transportation. Transport operators have a higher willingness to pay for hydrogen than other sectors, meaning if the cost of hydrogen can fall below \$4/kg then 10-15pc of trucks could adopt hydrogen, Satyapal explained.

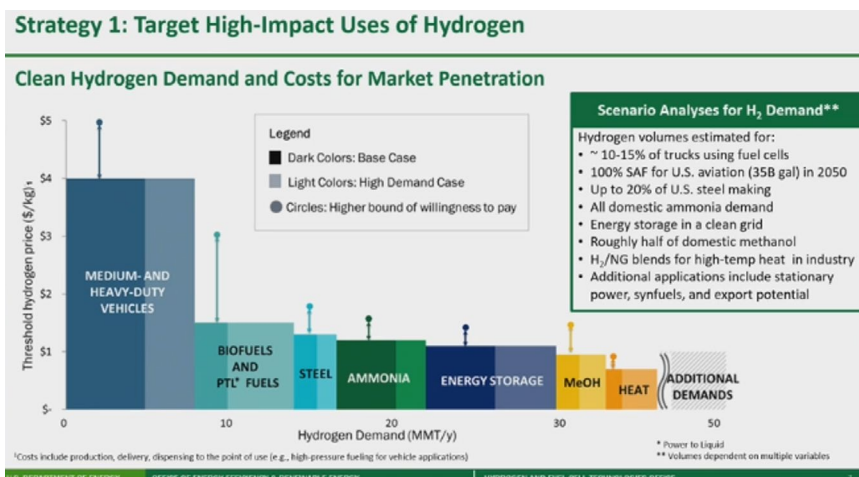
But for other sectors, costs need to fall even more to make adoption viable. “Cost still continues to be one of the major challenges,” Satyapal said. Even with the 45V production tax credit, hydrogen prices still need to fall substantially to compete with the price of conventional hydrogen for sustainable market penetration, she said.

Based on Argus’ calculated cost assessments, U.S. renewable hydrogen production would still be some \$2/kg more expensive than conventional gas-based output with unabated emissions, even factoring in the tax credits. And the final tax credit details have yet to be determined, with some industry participants warning that strict rules around additionally and temporal and geographical matching would drive up production costs for renewable hydrogen projects.

Dr. Sunita Satyapal
Hydrogen and Fuel Cell Technologies
Office Director and Hydrogen Program
Coordinator, U.S. Department of Energy



Source: Sunita Satyapal presentation



Source: Argus



SESSION 7: FINANCING HYDROGEN PROJECTS

A group of panellists comprised of developers and financing institutions discussed the hurdles for projects to secure financing and how public sector initiatives can support the growth of the industry.

Securing offtake agreements remains a crucial challenge. Swedish firm H2Green Steel was able to secure financing from ING because the project had offtake deals of 7-10 years, ING's Ramon van den Dungen said. Banks such as ING have an expert technical team to help understand the risks and opportunities in deploying new technologies, he noted. Exact terms and conditions will depend on each project and the bank aims to work closely with developers to understand the particular situation of each venture, he said, but an important aspect of securing financing is ensuring that the interests of both parties are aligned. More broadly, projects where hydrogen production is integrated with the direct manufacturing of other products – such as green iron or steel – are more likely to create bankable structures, van den Dungen said.

The finance industry should rethink the terms and criteria for taking debt for European states, European Economics chief executive Marc Isabelle said. It is important that public and financial institutions understand that investing in decarbonisation initiatives will have a long-term benefit to society, therefore, terms should allow for longer term returns on investment, he said.

An upside to the current situation is that the price of renewables is likely to keep falling as more renewable power is integrated into the grid, Smartenergy's Pedro Campos said. Power purchase agreements (PPAs) have a key role to play in supporting project financing, since they ensure physical supply as well as financial bankability, Campos said.

Projects in emerging markets and developing countries should have strong components to increase local value, according to FMO's Angie Salom. There are sets of specific challenges of investing in developing countries and development, and multilateral banks tailor financing for these cases. Governments are faced with a broad range of challenges, Salom said, including on questions of whether to provide tax incentives for the sector when taxes are much needed to drive other development projects forward.

Susana Moreira

Executive Director, Co-chair, [H2Global Foundation](#)

Ramon van den Dungen

Managing Director Energy Sector Coverage, Hydrogen Lead, The Netherlands, [ING](#)

Alan Hayes

Global Head of Pricing for Energy Transition, [S&P Global Commodity Insights](#)

Pedro Campos

Director Business Development H2 and eSAF, [Smartenergy](#)

Dr Marc Isabelle

Director & CEO, [European Economics](#)

Angie Salom

Manager Energy for Latin America & Caribbean, [FMO](#)



SPOTLIGHT: CANADA'S UNIQUE HYDROGEN ADVANTAGE

Invest in Canada's chief executive Laurel Broten presented some of the benefits for investors looking into her country's hydrogen opportunities. Canada is already a leading producer of hydrogen, ranking among the 10 top producing countries globally, she said, adding that it could become a "top 3" country for clean hydrogen production by 2050. At least 10 major hydrogen projects are planned across the country, she noted.

Canada can draw on strong wind and water power resources, Broten said. With a long-standing energy sector, the country also boasts an experienced workforce, has plans to train and upskill new talent and strong research institutions, she noted. Canada is home to more than 170 hydrogen and fuel cell technology companies, including Ballard, one of the first companies in the world to manufacture fuel cells.

Canada has a "strong and supportive" regulatory system and offers incentive mechanisms both at national and province levels. At national level, hydrogen project developers can benefit from tax credits and access to funds such as Clean Fuels Fund, Canada Growth Fund and the Strategic Innovation Fund, in addition to funds from provincial governments.

The Canadian government is planning to grant investment tax credits of up to 40pc to clean hydrogen projects, with the exact rules yet to be finalised. The country also has a carbon tax in place, which reached \$80/t at the start of April this year.

Laurel Broten
CEO, Invest in Canada



SPOTLIGHT: HYDROGEN IN THE AMERICAS

Panellists discussed their countries' strategies and targets across Latin and North America.

Uruguay already has a roadmap to 2040, focused on exports of renewable hydrogen and e-fuels, according to Elisa Facio. The emphasis on e-methanol is because Uruguay has competitive advantages such as availability of biogenic CO2 that is compliant with EU regulations. Uruguay also aims to be part of green maritime corridors in South America to enable trade from landlocked countries, she said. There is also scope for domestic applications of hydrogen, especially in long-distance and forestry transport, Facio said. The government is currently assessing the need for associated infrastructure and there are incentives such as tax exemptions for project developers, she added. Four projects are currently under development – two large scale sites for exports and two smaller pilots for domestic use.

Panama's government has just finalised a green hydrogen master plan, including for ammonia and e-methanol production facilities and infrastructure, according to Rosilena Lindo. Pre-feasibility studies have already been prepared for sample projects and are made available to investors to shed light on production costs estimates. The plan also outlines the necessary infrastructure expansions, Lindo said. Panama has a goal of producing 2mn t/yr by 2040, but its main ambition is to be an importer of derivatives to provide fuels to the maritime and aviation sectors. At least 40pc of bunkering in Panama needs to be "green" by 2050, Lindo said. Prospective project developers in the country enjoy some incentives, as they can get up to 40pc of their investments back from the government within three years. There's also an energy transition fund with a hydrogen-specific programme set to start running this year, Lindo said.

The U.S. made billions of dollars available in support to make clean hydrogen a core element of U.S. decarbonisation focused on high impact uses, such as industry, transport and long-duration storage, Anna Shpitsberg said. The government has made funds available not only on the production side, but also on the demand side, including recently to some planned green steel projects, Shpitsberg noted. Still, even with generous financial support, challenges remain, such as the need to scale up renewables, she said. The U.S. has a goal to reach renewable hydrogen production costs of \$2/kg by 2026 and \$1/kg by 2030, Shpitsberg said. "This is going to be very hard to do" unless we reduce the cost of electrolyzers, noting that the Department of Energy has also provided significant funding to electrolyser manufacturers to achieve these goals.

Canada's Newfoundland and Labrador province has ample wind energy potential, plenty of available land and a favourable location for exports to Europe, Andrew Parsons said. The province has 82pc of land available as crown land and last year carried out an allocation process for future renewable hydrogen projects. The local government is very supportive of hydrogen projects because it sees huge potential for these to boost local economies. In addition to national level mechanisms, there are incentives available at province level, such as green tech tax credits of up to 20pc of capital costs, and a green transition fund, he said.



Bart Biebuyck
CEO, Green Energy Park (Moderator)

H.E. Elisa Facio
Minister of Industry, Energy and Mining,
Government of the Republic of Uruguay

H.E. Rosilena Lindo
Secretary of Energy, Government
of Panama

Anna Shpitsberg
Deputy Assistant Secretary,
U.S. Department of State

The Honourable Andrew Parsons, KC
Minister of Industry, Energy and
Technology, Newfoundland and
Labrador, Canada



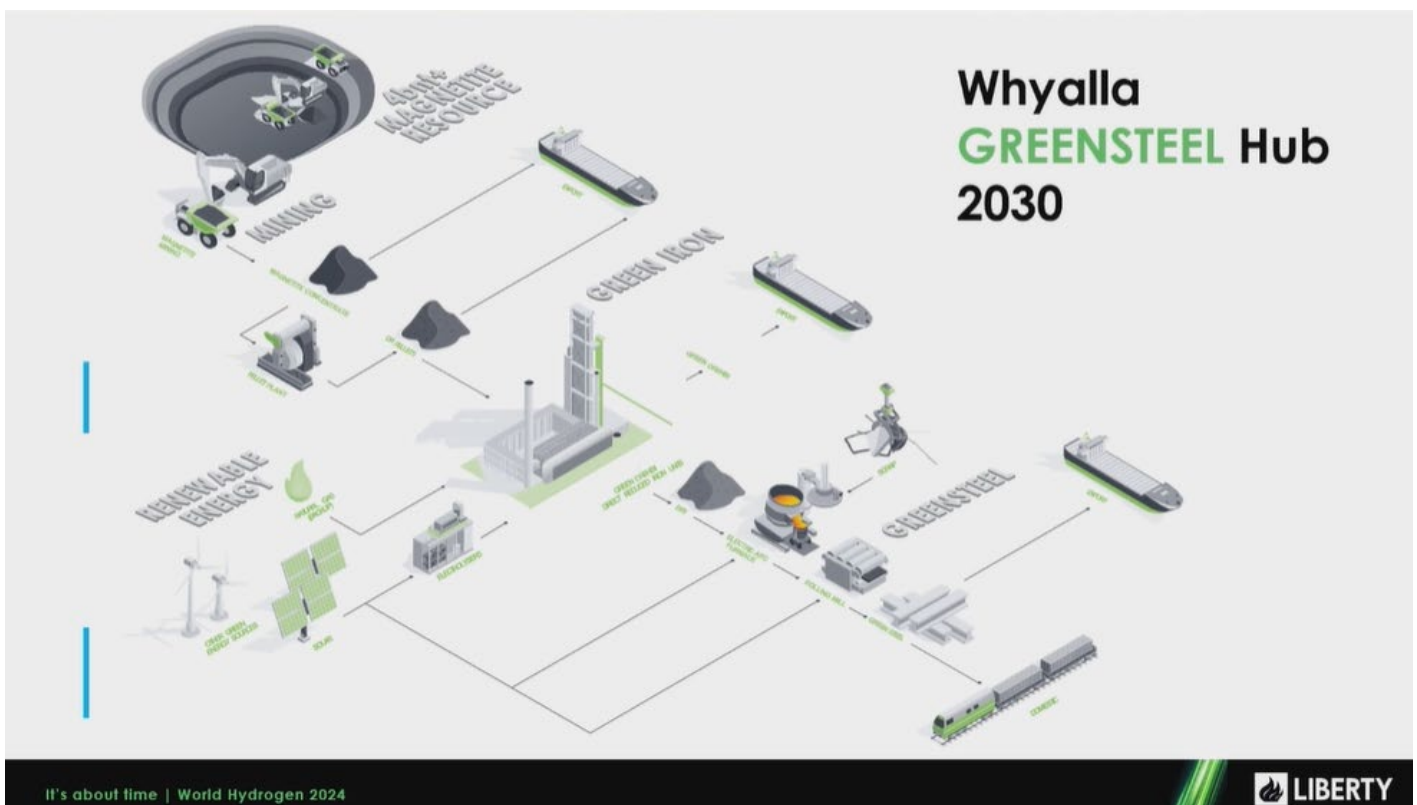
SPOTLIGHT: GFG ALLIANCE

During this spotlight session, GFG Alliance’s Sanjeev Gupta highlighted the cooperation between the government of South Australia and Liberty Steel – a GFG Alliance subsidiary – on replacing “highly polluting coke ovens and blast furnaces with green hydrogen and renewable energy feeding a brand new green iron and green steel plant”. Liberty will be the sole offtaker of hydrogen from the government-backed 250MW electrolysis plant under development in Whyalla.

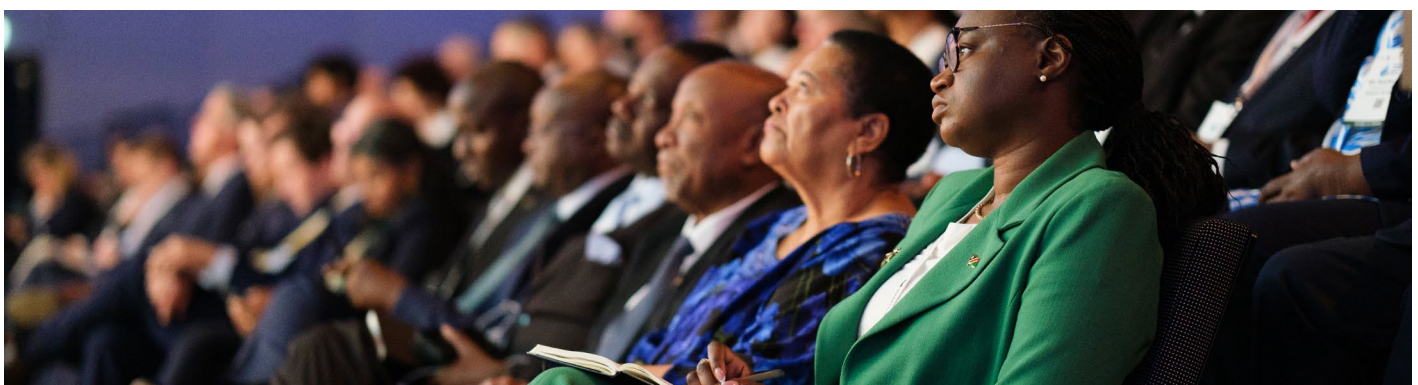
Sanjeev Gupta
Executive Chairman, GFG Alliance

The combination of highly favourable conditions for renewable power and hence for renewable hydrogen, “the highest grade magnetite” and ample land availability can foster green iron production not just for Australia but also for other parts of the world, according to a Liberty promotional video shown during the spotlight session. Australia’s federal government and the South Australian government are backing the efforts in the region through financial support and other means, Gupta said. “What Australia is doing now, other governments must also be willing to do in the near future he said.

The steel industry can cut around 10pc of “harmful emissions” globally and “by solving its own issues” can “kickstart a new green hydrogen revolution,” Gupta said.



Source: Sanjeev Gupta presentation



SESSION 8: REALISING OFFTAKE AGREEMENTS AND DEMAND FOR HYDROGEN

Panellists discussed what is arguably the biggest challenge in the industry – securing offtake agreements. There was a widespread agreement around the need for collaboration and serious partnerships between producers and consumers to ensure both parties share the risks.

ADNOC’s Thomas Pasfield talked about the company’s first delivery of low-carbon ammonia to customers in Japan. An important aspect in making this deal a reality was leveraging existing commercial infrastructure such as contracts and insurances as much as possible, he said, although he highlighted that many bits were still new, for instance around certification.

While affordability is a big challenge to overcome, other issues are currently also hindering offtake agreements, Woodside’s Shaun Gregory said. These other challenges include poor connectivity and lack of transport infrastructure as well as uncertainty on regulatory standards across different countries, he said. Woodside has some offtake deals in place, “but we could have a lot more” if it was not for these issues, Gregory said.

Damien Eyries of Rely pointed to the substantial increase in capital costs for renewable hydrogen plants in recent years which has increased the cost gap to conventional supply and makes it harder to strike offtake agreements.

Masdar expects the first offtake deals to happen for hydrogen derivatives such as green steel and e-SAF, Andreas Bieringer said. “We will see some offtake agreements materialising soon” in these areas, Bieringer said. But Bieringer also pointed to the enormous regulatory uncertainty that persists. “What do you do when in the middle of your offtake contracts the regulatory scheme is changing? Who’s taking this risk?”

Tech giant Microsoft plans to use hydrogen fuel-cell as alternative backup power at its data centres, according to hydrogen technology director Sonia Maleky. The company is committed to using hydrogen, Maleky said, adding that “it seems like we have lots of demand for hydrogen”. Given that hydrogen will play a backup role, storage will be crucial, with Maleky referring to this as “the big elephant in the room”.

Sunfire’s Ines Kraft explained some of the challenges that delayed FIDs for electrolytic hydrogen projects pose for electrolyser manufacturers. These revolve, for instance, around having to renegotiate deals with component suppliers which drives up costs, especially in times of high inflation, Kraft said. A reliable schedule of FIDs and projects actually executing equipment orders is therefore essential, she said.

Noé van Hulst

Vice-Chair, [IPHE](#). Hydrogen Advisor, [IEA](#) & [Gasunie](#)

Thomas Pasfield

VP, Hydrogen Business Development, [ADNOC](#)

Andreas Bieringer

Director, Green Hydrogen Business Development and Commercial, [Masdar](#) Green Hydrogen, [Masdar](#)

Sonia Maleky

Director of Hydrogen Technology, [Microsoft](#)

Shaun Gregory

EVP New Energy, [Woodside Energy](#)

Ines Kraft

Director Project Procurement Supply Chain Management, [Sunfire](#)

Damien Eyriès

Chief Executive Officer, [Rely](#)



SPOTLIGHT: DEEP DIVE INTO AUSTRALIAN OPPORTUNITIES PANEL

The panellists started with discussions on Australia’s 2024-25 budget which was announced on the same day. Among other measures, it includes provisions for A\$2/kg tax credits to eligible projects that reach an FID by 2030 at the latest, and another A\$2bn for Australia’s Hydrogen Headstart subsidy programme.

The newly announced tax credits are a “really big deal,” said Fiona Simon of the Australian Hydrogen Council. The support will be “a great injection” for production projects, “but also a really strong signal to the offtakers that the Australian government is prepared to chip in and see this delivered,” according to Stanwell’s Steve Quilter.

Simon pointed out that the tax credits can be stacked with other mechanisms, such as the Hydrogen Headstart subsidies and also with support schemes in other countries. Stacking different subsidies could be key for getting projects off the ground as the A\$2/kg tax credits themselves might not be enough to make all the projects that are planned economical, ARENA’s Alex MacIntosh agreed.

Based on Argus’ prevailing cost calculation assessments, making renewable hydrogen in Australia currently costs around \$5.60/kg, while the cost for producing hydrogen from gas with unabated emissions is below \$2/kg.

Simon also noted that in Australia there has been somewhat of a focus shift in the past few years. Initially, the focus was primarily on exporting hydrogen as energy, whereas now there are more plans for making other products based on hydrogen within Australia and then exporting them, such as green iron.

For Queensland’s Alana Barlow, e-fuels in particular will have a massive role to play going forward. Pointing to limited feedstock availability for biofuels, Barlow said that “from what I’m seeing at the moment, all roads lead back to e-fuels”.

Based on announced projects, Australia could have some 6.3mn t/yr of renewable hydrogen production capacity in operation by 2030, and close to 1mn t/yr for low-carbon hydrogen, data from Argus Consulting show.

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

Alex MacIntosh
Director Business Development and Transactions, Australian Renewable Energy Agency (ARENA)

Alana Barlow
Deputy Director-General for Hydrogen and Future Fuels, Queensland Government

Luc Kox
CCO, Hazer Group

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

Jop van Hattum
Managing Director, Theia Energy



SESSION 9: STANDARDIZATION, CERTIFICATION AND REGULATIONS

Jan Strybol of the EIGA opened the session with an optimistic perspective, saying that “we are very much progressing on the standards” for the hydrogen industry. He pointed to standards drawn up by the International Standardisation Organisation (ISO), but also others that firms in the industry adhere to. On the topic of certification, he argued that there are “too many” such schemes, but that a solution will be found for this issue.

Panellists agreed on the need for robust standards and reliable data underpinning these. The standards would then lead to certification which in turn would be referenced in regulations, Strybol explained.

The Hydrogen Council’s Daria Nochevnik shed light on the current status of the ISO standards. The ISO methodology for a greenhouse gas emissions assessment of hydrogen on a lifecycle basis is a technical specification that has yet to be translated into a suite of standards, Nochevnik said. “There is ongoing work underway to evolve this technical specification,” she noted. While it is “work in progress,” bringing different experts and parties together and “creating a common point of reference” has been a “critical step,” according to Nochevnik.

Nochevnik does not expect convergence on emissions thresholds across different geographies. Different countries are taking different positions based on their technological and resource endowments, she said, adding that tools which make these systems comparable are particularly crucial.

Similarly, there will not be one common global certification scheme. But nearly 40 countries – representing 80pc of a future global market – have already committed to mutually recognising each other’s certification scheme “to enable... fungibility of certificates in order to prevent market fragmentation,” Nochevnik said.

An ISO draft standard could be unveiled at the Cop 29 summit in Baku in November, according to IPHE’s Laurent Antoni. The standards are unlikely to replace regulations in countries where these already exist, but might be used by others as a reference, Antoni said.

Exxon Mobil’s Bert de Backker argued that the risks which project developers have to take on related to certification are “bigger than they should be”. “We are making choices in our projects, both on the design and the commercial choices, that will be hard to unwind if we find out later that the rules change,” he said.

Jan Strybol
Deputy General Secretary, EIGA

Bert De Backker
Policy & Strategy Manager, Exxon Mobil |
Low Carbon Solutions

Dr. Laurent Antoni
Executive Director, IPHE

Steve Hamburg
Chief Scientist, Environmental
Defense Fund

Ann-Kathrin Lippner
Associate Programme Officer, IRENA

Daria Nochevnik
Director for Policy and Partnerships,
Hydrogen Council



SUMMIT DAY THREE



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WORLD HYDROGEN 2024 SUMMIT & EXHIBITION

OPENING KEYNOTE ADDRESS

In the third day's opening address, Bhalla pointed to India's commitments to achieving net-zero carbon emissions by 2070. Building blocks for this include an expansion of renewable energy capacity to 500 GW, sourcing 50pc of installed electricity from non-fossil sources and reducing carbon intensity by 45pc. Key steps towards this will be a strong policy framework, significant investments with a focus on "green" hydrogen and transport electrification, and international partnerships, Bhalla said.

The minister shed light on India's National Green Hydrogen Mission, which was launched in January 2023 with a \$2.4 billion budget. It aims to position India as a leader in green hydrogen production, usage, and exports. By 2030, the mission aims for a minimum production capacity of 5mn t/yr of renewable hydrogen, which could require 100-125 GW of dedicated renewable power generation capacity and 60-100 GW of electrolyser capacity. The corporate sector already targets 7.5mn t/yr of green hydrogen production, which would exceed the government's goal, Bhalla said.

The country's hydrogen strategy foresees \$100bn in investments and creation of over 600,000 jobs.

Pilot projects stimulated by the government focus on hydrogen-based long-haul transport, retrofitting ships for ammonia, and steel production using direct reduced iron technology, Bhalla said. A robust research and development programme with 340 proposals is underway, alongside guidelines for hydrogen hubs and skill development, he said.

Bhalla noted that India's favourable conditions for green hydrogen production and exports include low renewable energy costs, a massive transmission network, highly-developed ports and a skilled workforce.

Bhupinder S Bhalla

Secretary, [Ministry of New and Renewable Energy](#), Government of India



SPOTLIGHT: EUROPEAN HYDROGEN POLICIES

During this session, several panellists highlighted the specific advantages for renewable hydrogen production in their respective countries.

Finland's Simo Säynevirta said that Finland has “one of the most vibrant communities in Europe when it comes to industry-led hydrogen transformation”. He pointed to the results of the European hydrogen bank auction where a Finnish project was successful in securing subsidies, alongside plants from Norway, Spain and Portugal – a result which underpinned Finland’s competitiveness in the sector, according to Säynevirta. Finland’s power supply is now 94pc “carbon neutral,” Säynevirta said, adding that the country has ample spare clean electricity which it can turn into hydrogen.

Jorge Paradela praised the favourable conditions in Spain generally and Andalusia more specifically. The latter offers not only 300 days of sun a year but also existing port infrastructure, among other advantages, Paradela said. The favourable renewable conditions in Spain are reflected in costs for power purchase agreements which are around 25-40pc lower than the EU average, according to him. Andalusia has set up a “project acceleration unit” which provides the most promising proposals in the region with a dedicated project manager as a single port of call. This allows cutting permitting times by 50-60pc, Paradela said.

The UK’s Stefanie Murphy said her country is now “in delivery mode” when it comes to hydrogen. “We are starting to see the results of the policies we’ve put in place,” including from funding allocations, she said. The UK is making “really good progress” towards its target of having 10GW of renewable and low-carbon hydrogen production capacity on line by 2030, Murphy added. London selected 11 electrolytic hydrogen projects with a combined 125MW capacity late last year for support through its contracts-for-difference scheme and is assessing a “very large number” of applications for a second round that is due to support another 875MW, she said. The government is also rolling out support programmes for storage and infrastructure.

Brett Ryan

Head of Policy & Analysis, [Hydrogen UK](#)
(Moderator)

Karlo van Dam

Director of Sustainable Industry,
Ministry of Economic Affairs, [Government of the Netherlands](#)

Dr. Philipp Steinberg

Director General of Economic
Stabilisation, Energy Security, Gas &
Hydrogen Infrastructure, Federal Ministry
for Economic Affairs & Climate Action,
[Government of Germany](#)

Simo Säynevirta

Chair of Hydrogen Cluster, Head of ABB
Green Electrification Ecosystem, [Finland](#)

Jorge Paradela

Regional Minister for Industry, Energy and
Mining, [Government of Andalusia, Spain](#)

Stefanie Murphy

Director of Hydrogen and Industrial
Carbon Capture, [UK Government](#)



Germany is shaping up to be a key importer of hydrogen, including from countries such as Finland and Spain, Philipp Steinberg said. The country is developing support schemes on the demand side, including its carbon-contracts-for-difference scheme, and is working on establishing the infrastructure for imports and domestic distribution.

But panellists also pointed to persisting challenges. Paradelo highlighted the complex EU rules that project developers are struggling with, such as around additionality. The Netherlands' Karlo van Dam agreed that there are issues that need to be tackled on a national and pan-European level. There is more clarity needed on the renewable energy directive (REDIII), while the Dutch government needs to address, for instance, the issue of high electricity grid connection fees. Some of the targets that have been set are contradictory, van Dam said, noting that REDIII targets for use of renewable hydrogen in industry could go against more efficient pathways to decarbonisation.

REDIII foresees that countries would have to ensure that 42pc of all hydrogen used in industry is renewable by 2030 and sits alongside other regulatory frameworks on the use of renewable or low-carbon hydrogen and derivatives in other sectors, such as the maritime or aviation industry. But member states still have to transpose the REDIII rules into national law with a deadline of May 2025 and it remains to be seen how the implementation will shape up domestically.



SESSION 10: GLOBAL PORTS LEADING THE ENERGY TRANSITION TO A HYDROGEN ECONOMY

The port of Rotterdam's Nico van Dooren emphasised the port's strategic importance in the current energy system and its commitment to reducing its CO2 footprint. Over the past seven years, Rotterdam has developed an energy transition program focusing on infrastructure, a new energy system, new feedstock systems and clean transport. The port is actively collaborating with global partners like ports in Brazil's Pecem and the US' Corpus Christi to establish hydrogen supply chains. Van Dooren noted the readiness level of Rotterdam in terms of supplying methanol and ammonia to ships, highlighting that the first bunkering of green methanol has already occurred. Despite the current headwinds, van Dooren is optimistic about reaching the port's goals for 2030 goals, with more investments anticipated in the coming years.

Jeff Pollack of the port of Corpus Christi discussed the port's role in hydrogen value chains, leveraging existing infrastructure for a smoother transition from liquid fossil energies to hydrogen. Pollack pointed to the significant impact of the U.S. Inflation Reduction Act, which provides substantial incentives for hydrogen production and creates a more attractive investment environment in the U.S. compared with Europe – although the exact rules for the production tax credits have yet to be finalised and some industry participants have warned that strict regulations could sharply reduce their attractiveness. Pollack explained that the Treasury's draft guidance on the tax credits necessitates the colocation of renewable generation and hydrogen production, driving project developers to move hydrogen production upstream. This has led to the port becoming a gathering point for hydrogen rather than a production hub. The shift underscores the importance of federal policy in catalysing market development and the need for certainty in regulations, Pollack said.

Van Dooren mentioned that the initial wave of investments, such as hydrogen pipelines and electrolysers, is already underway in Europe, even as the continent faces challenges due to uneven playing fields and regulatory issues. But van Dooren also agreed with Pollack, noting that the IRA is causing some developers to reconsider their projects in Europe in favour of the U.S.

Hugo Santana de Figueirêdo Junior highlighted Pecem's advantages due to its abundant renewable energy resources and strategic location. Pecem aims to become a major green energy exporter by 2028, with a target of hosting 1mn t/yr of renewable hydrogen production capacity by 2030. The port benefits from Brazil's high percentage of renewables in the electricity grid. The collaboration with Rotterdam aims to establish a green hydrogen corridor, enhancing Pecem's role in the global energy transition.

Alexander Garbar explained the evolving role of inland ports like Duisburg Hafen, which are now extending their reach to provide resilient supply chains for hydrogen and other green energy products. The transition involves significant structural changes within the ports to adapt to new energy requirements and ensure efficient logistics for green shipping.

Madadh MacLaine

Secretary General, Zero Emissions Ship Technology Association (Moderator)

Nico van Dooren

Head of Business Development, Port of Rotterdam

Jeff Pollack

Chief Strategy & Sustainability Officer, Port of Corpus Christi Authority

Alexander Garbar

Head of Corporate Development and Strategy, Duisburger Hafen AG

Hugo Santana de Figueirêdo Junior

CEO and President, Pecém Port & Industrial Complex



SESSION 11: DECARBONISING SHIPPING

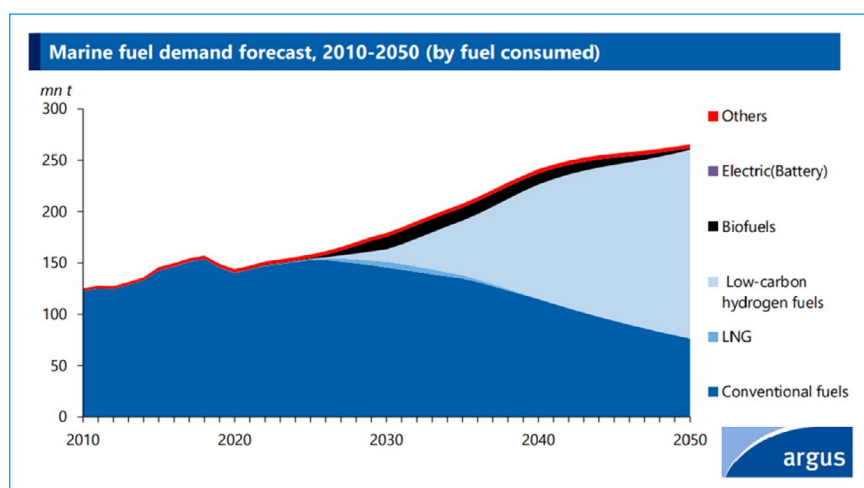
During this panel, industry participants discussed options to reduce emissions in the shipping sector and the role that hydrogen can play in this.

The Singapore maritime and port authority's Pauline Chua said that the decarbonisation of maritime sector will require a multifuel approach – a statement with which other panellists agreed. Chua sees three challenges for Singapore's port. The first is securing the fuel supply. The second is enabling and setting up robust emergency response procedures, given that methanol is more flammable than conventional fuels, ammonia is more toxic and hydrogen is more explosive. The third is training crew to be able to operate the vessels in safe and efficient manner.

Hydrogen will be used in shipping in two main ways, according to MSC Group's Bud Darr. One of these uses will be as a direct power source for ships, providing supplemental fuel. MSC itself has plans for 6MW hydrogen fuel cells to be deployed in some cruises that part of its fleet, Darr said. The most important use of hydrogen, however, will be as a feedstock to synthetic marine fuels such as e-methanol and ammonia. Both methanol and ammonia are widely touted as the most viable alternatives for future low-emissions bunkering. Many industry participants see methanol as the most viable option in the short term, while ammonia might be used more widely in the long run, not least because methanol will also require CO2 supply and the maritime sector will compete for this with other industries, such as aviation. Moreover, projections show that methanol will be more expensive than ammonia, Darr said. In order to scale up ammonia supply and use, industry participants need to address the safety challenges, which are solvable but need to be seriously dealt with, Darr said.

H2Fuel is working on an innovative concept to use white granules of sodium borohydride to transport hydrogen. This approach is meant to increase energy density and reduce costs since customers would save on transportation and storage, the firm's Koos-Jan van Brouwershaven said.

Meanwhile, Kawasaki Heavy Industries has built the world's first liquid hydrogen-powered carriers and has plans to build even bigger carriers, with a view to having established a commercial supply chain in 2030, according to Taku Hasegawa.



Source: Argus Consulting

Alicia Eastman

Co-host, [Everything About Hydrogen](#),
Co-Founder and Board Member,
[InterContinental Energy](#)

Koos-Jan van Brouwershaven

CEO, H2 Fuel

Taku Hasegawa

Manager Hydrogen Strategy Division,
[Kawasaki Heavy Industries](#)

Bud Darr

Executive Vice President, Maritime Policy
and Government Affairs, [MSC Group](#)

Pauline Chua

Deputy Director (Maritime Technology
Capability), [Maritime and Port Authority
of Singapore](#)



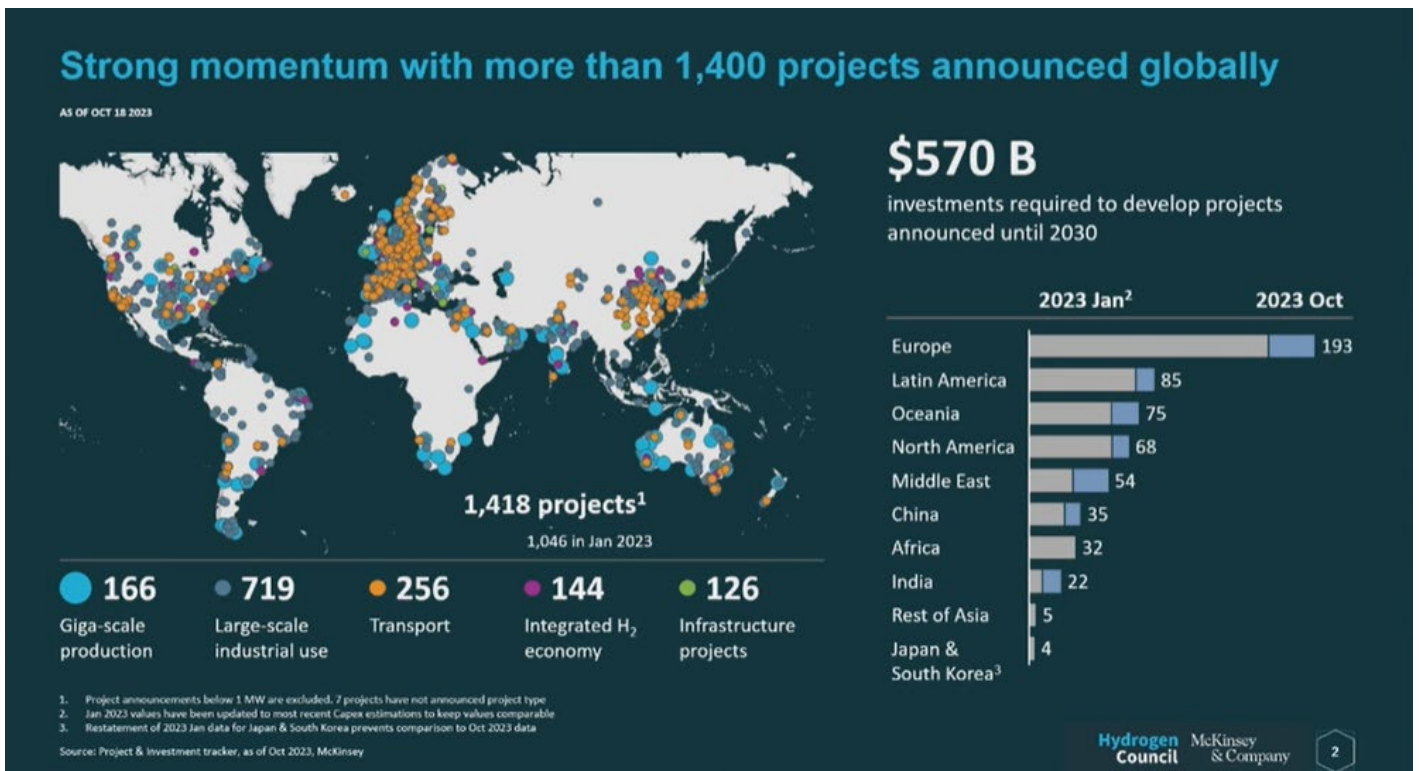
SPOTLIGHT: STATE OF THE INDUSTRY KEYNOTE ADDRESS

In her keynote, Daria Nochevnik provided a comprehensive overview of the global hydrogen industry's current state, emphasising the disparity between announced projects and actual investments. Globally, almost 1,400 clean hydrogen projects have been announced with a combined estimated investment of \$570 billion but only a small fraction of these planned investments have progressed to FIDs. Europe leads in terms of announcements, but just 4pc of planned investments there have reached an FID. These rates are higher in North America at 15pc and especially in China at 35pc. Overall, the industry has seen growth in committed investments, which reached \$40bn last year, up by \$10bn from a year earlier – a significant step up from earlier growth rates.

Nochevnik highlighted the importance of developing global hydrogen trade corridors, which can reduce costs by 40pc, create 10mn jobs by 2035, and double this by mid-century, with half of these jobs in emerging markets. The establishment of these trade routes could save \$3.7 trillion in investments by 2050. To achieve these benefits, about \$150bn is needed to develop the required infrastructure.

The keynote address also underscored the necessity of focusing on demand-side measures to realise these opportunities. Key future demand centres, namely Europe, Japan and South Korea, have combined “aspirational” hydrogen demand targets of around 27mn t/yr by 2030. Demand-side mechanisms announced in these countries so far only translate to around 3mn-7mn t/yr, Nochevnik said. Aspirational targets are important, but most crucially “we really need to make sure that we get this 3mn-7mn t/yr to work,” Nochevnik said.

Daria Nochevnik
Director of Policy and Partnerships,
Hydrogen Council



Source: Daria Nochevnik presentation

SPOTLIGHT: LEADING CITIES SPEARHEADING HYDROGEN DEVELOPMENT

In this panel discussion, Rotterdam’s mayor Ahmed Aboutaleb emphasised the pivotal role cities play in shaping the new energy future, particularly focusing on local governments’ influence over national governments. He argued that cities are crucial for implementing climate strategies since they house over 50% of the global population, many in delta cities like Rotterdam, which faces both domestic and international migration challenges. Aboutaleb highlighted the city’s role in reducing CO2 emissions through collaboration with industry and the national government, leading to a significant pollution reduction by constructing a pipeline to store emissions in the North Sea.

Phil Balhao discussed the challenges of and potential for accommodating large-scale industries at the Namibian city of Lüderitz and the opportunities to transform the port city into a significant energy hub. Lüderitz, constrained by its geography and small size, is trying to improve infrastructure to support future developments, including hydrogen production. Balhao stressed the importance of collaboration among local stakeholders and highlighted recent oil and gas discoveries that accentuate the urgency for infrastructure improvements.

Anita Leirvik North outlined Oslo’s ambitious environmental goals, focusing on hydrogen as a key element in the city’s energy transition. Oslo aims to become a zero-emission port and has partnered with Rotterdam to establish a green corridor. Norway is leveraging its extensive coastline and existing hydroelectric capabilities to advance its green agenda, Leirvik North said. Oslo is pioneering the use of hydrogen-powered ships and is set to introduce a cargo ship by 2025, showcasing the potential of green maritime transport, she said.

Thomas Schauf reflected on the broader challenges of energy transitions, emphasizing the necessity of regional and cross-border collaboration. Schauf pointed out that metropolitan regions, like his in northwest Germany with a population of nearly 9mn, can be substantial partners in international energy projects, working together to overcome limitations on a national level and promote sustainable energy solutions.

The panel underscored the need for cities and regions to lead in energy innovation and sustainability through collaboration, infrastructure investment, and leveraging local resources and capacities.

Noé van Hulst

Vice-Chair, IPHE, Hydrogen Advisor, IEA & Gasunie

Ahmed Aboutaleb

Mayor, City of Rotterdam

Thomas Schauf

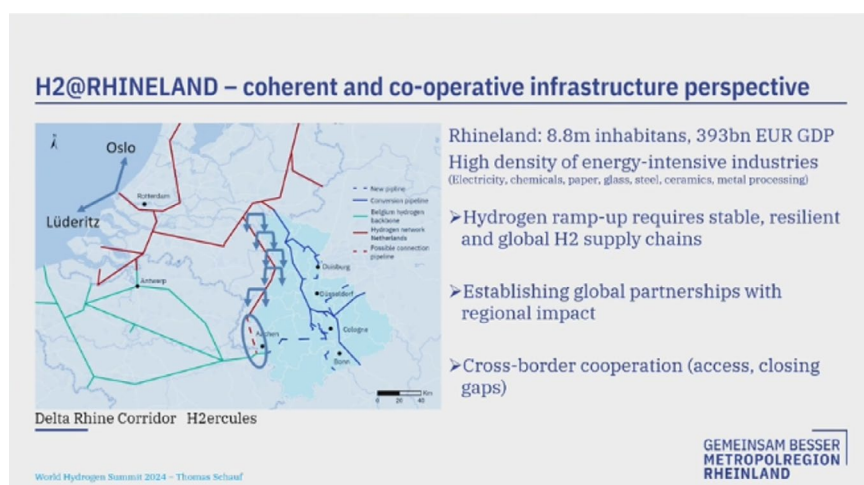
Director, Metropolregion Rheinland

Anita Leirvik North

Vice Mayor, City of Oslo

Phil Balhao

Mayor, City of Lüderitz



Source: Thomas Schauf presentation

SESSION 12: AN OUTLOOK FOR HYDROGEN'S FUTURE

Speakers discussed the future direction of the hydrogen market, with an overall consensus that demand-side incentives and mandates will be necessary to move projects towards FIDs.

The amount of “carrots” the industry needs to take off is so “phenomenal” that “sticks” will be needed to spur growth in the long run, the port of Rotterdam’s Martijn Coopman said. Carrots help get the first projects off the ground, but it’s the stick that will create long-term volume to the industry, he said.

The Australia Hydrogen Council’s Fiona Simon and Fortescue’s Mark Hutchinson acknowledged the positive impact that Australia’s tax credits – which were announced while the summit took place – will likely have for producers. Still, both agreed that more measures will be needed to get projects to FID. In that regard, they highlighted that the credits can be stacked with other incentives, including from importers abroad, such as Japan or South Korea, saying that this should help move the needle.

Participants showed confidence that prices will fall in the future. “We are confident that in the long-run, and definitely by 2030, the [cost] gap will be closing,” Coopman said.

One reason for this is how electrolyser technologies are maturing. Electrolyser manufacturer Verdagy’s David Bow noted that there have already been “substantial” reductions in the cost of electrolysers. Now one of the main challenges, he said, will be to integrate the technology into large scale projects.

Synthetic methane can be a workable solution until low-carbon hydrogen production scales up, according to Semptra Infrastructure’s Michael Jones. The company is involved in e-methane production, and is not facing demand issues, while the key advantage is that “you essentially need no new investments in the midstream and downstream portions of the value chain,” Jones said. While acknowledging that e-methane will not be a feasible solution for every situation, he noted that it can work in places where ample electrification is not possible or where land availability is limited, such as Japan.

Japanese companies have ramped up their efforts to secure e-methane recently, primarily eyeing blending with city gas. The firms are largely looking at participation in overseas projects and this has contributed to growth in the global project pipeline. Argus is currently tracking 17 planned e-methane production projects globally, many of which are slated to provide supply for the Japanese market.

Rachel Parkes
Deputy Editor, [Hydrogen Insight](#)
(Moderator)

Mark Hutchinson
Chief Executive Officer, [Fortescue Energy](#)

Martijn Coopman
Program Manager International Hydrogen Supply Chains, [Port of Rotterdam](#)

Dr. Fiona Simon
CEO, [Australian Hydrogen Council \(AHC\)](#)

David Bow
CCO, [Verdagy](#)

Michael Jones
Business Development Manager, Low Carbon Solutions, [Semptra Infrastructure](#)



SESSION 13: HYDROGEN ACCELERATING SUSTAINABLE MOBILITY

The panel discussion brought together industry leaders to discuss the potential of hydrogen in decarbonising various sectors, particularly aviation and heavy-duty transport.

Michelle Samson emphasized while sustainable aviation fuels help reduce emissions, they still contribute to greenhouse gases at high altitudes. Thus, Samson highlighted hydrogen as the only viable long-term solution for fully decarbonising the sector. The current focus includes safety and technical feasibility tests with small drones, in collaboration with startups and non-profit organizations aimed at knowledge-sharing across Europe.

Anouck Massant highlighted that Air Products has committed to investing \$15 billion in low-carbon and renewable hydrogen. The firm is developing a hydrogen infrastructure for various applications, including maritime, heavy-duty trucks, and aviation. Massant emphasised the company’s experience and expertise in building hydrogen refuelling stations, with projects underway in Rotterdam, Zeebrugge, and Ghent. She stressed the importance of regulatory support and incentives to spur demand and reduce costs, in order to make hydrogen a feasible option for end-users.

Isabelle Schnell of Volvo discussed her company’s global efforts in transitioning to sustainable energy, emphasising the need for a mix of solutions due to varying regional energy transitions. Volvo is focusing on battery-electric vehicles for urban applications and hydrogen fuel cell vehicles for more energy-demanding tasks and areas with inadequate electric grids. Schnell noted the urgency of advancing hydrogen technology and infrastructure. She stressed the importance of collaboration across sectors and strong, binding regulations to ensure a cohesive approach to decarbonisation.

The discussion also touched on the current state of hydrogen projects and sales, with moderator Dr Minh Khoi Le of Rystad Energy noting a decline in fuel cell vehicle sales, but a significant increase in heavy-duty truck sales. The panellists agreed on the need for industry convergence on certain applications, such as heavy-duty transport, which shows strong potential for hydrogen use.

In conclusion, the panel highlighted the critical role of hydrogen in achieving sustainable mobility in certain areas. Key points included the need for extensive testing and collaboration, significant investments in infrastructure, and supportive regulatory frameworks to drive adoption and reduce costs.

Dr. Minh Khoi Le

Vice President, Head of Hydrogen Research, [Rystad Energy](#) (Moderator)

Anouck Massant

Hydrogen for Mobility Business Manager Northern Europe, [Air Products](#)

Michelle Samson

Head of Strategy, Sustainability & Innovation, [Rotterdam The Hague Airport](#)

Isabelle Schnell

EU Public Policies & Regulatory Affairs Manager, [Volvo Group Trucks Technology](#)



SESSION 14: SCALING UP ELECTROLYSIS FOR LARGE SCALE END-USE

This session picked up and summarised some of the key topics discussed over the previous three summit days.

Randolf Weterings highlighted the importance of scaling up renewable hydrogen production plants in order to bring down costs. He also stressed that Europe will not be able to produce all the renewable hydrogen required domestically, meaning imports will be key – and the port of Rotterdam is bound to play a key role in this. Standards for hydrogen production and importation are crucial, along with system integration to utilise by-products like oxygen and heat, enhancing overall value beyond mere cost reduction, Weterings said.

Alexander Kotschi of Ramboll also underscored the need for scale and standardisation in hydrogen projects. He suggested learning from the power generation sector, where standardisation helped reduce costs. Kotschi also agreed with Weterings on the importance of utilising byproducts to improve the economics of hydrogen production.

Dirk Rabelink addressed the potential of nuclear energy in hydrogen production, arguing that nuclear plants can power electrolyzers with a high capacity factor by providing consistent, clean energy. This flexibility can balance the grid, especially when renewable power supply is insufficient. Rabelink advocated for integrating nuclear energy into hydrogen production, noting that this could be economically feasible in places like the Netherlands, which are open to nuclear power. “We can run an electrolyser [with a] 95pc capacity factor – that’s impossible in Northwest Europe running on renewables,” he said. A recent study ULC Energy did indicates “that we can produce hydrogen in the Netherlands at €3.50/kg baseload,” Rabelink said. “Towards 2050 when we have a highly variable network and based on a relatively limited curtailment of my annual production of hydrogen I can reduce that down to €2/kg.” That said, Rabelink stressed that this was not a feasibility study but a preliminary assessment.

When asked about phasing out grey hydrogen, the consensus between panellists was that rather than setting rigid targets, the focus should be on decarbonisation through both low-carbon and renewable hydrogen.

Regarding the impact of Chinese advancements in electrolyser technology, there was acknowledgment of the country’s competitive edge but also a call for Europe to support local manufacturing to avoid over-reliance on Chinese technology.

Fernanda Delgado
CEO, ABIHV (Brazilian Green Hydrogen Industry Association) (Moderator)

Randolf Weterings
Program Manager Hydrogen, Port of Rotterdam

Dirk Rabelink
CEO, ULC Energy

Alexander Kotschi
Country Market Director Energy - Germany, Ramboll





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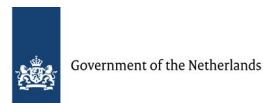
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